Appendices for SWMU 41 RFI Report

Final

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Appendix A

QA/QC

Appendix A-1

Analytical Services and Procedures

ANALYTICAL SERVICES AND PROCEDURES

ANALYTICAL SERVICES

The analytical services for the field investigation program were provided by the following USACE and National Environmental Laboratory Accreditation Conference (NELAC) accredited laboratories:

- Accutest Laboratories, Inc. (Accutest), Orlando, FL: Accutest used *USEPA Office of Soil Waste and Emergency Response Test Methods for Evaluating Soil Waste Physical and Chemical Methods, Update IIIB.* (SW-846) (USEPA, 2004) methodologies in providing analytical support for this investigation. Chemical analyses included: volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polynuclear aromatic hydrocarbons (PAHs), metals, pesticides, polychlorinated biphenyls (PCBs), herbicides, explosives, full toxicity characteristic leaching procedure (TCLP) analysis, ignitability, reactive sulfide, reactive cyanide, and corrosivity as pH. Accutest used *USEPA Methods for Chemical Analysis of Water and Wastes* (MCAWW) (USEPA, 1983) for chemical oxygen demand (COD) and biological oxygen demand (BOD) analysis.
- Datachem Laboratories, Inc. (Datachem), Salt Lake City, UT: Datachem was subcontracted by Accutest to perform analytical support for perchlorates. Datachem used *USEPA Office of Soil Waste and Emergency Response Test Methods for Evaluating Soil Waste Physical and Chemical Methods, Update IIIB* (SW-846) (USEPA, 2004) methodologies for this analysis.
- SGS Environmental Services, Inc. (SGS), Wilmington, NC: SGS was subcontracted by Accutest to perform analytical support for dioxins/furans. SGS used *USEPA Office of Soil Waste and Emergency Response Test Methods for Evaluating Soil Waste Physical and Chemical Methods, Update IIIB* (SW-846) (USEPA, 2004) methodologies for this analysis.

ANALYTICAL PROCEDURES

Analytical protocols used were in accordance with USEPA-approved methods for the analysis of environmental (i.e., organic, and inorganic parameters) and waste characterization samples. All methods performed were within the *DoD Quality Systems Manual for Environmental Laboratories, Final Version 3* (DoD, 2006) and the *DoD Perchlorate Handbook* (DoD, 2006) guidelines. The methodologies for environmental samples are summarized in **Table A-1** and for waste characterization samples in **Table A-2**. A brief discussion of the methodologies is presented in the following sections below.

Organics

Target compound list (TCL) VOCs, TCL SVOCs, TCL pesticides, TCL PCBs, herbicides, explosives, including nitroglycerin (NG) and pentaerythritol tetranitrate (PETN), PAHs, and dioxins/furans were analyzed using USEPA-approved methodologies. The laboratory procedures and methodologies for organic compounds are summarized below.

Table A-1
Summary of Analytical Methods for Environmental Samples

Parameter	Matrix	Analytical Method
Chemical Parameters		
TCL VOCs	Aqueous	USEPA SW-846 5030B/8260B
	Soil	USEPA SW-846 5035/8260B
TCL SVOCs	Aqueous	USEPA SW-846 3510C/8270C
	Soil	USEPA SW-846 3550B/8270C
TCL Pesticides	Aqueous	USEPA SW-846 3510C/8081A
	Soil	USEPA SW-846 3550B/8081A
TCL PCBs	Aqueous	USEPA SW-846 3510C/8082
	Soil	USEPA SW-846 3550B/8082
Herbicides	Aqueous	USEPA SW-846 3510C/8151A
	Soil	USEPA SW-846 3550B/8151A
Explosives	Aqueous	USEPA SW-846 3535A/8330A Modified
	Soil	USEPA SW-846 8330B/8330A Modified
Nitroglycerin & PETN	Aqueous	USEPA SW-846 3535A/8332
	Soil	USEPA SW-846 8330B/8332
Polynuclear Aromatic Hydrocarbons	Aqueous	USEPA SW-846 3510C/8270C SIM
	Soil	USEPA SW-846 3550B/8270C SIM
Perchlorates	Aqueous	USEPA SW-846 LC-MS-CLO_4/6850 SIM
Dioxins/furans	Aqueous	USEPA SW-846 8290
	Soil	USEPA SW-846 8290
TAL Metals	Aqueous	USEPA SW-846 3010A/6010B & 7470A
	Soil	USEPA SW-846 3050B/6010B & 7471A

Table A-2
Summary of Analytical Methods for Waste Characterization Samples

Parameter	Matrix	Analytical Method
TCLP VOCs	Solid	USEPA SW-846 1311/5030B/8260B
TCLP SVOCs	Solid	USEPA SW-846 1311/3510C/8270C
TCLP Pesticides	Solid	USEPA SW-846 1311/3510C/8081A
TCLP Herbicides	Solid	USEPA SW-846 1311/3510C/8151A
TCLP Metals	Solid	USEPA SW-846 1311/3010A/6010B & 1311/7470A
TCL PCBs	Solid	USEPA SW-846 3550B/8082
Explosives	Solid	USEPA SW-846 8330B/8330A Modified
Nitroglycerin & PETN	Solid	USEPA SW-846 8330B/8332
Ignitability	Solid	USEPA SW-846 1010
Reactive Cyanide	Solid	USEPA SW-846 Chapter 7.3.3
Reactive Sulfide	Solid	USEPA SW-846 Chapter 7.3.4
Biological Oxygen Demand	Aqueous	USEPA MCAWW 405.1
Chemical Oxygen Demand	Aqueous	USEPA MCAWW 410.1
Corrosivity as pH	Aqueous	USEPA SW-846 9040C

TCL VOCs: Aqueous and solid samples were analyzed for TCL VOCs using USEPA SW-846 Method 5030B/8260B for aqueous samples and USEPA SW-846 5035/8260B for solid matrices using purge and trap technology. TCLP extracts were analyzed according to USEPA SW-846 Method 1311/5030B/8260B for investigative-derived material (IDM) solid samples. Soil samples were collected using field preservation techniques. Approximately 5 grams of soil sample was added to pre-tarred vials containing methanol and/or de-ionized ultra filtered water (DIUF); then sent to the laboratory for analysis. Aqueous samples were sent to the laboratory in zero headspace vials. An inert gas was bubbled through a mixture of reagent water and 5 gram soil sample or through a 25 mL aqueous sample contained in a specifically designed purging chamber at 40°C for soil and ambient temperature for water. The vapor was swept through a sorbent column where the purgeable compounds were trapped. After purging was completed for both solid and aqueous samples, the sorbent column was heated and backflushed with the inert gas to desorb the purgeable compounds onto a gas chromatograph programmed to separate the purgeable compounds, which were then detected with a mass spectrometer. The gas chromatography/mass spectroscopy (GC/MS) instrument was calibrated for a series of target analytes using chemical standards of known concentration and purity. Quantification of these target analytes was performed against specific internal standards as identified in the respective method. Identification of these target analytes was based on a comparison of the analyte to the chemical standards used during calibration based on the analyte's retention time and mass spectra.

TCL SVOCs/PAHs: Aqueous and solid samples were analyzed for TCL SVOCs and PAHs using USEPA SW-846 Method 8270C. The use of selective ion monitoring (SIM) using USEPA SW-846 Method 8270C SIM was employed for PAH analysis to achieve lower quantitation and detection limits in order to meet screening criteria. Soil samples were extracted using ultrasonic extraction according to USEPA SW-846 Method 3550B and aqueous samples were extracted using a separatory funnel liquid-liquid extraction technique according to USEPA SW-846 Method 3510C. TCLP SVOC extracts were extracted using a separatory funnel liquid-liquid extraction technique according to USEPA SW-846 Method 1311/3510C for solid IDM samples. The extracts were injected into a gas chromatograph programmed to separate the compounds, which are then detected with a mass spectrometer. The gas chromatograph/mass spectrometer instrument was calibrated for a series of target analytes using chemical standards of known concentration and purity. Quantification of these target analytes was performed against specific internal standards as identified in the respective method. Identification of these target analytes was based on a comparison of the analyte to the chemical standards used during calibration based on the analyte's retention time and mass spectra.

TCL Pesticides/PCBs: Aqueous and solid samples were analyzed for TCL pesticides using USEPA SW-846 Method 8081A and for TCL PCBs using USEPA SW-846 Method 8082. Samples were prepared for analysis using extraction techniques. Soil samples were extracted using ultrasonic extraction according to USEPA SW-846 Method 3550B and aqueous samples were extracted using a separatory funnel liquid-liquid extraction technique according to USEPA SW-846 Method 3510C. TCLP pesticide extracts were extracted using a separatory funnel liquid-liquid extraction technique according to USEPA SW-846 Method 1311/3510C for solid IDM samples. The extracts were injected onto a gas chromatography programmed to separate the compounds, which are then detected with an electronic capture device (ECD). Sulfur cleanups were employed to aid in the quantification based upon the matrix interferences. Sample concentrations were confirmed on dissimilar columns.

Herbicides: Aqueous and solid samples were analyzed for herbicides according to USEPA SW-846 Method 8151A. Samples were prepared for analysis using extraction techniques. Soil samples were extracted using ultrasonic extraction according to USEPA SW-846 Method 3550B and aqueous samples were extracted using a separatory funnel liquid-liquid extraction technique according to USEPA SW-846 Method 3510C. TCLP herbicide extracts were extracted using a separatory funnel liquid-liquid extraction technique according to USEPA SW-846 Method 1311/3510C for solid IDM samples. Aqueous and solid samples were extracted with diethyl ether and then esterified with diazomethane. The derivatives were determined by gas chromatography with an electron capture detector (GC/ECD). The results were reported as acid equivalents. Sample concentrations were confirmed on dissimilar columns.

Explosives: Aqueous and solid (including IDM) samples were analyzed for explosives using USEPA SW-846 Method 8330A Modified. Aqueous samples were extracted using a Solid-phase Extraction (SPE) procedure USEPA SW-846 3535A. A measured volume of sample was adjusted to a specified pH and then extracted using a SPE device. Target analytes were eluted from the solid-phase media using methylene chloride. The resulting solvent extract was dried using sodium sulfate and concentrated. The concentrated extract were exchanged into a solvent compatible with subsequent cleanup procedures and then measurement of the target analytes separated on a C-18 reverse phase column. The wavelength was set at 254 nanometers and confirmed on a cyanide reverse column. For soil samples, they were homogenized and analyzed using USEPA SW-846 Method 8330B/8330A Modified. Because only a small 2-g portion (sub-sample) of the 10-g or larger sample was taken for analysis, the bulk sample was thoroughly mixed to allow for representative sub-sampling. This was achieved by air-drying at room temperature for 24 hours, sieving through a 30-mesh sieve, grinding, and mixing the bulk sample, after subjectively removing vegetation (organic debris) and pebbles. Soil samples were extracted using acetonitirile in an ultrasonic bath, then filtered and determined similarly to aqueous samples. Sample concentrations were confirmed on dissimilar columns.

Nitroglycerin/PETN: Aqueous and solid (including IDM) samples were analyzed for nitroglycerin and PETN using USEPA SW-846 Method 8332. For soil samples, they were homogenized and analyzed using USEPA SW-846 Method 8330B/8330A Modified. Solid samples were extracted with acetonitrile in an ultrasonic bath, then filtered and mixed with a calcium chloride solution. Aqueous samples were extracted using a Solid-phase Extraction (SPE) procedure USEPA SW-846 3535A, as described for explosives. The concentrations were quantified using an isocratic high pressure liquid chromatography (HPLC) system equipped with a column heater and ultraviolet (UV) detector. Sample concentrations were confirmed on dissimilar columns. Identification of these target analytes was based on a comparison of the analyte to the chemical standards used during calibration based on the analyte's retention time using primary and secondary columns.

Dioxins/Furans: Aqueous and solid samples were analyzed for dioxin/furans using USEPA SW-846 Method 8290. The analytical method used high-resolution gas chromatography and high-resolution mass spectrometry (HRGC/HRMS) on purified sample extracts. This method is specific for the analysis of 2,3,7,8-tetrachlorinated dibenzofuran (2,3,7,8-TCDD), substituted penta-, hexa-, hepta- and octachlorinated dibenzo-p-dioxins and substituted penta-, hexa-, hepta- and octachlorinated dibenzofurans in aqueous and solid samples. The extracts were injected onto a high-resolution gas chromatograph programmed to separate the compounds, which are then detected with a high-resolution mass spectrometer as confirmation.

Inorganics

Target analyte list (TAL) metals and perchlorate were analyzed using USEPA SW-846 methodologies. The laboratory procedures for inorganic compounds are summarized below.

TAL Metals: Aqueous and solid samples were analyzed for TAL metals using a combination of the following methodologies: inductively coupled plasma (ICP) and cold vapor atomic absorption (CVAA). Trace metals were analyzed using USEPA SW-846 3010A/6010B for aqueous samples and USEPA SW-846 Method 3050B/6010B for solid samples. TCLP extracts were digested according to USEPA SW-846 Method 1311/3010A/6010B for the solid IDM samples. The ICP method involved the simultaneous or sequential multi-element determination of trace elements in solution. The basis of the method is the measurement of atomic emission by optical spectrometry. Samples were nebulized and the aerosol that was produced was transported to the plasma torch where excitation occurs. Characteristic atomic-line emission spectra are produced by a radio-frequency ICP. A background correction technique was utilized to compensate for variable background contribution for the determination of trace elements.

Aqueous and solid samples were analyzed for mercury using CVAA according to USEPA SW-846 Method 7470A for aqueous samples and Method 7471A for solid samples. TCLP extracts were digested according to USEPA SW-846 Method 1311/7470A for solid IDM samples. A sample aliquot was initially digested with nitric acid to free combined mercury. The mercury was then reduced to its elemental state and aerated from the solution into a closed system. The mercury vapor was passed through a cell positioned in the path of the mercury light source and the measured abundance was proportional to the concentration of mercury in the sample.

Perchlorate: Perchlorate was analyzed for aqueous samples by using either USEPA SW-846 Method 6850 SIM by HPLC/MS following the *DoD Perchlorate Handbook* (DoD, 2006b) requirements. The HPLC-MS method 6850 uses a second order external standard approach using laboratory ChemStation software. The method provides HPLC-MS conditions for the detection of perchlorate in SIM mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. In general, water samples were extracted at a neutral pH with methylene chloride, using LC-MS-CLO_4 method. Sample extracts were injected into the HPLC-MS and the ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in the quantitation. Confirmation was obtained by the use of the mass spectrometer.

Waste Characterization

Samples collected to characterize IDM were analyzed for hazardous waste characteristics using USEPA-approved methodologies, including TCLP VOCs, TCLP SVOCs, TCLP metals, TCLP pesticides, TCLP herbicides, ignitability, reactive cyanide, reactive sulfide, TCL PCBs, explosives, chemical oxygen demand (COD), biological oxygen demand (BOD), and corrosivity as pH. The laboratory procedures and methodologies are summarized below and in the prior section.

TCLP Extraction: Solid IDM samples were collected for full TCLP waste characterization and extracted using the USEPA SW-846 Method 1311. Aqueous IDM samples were collected for TCLP metals analysis. The final liquid extract was separated from the sample material and combined with the initial liquid phase (if applicable). The sample TCLP extract was then treated as an aqueous sample for analysis for TCLP VOCs, TCLP SVOCs, TCLP pesticides, TCLP herbicides, and TCLP metals. Brief discussions of the procedures and methodologies are presented below and in the prior section.

Explosives/PETN/NG: Solid IDM samples were analyzed for explosives and PETN using USEPA SW-846 Method 8330B/8330A Modified and for NG using USEPA SW-846 Method 8330B/8332 Modified. Brief discussions of these procedures and methodologies are presented in the prior section.

Reactive Cyanide: Solid IDM samples were analyzed for reactive cyanide using USEPA SW-846 Method Chapter 7.3.3. The cyanide as hydrocyanic acid (HCN) was released from cyanide complexes by means of a reflux-distillation operation and absorbed in a scrubber containing sodium hydroxide solution. The cyanide ion in the absorbing solution was then determined colorimetrically. In the colorimetric measurement, the cyanide was converted to cyanogen chloride, CNCl, by reaction with chloramine-T at a pH less than 8.0 without hydrolyzing the cyanate. After the reaction was completed, color was formed on the addition of pyridine-pyrazolone or pyridine-barbituric acid reagent. The absorbance was read at 578 nm for pyridine-barbituric acid. To obtain colors of comparable intensity, the sample and the standards contain the same salt content. The titrimetric measurement uses a standard solution of silver nitrate to titrate cyanide in the presence of a silver sensitive indicator.

Reactive Sulfide: Solid IDM samples were analyzed for reactive sulfide using USEPA SW-846 Method Chapter 7.3.4. This procedure is a colorimetric determination. Sulfide reacts with dimethyl-p-phenylenediamine in the presence of ferric chloride to produce methylene blue.

Flashpoint: Solid IDM samples were analyzed for flashpoint or ignitability using USEPA SW-846 Method 1010. A sample was heated at a slow, constant rate with continual stirring. A small flame was directed into the cup at regular intervals with simultaneous interruption of stirring. The flash point is the lowest temperature at which application of the test flame ignites the vapor above the sample.

TCL PCBs: Solid IDM samples were analyzed for TCL PCBs using USEPA SW-846 Method 3550B/8082. A brief discussion of this procedure and methodology is presented in the prior section.

TCLP VOCs: Solid IDM samples were analyzed for TCLP VOCs using USEPA SW-846 Method 1311/8260B. A brief discussion of this procedure and methodology is presented in the prior section.

TCLP SVOCs: Solid IDM samples were analyzed for TCLP SVOCs using USEPA SW-846 Method 1311/8270C. A brief discussion of this procedure and methodology is presented in the prior section.

TCLP Pesticides: Solid IDM samples were analyzed for TCLP pesticides using USEPA SW-846 Method 1311/8081A. The samples were prepared for analysis using extraction techniques. TCLP pesticide extracts were extracted using a separatory funnel liquid-liquid extraction technique according to USEPA SW-846 Method 1311/3510C for solid IDM samples. The extracts were injected onto a gas chromatography programmed to separate the compounds, which are then detected with an electronic capture device (ECD). Sulfur cleanups were employed to aid in the quantification based upon the matrix interferences. Sample concentrations were confirmed on dissimilar columns.

TCLP Herbicides: Solid IDM samples were analyzed for TCLP herbicides according to USEPA SW-846 Method 1311/8151A. Samples were prepared for analysis using extraction techniques. TCLP herbicide extracts were extracted using a separatory funnel liquid-liquid extraction technique according to USEPA SW-846 Method 1311/3510C for solid IDM samples. The samples were extracted with diethyl ether and then esterified with diazomethane. The derivatives were determined by gas chromatography with an electron capture detector (GC/ECD). The results were reported as acid equivalents. Sample concentrations were confirmed on dissimilar columns.

TCLP Metals: Aqueous and solid IDM samples were analyzed for TCLP metals using a combination of the following methodologies: inductively coupled plasma (ICP) and cold vapor atomic absorption (CVAA). Aqueous IDM samples were extracted using the USEPA SW-846 Method 1311. The final liquid extract was separated from the sample material and combined with the initial liquid phase (if applicable). The sample TCLP extract was then treated as an aqueous sample for analysis for TCLP metals. Brief discussions of these procedures and methodologies are presented in the prior section.

Corrosivity as pH: Aqueous IDM samples were analyzed for corrosivity as pH using USEPA SW-846 Method 9040C. A sample pH was directly measured electrometrically using either a glass electrode in combination with a reference potential or a combination electrode.

BOD: Aqueous IDM samples were analyzed for BOD using USEPA MCAWW Method 405.1. A seeded sample, or an appropriate dilution, was incubated for 5 days at 20 degrees Celsius in the dark. The dilution water or seeded dilution water was added as a buffered salt solution to minimize oxygen uptake. The reduction in dissolved oxygen concentration during the incubation period yields a measure of the biological oxygen demand.

COD: Aqueous IDM samples were analyzed for COD using USEPA MCAWW Method 410.1. Organic and oxidizable inorganic substances were oxidized by potassium dichromate in 50% sulfuric acid solution at reflux temperature. Silver sulfate was used as a catalyst and mercuric sulfate was added to remove chloride interference. The excess dichromate was titrated with standard ferrous ammonium sulfate using orthophenanthroline ferrous complex as an indicator.

Appendix A-2

Quality Assurance/Quality Control Evaluation

QUALITY ASSURANCE/QUALITY CONTROL EVALUATION

The project quality assurance and quality control criteria to perform characterization and remediation activities at eleven Solid Waste Management Units (SWMUs) and Areas of Concern at Radford Army Ammunition Plant (RFAAP) are based on *RFAAP Final Master Work Plan* (MWP) (URS, 2003) as specified in MWP Addendum 019 (Shaw, 2007). The MWP and Addendum 019 were implemented through the integration of well-defined quality control elements for activities associated with the task assignment. The quality control criteria defined for sampling and analysis activities were developed in conjunction with specifications contained in *USACE EM200-1-3, Requirements for the Preparation of Sampling and Analysis Plans*, (USACE, 2001), *DoD Quality Systems Manual for Environmental Laboratories, Final Version 3* (DoD, 2006a), *USEPA Office of Solid Waste and Emergency Response Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), Update IIIB* (November, 2004), *USEPA Methods for the Chemical Analysis of Water and Wastes* (March, 1983), and *DoD Perchlorate Handbook* (March, 2006b).

Table A-3 outlines the data quality indicators as to their definitions, project goals, sampling and analytical assessments. Data quality was assessed through the evaluation of sampling activities and field measurements associated with the chemical analytical data in order to assess the reliability of the chemical analyses and the accuracy and precision of information acquired from the laboratory.

Table A-3
RFI Data Quality Indicators

Data Quality Indicator	Definition	Goal	Sampling Assessment	Analytical Assessment
Precision	Quantitative measure of the variability of a group of measurements in comparison to the average value	Low relative percent difference	Duplicate samples	MS/MSD or lab sample duplicate; Field sample duplicate
Accuracy	Bias in a measurement system	Low bias	Blank contamination	Analysis spike results (LCS, MS, MSD)
Representativeness	Degree to which the measured results accurately reflect the medium being sampled	100%	Holding times, blanks, associated documentation	Inferred from accuracy, precision, and completeness evaluation
Completeness	Percentage of measurements which are judged to be usable	≥90%	Records review	Data validation
Comparability	Qualitative parameter expressing the confidence with which one data set can be compared with another	High	Work plans, quality documents	Analytical methods
Sensitivity	Quantitative measure of the level of detection and quantitation.	High	Review of analytical method or procedures and instrumentation	Analysis of MDLs and MRLs per analyte, analytical method, and matrix

Review of Documentation

The following documentation was required by the field investigation program in order to provide a quality assessment of data collected during routine investigative activities:

- **Field Logbooks:** Hardback logbooks with numbered pages were used to log daily activities, and data collected during the course of field activities. Designated logbooks were also used to record calibration records and equipment maintenance as they were performed. Entries into field logbooks were evaluated for completeness and accuracy.
- **Field Parameter Table:** Documentation of collected samples was provided to the laboratory on a spreadsheet developed by Shaw specifically for USACE investigations. Field Parameter Tables were electronically generated based on information recorded in field logbooks and Chain-of-Custody for every sample, including QC samples. The completed forms contained the required information for encoding chemical data into Environmental Restoration Information System (ERIS) database.
- **Chain-of-Custody:** Samples were collected and relinquished under stringent Chain-of-Custody protocols as specified in the project MWP. A review of the Chain-of-Custodies identified transcription errors that were corrected by drawing a single line through the incorrect information and subsequently correct information was supplied, dated, and initialed.
- **Sample Tracking Table:** Documentation of collected samples was recorded in an electronic sample tracking table as a tool to track project status. Field entries included the field sample identification, sample depth (where applicable), date collected, laboratory ID, deliverable due dates, and requested laboratory analyses. The status of completeness was tracked from work planning stage through data validation completion.

Sampling activities were performed in compliance with standard operating procedures (SOPs) and each individual performing sampling was aware of the requisite protocols for collection of environmental samples.

Data Reporting

Data packages were provided to Shaw in Shaw Alliance Level 4 CLP-like deliverables with electronic data deliverable files from the laboratory. Detected target compound values above the reporting limit and within the acceptable calibration range were reported as determined to no more than three significant figures. Target analytes detected below the lower calibration standard, estimated detection limit (dioxin and furans), or the reporting limit (whichever was greater) and above the method detection limit were reported as estimated values "J." Appropriate data qualifiers were applied during validation process and recorded in an electronic database.

Data Reduction and Validation

Data validation determines the acceptability or unacceptability of the data quality based on a set of pre-defined criteria. Data validation is defined as the systematic process for reviewing a data package against a set of criteria to provide assurance that the data is adequate for its intended uses. These criteria depend upon the type(s) of data involved and the purpose for which data are collected. The intended use of the data and the associated acceptance criteria for data quality was identified before the data collection effort began. Both the organic and inorganic chemical data (except for the waste characterization and natural attenuation data) were validated. The data were validated in accordance with *RFAAP Final Master Work Plan* (URS, 2003) QAP requirements, *DoD Quality Systems Manual for Environmental Laboratories, Final Version 3* (DoD, 2006a), *USEPA Office of Solid Waste and Emergency Response Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), Update IIIB* (November, 2004), *USEPA Methods for the Chemical Analysis of Water and Wastes* (March, 1983), *DoD Perchlorate Handbook* (March, 2006b), and laboratory SOPs. The data qualifier scheme was consistent with USEPA Region III conventions using the *USEPA Region III Modifications to National Functional Guidelines for Inorganic Data Review* (USEPA, 1993b), *USEPA Region III Modifications to the National Functional Guidelines for Organic Data Review Multi-media, Multi-concentration* (USEPA, 1994c), and the *USEPA Region III Dioxin/Furan Data Validation Guidance* (USEPA, 1999d) as appropriate.

Data packages were validated to ensure compliance with specified analytical, Quality Assurance/Quality Control (QA/QC) requirements, data reduction procedures, data reporting requirements, and required accuracy, precision, and completeness criteria. This includes (as applicable), but is not limited to:

- Sample temperature, preservation, and holding times.
- Instrument performance check (for GC, GC/MS, LC/MS).
- Calibration (initial and continuing).
- Blanks (calibration, preparatory, rinse, and trip).
- Matrix spike and spike duplicate recoveries.
- Laboratory and field sample duplicate pairs.
- Surrogate spike recoveries (for organics).
- Laboratory control samples.
- Interference check sample (for metals).
- Serial dilution (for metals).
- Internal standards and retention times (for GC, GC/MS, LC/MS).
- Quantitative verification.

Results were assessed for accuracy and precision of laboratory analysis to identify the limitations and quantity of data. The data validation reports are contained in **Appendix A-3**. The quality of the data collected in support of the sampling activity was considered acceptable, unless qualified rejected "R" during the validation process. The samples that qualified "B" for blank contamination were considered non-detect at the MRL or level of blank contamination, whichever was greater. The samples qualified "J", "UJ", "L", "UL", or "K" were considered acceptable as estimated or non-detect estimated.

Data Review

Data obtained from both the laboratory and data validation were reviewed by the Shaw Project Chemist to assess whether the project-specific data quality objectives, as defined in the associated MWP, were met.

Data Quality Objectives

Data quality objectives were developed concurrently with the Work Plan to ensure: (1) the reliability of field sampling, chemical analyses, and physical analyses; (2) the collection of sufficient data; (3) the quality of data generated was acceptable for its intended use; and (4) valid assumptions could be inferred from the data. Attainment of data quality objectives was assessed through evaluation of data collected using the following data quality indicators:

- **Precision** - a quantitative measure of the variability of a group of measurements in comparison to the average value.
- **Accuracy** - the bias in a measurement system.
- **Representativeness** - the degree to which the measured results accurately reflect the medium being sampled. Representativeness will be assessed based on accuracy, precision, and completeness.
- **Completeness** - the percentage of measurements which are judged to be useable.
- **Comparability** - defined as a qualitative parameter expressing the confidence with which one data set can be compared with another.
- **Sensitivity** - describes the method detection, quantitation, and reporting limits. It also may be expressed as the slope of the analytical curve (intensity verses concentration).

Data quality was assessed through the evaluation of sampling activities and field measurements associated with the chemical data in order to verify the reliability of the chemical analyses and the accuracy and precision of information acquired from the laboratory.

Precision: Method or laboratory precision performed by the laboratory was evaluated during the validation process. Overall sampling or field precision was evaluated during the data review process. Precision is measured by calculating and evaluating the relative percent difference (RPD) between the results of field or laboratory duplicate pairs. The RPD is calculated by the following equation:

$$RPD = \frac{/XA-XB/ * 100}{XM}$$

Where:
XA and XB are duplicate analyses, and
XM is the average value [(XA + XB)/2] of the duplicate analyses.

The RPD was calculated for those analytes which were detected at levels exceeding the method detection limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Analytical results were qualified as estimated (J) for RPDs exceeding criteria for both the sample and its duplicate pair.

Laboratory duplicate sample determinations were used to demonstrate acceptable method precision by the laboratory at the time of analysis and evaluated. Laboratory precision was performed either on the sample and its duplicate pair or the matrix spike and its spike duplicate pair. Duplicate analyses were performed to generate data in order to assess the long-term precision of the analytical method on various matrices. RPDs must be within established control limits.

- **Laboratory Duplicate Analysis:** Laboratory duplicate pairs (dupe) or laboratory spiked duplicate pairs (MSDs) were evaluated for the SWMU 41 samples. Laboratory duplicate pairs or laboratory spiked duplicate pairs were within specified precision criteria for each parameter and/or compound. The precision data quality goal was met for all laboratory duplicate pairs and matrix spike duplicate pairs except for tetryl for matrix spike duplicate pair for sample 41MW1 and dieldrin for matrix spike duplicate pair for sample 41MW3. All associated samples were non-detect for tetryl and dieldrin; therefore, no qualifiers were applied based upon the high RPDs. The data was considered useable; the precision data quality goals were met, and were no impacts to the data quality for the RFI. Further discussion may be found in the data validation reports located in Appendix A-3. No further action was required. Further discussion may be found in the data validation reports located in **Appendix A-3**.

- **Field Duplicate Analysis:** Field duplicates were collected during the RFI on a 10% frequency per matrix to identify the cumulative precision of the sampling and analytical process, which includes the homogenization of soil samples. The RPD was calculated for those analytes that were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. For where values exceeding calibration range, the diluted values were evaluated. If one of the duplicate pair was non-detect and other <MRL, then the field duplicate was not evaluated. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD (35% RPD for metals) for the aqueous and solid matrix sample pairs. Field precision frequency was conducted on a site-wide basis for the RFI and no field duplicates were collected at SWMU41.

Accuracy: Accuracy is the measure of bias in a system. The accuracy of the results is measured by percent recovery (%R). Laboratory analytical accuracy was assessed through the use of laboratory blanks (method and calibration), rinse blanks, trip blanks, laboratory control samples (LCSs), and matrix spike samples (MSs). Trip blanks were not required for soil samples, but were collected with associated rinse blank samples and evaluated. Laboratory analytical accuracy was reviewed during the validation of data. Sampling accuracy was assessed by evaluating blank contamination and the impact of contaminant contributions originating from non-point sources, such as field sampling equipment decontamination procedures, or laboratory contamination. QC samples evaluated for this assessment included equipment blanks and laboratory method or preparatory blanks. The data validation qualifiers would be applied for analytical non-conformances as outlined in the USEPA Region III validation guidance. Accuracy was measured as percent recovery by the following equation:

$$\%R = \frac{(\text{test value} - \text{spiked value}) * 100}{(\text{true value amount spiked})}$$

The test value is the concentration of the LCS, MS, or MSD determined from analysis. The spiked value for the MS and MSD is the original un-spiked sample concentration and for the LCS is zero. The true value is the concentration of amount spiked into the MS or MSD and the true concentration for the LCS.

Method and calibration blanks, rinse blanks, trip blanks, laboratory control samples, and matrix spikes were evaluated and discussion follows.

Method and Calibration Blanks: A method blank also known as a preparatory blank is a volume of analyte-free water or soil that is processed through the entire analytical scheme (i.e., extraction, digestion, concentration, and analysis) as with the actual samples. Method blanks monitor potential laboratory-induced contamination. Results were qualified "B" for blank contamination by the laboratory and/or through the data validation process. In accordance with USEPA Region III data validation guidelines, reported sample results were considered "non-detect" and qualified with the letter "B" if the detected sample concentration was within 5 times (10 times for common laboratory contaminants: methylene chloride, acetone, 2-butanone, OCDD, OCDF, and common phthalate esters) the concentration in the associated method blank. The method blank contamination assessment was evaluated during the data validation process and may be found in the data validation reports located in **Appendix A-3**. Method blanks were calculated and compared against the same matrix environmental samples on a batch specific basis. Method (preparatory) blanks were reported in ng/L, mg/L, or µg/L units for aqueous matrices and pg/g, mg/kg, or µg/kg for solid matrices. No unit conversions were necessary for method blanks since they were treated in the same manner as the samples. Calibration blanks were also compared against the environmental samples for select parameters. Calibration blanks are aqueous samples and were reported in aqueous units. Performing blank assessments for solid matrix samples, action levels were calculated and expressed in soil units pg/g, µg/kg, or mg/kg from the given aqueous rinse blank or calibration blanks concentrations to be compared against actual solid sample concentrations. This conversion is dependent upon the method performed, sample amounts used, and final digestate or extract volumes used during the analytical analysis. Action levels were based upon 100% solids and 1x dilution factor and adjusted for each sample as appropriate.

- **Method and Calibration Blank Analysis:** For aqueous matrices, the method and calibration blanks were non-detect for all target parameters and/or compounds of interest except for aluminum, antimony, beryllium, copper, lead, iron, magnesium, nickel, potassium, selenium, sodium, thallium, mercury, chloroform, methylene chloride, OCDD, OCDF, 2,3,7,8-TCDF, 1,2,3,7,8-PeCDD, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, Total TCDFs, Total PeCDDs, Total PeCDFs, Total HxCDFs, and Total HpCDFs for select sample delivery groups (SDGs). For solid matrices, the method blanks were non-detect for all target parameters and/or compounds of interest except for antimony, copper, lead, nickel, potassium, selenium, sodium, thallium, zinc, mercury, OCDD, OCDF, 2,3,7,8-TCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,6,7,8-HpCDD, 2,3,4,7,8-PeCDF, Total TCDFs, Total HxCDFs, Total HpCDFs, Total HpCDDs, and Total PeCDFs for select SDGs. The "B" flagged sample data from the evaluation of QC blanks is presented in **Table A-4**. Analytical results qualified "B" were considered non-detect at the MRL or level of contamination, whichever was greater. Samples meeting the USEPA Region III condition were qualified. While these noted parameters were qualified "B" due to the blank contamination, the data was still considered useable, the accuracy data quality goal was met, and the qualified data did not impact the data quality for the RFI. For each of the other noted analytes not presented in **Table A-4**, the samples were either non-detect for that compound or greater than the blank action level. Further discussion as to method and calibration blanks may be found in the data validation reports located in **Appendix A-3**.

Rinse Blanks: The blank contamination assessment was performed to assess the impact of contaminant contributions originating from non-point sources, such as field sampling equipment decontamination procedures. Rinse blanks were intended to identify cross-contamination between samples as a result of sampling equipment decontamination procedures. Rinse blanks were collected by pouring the required volume of de-ionized, organic-free water over the equipment and collecting the water in the appropriate sample containers. Rinse blanks were performed at a rate of one per 20 samples collected or 5% per matrix per sampling technique. The rinse blank results were evaluated to ascertain the efficiency of decontamination and assess the potential for cross-contamination. Rinse blanks were analyzed for the analytes of concern for the RFI. In accordance with USEPA Region III data validation guidelines, the detected concentration in the sample were qualified "B" for blank contamination and was considered non-detect if the sample concentration was within five times (10 times for common laboratory contaminants such as acetone, 2-butanone, methylene chloride, OCDD, OCDF, and phthalate esters) the concentration in the associated equipment blank. Rinse blanks are aqueous samples and were reported in ng/L, µg/L, or mg/L units. Performing blank assessments for solid matrix samples, action levels were calculated and expressed in soil units pg/g, µg/kg, or mg/kg from the given aqueous rinse blank concentrations to be compared against actual solid sample concentrations. This conversion is dependent upon the method performed, sample amounts used, and final digestate or extract volumes used during the analytical analysis. Action levels were based upon 100% solids and 1x dilution factor and adjusted for each sample as appropriate.

Table A-4
B-Qualified Data Summary

Field ID	Analyte	Result	LQ	Units	Field ID	Analyte	Result	LQ	Units
41GW03	Beryllium	6.6		UG/L	41SD10	Sodium	199	J	MG/KG
41GW03	Chloroform	0.84	JB	UG/L	41SD10	Antimony	0.50	J	MG/KG
41GW03	Beryllium - Dissolved	1.2	J	UG/L	41SD10	Selenium	2.9	J	MG/KG
41GW01	Lead - Dissolved	4.1	J	UG/L	41SD10	Mercury	0.027	J	MG/KG
41GW01	Potassium - Dissolved	5290	J	UG/L	41SD11	Potassium	1010		MG/KG
41GW02	1,2,3,6,7,8-HxCDF	3.35	A	PG/L	41SD11	Thallium	1.1	J	MG/KG
41GW02	1,2,3,7,8-PeCDF	3.59	A	PG/L	41SD11	Antimony	1.1	J	MG/KG
41GW02	Potassium - Dissolved	4910	J	UG/L	41SD11	Mercury	0.056	J	MG/KG
41MW1	Lead	4.2	J	UG/L	41SW08	Iron	88.1	J	UG/L
41MW1	Potassium	3900	J	UG/L	41SW08	Nickel	1.2	J	UG/L
41MW2	Lead	3.1	J	UG/L	41SW08	Potassium	4300	J	UG/L
41MW2	Potassium	8570	J	UG/L	41SW09	Aluminum	170	J	UG/L
41MW3	Lead	4.5	J	UG/L	41SW09	Potassium	4020	J	UG/L
41SD08	Potassium	1890		MG/KG	41SW10	Iron	52.7	J	UG/L
41SD08	Sodium	475	J	MG/KG	41SW10	Nickel	1.1	J	UG/L
41SD08	Selenium	3.3	J	MG/KG	41SW10	Potassium	4060	J	UG/L
41SD08	Mercury	0.10	J	MG/KG	41SW10	Copper	1.2	J	UG/L
41SD09	Potassium	939		MG/KG	41SD11	2,3,7,8-TCDF	0.492	A	PG/G
41SD09	Sodium	173	J	MG/KG	41SD11	1,2,3,4,7,8-HxCDF	0.801	A	PG/G
41SD09	Antimony	1.4	J	MG/KG	41SD11	1,2,3,4,6,7,8-HpCDF	4.20	A	PG/G
41SD09	Mercury	0.030	J	MG/KG	41SD11	OCDF	11.2	A	PG/G
41SD10	Potassium	731		MG/KG					

J = A = Indicates an estimated value for estimating a concentration <MRL or <EDL and ≥ MDL.
B = The analyte has been detected in the sample and the associated laboratory or field blank.

- **Rinse Blank Analysis:** Rinse blank RB083007 (low-flow pump) applies to the groundwater samples collected at SWMU41, except for samples 41GW01 and 41GW02. These samples were sampled with disposable bailers; therefore, no rinse blank applies to these samples. The surface water samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the surface water samples. Rinse blank RB071807 applies to the sediment samples collected at SWMU41. This rinse blank was taken from the stainless steel bowl and trowel used to collect the field sediment samples. For rinse blank RB083007, all analytes were non-detect for all target parameters and/or compounds of concern except for potassium and sodium. For rinse blank RB071807, all analytes were non-detect for all target parameters and/or compounds of concern except for potassium, sodium, zinc, and methylene chloride. The "B" flagged sample data from the evaluation of QC blanks is presented in **Table A-4**. Analytical results qualified "B" were considered non-detect at the MRL or level of contamination, whichever was greater. Samples meeting the USEPA Region III condition were qualified. While these noted parameters were qualified "B" due to the blank contamination, the data was still considered useable, the accuracy data quality goal was met, and the qualified data did not impact the data quality for the RFI. For each of the other noted analytes not presented in **Table A-4**, the samples were either non-detect for that compound or greater than the blank action level. Further discussion as to rinse blanks may be found in the data validation reports located in **Appendix A-3**.

Trip Blanks: Trip blanks were prepared by the project contract laboratory and accompanied the samples requiring VOC analysis. One trip blank was transported with each VOC sample cooler to the laboratory for each day of sampling. The trip blanks were prepared by pouring the required volume of de-ionized, organic-free water into appropriate sample containers in the laboratory. The trip blanks were analyzed for the TCL VOCs. The trip blank results were used to assess the potential incidental contamination due to sample transport before, during, and after field operations (i.e., exposure to air) and/or contamination due to the sample container. In accordance with USEPA Region III data validation guidelines, the detected concentration in the sample was considered a "non-detect" (i.e., qualified "B" for blank contamination) and was excluded from consideration if the sample concentration was within five times (10 times for common laboratory contaminants such as acetone, 2-butanone, methylene chloride) the concentration in the associated trip blank. Trip blanks are aqueous samples and were reported in µg/L units. Performing blank assessments for solid matrix samples, action levels were calculated and expressed in soil units µg/kg from the given aqueous rinse blank VOC concentrations to be compared against actual solid sample concentrations. This conversion is dependent upon the method performed, sample amounts used, and final volumes used during the analytical analysis. Action levels were based upon 100% solids and 1x dilution factor and adjusted for each sample as appropriate.

- **Trip Blank Analysis:** The trip blank 071807TW applies to the surface water samples collected on 07/18/07. The trip blanks 071807TS and TB071907S apply to the sediment samples collected on 07/18/07 and 07/19/07, respectively. No trip blank was analyzed for groundwater samples collected on 08/22/07. The trip blanks TB082707 and TB082807 apply to the ground water samples collected on 08/27/07 and 08/28/07, respectively. For trip blanks 071807TW and TB071907W, all target analytes were non-detect for all parameters and/or compounds of concern, except for chloroform in trip blank TB071907W. For trip blanks 071807TS and TB071907S, all target analytes were non-detect for all parameters and/or compounds of concern. For trip blanks TB082707 and TB082807, all target analytes were non-detect for all parameters and/or compounds of concern, except for methylene chloride in both trip blanks. The "B" flagged sample data from the evaluation of QC blanks is presented in **Table A-4**. For the VOC sample collected on 08/22/07, the associated sample target compounds were non-detect or "B" qualified from method blank contamination; therefore, no direct impacts were noted for the omitted trip blank. Analytical results qualified "B" were considered non-detect at the MRL or level of contamination, whichever was greater. Samples meeting the USEPA Region III condition were qualified. While these noted parameters were qualified "B" due to the blank contamination, the data was still considered useable, the accuracy data quality goal was met, and the qualified data did not impact the data quality for the RFI. For each of the other noted analytes not presented in **Table A-4**, the samples were either non-detect for that compound or greater than the blank action level. Further discussion as to trip blanks may be found in the data validation reports located in **Appendix A-3**.

Laboratory Control Samples: The LCSs were analyzed to assess general method performance by the ability of the laboratory to successfully recover the target analytes from a control matrix. The LCS is similar in composition to the method blank. For aqueous analyses, spiked analyte-free reagent water was used. For soil analyses, a purified solid matrix (e.g., sand, sodium sulfate, or other purified solid) was used. The LCSs were spiked with single-component target analytes before it is carried through the preparation, cleanup, and determinative procedures. LCSs were performed at a rate of one per preparation batch per matrix. When samples were not subjected to a separate preparatory procedure (i.e., purge and trap VOC analyses, or aqueous Hg analysis), the CCV may have been used as the LCS, provided the CCV acceptance limits were used for evaluation.

- **Laboratory Control Sample Recovery Analysis:** The results of the LCS were evaluated, in conjunction with other QC information during the data validation process to ascertain the acceptability of the data generated for that batch of samples. The LCS samples were evaluated for each SDG and are matrix specific. For LCS samples, USACE DoD QSM and laboratory criteria limits were used for each method in the validation process. The aqueous LCS samples were within specified criteria for all target parameters and/or compounds of concern except for chloromethane, trans-1,3-dichloropropane, endrin aldehyde, 1,3-dichlorobenzene, 1,4-dichlorobenzene, benzoic acid, 1-methylnaphthalene, 2-methylnaphthalene, hexachlorobutadiene, hexachloroethane, benzo(a)pyrene, benzo(b)flouranthene, benzo(k)flouranthene, chrysene, flouranthene, naphthalene, phenanthene, pyrene, HMX, 2-amino-4,6-dinitrotoluene, dicamba, dinoseb, and 2,4,5-T for select SDGs. The solid LCS samples were within specified criteria for all target parameters and/or compounds of concern except for chloromethane, vinyl chloride, and dicamba for select SDGs. Data qualifiers were applied as appropriate to associated samples based upon these outliers. In some cases, the associated sample was non-detect for a high recovery; therefore, no qualifiers were required. Further details may be found in the data validation reports located on a CD at the back of this report. While qualification was applied due to high or low LCS recoveries, the data was still considered useable (except for benzoic acid – see completeness discussion), the accuracy data quality goal was met, and the qualified data did not impact the data quality for the RFI.

Matrix Spikes: The MS was used to assess the performance of the method as applied to a particular project matrix. A MS is an environmental sample to which known concentrations of certain target analytes have been added before sample manipulation from the preparation, cleanup, and determinative procedures have been implemented. The original field sample was mixed or shaken to ensure homogeneous fractions when allowed by the method. MSs were performed at a rate of one per preparation batch or 5% whichever was more frequent per matrix. The results of the MS are evaluated, in conjunction with other QC information during the validation process to assess the effect of the matrix on the bias of the analysis. If a matrix spike duplicate (MSD) was analyzed, it was also evaluated.

- **Matrix Spike and Matrix Spike Duplicate Recovery Analysis:** The results of the MS/MSD were evaluated, in conjunction with other QC information during the data validation process to ascertain the acceptability of the data generated for that batch of samples. Only spiked project site SWMU 41 samples were evaluated. For MS/MSD samples, USACE DoD QSM and laboratory criteria limits were used for each method in the validation process. For aqueous matrices, MS and MSD samples were within specified criteria for all target parameters and/or compounds of interest except for antimony, calcium, iron, magnesium, manganese, potassium, selenium, and zinc for spiked sample 41GW01; potassium, sodium, and HMX for sample 41MW1; 2-hexanone, 4-methyl-2-pentanone, and chloromethane for spiked sample 41MW2; dieldrin for spiked sample 41MW3; and HMX for spiked sample 41SW09. For solid matrices, MS and MSD samples were within specified criteria for all target parameters and/or compounds of interest except for benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and benzo(a)anthracene for spiked sample 41SD09. The spiked samples were qualified as applicable to USEPA Region III guidance. In some cases, the sample amount was greater than the amount

spiked or the associated sample was non-detect for a high recovery; therefore, no qualifiers were required. Further details may be found in the data validation reports located on a CD at the back of this report. While qualification was applied due to high or low MS or MSD recoveries in some cases, the data was still considered useable, the accuracy data quality goal was met, and the qualified data did not impact the data quality for the RFI.

Completeness: Completeness is a measure of the amount of information that must be collected during the field investigation to allow for successful achievement of the objectives. An adequate amount and type of data must be collected for conclusions to be valid. Missing data may reduce the precision of estimates or introduce bias, thus lowering the confidence level of the conclusions. While completeness has been historically presented as a percentage of the data that is considered usable, this does not take into account critical sample locations or critical analytical parameters.

The amount and type of data that may be lost due to sampling or analytical error cannot be predicted or evaluated in advance. The importance of lost or suspect data will be evaluated in terms of the sample location, analytical parameter, nature of the problem, decision to be made, and the consequence of an erroneous decision. Critical locations or parameters for which data is found to be inadequate will either be re-sampled and re-analyzed or the data will be appropriately qualified based on the decision of the project QA manager. The completeness goal percentage of usable data is set at 90%.

Sampling completeness was assessed through evaluation of the total number of samples proposed for collection in the work plan versus the actual number of samples collected and analyzed. Analytical completeness was assessed by comparing the number of useable data points collected to the total number of data points generated. Completeness is calculated using the following equations:

$$\%\,\text{Sampling Completeness} = \frac{\text{No. of actual samples collected}}{\text{No. of proposed samples}}$$

$$\%\,\text{Analytical Completeness} = \frac{\text{No. of usable data}}{\text{No. of requested analyses}}$$

For the purposes of this report, unusable data are defined to include rejected data points ("R" qualifier).

- **Completeness Analysis:** Six groundwater samples, four surface water samples, four sediment samples, two project wide IDM samples (one aqueous and one solid), six trip blanks, and two rinse blanks were proposed for collection at SWMU 41 as specified in MWP Addendum 019 (Shaw, 2007). The field duplicates, rinse blanks, and IDM samples were collected on a site-wide basis. All samples were collected and analyzed for the parameters as specified in MWP Addendum 019, except for one trip blank for the 08/22/07 VOC sample. The resulting sampling completeness quotient is 95.8% and meets the pre-defined goals of 90% for the sampling program. There were no direct impacts for the omitted trip blank as noted in the trip blank discussion section. The overall analytical percent completeness was assessed by parameter group and matrix for the samples collected. Analysis of the all samples resulted in the generation of 3,078 out of 3,081 data points deemed to be useable, generating an overall analytical completeness quotient of 99.9%. Benzoic acid was rejected for the samples 41SW08, 41SW09, and 41SW10 based upon grossly low recovery (i.e. <10%) found in the LCS resulting in an analytical completeness percentage of 99.4% (487 out of 490 data points) for the SVOCs in aqueous matrix. All other completeness scenarios for all other parameter groups and/or matrices were 100%. The completeness percentages met the pre-defined goal of 90% for all SWMU 41 sampling events and did not impact the overall RFI.

Representativeness: Representativeness is a measure of the degree to which the measured results accurately reflect the medium being sampled. It is a qualitative parameter that is addressed through the proper design of the sampling program in terms of sample location, number of samples, and actual material collected as a "sample" of the whole.

Sampling protocols were developed to assure that samples collected are representative of the media. Field handling protocols (e.g., storage, handling in the field, and shipping) were designed to protect the representativeness of the collected samples. Proper field documentation and QC inspections were used to establish that protocols were followed and that sample identification and integrity was maintained and met pre-defined goals.

Comparability: Comparability is the confidence with which one data set can be compared to another. Comparability was controlled through the use of SOPs that have been developed to standardize the collection of measurements and samples and approved analytical technique with defined QC criteria. USEPA-approved methodologies were used in providing laboratory analytical support for this project. Laboratory SOPs were developed from these methods. Consistent and proper calibration of equipment throughout the field exercises, as described in MWP Addendum 019 and the MWP (URS, 2003), will assist in the comparability of measurements. Field documentation and QA audits were used to establish that protocols for sampling and measurement follow appropriate SOPs and met pre-defined goals.

Levels of Concern

An integral part of the identification of DQOs is the establishment of LOCs. These levels were compared with analytical PQLs and MDLs prior to analytical method selection to ensure the method was capable of addressing project DQOs, preclude occurrence of false negative issues, and assess best available technology limitations. Although LOCs selected as potential concerns may not necessarily reflect RFI-specific objectives, they were developed to ensure that the chosen analytical methods have detection limits sensitive enough to achieve compliance with appropriate site-specific screening levels or other specified criteria for soil. The LOCs for the SWMU 41 are based on soil applicable or relevant and appropriate requirements (ARARs) and To-Be-Considered (TBC) guidance and are as follows:

The sediment ARAR/TBC guidance includes:

- RFAAP Facility-Wide Background inorganic soil concentrations (IT, 2001).
- Oakridge National Laboratory (ORNL) Regional Screening Table – Residential and Industrial Scenarios with a hazard index (HI) = 0.1 for non-carcinogen compounds and a dilution attenuation factor (DAF) = 20 for the SSL Transfer levels (September 12, 2008)

The groundwater and surface water ARAR/TBC guidance includes:

- Oakridge National Laboratory Regional Screening Table – Tap Water Scenario (September 12, 2008) with a hazard index (HI) = 0.1 for non-carcinogen compounds.
- USEPA Drinking Water Maximum Contaminant Levels (August, 2006).

Sensitivity (quantitation, reporting, and detection limits): The term sensitivity is used broadly to describe the method detection, quantitation, and reporting limits established to meet project-specific data quality objectives; and not limited to the definition which describes the capability of a method or instrument to discriminate between measurement responses. The method detection limits (MDLs) and the practical quantitation limits (PQLs) published within USEPA methods are based upon a reagent water matrix, and are not necessarily reflective of typical sample matrices; therefore, care was taken in establishing limits for laboratory analysis. Methods were selected based upon their sensitivity, technological, and economical considerations while keeping the screening values and available methodology in mind and were sufficient in meeting the given levels of concern (LOCs).

The laboratory generated PQLs and MDLs were compared at the onset of the project. The MDL is the minimum concentration of an analyte that can be measured and reported with a 99% confidence that the analyte is above zero and is identified from the analysis of a sample in a given matrix containing the analyte. The MDLs were derived by the method based upon 40 CFR Chapter 136 Appendix B. The MDL values differ and change periodically because each MDL is laboratory, instrument, analyst, matrix, and method specific. Therefore, the more conservative MDLs were reported where there were multiple instruments and or studies performed. The PQLs are the values at which the laboratory has demonstrated the ability to reliably quantitate the target value of an analyte for the method performed and are based upon the lowest calibration standard used for the initial calibration curve or the lowest verification standard performed. PQLs must be at least 3 times the MDL.

The laboratory used a method reporting limit (MRL) or sample quantitation limit to report non-detects for each sample. The MRL is the threshold value below which the laboratory reports non-detected values as "U," "ND," or "<" and will vary for each sample based upon matrix, dilution, sample volumes, percent moistures (for solids), and the method performed. For dioxin and furans, the estimated detection limit (EDL) method was reported. The sample specific EDL is the concentration of a given analyte required to produce a signal with a peak height of at least 2.5 times the background signal level and is calculated only for where each 2,3,7,8-substituted congener was not identified. The sample specific EDL level is above the actual MDL levels at a representative level for reporting dioxins and furans.

Data was calculated over a linear range and the resulting highest concentration within the linear range represents the upper quantitation limit. Each target compound for every sample was reported at a specific level. Any target analytes detected above the MDL, but less than the MRL or 3 times the MDL (whichever was greater), were reported as estimated values "J." Target analytes detected above the upper calibration standard were diluted and analyzed within established calibration windows or qualified. The units used for aqueous samples were ng/L, µg/L, or mg/L and for solid samples were pg/g, µg/kg, or mg/kg.

- **SWMU 41 Sensitivity Analysis:** The method sensitivities (i.e., MDLs) were compared to the levels of concern for the samples collected. Comparing the surface water samples against the USEPA ORNL tap water RBCs, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,2-dichloroethane, 1,2-dichloropropane, benzene, bromomethane, carbon tetrachloride, chloroform, tetrachloroethene, vinyl chloride, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 2,4-dinitrophenol, 3,3'-dichlorobenzidine, 3-nitroaniline, 4,6-dinitro-2-methylphenol, 4-chloroaniline, bis(2-chloroethyl)ether, bis(chloroisopropyl)ether, hexachlorobenzene, hexachlorobutadiene, nitrobenzene, n-nitrosodi-n-propylamine, pentachlorophenol, aldrin, alpha-BHC, dieldrin, heptachlor epoxide, heptachlor, toxaphene, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, nitroglycerin, MCPA, MCPP, antimony, arsenic, mercury, and thallium had MDLs greater than the given tap water RBCs for select samples. Comparing the surface water samples against the Drinking Water MCLs, hexachlorobenzene, pentachlorophenol, and thallium had MDLs greater than the given MCLs for select samples. The samples had higher sensitivity levels due to the given available USEPA method sensitivity capabilities as well as any required sample dilutions and/or sample volume adjustments due to either high analyte concentration and/or matrix interferences. Though an uncertainty may be present with these sensitivity gaps between the MCLs and/or tap water RBCs to the MDLs for these compounds, it is unlikely that they present an impact to the decisions regarding the RFI.

- Comparing the groundwater samples against the USEPA ORNL tap water RBCs, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,2-dichloroethane, carbon tetrachloride, chloroform, tetrachloroethene, vinyl chloride, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 2,4-dinitrophenol, 3,3'-dichlorobenzidine, 3-nitroaniline, 4,6-dinitro-2-methylphenol, 4-chloroaniline, bis(2-chloroethyl)ether, bis(chloroisopropyl)ether, hexachlorobenzene, hexachlorobutadiene, nitrobenzene, n-nitrosodi-n-propylamine, pentachlorophenol, aldrin, alpha-BHC, dieldrin, heptachlor epoxide, toxaphene, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, nitroglycerin, MCPA, MCPP, aluminum, antimony, arsenic, mercury, selenium, and thallium had MDLs greater than the given tap water RBCs for select samples. Comparing the groundwater samples against the Drinking Water MCLs, hexachlorobenzene, pentachlorophenol, aluminum, antimony, selenium, and thallium had MDLs greater than the given MCLs for select samples. The samples had higher sensitivity levels due to the given available USEPA method sensitivity capabilities as well as any required sample dilutions and/or sample volume adjustments due to either high analyte concentration and/or matrix interferences. Though an uncertainty may be present with these sensitivity gaps between the MCLs and/or tap water RBCs to the MDLs for these compounds, it is unlikely that they present an impact to the decisions regarding the RFI.
- Comparing the sediment samples against the USEPA ORNL residential RBCs, cis-1,3-dichloropropene, trans-1,3-dichloropropene, benzo(a)pyrene, dibenz(a,h)anthracene, n-nitrosodi-n-propylamine, nitroglycerin, and thallium had MDLs greater than the given residential RBCs for select samples. Comparing the sediment samples against the USEPA ORNL industrial RBCs, all target compound MDLs were less than the given industrial RBCs for all samples. Comparing the sediment samples against site-wide metals background concentrations, all target compound MDLs were less than the given site-wide metals background for all samples. The samples had higher sensitivities due to the given available USEPA method sensitivity capabilities as well as percent solid adjustments for dryness, and any required sample dilutions or sample volume adjustments due to either high analyte concentration and/or matrix interferences. Though an uncertainty may be present with these sensitivity gaps between the residential RBCs, industrial RBCs, and/or background concentrations to the MDLs for these compounds, it is unlikely that they present an impact to the decisions regarding the RFI.

Appendix A-3

Data Validation Reports and Form I

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Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Dioxin Furans
SGS Paradigm Analytical Laboratories, Inc. SDGs G383-583
(Accutest SDG F51154)

DATE: September 26, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on July 18, 2007 and July 19, 2007. The samples were analyzed for Dioxin Furan compounds using USEPA SW-846 Method 8290 High Resolution Gas Chromatography/High Resolution Mass Spectroscopy (HRGC/HRMS). A total of five aqueous samples and seventeen solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41SW08	F51154-6	41SD11	F51154-22
41SW09	F51154-7	49SS02	F51154-23
41SW10	F51154-8	49SS03	F51154-24
41SD08	F51154-9	49SS04	F51154-25
41SD09	F51154-10	49SS05	F51154-26
41SD10	F51154-11	59SS06	F51154-27
LFSD01	F51154-15	59SS07	F51154-28
TMSD01	F51154-16	59SS08	F51154-29
LFSW01	F51154-17	59SS09	F51154-30
APSD01	F51154-18	59SS10	F51154-31
TMSW01	F51154-20	TMSS05	F51154-32

Data were reviewed and validated using a combination of project QAPP, *DOD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *USEPA Region III Dioxin/Furan Data Validation Guidance* (March, 1999). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
X		Blank Analysis
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Internal Standards (IS) Recovery Standard Solutions
	X	Cleanup Standards
	X	Laboratory Control Standard or Ongoing Precision Result (OPR)
X		Matrix Spike and Spike Duplicate
X		Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

9/26/07
Date

RFAAP VALIDATION REPORT
DIOXIN FURAN REVIEW
SDGs G383-583
(Accutest SDG F51154)

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, dioxin and furans are shipped cooled (@4°C ± 2°C) with a maximum holding time of 30 days from sample collection to preparative extraction and 45 days from preparative extraction to determinative analysis. For solid samples, dioxin and furans are shipped cooled (@4°C ± 2°C) with a maximum holding time of 30 days from sample collection to preparative extraction and 45 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 07/18/07 and 07/19/07, the coolers were received by the primary laboratory (Accutest) on 07/20/07 at 4.0°C, 4.0°C, 4.6°C, 4.6°C, 4.8°C, 5.0°C, 5.0°C, and 5.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.2°C, 4.0°C, and 3.6°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 3.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 5.5°C and 5.2°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The aqueous and soil samples were collected on 07/18/07 and 07/19/07. For samples collected 07/18/07, the dioxins and furans were extracted on 07/26/07 and 07/29/07 and analyzed on 07/28/07, 07/30/07, and 07/31/07. For samples collected 07/19/07, the dioxins and furans were extracted on 07/26/07, 07/29/07, 07/30/07, and 07/31/07 and analyzed on 07/31/07 and 08/01/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Blank Analysis

The purpose of laboratory (or field) blank analyses is to determine the existence and magnitude of contamination problems resulting from field and laboratory activities. No contamination should be found in any of the blanks >EDL (estimated detection limit). The DoD QSM criteria specifies all concentrations should be less than ½ MRL (<MRL for common laboratory contaminants OCDD and OCDF) and <2EDL for the calibration blanks. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants OCDD or OCDF, or 5 times (5X) the maximum amount for other target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one and for solid matrices were converted to soil values (soil conversion factor = 100) if needed. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. The surface water "SW" samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the SW samples. Rinse blanks 072407R (F51275-1) and 072507R (F51300-31) apply to the surface soil "SS" and subsurface soil "SB" samples in this SDG. Rinse blank RB071807 (F51154-12) applies to the sediment "SD" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. ng/L	Action Level ng/L	B qualified samples
07/28/07	LMB14381	All congeners <EDL	NA	NA	None
09/09/07	RB083007	All congeners <EDL	NA	NA	None
Analysis Date	**QC Blank ID**	**Compound**	**Max Conc. pg/g**	**Action Level pg/g**	**B qualified samples**
07/30/07	LMB14383	OCDD	0.640J	6.40	None
07/30/07	LMB14383	2,3,7,8-TCDF	0.0940J	0.47	None
07/30/07	LMB14383	1,2,3,4,7,8-HxCDF	0.186J	0.93	None
07/30/07	LMB14383	1,2,3,4,6,7,8-HpCDF	0.776J	3.88	None
07/30/07	LMB14383	OCDF	1.57J	15.7	None
07/30/07	LMB14383	Total TCDFs	0.0940J	0.47	None
07/30/07	LMB14383	Total HxCDFs	0.186J	0.93	None
07/30/07	LMB14383	Total HpCDFs	0.776J	3.88	None
07/31/07	LMB14385	1,2,3,4,6,7,8-HpCDD	0.374J	1.87	None
07/31/07	LMB14385	OCDD	1.31J	13.1	None
07/31/07	LMB14385	2,3,7,8-TCDF	0.174J	0.87	41SD11, APSD01
07/31/07	LMB14385	1,2,3,4,7,8-HxCDF	0.256J	1.28	41SD11, APSD01
07/31/07	LMB14385	1,2,3,4,6,7,8-HpCDF	1.79J	8.95	41SD11
07/31/07	LMB14385	OCDF	3.80J	19.0	41SD11
07/31/07	LMB14385	Total HpCDDs	0.374J	1.87	None
07/31/07	LMB14385	Total TCDFs	0.174J	0.87	None
07/31/07	LMB14385	Total HxCDFs	0.444J	2.22	None
07/31/07	LMB14385	Total HpCDFs	1.79J	8.95	None
08/01/07	LMB14389	OCDD	0.702J	7.02	None
08/01/07	LMB14389	2,3,7,8-TCDF	0.122J	0.61	49SS04, 59SS06, 59SS07, 59SS08, 59SS09, 59SS10
08/01/07	LMB14389	2,3,4,7,8-PeCDF	0.0680J, EMPC	0.34	49SS04, 59SS09, 59SS10
08/01/07	LMB14389	1,2,3,4,6,7,8-HpCDF	0.650J	3.25	None
08/01/07	LMB14389	OCDF	1.12J	11.2	None
08/01/07	LMB14389	Total TCDFs	0.122J	0.61	None
08/01/07	LMB14389	Total PeCDFs	0.0680J	0.34	None
08/01/07	LMB14389	Total HxCDFs	0.0940J	0.47	None
08/01/07	LMB14389	Total HpCDFs	0.650J	3.25	None
07/28/07	RB071807	All congeners <EDL	NA	NA	None
08/03/07	072407R	All congeners <EDL	NA	NA	None
08/08/07	072507R	1,2,3,4,6,7,8-HpCDF	0.849J	4.25	None
08/08/07	072507R	OCDF	1.42J	14.2	None
08/08/07	072507R	Total HpCDFs	0.849J	4.25	None

J = Estimated value <MRL and >EDL.
EMPC = Estimated Maximum Possible Concentration.

III-Instrument Performance Check

Instrument must be tuned with perfluorokerosene (PFK) to achieve a static resolving power of at least 10,000 (10% valley) and lock-mass ion between lowest and highest masses for each descriptor and level of reference compound ≤10%. Documentation of the mass spectrometer resolving power is accomplished by recording the peak profile of the high-mass reference signal (typically m/z 330.9792) obtained during a peak examination by using the low-mass PFK ion at m/z 292.9825 or lower in mass as reference. At the beginning of the each 12-hour period, the chromatographic resolution is verified in the same fashion as in the initial calibration through the analysis of HRCC solution on the DB-5 (or equivalent) column or through the analysis of the column performance solution on the SP-2331 or SP-225 (or equivalent) column. A 25% valley must be achieved between the close eluters.

- All PFK forms were verified and found to be in compliance with method specification. No qualifiers were applied.

IV-Initial Calibration
Once the window defining mix has been analyzed and the descriptor switching times have been verified, the five point calibration solutions can be analyzed prior to sample analysis. Per method and DoD QSM, the initial calibration criteria are as follows:

- The percent relative standard deviations for the mean response factors RRF(n) from the 17 unlabeled standards must not exceed ±20%, and those for the labeled reference compounds must not exceed ±30%;
- The signal to noise ratio ≥10% for all target ions;
- Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For initial calibration performed on 07/10/07 for all target compounds on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), LFSW01 (F51154-17), APSD01 (F51154-18), TMSW01 (F51154-20), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this initial calibration.

V-Continuing Calibration
The continuing calibration consists of two parts: evaluation of the mass resolution and retention time check. Per method and DoD QSM, the following stipulates the continuing calibration criteria.

- The signal signal-to-noise ratio (S/N) must be at least 10:1 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard for each analyte.
- The relative response factor of each analyte for the unlabeled standard must be within ±20% of the average RF obtained from the initial calibration, and the RRF of each labeled standard must be within ±30% of the average RRF established during initial calibration. This is expressed in term of percent difference %D.
- Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For continuing calibration performed on 07/28/07 @02:22 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 07/28/07 @13:44 on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this continuing calibration.

- For continuing calibration performed on 07/28/07 @23:29 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 07/30/07 @17:04 on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), and 41SD11 (F51154-22) apply to this continuing calibration.

- For continuing calibration performed on 07/31/07 @04:20 on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples LFSW01 (F51154-17), TMSW01 (F51154-20), 49SS02 (F51154-23), and 49SS03 (F51154-24) apply to this continuing calibration.

- For continuing calibration performed on 07/31/07 @13:17 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/01/07 @00:39 on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) apply to this continuing calibration.

- For continuing calibration performed on 08/01/07 @10:25 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/01/07 @14:32 on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample TMSS05 (F51154-32) applies to this continuing calibration.

- For continuing calibration performed on 08/02/07 @01:54 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/02/07 @12:28 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/02/07 @16:03 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/03/07 @03:24 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/03/07 @14:47 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

VI-Internal Standards (IS) Recovery Standard Solutions
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: Recoveries of the isotopically-labeled recovery standards to fall within the 40 to 135 percent range for the tetra- through octachlorinated congeners, or as stated in the data package (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VII-Cleanup Standards
Cleanup standards are added to every sample, blank, quality control sample, and calibration solution. This compound is added to the samples after extraction but prior to cleanup and is used to verify the percent recovery obtained using the isotope dilution technique. The control limits are 40 to 135 percent (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Standard (LCS) or Ongoing Precision Result (OPR)
LCSs are used to monitor laboratory accuracy and precision by calculating the percent recoveries of the spiked compounds. Per DOD QSM and method criteria, acceptable performance is determined by:

1. Recoveries of the isotopically-labeled extraction standards to fall within 40-135% control limits for the tetra- through octachlorinated congeners, or as stated in the data package;

2. Recoveries (accuracy) of the unlabeled compounds should be within ±35% when spiked at the method quantitation limit and within ±30% when spiked above 20 times the method quantitation limit, or as stated in the data package;

3. When duplicate OPR are required, the relative percent difference (RPD) of the unlabeled analytes concentrations should be within 30% when spiked at the method quantitation limit and within ±20% when spiked above 20 times the method quantitation limit.

- Sample OPR14381 was used as LCS and LCSD on 07/28/07 analytical run. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this LCS.

- Sample OPR14383 was used as LCS and LCSD on 07/30/07 analytical run. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), and 41SD11 (F51154-22) apply to this LCS.

- Sample OPR14385 was used as LCS and LCSD on 07/31/07 analytical run. All criteria were met. No qualifiers were applied. Samples LFSW01 (F51154-17), TMSW01 (F51154-20), 49SS02 (F51154-23), and 49SS03 (F51154-24) apply to this LCS.

- Sample OPR14389 was used as LCS and LCSD on 08/01/07 analytical run. All criteria were met. No qualifiers were applied. Samples 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. Per DoD QSM, MS/MSD recoveries must be within in-house laboratory limits (75-125%) and RPD ≤20%.

- Sample LFSW01 (F51154-17) was used for the aqueous MS/MSD analysis on 07/31/07. OCDD (147%, 167%) and 2,3,4,7,8-PeCDF (RPD=21%) were outside lab criteria. For all other congeners, all criteria were met. OCDD was qualified estimated bias high "K" for detects for the spiked sample based upon the high recoveries. The associated LCS was within criteria limits. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this MS/MSD.

- No project specific solid matrix MS/MSD was performed; therefore, it was not evaluated.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous and solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field surface water sample duplicate pair LFSW01 (F51154-17) and TMSW01 (F51154-20) was collected for dioxin and furans. All detected dioxin and furans found in the sample and its duplicate pair and associated %RPD are noted in **Table 3**. All other dioxin and furans target compounds were non-detect. Total HpCDDs (71.7%) was above criteria due to low concentration levels detected below the MRL and were reported as estimated maximum possible concentration (EMPC). Total HpCDDs was qualified estimated "J" for the original and duplicate pair samples based upon these outliers. For all other dioxin and furans, all criteria were met.

Table 3 Field Precision Hits Analysis Summary for Dioxin and Furans for Duplicate Pair LFSW01 (F51154-17) and TMSW01 (F51154-20)

Compound	Original Sample (ng/L)	Duplicate Pair (ng/L)	%RPD
1,2,3,4,6,7,8-HpCDD	0.00503J, EMPC	0.00448J	11.6
OCDD	0.0423J	0.0295J	35.7
1,2,3,7,8-PeCDF	0.00593U	0.00178J	NA
1,2,3,4,6,7,8-HpCDF	0.00205J	0.00609U	NA
OCDF	0.00586J	0.0122U	NA
Total HpCDDs	0.00949J, EMPC	0.00448	71.7
Total TCDFs	0.00622J, EMPC	0.00200U	NA
Total HpCDFs	0.00422J, EMPC	0.00609U	NA
Total PeCDFs	0.00202U	0.00373J, EMPC	NA

U = Value non-detect as <EDL.
J = Estimated value <MRL and >EDL. Data point qualified was estimated "J".
NA = Not Applicable.
EMPC = Estimated Maximum Possible Concentration

- Field sediment sample duplicate pair LFSD01 (F51154-15) and TMSD01 (F51154-16) was collected for dioxin and furans. All detected dioxin and furans found in the sample and its duplicate pair and associated %RPD are noted in **Table 4**. All other dioxin and furans target compounds were non-detect. 2,3,7,8-TCDF (59.5%), 1,2,3,7,8-PeCDF (59.9%), 2,3,4,7,8-PeCDF (93.8%), 1,2,3,6,7,8-HxCDF (59.5%), 2,3,4,6,7,8-HxCDF (86.9%), 1,2,3,7,8,9-HxCDF (72.4%), Total TCDFs (84.2%), and Total PeCDFs (90.4%) was above criteria probably due to sample non-homogeneity and/or low sample concentration levels detected below the MRL. 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,6,7,8-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, Total TCDFs, and Total PeCDFs were qualified estimated "J" for the original and duplicate pair samples based upon these outliers. For all other dioxin and furans, all criteria were met.

Table 4 Field Precision Hits Analysis Summary for Dioxin and Furans for Duplicate Pair LFSD01 (F51154-15) and TMSD01 (F51154-16)

Compound	Original Sample (pg/g)	Duplicate Pair (pg/g)	%RPD
2,3,7,8-TCDD	2.38	1.72	32.2
1,2,3,7,8-PeCDD	7.55J	5.77J	26.7
1,2,3,4,7,8-HxCDD	7.83J	6.23	22.8
1,2,3,6,7,8-HxCDD	19.0	18.8	1.1
1,2,3,7,8,9-HxCDD	17.5	16.2	7.7
1,2,3,4,6,7,8-HpCDD	571	734	25.0
OCDD	5030	6660E	27.9
2,3,7,8-TCDF	5.58	3.02	59.5
1,2,3,7,8-PeCDF	5.73J	3.09J	59.9
2,3,4,7,8-PeCDF	10.6	3.83J	93.8
1,2,3,4,7,8-HxCDF	19.8	15.8	22.5
1,2,3,6,7,8-HxCDF	10.8	5.85J	59.5
2,3,4,6,7,8-HxCDF	11.7	4.61J	86.9
1,2,3,7,8,9-HxCDF	2.39J	1.12J	72.4
1,2,3,4,6,7,8-HpCDF	132	139	5.2
1,2,3,4,7,8,9-HpCDF	5.24J	4.97J	5.3
OCDF	385	416	7.7
Total TCDDs	37.9	27.8	30.8
Total PeCDDs	69.9	57.4	19.6
Total HxCDDs	200	186	7.3
Total HpCDDs	1060	1310	21.1
Total TCDFs	132	53.8	84.2
Total PeCDFs	137	51.7	90.4
Total HxCDFs	158	113	33.2
Total HpCDFs	328	333	1.5

E = Value exceeded calibration range. Data point qualified was estimated "J".
J = Estimated value <MRL and >EDL. Data point qualified was estimated "J".

- Field surface soil sample duplicate pair 49SS05 (F51154-26) and TMSS05 (F51154-32) was collected for dioxin and furans. All detected dioxin and furans found in the sample and its duplicate pair and associated %RPD are noted in **Table 5**. All other dioxin and furans target compounds were non-detect. All criteria were met. No qualifiers were applied.

Table 5 Field Precision Hits Analysis Summary for Dioxin and Furans for Duplicate Pair 49SS05 (F51154-26) and TMSS05 (F51154-32)

Compound	Original Sample (pg/g)	Duplicate Pair (pg/g)	%RPD
2,3,7,8-TCDD	0.333J, EMPC	0.241J, EMPC	32.1
1,2,3,7,8-PeCDD	2.89J	3.04J	5.1
1,2,3,4,7,8-HxCDD	9.00	10.8	18.2
1,2,3,6,7,8-HxCDD	36.5	27.8	27.1
1,2,3,7,8,9-HxCDD	21.0	19.2	9.0
1,2,3,4,6,7,8-HpCDD	946	950	0.4
OCDD	9640E	10300E	6.6
2,3,7,8-TCDF	0.938J	0.917J	2.3
1,2,3,7,8-PeCDF	0.567J	0.593J	4.5
2,3,4,7,8-PeCDF	1.04J	0.996J	4.3
1,2,3,4,7,8-HxCDF	4.61J	6.93J	40.2
1,2,3,6,7,8-HxCDF	3.71J	6.14	49.3
2,3,4,6,7,8-HxCDF	6.00	5.34J	11.6
1,2,3,7,8,9-HxCDF	0.839J	0.635J	27.7
1,2,3,4,6,7,8-HpCDF	138	132	4.4
1,2,3,4,7,8,9-HpCDF	10.2	8.10	23.0
OCDF	367	397	7.9
Total TCDDs	4.08J, EMPC	6.23J, EMPC	41.7
Total PeCDDs	13.2J, EMPC	15.9	18.6
Total HxCDDs	137	134J, EMPC	2.2
Total HpCDDs	1400	1420	1.4
Total TCDFs	8.68J, EMPC	10.4J, EMPC	18.0
Total PeCDFs	25.3J, EMPC	22.0J, EMPC	14.0
Total HxCDFs	138	129	6.7
Total HpCDFs	418	420	0.5

E = Value exceeded calibration range. Data point qualified was estimated "J".
J = Estimated value <MRL and >EDL. Data point qualified was estimated "J".
EMPC = Estimated Maximum Possible Concentration

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of at least one the several parameters such as the %D, %RSD, % recovery, and/or compound concentration. Values were found to be within 10%. Any value reported by the laboratory as estimated "A" based on an analyte to internal standard ratio below the calibration curve was qualified as estimated "J". The signal signal-to-noise ratio (S/N) must be greater than 2.5 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard. Any detected value with ether interference (I-lab flag) was qualified as estimated "J". For where the ion ratio failed the 25% criteria (*-lab flag), the estimated maximum possible concentration (EMPC) was reported and flagged estimated "J". For where presence of quantitation interference (Q-lab flag), the date was flagged estimated "J" for detects and "UJ" for non-detects.

- For sample 41SW08 (F51154-6), 1,2,3,7,8-PeCDD, 2,3,4,7,8-PeCDF, Total PeCDDs, and Total PeCDFs were qualified estimated non-detect "UJ" based upon the presence of quantitation interference.

- For sample 59SS09 (F51154-30), Total TCDFs was qualified estimated non-detect "J" based upon the presence of quantitation interference.

- OCDD exceeded upper calibration limit for samples 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), TMSD01 (F51154-16), and TMSS05 (F51154-32). OCDD was qualified estimated "J" for all associated samples based upon these outliers.

Sample: 41SW08 (F51154-6), OCDD

A(x) = sum of the integrated ion abundances of the quantitation ions for the unlabeled ions;
A(is) = sum of the integrated ion abundances of the quantitation ions for the labeled ions;
Q(is) = quantity, in ng/ul, of the internal standard added to the sample before extraction;
W = weight, in g, of the sample (solid or organic liquid) as dry weight, or volume in mL of an aqueous sample; and
Avg. RRF(n) = calculated mean relative response factor for the unlabeled analyte.

$$\text{Conc. (ng/L)} = \frac{(A(x)) * Q(is) * 1000}{A(is) * W * \text{Avg. RRF}} = \frac{(214000+222000) * 4.0 * 1000}{(36700000+40800000) * 953 * 1.0783} = 0.0219 \text{ ng/L}$$

Reported Value = 0.0219 ng/L
% Difference = 0.0%
Values were within 10% difference

Sample: 41SD09 (F51154-10), OCDD

A(x) = sum of the integrated ion abundances of the quantitation ions for the unlabeled ions;

A(is) = sum of the integrated ion abundances of the quantitation ions for the labeled ions;

Q(is) = quantity, in pg, of the internal standard added to the sample before extraction; Here need to multiply concentration (pg/uL) by final extract volume (uL).

W = weight, in g, of the sample (solid or organic liquid) as dry weight, or volume in mL of an aqueous sample; and

Avg. RRF(n) = calculated mean relative response factor for the unlabeled analyte.

$$\text{Conc. (ng/kg)} = \frac{(A(x)) * Q(is)}{A(is) * W * \text{Avg. RRF}} = \frac{(56400000+63100000) * 4.0 * 1000}{(26300000+29500000) * (12.20 * 0.7270) * 1.0783} =$$
$$= 896 \text{ ng/kg} = 896 \text{ pg/g}$$

Reported Value = 897 pg/g
% Difference = 0.1%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ EDL and <MRL or <3*EDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥EDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ EDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I Copy

SGS Environmental Services

Method 8290
F51154-6
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00164				
1,2,3,7,8-PeCDD	ND VJ	0.00525				Q
1,2,3,4,7,8-HxCDD	ND	0.00525				
1,2,3,6,7,8-HxCDD	ND	0.00525				
1,2,3,7,8,9-HxCDD	ND	0.00525				
1,2,3,4,6,7,8-HpCDD	ND	0.00525				
OCDD	0.0219 J			45:10	0.97	A
2,3,7,8-TCDF	ND	0.00105				
1,2,3,7,8-PeCDF	ND	0.00525				
2,3,4,7,8-PeCDF	ND VJ	0.00525				Q
1,2,3,4,7,8-HxCDF	ND	0.00525				
1,2,3,6,7,8-HxCDF	ND	0.00525				
2,3,4,6,7,8-HxCDF	ND	0.00525				
1,2,3,7,8,9-HxCDF	ND	0.00525				
1,2,3,4,6,7,8-HpCDF	ND	0.00525				
1,2,3,4,7,8,9-HpCDF	ND	0.00525				
OCDF	ND	0.0105				
Total TCDDs	ND	0.00164				
Total PeCDDs	ND VJ	0.00525				Q
Total HxCDDs	ND	0.00525				
Total HpCDDs	ND	0.00525				
Total TCDFs	ND	0.00105				
Total PeCDFs	ND VJ	0.00525				Q
Total HxCDFs	ND	0.00525				
Total HpCDFs	ND	0.00525				
WHO-2005 TEQ (ND=0)	0.00000657		0.00000657			
WHO-2005 TEQ (ND=½)	0.00629		0.00629			

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F51154-6		Weight / Volume:	953 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14381
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-1C		Filename:	a27jul07a_3-8
Collection Date/Time:	07/18/07	10:40	Retchk:	a27jul07a_2-14
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a27jul07a_2-14
Extraction Date:	07/26/07		End ConCal:	a27jul07a_3-12
Analysis Date/Time:	07/28/07	20:15	Initial Cal:	m8290-071007a

Form I (OH)

Method 8290
F51154-6
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.57	78.6	31:40	0.77	
13C12-1,2,3,7,8-PeCDD	2.0	1.10	55.2	34:25	1.60	Q
13C12-1,2,3,6,7,8-HxCDD	2.0	1.64	82.0	37:10	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.73	86.3	40:39	1.06	
13C12-OCDD	4.0	3.79	94.7	45:09	0.90	
13C12-2,3,7,8-TCDF	2.0	1.76	88.0	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.41	70.5	33:37	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.37	68.5	36:28	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.69	84.7	39:21	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.365	91.3	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.269	67.3	34:13	1.63	Q
13C12-1,2,3,4,7,8-HxCDD	0.4	0.330	82.6	37:06	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.319	79.7	36:22	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.326	81.5	41:21	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:15	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.25	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F51154-6		Weight / Volume:	953 mL	
			Solids / Lipids:	NA	%
			Original pH :	8	
Laboratory Information			Batch ID:	WG14381	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-1C		Filename:	a27jul07a_3-8	
Collection Date/Time:	07/18/07	10:40	Retchk:	a27jul07a_2-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a27jul07a_2-14	
Extraction Date:	07/26/07		End ConCal:	a27jul07a_3-12	
Analysis Date/Time:	07/28/07	20:15	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: JMC
Date: 28/07/07

Reviewed by: [illegible]
Date: 8/9/07

Form I copy

SGS Environmental Services

Method 8290
F51154-7
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	EMPC	~~0.00114~~	0.00257 J	31:40	0.60	*	A
1,2,3,7,8-PeCDD	0.00607 J			34:25	1.36		A
1,2,3,4,7,8-HxCDD	0.00468 J			37:07	1.27		A
1,2,3,6,7,8-HxCDD	0.00475 J			37:12	1.10		A
1,2,3,7,8,9-HxCDD	0.00495 J			37:27	1.23		A
1,2,3,4,6,7,8-HpCDD	0.00564 J			40:39	1.14		A
OCDD	0.0292 J			45:09	0.91		A
2,3,7,8-TCDF	0.00147 J			31:07	0.73		A
1,2,3,7,8-PeCDF	0.00662 J			33:37	1.62		A
2,3,4,7,8-PeCDF	0.00589 J			34:15	1.71		A
1,2,3,4,7,8-HxCDF	0.00532 J			36:22	1.30		A
1,2,3,6,7,8-HxCDF	0.00509 J			36:28	1.18		A
2,3,4,6,7,8-HxCDF	0.00409 J			37:00	1.16		A
1,2,3,7,8,9-HxCDF	0.00501 J			37:46	1.18		A
1,2,3,4,6,7,8-HpCDF	EMPC	~~0.00509~~	0.00536 J	39:21	1.22	*	A
1,2,3,4,7,8,9-HpCDF	0.00420			41:21	1.08		A
OCDF	0.00874			45:27	1.01		A
Total TCDDs	ND	~~0.00114~~	0.00257 J				
Total PeCDDs	0.00607						
Total HxCDDs	0.0144						
Total HpCDDs	0.00564						
Total TCDFs	0.00147						
Total PeCDFs	0.0125						
Total HxCDFs	0.0195						
Total HpCDFs	~~0.00420~~		0.00955 J				
WHO-2005 TEQ (ND=0)	0.0117		0.0143				
WHO-2005 TEQ (ND=½)	0.0123		0.0143				

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F51154-7		Weight / Volume:	982 mL	
			Solids / Lipids:	NA	%
			Original pH :	8	
Laboratory Information			Batch ID:	WG14381	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-2C		Filename:	a27jul07a_3-9	
Collection Date/Time:	07/18/07	11:05	Retchk:	a27jul07a_2-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a27jul07a_2-14	
Extraction Date:	07/26/07		End ConCal:	a27jul07a_3-12	
Analysis Date/Time:	07/28/07	21:04	Initial Cal:	m8290-071007a	

Form 1 Cm

SGS Environmental Services

Method 8290
F51154-7
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.51	75.4	31:39	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.40	69.8	34:25	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.58	78.9	37:10	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.69	84.7	40:39	1.05	
13C12-OCDD	4.0	3.70	92.4	45:09	0.89	
13C12-2,3,7,8-TCDF	2.0	1.72	86.0	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.34	67.1	33:37	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.50	74.8	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.64	82.1	39:21	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.364	90.9	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.311	77.8	34:13	1.61	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.339	84.7	37:06	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.350	87.6	36:22	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.337	84.1	41:21	0.42	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:15	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.26	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F51154-7		Weight / Volume:	982 mL	
			Solids / Lipids:	NA	%
			Original pH :	8	
Laboratory Information			Batch ID:	WG14381	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-2C		Filename:	a27jul07a_3-9	
Collection Date/Time:	07/18/07	11:05	Retchk:	a27jul07a_2-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a27jul07a_2-14	
Extraction Date:	07/26/07		End ConCal:	a27jul07a_3-12	
Analysis Date/Time:	07/28/07	21:04	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: JWP
Date: 080907

Reviewed by: DD
Date: 8/9/07

Form I Corp

SGS Environmental Services

Method 8290
F51154-8
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00179				
1,2,3,7,8-PeCDD	ND	0.00538				
1,2,3,4,7,8-HxCDD	ND	0.00689				
1,2,3,6,7,8-HxCDD	ND	0.00702				
1,2,3,7,8,9-HxCDD	ND	0.00712				
1,2,3,4,6,7,8-HpCDD	ND	0.00538				
OCDD	0.0618 J			45:09	0.95	A
2,3,7,8-TCDF	ND	0.00128				
1,2,3,7,8-PeCDF	ND	0.00538				
2,3,4,7,8-PeCDF	ND	0.00538				
1,2,3,4,7,8-HxCDF	ND	0.00538				
1,2,3,6,7,8-HxCDF	ND	0.00538				
2,3,4,6,7,8-HxCDF	ND	0.00538				
1,2,3,7,8,9-HxCDF	ND	0.00538				
1,2,3,4,6,7,8-HpCDF	ND	0.00538				
1,2,3,4,7,8,9-HpCDF	ND	0.00538				
OCDF	ND	0.0108				
Total TCDDs	ND	0.00179				
Total PeCDDs	ND	0.00538				
Total HxCDDs	ND	0.00712				
Total HpCDDs	ND	0.00538				
Total TCDFs	ND	0.00128				
Total PeCDFs	ND	0.00538				
Total HxCDFs	ND	0.00538				
Total HpCDFs	ND	0.00538				
WHO-2005 TEQ (ND=0)	0.0000185		0.0000185			
WHO-2005 TEQ (ND=½)	0.00677		0.00677			

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F51154-8		Weight / Volume:	929 mL	
			Solids / Lipids:	NA	%
			Original pH :	8	
Laboratory Information			Batch ID:	WG14381	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-3C		Filename:	a27jul07a_3-10	
Collection Date/Time:	07/18/07	11:45	Retchk:	a27jul07a_2-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a27jul07a_2-14	
Extraction Date:	07/26/07		End ConCal:	a27jul07a_3-12	
Analysis Date/Time:	07/28/07	21:52	Initial Cal:	m8290-071007a	

Form I Copy

SGS Environmental Services

Method 8290
F51154-8
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.34	67.0	31:39	0.77	
13C12-1,2,3,7,8-PeCDD	2.0	1.30	65.1	34:25	1.60	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.37	68.6	37:10	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.49	74.3	40:39	1.06	
13C12-OCDD	4.0	3.16	79.1	45:07	0.90	
13C12-2,3,7,8-TCDF	2.0	1.51	75.7	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.28	63.9	33:37	1.60	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.34	66.8	36:28	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.43	71.4	39:21	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.329	82.1	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.291	72.8	34:13	1.64	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.301	75.1	37:06	1.29	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.319	79.7	36:22	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.297	74.3	41:19	0.42	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.27	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F51154-8		Weight / Volume:	929 mL	
			Solids / Lipids:	NA	%
			Original pH :	8	
Laboratory Information			Batch ID:	WG14381	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-3C		Filename:	a27jul07a_3-10	
Collection Date/Time:	07/18/07	11:45	Retchk:	a27jul07a_2-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a27jul07a_2-14	
Extraction Date:	07/26/07		End ConCal:	a27jul07a_3-12	
Analysis Date/Time:	07/28/07	21:52	Initial Cal:	m8290-071007a	

FormVersion:[8290_DB_2.14]Report

Analyzed by: JWO
Date: 08/09/07

Reviewed by: [illegible]
Date: 8/9/07

Form I Corr

Method 8290
F51154-9
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	EMPC	~~0.438~~	0.748 J	31:40	0.98	*	A
1,2,3,7,8-PeCDD	ND	1.43					
1,2,3,4,7,8-HxCDD	ND	1.43					
1,2,3,6,7,8-HxCDD	ND	1.43					
1,2,3,7,8,9-HxCDD	3.18 J			37:28	1.30		A
1,2,3,4,6,7,8-HpCDD	46.7			40:42	1.05		
OCDD	2080			45:13	0.89		
2,3,7,8-TCDF	EMPC	~~0.637~~	1.55 J	31:09	0.91	*	A
1,2,3,7,8-PeCDF	2.90 J			33:37	1.61		A
2,3,4,7,8-PeCDF	1.40 J			34:16	1.39		A
1,2,3,4,7,8-HxCDF	8.37 J			36:24	1.27		A
1,2,3,6,7,8-HxCDF	4.78 J			36:30	1.34		A
2,3,4,6,7,8-HxCDF	1.49 J			37:01	1.35		A
1,2,3,7,8,9-HxCDF	ND	1.43					
1,2,3,4,6,7,8-HpCDF	62.2			39:22	1.03		
1,2,3,4,7,8,9-HpCDF	1.26 J			41:22	1.07		A
OCDF	53.9			45:31	0.86		
Total TCDDs	~~2.77~~		3.52 J				
Total PeCDDs	4.57						
Total HxCDDs	~~13.0~~		13.5 J				
Total HpCDDs	99.0						
Total TCDFs	~~16.5~~		27.6 J				
Total PeCDFs	~~30.6~~		32.6 J				
Total HxCDFs	~~43.3~~		45.3 J				
Total HpCDFs	75.6						
WHO-2005 TEQ (ND=0)	4.03		4.93				
WHO-2005 TEQ (ND=½)	5.21		5.86				

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-9		Weight / Volume:	10.07 g	
			Solids / Lipids:	34.8	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-4B		Filename:	a30jul07a-8	
Collection Date/Time:	07/18/07	10:50	Retchk:	a30jul07a-1	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1	
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15	
Analysis Date/Time:	07/30/07	22:42	Initial Cal:	m8290-071007a	

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SGS Environmental Services

Method 8290
F51154-9
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.46	73.0	31:40	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.41	70.3	34:25	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.57	78.3	37:12	1.27	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.67	83.3	40:40	1.07	
13C12-OCDD	4.0	3.42	85.5	45:10	0.90	
13C12-2,3,7,8-TCDF	2.0	1.69	84.7	31:07	0.80	
13C12-1,2,3,7,8-PeCDF	2.0	1.37	68.7	33:37	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.41	70.7	36:30	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.52	76.1	39:22	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.341	85.3	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.253	63.1	34:15	1.62	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.297	74.1	37:07	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.299	74.6	36:24	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.289	72.3	41:22	0.42	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:15	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:28	1.25	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-9		Weight / Volume:	10.07 g	
			Solids / Lipids:	34.8	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-4B		Filename:	a30jul07a-8	
Collection Date/Time:	07/18/07	10:50	Retchk:	a30jul07a-1	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1	
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15	
Analysis Date/Time:	07/30/07	22:42	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: JWF
Date: 08/09/07

Reviewed by: DM
Date: 8/9/07

Form 1 Copy

SGS Environmental Services

Method 8290
F51154-10
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	EMPC	~~0.177~~	0.280 J	31:40	0.53	*	A
1,2,3,7,8-PeCDD	EMPC	~~0.564~~	0.259 J	34:27	1.80	*	A
1,2,3,4,7,8-HxCDD	0.316 J			37:07	1.08		A
1,2,3,6,7,8-HxCDD	EMPC	~~0.564~~	0.595 J	37:12	0.99	*	A
1,2,3,7,8,9-HxCDD	1.01 J			37:28	1.21		A
1,2,3,4,6,7,8-HpCDD	20.8			40:40	1.05		
OCDD	897			45:13	0.89		
2,3,7,8-TCDF	0.866 J			31:09	0.68		A
1,2,3,7,8-PeCDF	1.15 J			33:37	1.48		A
2,3,4,7,8-PeCDF	0.633 J			34:15	1.65		A
1,2,3,4,7,8-HxCDF	3.07 J			36:24	1.32		A
1,2,3,6,7,8-HxCDF	1.88 J			36:30	1.19		A
2,3,4,6,7,8-HxCDF	0.482 J			37:00	1.21		A
1,2,3,7,8,9-HxCDF	EMPC	~~0.564~~	0.189 J	37:49	1.67	*	A
1,2,3,4,6,7,8-HpCDF	22.2			39:22	1.05		
1,2,3,4,7,8,9-HpCDF	0.498 J			41:22	1.11		A
OCDF	20.8			45:31	0.87		
Total TCDDs	ND	~~0.177~~	0.280 J				
Total PeCDDs	1.59		2.15 J				
Total HxCDDs	6.16		6.76 J				
Total HpCDDs	44.4						
Total TCDFs	8.67		10.3 J				
Total PeCDFs	12.0		13.0 J				
Total HxCDFs	16.3						
Total HpCDFs	27.2						
WHO-2005 TEQ (ND=0)	1.70		2.31				
WHO-2005 TEQ (ND=½)	2.12		2.31				

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-10		Weight / Volume:	12.20 g	
			Solids / Lipids:	72.7	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-5B		Filename:	a30jul07a-9	
Collection Date/Time:	07/18/07	11:15	Retchk:	a30jul07a-1	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1	
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15	
Analysis Date/Time:	07/30/07	23:30	Initial Cal:	m8290-071007a	

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SGS Environmental Services

Method 8290
F51154-10
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.48	73.9	31:40	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.32	65.8	34:25	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.49	74.6	37:12	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.60	79.8	40:40	1.06	
13C12-OCDD	4.0	3.08	77.0	45:10	0.89	
13C12-2,3,7,8-TCDF	2.0	1.62	80.9	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.34	66.9	33:37	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.39	69.5	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.46	73.1	39:22	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.342	85.6	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.264	66.0	34:15	1.62	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.317	79.2	37:07	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.291	72.7	36:22	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.285	71.4	41:22	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:15	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:28	1.25	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-10		Weight / Volume:	12.20 g	
			Solids / Lipids:	72.7	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-5B		Filename:	a30jul07a-9	
Collection Date/Time:	07/18/07	11:15	Retchk:	a30jul07a-1	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1	
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15	
Analysis Date/Time:	07/30/07	23:30	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: JW
Date: 080907

Reviewed by: DLD
Date: 8/9/07

for 5 cm

SGS Environmental Services

Method 8290
F51154-11
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	EMPC	~~0.303~~	0.573 J	31:40	0.44	*	A
1,2,3,7,8-PeCDD	0.601			34:25	1.67		A
1,2,3,4,7,8-HxCDD	EMPC	~~1.35~~	0.805 J	37:07	1.50	*	A
1,2,3,6,7,8-HxCDD	EMPC	~~1.37~~	1.41 J	37:12	1.61	*	A
1,2,3,7,8,9-HxCDD	1.71 J			37:28	1.32		A
1,2,3,4,6,7,8-HpCDD	44.5			40:40	1.05		
OCDD	1790			45:10	0.89		
2,3,7,8-TCDF	1.58 J			31:09	0.78		A
1,2,3,7,8-PeCDF	2.68 J			33:37	1.60		A
2,3,4,7,8-PeCDF	1.27 J			34:15	1.74		A
1,2,3,4,7,8-HxCDF	7.44 J			36:22	1.22		A
1,2,3,6,7,8-HxCDF	4.60 J			36:28	1.24		A
2,3,4,6,7,8-HxCDF	1.68 J			37:00	1.27		A
1,2,3,7,8,9-HxCDF	0.541 J			37:48	1.15		A
1,2,3,4,6,7,8-HpCDF	58.6			39:22	1.04		
1,2,3,4,7,8,9-HpCDF	1.06 J			41:22	1.10		A
OCDF	48.4			45:28	0.88		
Total TCDDs	~~0.424~~		1.93 J				
Total PeCDDs	~~3.69~~		4.37 J				
Total HxCDDs	~~13.0~~		14.4 J				
Total HpCDDs	96.3						
Total TCDFs	~~17.2~~		19.3 J				
Total PeCDFs	~~27~~.1		28.1 J				
Total HxCDFs	41.0						
Total HpCDFs	69.2						
WHO-2005 TEQ (ND=0)	4.41		5.21				
WHO-2005 TEQ (ND=½)	4.70		5.21				

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-11		Weight / Volume:	10.42 g
			Solids / Lipids:	47.9 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14383
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-6B		Filename:	a30jul07a-10
Collection Date/Time:	07/18/07	12:00	Retchk:	a30jul07a-1
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15
Analysis Date/Time:	07/31/07	0:19	Initial Cal:	m8290-071007a

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SGS Environmental Services

Method 8290
F51154-11
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards		-				
13C12-2,3,7,8-TCDD	2.0	1.46	72.8	31:39	0.77	
13C12-1,2,3,7,8-PeCDD	2.0	1.39	69.6	34:25	1.60	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.53	76.3	37:12	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.63	81.6	40:39	1.05	
13C12-OCDD	4.0	3.25	81.4	45:10	0.90	
13C12-2,3,7,8-TCDF	2.0	1.64	82.2	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.35	67.6	33:37	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.41	70.5	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.48	73.8	39:22	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.400	99.9	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.308	77.0	34:13	1.61	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.340	85.0	37:07	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.359	89.8	36:22	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.346	86.4	41:21	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:15	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.26	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-11		Weight / Volume:	10.42 g	
			Solids / Lipids:	47.9	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-6B		Filename:	a30jul07a-10	
Collection Date/Time:	07/18/07	12:00	Retchk:	a30jul07a-1	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1	
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15	
Analysis Date/Time:	07/31/07	0:19	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: JW
Date: 08/8/07

Reviewed by: DD
Date: 8/9/07

Form I Cont

SGS Environmental Services

Method 8290
F51154-15
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	2.38			31:40	0.76	
1,2,3,7,8-PeCDD	7.55 J			34:25	1.57	A
1,2,3,4,7,8-HxCDD	7.83 J			37:07	1.31	A
1,2,3,6,7,8-HxCDD	19.0			37:13	1.35	
1,2,3,7,8,9-HxCDD	17.5			37:28	1.28	
1,2,3,4,6,7,8-HpCDD	571			40:40	1.05	
OCDD	5030			45:10	0.89	
2,3,7,8-TCDF	5.58 J			31:09	0.69	
1,2,3,7,8-PeCDF	5.73 J			33:37	1.65	A
2,3,4,7,8-PeCDF	10.6 J			34:15	1.64	
1,2,3,4,7,8-HxCDF	19.8			36:22	1.25	
1,2,3,6,7,8-HxCDF	10.8 J			36:28	1.27	
2,3,4,6,7,8-HxCDF	11.7 J			37:00	1.38	
1,2,3,7,8,9-HxCDF	2.39 J			37:48	1.21	A
1,2,3,4,6,7,8-HpCDF	132			39:22	1.04	
1,2,3,4,7,8,9-HpCDF	5.24 J			41:22	1.17	A
OCDF	385			45:28	0.88	
Total TCDDs	37.9					
Total PeCDDs	69.9					
Total HxCDDs	200					
Total HpCDDs	1060					
Total TCDFs	~~132~~		140 J			
Total PeCDFs	~~137~~		137 J			
Total HxCDFs	~~158~~		163 J			
Total HpCDFs	328					
WHO-2005 TEQ (ND=0)	31.4		31.4			
WHO-2005 TEQ (ND=½)	31.4		31.4			

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-15		Weight / Volume:	10.10 g	
			Solids / Lipids:	60.8	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-8B		Filename:	a30jul07a-11	
Collection Date/Time:	07/19/07	11:30	Retchk:	a30jul07a-1	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1	
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15	
Analysis Date/Time:	07/31/07	1:07	Initial Cal:	m8290-071007a	

Form I Cont

SGS Environmental Services

Method 8290
F51154-15
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.48	73.9	31:39	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.41	70.7	34:25	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.56	78.0	37:12	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.67	83.5	40:39	1.07	
13C12-OCDD	4.0	3.37	84.3	45:10	0.89	
13C12-2,3,7,8-TCDF	2.0	1.63	81.4	31:07	0.78	
13C12-1,2,3,7,8-PeCDF	2.0	1.37	68.6	33:37	1.60	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.42	70.8	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.50	75.2	39:22	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.342	85.5	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.258	64.5	34:13	1.61	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.301	75.2	37:06	1.28	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.307	76.7	36:22	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.295	73.9	41:21	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:15	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.26	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-15		Weight / Volume:	10.10 g	
			Solids / Lipids:	60.8	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-8B		Filename:	a30jul07a-11	
Collection Date/Time:	07/19/07	11:30	Retchk:	a30jul07a-1	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1	
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15	
Analysis Date/Time:	07/31/07	1:07	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: JMC
Date: 080907

Reviewed by: [signature]
Date: 8/4/07

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SGS Environmental Services

Method 8290
F51154-16
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	1.72			31:40	0.67	
1,2,3,7,8-PeCDD	5.77 J			34:25	1.60	A
1,2,3,4,7,8-HxCDD	6.23			37:07	1.35	
1,2,3,6,7,8-HxCDD	18.8			37:13	1.24	
1,2,3,7,8,9-HxCDD	16.2			37:28	1.29	
1,2,3,4,6,7,8-HpCDD	734			40:40	1.04	
OCDD	6660 J			45:10	0.89	E
2,3,7,8-TCDF	3.02 J			31:09	0.77	
1,2,3,7,8-PeCDF	3.09 J			33:37	1.66	A
2,3,4,7,8-PeCDF	3.83 J			34:15	1.60	A
1,2,3,4,7,8-HxCDF	15.8			36:22	1.31	
1,2,3,6,7,8-HxCDF	5.85 J			36:28	1.25	A
2,3,4,6,7,8-HxCDF	4.61 J			37:00	1.27	A
1,2,3,7,8,9-HxCDF	1.12 J			37:49	1.38	A
1,2,3,4,6,7,8-HpCDF	139			39:22	1.03	
1,2,3,4,7,8,9-HpCDF	4.97 J			41:22	1.02	A
OCDF	416			45:28	0.89	
Total TCDDs	~~27.8~~		28.8 J			
Total PeCDDs	57.4					
Total HxCDDs	186					
Total HpCDDs	1310					
Total TCDFs	~~53.8 J~~		54.3 J			
Total PeCDFs	~~51.7 J~~		58.1 J			
Total HxCDFs	113					
Total HpCDFs	333					
WHO-2005 TEQ (ND=0)	26.8		26.8			
WHO-2005 TEQ (ND=½)	26.8		26.8			

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-16		Weight / Volume:	11.67 g	
			Solids / Lipids:	70.5	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-9B		Filename:	a30jul07a-12	
Collection Date/Time:	07/19/07	10:30	Retchk:	a30jul07a-1	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1	
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15	
Analysis Date/Time:	07/31/07	1:55	Initial Cal:	m8290-071007a	

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SGS Environmental Services

Method 8290
F51154-16
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.50	75.0	31:39	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.41	70.7	34:25	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.58	78.8	37:12	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.68	83.8	40:39	1.06	
13C12-OCDD	4.0	3.62	90.4	45:10	0.90	
13C12-2,3,7,8-TCDF	2.0	1.67	83.5	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.40	70.1	33:37	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.45	72.5	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.55	77.4	39:22	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.383	95.7	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.286	71.5	34:13	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.336	84.0	37:06	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.346	86.6	36:22	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.330	82.5	41:22	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:15	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.26	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-16		Weight / Volume:	11.67 g	
			Solids / Lipids:	70.5	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-9B		Filename:	a30jul07a-12	
Collection Date/Time:	07/19/07	10:30	Retchk:	a30jul07a-1	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1	
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15	
Analysis Date/Time:	07/31/07	1:55	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: JWP
Date: 080907

Reviewed by: [illegible]
Date: 8/9/07

Form I Copy

Method 8290
F51154-17
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00175				
1,2,3,7,8-PeCDD	ND	0.00593				
1,2,3,4,7,8-HxCDD	ND	0.00593				
1,2,3,6,7,8-HxCDD	ND	0.00593				
1,2,3,7,8,9-HxCDD	ND	0.00593				
1,2,3,4,6,7,8-HpCDD	EMPC	~~0.00593~~	0.00503 J	40:39	0.88 *	A
OCDD	0.0423 K			45:10	0.87	A
2,3,7,8-TCDF	ND	0.00153				
1,2,3,7,8-PeCDF	ND	0.00593				
2,3,4,7,8-PeCDF	ND	0.00593				
1,2,3,4,7,8-HxCDF	ND	0.00593				
1,2,3,6,7,8-HxCDF	ND	0.00593				
2,3,4,6,7,8-HxCDF	ND	0.00593				
1,2,3,7,8,9-HxCDF	ND	0.00593				
1,2,3,4,6,7,8-HpCDF	0.00204 J			39:21	1.18	A
1,2,3,4,7,8,9-HpCDF	ND	0.00593				
OCDF	0.00586 J			45:28	0.79	A
Total TCDDs	ND	0.00175				
Total PeCDDs	ND	0.00593				
Total HxCDDs	ND	0.00593				
Total HpCDDs	~~0.00446~~		0.00949 J			
Total TCDFs	~~0.00382~~		0.00622 J			
Total PeCDFs	ND	~~0.00593~~	0.00202 J			
Total HxCDFs	ND	0.00593				
Total HpCDFs	~~0.00204~~		0.00422 J			
WHO-2005 TEQ (ND=0)	0.0000348		0.0000851			
WHO-2005 TEQ (ND=½)	0.00707		0.00709			

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F51154-17		Weight / Volume:	843 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14381
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-10C		Filename:	a30jul07a_2-4
Collection Date/Time:	07/19/07	11:20	Retchk:	a30jul07a-15
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-15
Extraction Date:	07/26/07		End ConCal:	a30jul07a_2-11
Analysis Date/Time:	07/31/07	7:38	Initial Cal:	m8290-071007a

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Method 8290
F51154-17
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.47	73.6	31:39	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.46	73.2	34:25	1.60	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.66	83.1	37:10	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.76	88.1	40:37	1.06	
13C12-OCDD	4.0	3.84	95.9	45:07	0.89	
13C12-2,3,7,8-TCDF	2.0	1.68	84.2	31:06	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.41	70.6	33:37	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.51	75.6	36:28	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.66	83.2	39:21	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.360	89.9	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.276	69.1	34:13	1.63	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.322	80.5	37:06	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.341	85.3	36:22	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.326	81.5	41:21	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:25	1.25	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F51154-17		Weight / Volume:	843 mL	
			Solids / Lipids:	NA	%
			Original pH :	8	
Laboratory Information			Batch ID:	WG14381	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-10C		Filename:	a30jul07a_2-4	
Collection Date/Time:	07/19/07	11:20	Retchk:	a30jul07a-15	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-15	
Extraction Date:	07/26/07		End ConCal:	a30jul07a_2-11	
Analysis Date/Time:	07/31/07	7:38	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: JWP
Date: 08/2/07

Reviewed by: [illegible]
Date: 8/9/07

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SGS Environmental Services

Method 8290
F51154-18
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	EMPC	~~0.168~~	0.191 J	31:39	0.62	*	A
1,2,3,7,8-PeCDD	0.875 J			34:25	1.45		A
1,2,3,4,7,8-HxCDD	1.53 J			37:07	1.18		A
1,2,3,6,7,8-HxCDD	4.08 J			37:12	1.28		A
1,2,3,7,8,9-HxCDD	4.19 J			37:27	1.29		A
1,2,3,4,6,7,8-HpCDD	178			40:40	1.04		
OCDD	2180			45:09	0.90		
2,3,7,8-TCDF	0.509 B			31:07	0.87		A
1,2,3,7,8-PeCDF	0.238 J			33:37	1.56		A
2,3,4,7,8-PeCDF	EMPC	~~0.561~~	0.0965 J	34:19	1.09	*	A
1,2,3,4,7,8-HxCDF	0.938 B			36:22	1.32		A
1,2,3,6,7,8-HxCDF	0.763 J			36:28	1.30		A
2,3,4,6,7,8-HxCDF	0.965 J			36:58	1.29		A
1,2,3,7,8,9-HxCDF	ND	0.561					
1,2,3,4,6,7,8-HpCDF	37.6			39:22	1.06		
1,2,3,4,7,8,9-HpCDF	1.14 J			41:22	1.11		A
OCDF	115			45:28	0.90		
Total TCDDs	ND	~~0.168~~	1.30 J				
Total PeCDDs	3.04		3.27 J				
Total HxCDDs	27.3						
Total HpCDDs	304						
Total TCDFs	3.13		3.48 J				
Total PeCDFs	5.63		5.80 J				
Total HxCDFs	23.2		23.4 J				
Total HpCDFs	95.5		95.9 J				
WHO-2005 TEQ (ND=0)	5.04		5.26				
WHO-2005 TEQ (ND=½)	5.23		5.28				

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-18		Weight / Volume:	10.39 g
			Solids / Lipids:	85.8 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14383
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-13B		Filename:	a30jul07a-13
Collection Date/Time:	07/19/07	14:45	Retchk:	a30jul07a-1
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15
Analysis Date/Time:	07/31/07	2:44	Initial Cal:	m8290-071007a

Form I Conf

Method 8290
F51154-18
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.42	71.2	31:39	0.77	
13C12-1,2,3,7,8-PeCDD	2.0	1.43	71.5	34:25	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.54	77.1	37:12	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.65	82.6	40:39	1.07	
13C12-OCDD	4.0	3.48	86.9	45:09	0.89	
13C12-2,3,7,8-TCDF	2.0	1.59	79.5	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.36	68.2	33:37	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.43	71.4	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.50	74.8	39:21	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.331	82.7	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.255	63.7	34:13	1.63	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.315	78.8	37:06	1.29	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.295	73.7	36:22	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.290	72.5	41:21	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:15	0.77	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.25	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-18		Weight / Volume:	10.39 g	
			Solids / Lipids:	85.8	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-13B		Filename:	a30jul07a-13	
Collection Date/Time:	07/19/07	14:45	Retchk:	a30jul07a-1	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1	
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15	
Analysis Date/Time:	07/31/07	2:44	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: JMP
Date: 080907

Reviewed by: MM
Date: 8/9/07

Form I Cont

Method 8290
F51154-20
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00236				
1,2,3,7,8-PeCDD	ND	0.00609				
1,2,3,4,7,8-HxCDD	ND	0.00609				
1,2,3,6,7,8-HxCDD	ND	0.00609				
1,2,3,7,8,9-HxCDD	ND	0.00609				
1,2,3,4,6,7,8-HpCDD	0.00448 J			40:39	1.19	A
OCDD	0.0295 J			45:09	0.92	A
2,3,7,8-TCDF	ND	0.00200				
1,2,3,7,8-PeCDF	0.00178 J			33:37	1.58	A
2,3,4,7,8-PeCDF	ND	0.00609				
1,2,3,4,7,8-HxCDF	ND	0.00609				
1,2,3,6,7,8-HxCDF	ND	0.00609				
2,3,4,6,7,8-HxCDF	ND	0.00609				
1,2,3,7,8,9-HxCDF	ND	0.00609				
1,2,3,4,6,7,8-HpCDF	ND	0.00609				
1,2,3,4,7,8,9-HpCDF	ND	0.00609				
OCDF	ND	0.0122				
Total TCDDs	ND	0.00236				
Total PeCDDs	ND	0.00609				
Total HxCDDs	ND	0.00609				
Total HpCDDs	0.00448 J					
Total TCDFs	ND	0.00200				
Total PeCDFs	~~0.00178~~		0.00373 J			
Total HxCDFs	ND	0.00609				
Total HpCDFs	ND	0.00609				
WHO-2005 TEQ (ND=0)	0.000107		0.000107			
WHO-2005 TEQ (ND=½)	0.00754		0.00754			

Client Information			Sample Information	
Project Name:	F51154		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F51154-20		Weight / Volume:	821 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14381
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-14C		Filename:	a30jul07a_2-7
Collection Date/Time:	07/19/07	11:20	Retchk:	a30jul07a-15
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-15
Extraction Date:	07/26/07		End ConCal:	a30jul07a_2-11
Analysis Date/Time:	07/31/07	10:03	Initial Cal:	m8290-071007a

Form I Cont

Method 8290
F51154-20
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.39	69.3	31:39	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.45	72.4	34:25	1.57	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.55	77.7	37:10	1.24	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.73	86.4	40:37	1.06	
13C12-OCDD	4.0	3.70	92.5	45:07	0.89	
13C12-2,3,7,8-TCDF	2.0	1.58	78.9	31:06	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.37	68.6	33:37	1.60	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.45	72.6	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.57	78.4	39:21	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.341	85.2	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.303	75.8	34:13	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.338	84.4	37:04	1.33	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.320	80.1	36:22	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.310	77.6	41:21	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:25	1.26	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F51154-20		Weight / Volume:	821 mL	
			Solids / Lipids:	NA	%
			Original pH :	8	
Laboratory Information			Batch ID:	WG14381	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-14C		Filename:	a30jul07a_2-7	
Collection Date/Time:	07/19/07	11:20	Retchk:	a30jul07a-15	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-15	
Extraction Date:	07/26/07		End ConCal:	a30jul07a_2-11	
Analysis Date/Time:	07/31/07	10:03	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: JLW
Date: 08/8/07

Reviewed by: [illegible]
Date: 8/9/07

Form I Cay

Method 8290
F51154-22
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	ND	0.181					
1,2,3,7,8-PeCDD	ND	0.594					
1,2,3,4,7,8-HxCDD	0.214 J			37:07	1.33		A
1,2,3,6,7,8-HxCDD	0.537 J			37:10	1.29		A
1,2,3,7,8,9-HxCDD	1.27 J			37:27	1.30		A
1,2,3,4,6,7,8-HpCDD	27.9			40:40	1.04		
OCDD	1710			45:10	0.89		
2,3,7,8-TCDF	0.492 B			31:07	0.86		A
1,2,3,7,8-PeCDF	0.235 J			33:37	1.52		A
2,3,4,7,8-PeCDF	EMPC	~~0.594~~	0.356 J	34:15	1.86	*	A
1,2,3,4,7,8-HxCDF	0.801 B			36:22	1.21		A
1,2,3,6,7,8-HxCDF	0.297 J			36:28	1.29		A
2,3,4,6,7,8-HxCDF	EMPC	~~0.594~~	0.342 J	36:58	1.50	*	A
1,2,3,7,8,9-HxCDF	ND	0.594					
1,2,3,4,6,7,8-HpCDF	4.20 B			39:21	1.08		A
1,2,3,4,7,8,9-HpCDF	0.361 J			41:21	0.91		A
OCDF	11.2 B			45:28	0.86		A
Total TCDDs	ND	0.181					
Total PeCDDs	0.268						
Total HxCDDs	8.65						
Total HpCDDs	65.9						
Total TCDFs	~~2.38~~		2.55 J				
Total PeCDFs	~~2.56~~		3.10 J				
Total HxCDFs	~~4.74~~		5.08 J				
Total HpCDFs	10.5						
WHO-2005 TEQ (ND=0)	1.21		1.35				
WHO-2005 TEQ (ND=½)	1.75		1.77				

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-22		Weight / Volume:	10.64 g
			Solids / Lipids:	79.1 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14383
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-15B		Filename:	a30jul07a-14
Collection Date/Time:	07/19/07	7:00	Retchk:	a30jul07a-1
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15
Analysis Date/Time:	07/31/07	3:32	Initial Cal:	m8290-071007a

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SGS Environmental Services

Method 8290
F51154-22
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.31	65.7	31:39	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.32	66.2	34:25	1.60	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.43	71.7	37:10	1.29	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.52	75.9	40:37	1.05	
13C12-OCDD	4.0	3.10	77.5	45:07	0.89	
13C12-2,3,7,8-TCDF	2.0	1.48	73.9	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.27	63.3	33:37	1.61	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.32	66.1	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.36	68.1	39:21	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.310	77.4	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.249	62.2	34:13	1.66	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.279	69.7	37:06	1.09	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.276	69.0	36:22	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.270	67.5	41:21	0.42	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.25	

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-22		Weight / Volume:	10.64 g
			Solids / Lipids:	79.1 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14383
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-15B		Filename:	a30jul07a-14
Collection Date/Time:	07/19/07	7:00	Retchk:	a30jul07a-1
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-1
Extraction Date:	07/29/07		End ConCal:	a30jul07a-15
Analysis Date/Time:	07/31/07	3:32	Initial Cal:	m8290-071007a

Report Version: [8290_DB_2.14] Report

Analyzed by: JW
Date: 08-09-07

Reviewed by: RW
Date: 8/9/07

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SGS Environmental Services

Method 8290
F51154-23
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	EMPC	~~0.160~~	0.198 J	31:40	0.64 *	A
1,2,3,7,8-PeCDD	3.72 J			34:27	1.55	A
1,2,3,4,7,8-HxCDD	8.98			37:07	1.26	
1,2,3,6,7,8-HxCDD	29.3			37:12	1.28	
1,2,3,7,8,9-HxCDD	22.2			37:28	1.30	
1,2,3,4,6,7,8-HpCDD	1110			40:40	1.04	
OCDD	10000 J			45:10	0.90	E
2,3,7,8-TCDF	1.19			31:09	0.77	
1,2,3,7,8-PeCDF	1.45 J			33:37	1.52	A
2,3,4,7,8-PeCDF	0.348 J			34:19	1.44	A
1,2,3,4,7,8-HxCDF	8.47			36:24	1.23	
1,2,3,6,7,8-HxCDF	6.38			36:30	1.27	
2,3,4,6,7,8-HxCDF	8.25			37:00	1.28	
1,2,3,7,8,9-HxCDF	1.30 J			37:49	1.15	A
1,2,3,4,6,7,8-HpCDF	214			39:22	1.05	
1,2,3,4,7,8,9-HpCDF	13.7			41:22	1.10	
OCDF	736			45:28	0.89	
Total TCDDs	~~5.11~~		5.67 J			
Total PeCDDs	14.4					
Total HxCDDs	~~147~~		148 J			
Total HpCDDs	1670					
Total TCDFs	~~13.6~~		15.6 J			
Total PeCDFs	~~45.4~~		46.3 J			
Total HxCDFs	221					
Total HpCDFs	719					
WHO-2005 TEQ (ND=0)	29.1		29.3			
WHO-2005 TEQ (ND=½)	29.2		29.3			

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-23		Weight / Volume:	11.02 g
			Solids / Lipids:	89.6 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14383
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-16B		Filename:	a30jul07a_2-2
Collection Date/Time:	07/19/07	7:55	Retchk:	a30jul07a-15
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-15
Extraction Date:	07/29/07		End ConCal:	a30jul07a_2-11
Analysis Date/Time:	07/31/07	6:01	Initial Cal:	m8290-071007a

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SGS Environmental Services

Method 8290
F51154-23
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.50	75.2	31:40	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.46	72.8	34:25	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.57	78.3	37:12	1.24	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.70	84.8	40:39	1.05	
13C12-OCDD	4.0	3.50	87.4	45:10	0.89	
13C12-2,3,7,8-TCDF	2.0	1.74	87.1	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.41	70.7	33:37	1.60	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.44	72.1	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.52	76.2	39:22	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.348	87.0	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.294	73.6	34:15	1.62	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.309	77.2	37:07	1.42	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.297	74.4	36:22	0.49	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.278	69.5	41:21	0.41	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:16	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.26	

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-23		Weight / Volume:	11.02 g
			Solids / Lipids:	89.6 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14383
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-16B		Filename:	a30jul07a_2-2
Collection Date/Time:	07/19/07	7:55	Retchk:	a30jul07a-15
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-15
Extraction Date:	07/29/07		End ConCal:	a30jul07a_2-11
Analysis Date/Time:	07/31/07	6:01	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 8/8/07

Reviewed by: _____
Date: 8/9/07

Form I copy

TCDF Confirmation - Method 8290
F51154-23
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	1.71	0.274		20.84	0.79	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.83	0.78	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-23		Weight / Volume:	11.02	g
			Solids / Lipids:	89.63	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	hrms3	
Sample ID:	G383-583-16B		Filename:	c11aug07a-8	
Collection Date/Time:	07/19/07	7:55	Retchk:	c11aug07a-2	
Receipt Date:	07/21/07	10:35	Begin ConCal:	c11aug07a-1	
Extraction Date:	07/29/07		End ConCal:	c11aug07a-25	
Analysis Date/Time:	08/11/07	13:07	Initial Cal:	mcf-c041807a	

Analyzed by: JWP
Date: 081307

Reviewed by: [signature]
Date: 8/13/07

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Method 8290
F51154-24
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	0.318 J			31:40	0.69		A
1,2,3,7,8-PeCDD	1.91 J			34:25	1.64		A
1,2,3,4,7,8-HxCDD	4.29 J			37:07	1.41		A
1,2,3,6,7,8-HxCDD	13.6			37:12	1.27		
1,2,3,7,8,9-HxCDD	11.7			37:28	1.26		
1,2,3,4,6,7,8-HpCDD	549			40:40	1.04		
OCDD	6510 J			45:10	0.90		E
2,3,7,8-TCDF	1.44			31:07	0.88		
1,2,3,7,8-PeCDF	1.80 J			33:37	1.74		A
2,3,4,7,8-PeCDF	EMPC	~~0.537~~	0.189 J	34:19	1.17	*	A
1,2,3,4,7,8-HxCDF	5.21 J			36:24	1.24		A
1,2,3,6,7,8-HxCDF	3.66 J			36:30	1.30		A
2,3,4,6,7,8-HxCDF	4.48 J			37:00	1.23		A
1,2,3,7,8,9-HxCDF	0.833 J			37:49	1.09		A
1,2,3,4,6,7,8-HpCDF	101			39:22	1.05		
1,2,3,4,7,8,9-HpCDF	7.64			41:22	1.01		
OCDF	389			45:28	0.89		
Total TCDDs	~~18.3~~		18.6 J				
Total PeCDDs	10.3						
Total HxCDDs	~~76.9~~		77.8 J				
Total HpCDDs	871						
Total TCDFs	~~17.4~~		17.8 J				
Total PeCDFs	~~29.1~~		30.0 J				
Total HxCDFs	101						
Total HpCDFs	325						
WHO-2005 TEQ (ND=0)	15.4		15.5				
WHO-2005 TEQ (ND=½)	15.5		15.5				

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-24		Weight / Volume:	10.22 g	
			Solids / Lipids:	91.2	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-17B		Filename:	a30jul07a_2-3	
Collection Date/Time:	07/19/07	8:10	Retchk:	a30jul07a-15	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-15	
Extraction Date:	07/29/07		End ConCal:	a30jul07a_2-11	
Analysis Date/Time:	07/31/07	6:50	Initial Cal:	m8290-071007a	

Form I Corp

SGS Environmental Services

Method 8290
F51154-24
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.53	76.4	31:40	0.77	
13C12-1,2,3,7,8-PeCDD	2.0	1.52	75.9	34:25	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.61	80.3	37:12	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.73	86.4	40:39	1.04	
13C12-OCDD	4.0	3.56	88.9	45:09	0.89	
13C12-2,3,7,8-TCDF	2.0	1.78	88.9	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.45	72.3	33:37	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.46	72.9	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.56	78.2	39:21	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.355	88.8	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.299	74.9	34:15	1.63	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.300	74.9	37:06	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.304	76.0	36:22	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.288	72.0	41:21	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:15	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.25	

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-24		Weight / Volume:	10.22 g
			Solids / Lipids:	91.2 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14383
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-17B		Filename:	a30jul07a_2-3
Collection Date/Time:	07/19/07	8:10	Retchk:	a30jul07a-15
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a-15
Extraction Date:	07/29/07		End ConCal:	a30jul07a_2-11
Analysis Date/Time:	07/31/07	6:50	Initial Cal:	m8290-071007a

Report Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 08/01/07

Reviewed by: _____
Date: 8/9/07

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TCDF Confirmation - Method 8290
F51154-24
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	1.95	0.585		20.83	0.77	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.80	0.78	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-24		Weight / Volume:	10.22	g
			Solids / Lipids:	91.19	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14383	
Project ID:	G383-583		Instrument:	hrms3	
Sample ID:	G383-583-17B		Filename:	c11aug07a-9	
Collection Date/Time:	07/19/07	8:10	Retchk:	c11aug07a-2	
Receipt Date:	07/21/07	10:35	Begin ConCal:	c11aug07a-1	
Extraction Date:	07/29/07		End ConCal:	c11aug07a-25	
Analysis Date/Time:	08/11/07	13:31	Initial Cal:	mcf-c041807a	

Analyzed by: JWP
Date: 08/13/07

Reviewed by: [signature]
Date: 8/13/07

Form I Corr

SGS Environmental Services

Method 8290
F51154-25
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	ND	0.198					
1,2,3,7,8-PeCDD	ND	0.553					
1,2,3,4,7,8-HxCDD	0.588 J			37:06	1.13		A
1,2,3,6,7,8-HxCDD	1.60 J			37:12	1.25		A
1,2,3,7,8,9-HxCDD	1.32 J			37:27	1.18		A
1,2,3,4,6,7,8-HpCDD	80.0			40:39	1.04		
OCDD	4540 J			45:09	0.90		E
2,3,7,8-TCDF	0.413 B			31:07	0.81		A
1,2,3,7,8-PeCDF	0.168 J			33:37	1.75		A
2,3,4,7,8-PeCDF	EMPC	~~0.553~~	0.252 B	34:15	1.19	*	A
1,2,3,4,7,8-HxCDF	0.791 J			36:22	1.30		A
1,2,3,6,7,8-HxCDF	0.343 J			36:28	1.20		A
2,3,4,6,7,8-HxCDF	0.422 J			36:58	1.34		A
1,2,3,7,8,9-HxCDF	ND	0.553					
1,2,3,4,6,7,8-HpCDF	10.4			39:21	1.02		
1,2,3,4,7,8,9-HpCDF	0.718 J			41:21	1.05		A
OCDF	30.2			45:27	0.90		
Total TCDDs	~~ND~~	~~0.198~~	1.20 J				
Total PeCDDs	1.13						
Total HxCDDs	~~10.8~~		11.1 J				
Total HpCDDs	147						
Total TCDFs	~~1.45~~		1.59 J				
Total PeCDFs	~~2.68~~		2.94 J				
Total HxCDFs	8.87						
Total HpCDFs	28.9						
WHO-2005 TEQ (ND=0)	2.83		2.91				
WHO-2005 TEQ (ND=½)	3.32		3.31				

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-25		Weight / Volume:	10.40 g	
			Solids / Lipids:	87.0	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14385	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-18B		Filename:	a30jul07a_4-2	
Collection Date/Time:	07/19/07	8:25	Retchk:	a30jul07a_3-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14	
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12	
Analysis Date/Time:	08/01/07	2:21	Initial Cal:	m8290-071007a	

Form I Cdn

SGS Environmental Services

Method 8290
F51154-25
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.52	76.2	31:39	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.54	77.2	34:25	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.57	78.5	37:10	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.67	83.7	40:37	1.06	
13C12-OCDD	4.0	3.36	84.0	45:07	0.90	
13C12-2,3,7,8-TCDF	2.0	1.78	89.0	31:06	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.46	73.1	33:37	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.44	71.8	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.50	75.0	39:19	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.354	88.5	31:39	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.303	75.7	34:13	1.62	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.325	81.4	37:04	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.318	79.5	36:22	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.291	72.8	41:19	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:25	1.25	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-25		Weight / Volume:	10.40 g	
			Solids / Lipids:	87.0	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14385	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-18B		Filename:	a30jul07a_4-2	
Collection Date/Time:	07/19/07	8:25	Retchk:	a30jul07a_3-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14	
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12	
Analysis Date/Time:	08/01/07	2:21	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 8/9/07

Reviewed by: _____
Date: 8/9/07

Form I corr

SGS Environmental Services

Method 8290
F51154-26
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	EMPC	~~0.161~~	0.333 J	31:40	0.57	*	A
1,2,3,7,8-PeCDD	2.89 J			34:25	1.49		A
1,2,3,4,7,8-HxCDD	9.00			37:06	1.25		
1,2,3,6,7,8-HxCDD	26.5			37:10	1.27		
1,2,3,7,8,9-HxCDD	21.0			37:27	1.27		
1,2,3,4,6,7,8-HpCDD	946			40:39	1.04		
OCDD	9640 J			45:09	0.89		E
2,3,7,8-TCDF	0.938 J			31:07	0.74		A
1,2,3,7,8-PeCDF	0.567 J			33:37	1.54		A
2,3,4,7,8-PeCDF	1.04 J			34:15	1.55		A
1,2,3,4,7,8-HxCDF	4.61 J			36:22	1.34		A
1,2,3,6,7,8-HxCDF	3.71 J			36:28	1.18		A
2,3,4,6,7,8-HxCDF	6.00			36:58	1.23		
1,2,3,7,8,9-HxCDF	0.839 J			37:48	1.20		A
1,2,3,4,6,7,8-HpCDF	138			39:21	1.05		
1,2,3,4,7,8,9-HpCDF	10.2			41:21	1.01		
OCDF	367			45:27	0.89		
Total TCDDs	~~3.56~~		4.08 J				
Total PeCDDs	~~13.0~~		13.2 J				
Total HxCDDs	137						
Total HpCDDs	1400						
Total TCDFs	~~7.08~~		8.68 J				
Total PeCDFs	~~24.9~~		25.3 J				
Total HxCDFs	138						
Total HpCDFs	418						
WHO-2005 TEQ (ND=0)	24.4		24.8				
WHO-2005 TEQ (ND=½)	24.5		24.8				

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-26		Weight / Volume:	10.48 g	
			Solids / Lipids:	86.5	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14385	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-19B		Filename:	a30jul07a_4-3	
Collection Date/Time:	07/19/07	8:40	Retchk:	a30jul07a_3-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14	
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12	
Analysis Date/Time:	08/01/07	3:09	Initial Cal:	m8290-071007a	

Form 1 Copy

SGS Environmental Services

Method 8290
F51154-26
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.77	88.3	31:39	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.77	88.5	34:25	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.85	92.3	37:10	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	2.02	101	40:37	1.05	
13C12-OCDD	4.0	4.23	106	45:07	0.89	
13C12-2,3,7,8-TCDF	2.0	1.99	99.5	31:06	0.78	
13C12-1,2,3,7,8-PeCDF	2.0	1.64	82.0	33:37	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.66	83.2	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.76	88.1	39:19	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.410	102	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.351	87.7	34:13	1.58	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.392	98.0	37:06	1.28	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.357	89.3	36:22	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.360	90.0	41:19	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.77	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:25	1.25	

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-26		Weight / Volume:	10.48 g
			Solids / Lipids:	86.5 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14385
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-19B		Filename:	a30jul07a_4-3
Collection Date/Time:	07/19/07	8:40	Retchk:	a30jul07a_3-14
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12
Analysis Date/Time:	08/01/07	3:09	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 8/8/07

Reviewed by: _____
Date: 8/9/07

Form I Corr

SGS Environmental Services

Method 8290
F51154-27
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	EMPC	~~0.178~~	0.236 J	31:39	0.52	*	A
1,2,3,7,8-PeCDD	1.09 J			34:25	1.61		A
1,2,3,4,7,8-HxCDD	2.05 J			37:04	1.28		A
1,2,3,6,7,8-HxCDD	5.92			37:10	1.24		
1,2,3,7,8,9-HxCDD	5.30			37:27	1.20		
1,2,3,4,6,7,8-HpCDD	274			40:39	1.04		
OCDD	17400 J			45:09	0.89		E
2,3,7,8-TCDF	0.424 B			31:07	0.77		A
1,2,3,7,8-PeCDF	0.302 J			33:37	1.53		A
2,3,4,7,8-PeCDF	0.473 J			34:15	1.47		A
1,2,3,4,7,8-HxCDF	2.03 J			36:22	1.14		A
1,2,3,6,7,8-HxCDF	0.963 J			36:28	1.31		A
2,3,4,6,7,8-HxCDF	1.40 J			36:58	1.30		A
1,2,3,7,8,9-HxCDF	0.581 J			37:48	1.23		A
1,2,3,4,6,7,8-HpCDF	46.1			39:21	1.03		
1,2,3,4,7,8,9-HpCDF	2.02 J			41:21	1.03		A
OCDF	150			45:27	0.89		
Total TCDDs	~~1.60~~		1.84 J				
Total PeCDDs	~~4.35~~		5.00 J				
Total HxCDDs	41.5						
Total HpCDDs	490						
Total TCDFs	~~2.21~~		2.42 J				
Total PeCDFs	~~6.76~~		7.31 J				
Total HxCDFs	49.4						
Total HpCDFs	154						
WHO-2005 TEQ (ND=0)	11.6		11.8				
WHO-2005 TEQ (ND=½)	11.7		11.8				

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-27		Weight / Volume:	10.67 g	
			Solids / Lipids:	90.7	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14385	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-20B		Filename:	a30jul07a_4-4	
Collection Date/Time:	07/19/07	9:40	Retchk:	a30jul07a_3-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14	
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12	
Analysis Date/Time:	08/01/07	3:58	Initial Cal:	m8290-071007a	

Form I Corp

SGS Environmental Services

Method 8290
F51154-27
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.59	79.6	31:39	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.60	79.9	34:25	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.68	83.8	37:10	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.77	88.5	40:37	1.05	
13C12-OCDD	4.0	3.76	94.1	45:07	0.90	
13C12-2,3,7,8-TCDF	2.0	1.80	90.2	31:06	0.78	
13C12-1,2,3,7,8-PeCDF	2.0	1.51	75.5	33:37	1.57	
13C12-1,2,3,6,7.8-HxCDF	2.0	1.50	75.2	36:28	0.52	
13C12-1,2.3,4,6,7,8-HpCDF	2.0	1.56	78.1	39:19	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.371	92.6	31:39	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.286	71.4	34:13	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.316	78.9	37:04	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.327	81.7	36:22	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.313	78.3	41:19	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:25	1.25	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-27		Weight / Volume:	10.67 g	
			Solids / Lipids:	90.7	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14385	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-20B		Filename:	a30jul07a_4-4	
Collection Date/Time:	07/19/07	9:40	Retchk:	a30jul07a_3-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14	
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12	
Analysis Date/Time:	08/01/07	3:58	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: JWO
Date: 080907

Reviewed by:
Date: 8/9/07

Form I Cont

Method 8290
F51154-28
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	ND	0.210					
1,2,3,7,8-PeCDD	1.23 J			34:25	1.55		A
1,2,3,4,7,8-HxCDD	1.95 J			37:06	1.24		A
1,2,3,6,7,8-HxCDD	5.26			37:12	1.20		
1,2,3,7,8,9-HxCDD	5.44			37:27	1.24		
1,2,3,4,6,7,8-HpCDD	204			40:39	1.04		
OCDD	7200 J			45:07	0.89		E
2,3,7,8-TCDF	0.413 B			31:07	0.68		A
1,2,3,7,8-PeCDF	EMPC	~~0.496~~	0.254 J	33:37	1.95	*	A
2,3,4,7,8-PeCDF	0.437 J			34:15	1.55		A
1,2,3,4,7,8-HxCDF	2.11 J			36:22	1.27		A
1,2,3,6,7,8-HxCDF	0.840 J			36:28	1.24		A
2,3,4,6,7,8-HxCDF	1.11 J			36:58	1.12		A
1,2,3,7,8,9-HxCDF	0.391 J			37:48	1.21		A
1,2,3,4,6,7,8-HpCDF	33.2			39:21	1.04		
1,2,3,4,7,8,9-HpCDF	1.39 J			41:21	0.96		A
OCDF	79.3			45:25	0.89		
Total TCDDs	1.26						
Total PeCDDs	~~3.87~~		5.17 J				
Total HxCDDs	~~40.0~~		41.3 J				
Total HpCDDs	385						
Total TCDFs	~~2.02~~		2.52 J				
Total PeCDFs	~~5.87~~		6.13 J				
Total HxCDFs	36.2						
Total HpCDFs	~~93.3~~		93.8 J				
WHO-2005 TEQ (ND=0)	7.68		7.69				
WHO-2005 TEQ (ND=½)	7.79		7.79				

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-28		Weight / Volume:	11.03 g
			Solids / Lipids:	91.4 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14385
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-21B		Filename:	a30jul07a_4-5
Collection Date/Time:	07/19/07	9:25	Retchk:	a30jul07a_3-14
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12
Analysis Date/Time:	08/01/07	4:46	Initial Cal:	m8290-071007a

From I Corp

SGS Environmental Services

Method 8290
F51154-28
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.58	79.2	31:37	0.77	
13C12-1,2,3,7,8-PeCDD	2.0	1.64	81.8	34:25	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.66	82.9	37:10	1.23	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.77	88.4	40:37	1.05	
13C12-OCDD	4.0	3.73	93.3	45:07	0.90	
13C12-2,3,7,8-TCDF	2.0	1.82	91.2	31:06	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.52	75.9	33:37	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.52	76.0	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.58	78.9	39:19	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.366	91.4	31:39	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.283	70.6	34:13	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.336	84.0	37:04	1.38	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.321	80.3	36:22	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.316	79.1	41:19	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:25	1.25	

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-28		Weight / Volume:	11.03 g
			Solids / Lipids:	91.4 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14385
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-21B		Filename:	a30jul07a_4-5
Collection Date/Time:	07/19/07	9:25	Retchk:	a30jul07a_3-14
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12
Analysis Date/Time:	08/01/07	4:46	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2 14]Report

Analyzed by: JMP
Date: 080907

Reviewed by: [signature]
Date: 8/8/07

Form I Corp

Method 8290
F51154-29
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	0.231 J			31:40	0.77		A
1,2,3,7,8-PeCDD	2.03 J			34:25	1.58		A
1,2,3,4,7,8-HxCDD	3.47 J			37:06	1.41		A
1,2,3,6,7,8-HxCDD	8.25			37:12	1.28		
1,2,3,7,8,9-HxCDD	9.49			37:27	1.25		
1,2,3,4,6,7,8-HpCDD	269			40:39	1.05		
OCDD	9970 J			45:07	0.90		E
2,3,7,8-TCDF	0.566 B			31:07	0.84		A
1,2,3,7,8-PeCDF	EMPC	~~0.560~~	0.275 J	33:37	1.26	*	A
2,3,4,7,8-PeCDF	0.537 J			34:15	1.52		A
1,2,3,4,7,8-HxCDF	2.10 J			36:22	1.20		A
1,2,3,6,7,8-HxCDF	1.38 J			36:28	1.17		A
2,3,4,6,7,8-HxCDF	1.95 J			36:58	1.27		A
1,2,3,7,8,9-HxCDF	ND	0.560					
1,2,3,4,6,7,8-HpCDF	49.2			39:21	1.04		
1,2,3,4,7,8,9-HpCDF	2.09 J			41:21	1.11		A
OCDF	136			45:25	0.89		
Total TCDDs	1.67						
Total PeCDDs	7.45						
Total HxCDDs	55.3						
Total HpCDDs	461						
Total TCDFs	~~3.62~~		3.91 J				
Total PeCDFs	~~8.05~~		8.48 J				
Total HxCDFs	~~48.3~~		48.5 J				
Total HpCDFs	143						
WHO-2005 TEQ (ND=0)	11.4		11.4				
WHO-2005 TEQ (ND=½)	11.4		11.4				

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-29		Weight / Volume:	10.07 g
			Solids / Lipids:	88.7 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14385
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-22B		Filename:	a30jul07a_4-6
Collection Date/Time:	07/19/07	8:55	Retchk:	a30jul07a_3-14
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12
Analysis Date/Time:	08/01/07	5:35	Initial Cal:	m8290-071007a

Form I Cont

SGS Environmental Services

Method 8290
F51154-29
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.59	79.4	31:39	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.56	78.1	34:25	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.63	81.7	37:10	1.27	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.76	88.1	40:37	1.06	
13C12-OCDD	4.0	3.68	92.1	45:07	0.89	
13C12-2,3,7,8-TCDF	2.0	1.80	89.9	31:06	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.47	73.6	33:37	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.49	74.7	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.56	78.0	39:19	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.355	88.9	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.271	67.8	34:13	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.329	82.2	37:04	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.326	81.5	36:22	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.301	75.2	41:19	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.24	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-29		Weight / Volume:	10.07 g	
			Solids / Lipids:	88.7	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14385	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-22B		Filename:	a30jul07a_4-6	
Collection Date/Time:	07/19/07	8:55	Retchk:	a30jul07a_3-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14	
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12	
Analysis Date/Time:	08/01/07	5:35	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 8/8/07

Reviewed by: _____
Date: 8/9/07

Form I copy

SGS Environmental Services

Method 8290
F51154-30
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	EMPC	~~0.184~~	0.248 J	31:42	0.55	*	A
1,2,3,7,8-PeCDD	0.934 J			34:25	1.61		A
1,2,3,4,7,8-HxCDD	1.66 J			37:07	1.13		A
1,2,3,6,7,8-HxCDD	3.73 J			37:13	1.25		A
1,2,3,7,8,9-HxCDD	4.39 J			37:28	1.19		A
1,2,3,4,6,7,8-HpCDD	122			40:40	1.05		
OCDD	1410			45:10	0.89		
2,3,7,8-TCDF	0.424 B			31:10	0.78		A
1,2,3,7,8-PeCDF	EMPC	~~0.484~~	0.286 J	33:39	1.79	*	A
2,3,4,7,8-PeCDF	EMPC	~~0.484~~	0.292 B	34:15	1.83	*	A
1,2,3,4,7,8-HxCDF	1.04 J			36:24	1.20		A
1,2,3,6,7,8-HxCDF	0.619 J			36:30	1.14		A
2,3,4,6,7,8-HxCDF	0.745 J			37:00	1.21		A
1,2,3,7,8,9-HxCDF	ND	0.484					
1,2,3,4,6,7,8-HpCDF	21.5			39:22	1.04		
1,2,3,4,7,8,9-HpCDF	0.830 J			41:22	1.09		A
OCDF	57.6			45:28	0.90		
Total TCDDs	~~3.35~~		3.60 J				
Total PeCDDs	~~5.10~~		5.46 J				
Total HxCDDs	30.9						
Total HpCDDs	222						
Total TCDFs	~~5.14 J~~		5.30 J				Q
Total PeCDFs	~~4.05~~		4.74 J				
Total HxCDFs	~~17.5~~		17.8 J				
Total HpCDFs	57.9						
WHO-2005 TEQ (ND=0)	4.08		4.42				
WHO-2005 TEQ (ND=½)	4.27		4.45				

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-30		Weight / Volume:	11.03 g	
			Solids / Lipids:	93.8	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14385	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-23B		Filename:	a30jul07a_4-7	
Collection Date/Time:	07/19/07	9:10	Retchk:	a30jul07a_3-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14	
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12	
Analysis Date/Time:	08/01/07	6:23	Initial Cal:	m8290-071007a	

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SGS Environmental Services

Method 8290
F51154-30
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.59	79.6	31:40	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.63	81.4	34:25	1.57	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.74	86.8	37:12	1.27	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.88	93.9	40:39	1.06	
13C12-OCDD	4.0	3.87	96.8	45:10	0.89	
13C12-2,3,7,8-TCDF	2.0	1.88	93.8	31:09	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.50	75.1	33:39	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.57	78.4	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.67	83.4	39:21	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.375	93.7	31:42	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.306	76.4	34:15	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.343	85.8	37:07	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.339	84.9	36:22	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.337	84.4	41:21	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:16	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.25	

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-30		Weight / Volume:	11.03 g	
			Solids / Lipids:	93.8	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14385	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-23B		Filename:	a30jul07a_4-7	
Collection Date/Time:	07/19/07	9:10	Retchk:	a30jul07a_3-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14	
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12	
Analysis Date/Time:	08/01/07	6:23	Initial Cal:	m8290-071007a	

Form Version:[8290_DD_2.14]Report

Analyzed by: JWC
Date: 080907

Reviewed by: [illegible]
Date: 8/9/07

Form I Corr

SGS Environmental Services

Method 8290
F51154-31
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	ND	0.204					
1,2,3,7,8-PeCDD	0.341 J			34:25	1.56		A
1,2,3,4,7,8-HxCDD	0.657 J			37:07	1.21		A
1,2,3,6,7,8-HxCDD	1.56 J			37:13	1.23		A
1,2,3,7,8,9-HxCDD	1.49 J			37:27	1.37		A
1,2,3,4,6,7,8-HpCDD	54.1			40:40	1.04		
OCDD	1030			45:10	0.89		
2,3,7,8-TCDF	EMPC	~~0.184~~	0.442 B	31:09	0.89	*	A
1,2,3,7,8-PeCDF	0.196 J			33:39	1.47		A
2,3,4,7,8-PeCDF	EMPC	~~0.517~~	0.184 B	34:15	1.93	*	A
1,2,3,4,7,8-HxCDF	0.810 J			36:22	1.18		A
1,2,3,6,7,8-HxCDF	0.358 J			36:28	1.14		A
2,3,4,6,7,8-HxCDF	0.335 J			36:58	1.23		A
1,2,3,7,8,9-HxCDF	ND	0.517					
1,2,3,4,6,7,8-HpCDF	10.6			39:22	1.02		
1,2,3,4,7,8,9-HpCDF	0.451 J			41:21	1.05		A
OCDF	26.0			45:28	0.89		
Total TCDDs	13.3						
Total PeCDDs	~~1.93~~		2.20 J				
Total HxCDDs	11.8						
Total HpCDDs	99.1						
Total TCDFs	~~1.70~~		2.82 J				
Total PeCDFs	~~2.11~~		2.57 J				
Total HxCDFs	~~7.58~~		7.80 J				
Total HpCDFs	26.4						
WHO-2005 TEQ (ND=0)	1.84		1.94				
WHO-2005 TEQ (ND=½)	2.05		2.06				

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-31		Weight / Volume:	10.26 g
			Solids / Lipids:	94.3 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14385
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-24B		Filename:	a30jul07a_4-8
Collection Date/Time:	07/19/07	9:55	Retchk:	a30jul07a_3-14
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12
Analysis Date/Time:	08/01/07	7:11	Initial Cal:	m8290-071007a

Form I COMP

Method 8290
F51154-31
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.63	81.7	31:40	0.77	
13C12-1,2,3,7,8-PeCDD	2.0	1.66	82.8	34:25	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.68	84.1	37:12	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.83	91.5	40:39	1.06	
13C12-OCDD	4.0	3.73	93.2	45:09	0.90	
13C12-2,3,7,8-TCDF	2.0	1.90	95.0	31:07	0.78	
13C12-1,2,3,7,8-PeCDF	2.0	1.54	77.2	33:37	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.54	76.8	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.63	81.7	39:21	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.404	101	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.316	79.0	34:15	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.377	94.3	37:06	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.366	91.4	36:22	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.351	87.8	41:21	0.44	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:15	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.25	

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-31		Weight / Volume:	10.26 g
			Solids / Lipids:	94.3 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14385
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-24B		Filename:	a30jul07a_4-8
Collection Date/Time:	07/19/07	9:55	Retchk:	a30jul07a_3-14
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_3-14
Extraction Date:	07/30/07		End ConCal:	a30jul07a_4-12
Analysis Date/Time:	08/01/07	7:11	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 08-Aug-07

Reviewed by: _____
Date: 8/9/07

Form I Corr

SGS Environmental Services

Method 8290
F51154-32
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	EMPC	~~0.223~~	0.241 J	31:39	0.61	*	A
1,2,3,7,8-PeCDD	3.04 J			34:25	1.58		A
1,2,3,4,7,8-HxCDD	10.8			37:06	1.26		
1,2,3,6,7,8-HxCDD	27.8			37:10	1.30		
1,2,3,7,8,9-HxCDD	19.2			37:25	1.29		
1,2,3,4,6,7,8-HpCDD	950			40:39	1.04		
OCDD	10300 J			45:07	0.89		E
2,3,7,8-TCDF	0.917 J			31:06	0.87		A
1,2,3,7,8-PeCDF	0.593 J			33:37	1.35		A
2,3,4,7,8-PeCDF	0.996 J			34:13	1.71		A
1,2,3,4,7,8-HxCDF	6.93			36:22	1.21		
1,2,3,6,7,8-HxCDF	6.14			36:28	1.35		
2,3,4,6,7,8-HxCDF	5.34 J			36:58	1.30		A
1,2,3,7,8,9-HxCDF	0.635 J			37:46	1.19		A
1,2,3,4,6,7,8-HpCDF	132			39:21	1.05		
1,2,3,4,7,8,9-HpCDF	8.10			41:21	0.90		
OCDF	397			45:25	0.89		
Total TCDDs	~~5.50~~		6.23 J				
Total PeCDDs	15.9						
Total HxCDDs	~~130~~		134 J				
Total HpCDDs	1420						
Total TCDFs	~~7.80~~		10.4 J				
Total PeCDFs	~~21.6~~		22.0 J				
Total HxCDFs	129						
Total HpCDFs	420						
WHO-2005 TEQ (ND=0)	25.2		25.5				
WHO-2005 TEQ (ND=½)	25.4		25.5				

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51154-32		Weight / Volume:	10.19 g	
			Solids / Lipids:	85.4	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14389	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-25B		Filename:	a30jul07a_6-5	
Collection Date/Time:	07/19/07	8:40	Retchk:	a30jul07a_4-12	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_4-12	
Extraction Date:	07/31/07		End ConCal:	a30jul07a_6-14	
Analysis Date/Time:	08/01/07	18:39	Initial Cal:	m8290-071007a	

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SGS Environmental Services

Method 8290
F51154-32
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.54	76.8	31:39	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.48	74.0	34:25	1.60	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.64	81.9	37:10	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.78	89.1	40:37	1.06	
13C12-OCDD	4.0	3.83	95.8	45:07	0.89	
13C12-2,3,7,8-TCDF	2.0	1.73	86.6	31:06	0.78	
13C12-1,2,3,7,8-PeCDF	2.0	1.40	70.0	33:37	1.61	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.51	75.3	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.58	79.2	39:19	0.43	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.362	90.4	31:39	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.267	66.7	34:13	1.64	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.317	79.3	37:04	1.28	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.324	81.1	36:22	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.293	73.3	41:19	0.41	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:25	1.26	

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51154-32		Weight / Volume:	10.19 g
			Solids / Lipids:	85.4 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14389
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-25B		Filename:	a30jul07a_6-5
Collection Date/Time:	07/19/07	8:40	Retchk:	a30jul07a_4-12
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a30jul07a_4-12
Extraction Date:	07/31/07		End ConCal:	a30jul07a_6-14
Analysis Date/Time:	08/01/07	18:39	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: JWP
Date: 08/07/07

Reviewed by: DLL
Date: 8/9/07

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SGS Environmental Services

Method 8290
F51154-12 RB071807
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00179				
1,2,3,7,8-PeCDD	ND	0.00551				
1,2,3,4,7,8-HxCDD	ND	0.00551				
1,2,3,6,7,8-HxCDD	ND	0.00551				
1,2,3,7,8,9-HxCDD	ND	0.00551				
1,2,3,4,6,7,8-HpCDD	ND	0.00551				
OCDD	ND	0.0110				
2,3,7,8-TCDF	ND	0.00126				
1,2,3,7,8-PeCDF	ND	0.00551				
2,3,4,7,8-PeCDF	ND	0.00551				
1,2,3,4,7,8-HxCDF	ND	0.00551				
1,2,3,6,7,8-HxCDF	ND	0.00551				
2,3,4,6,7,8-HxCDF	ND	0.00551				
1,2,3,7,8,9-HxCDF	ND	0.00551				
1,2,3,4,6,7,8-HpCDF	ND	0.00551				
1,2,3,4,7,8,9-HpCDF	ND	0.00551				
OCDF	ND	0.0110				
Total TCDDs	ND	0.00179				
Total PeCDDs	ND	0.00551				
Total HxCDDs	ND	0.00551				
Total HpCDDs	ND	0.00551				
Total TCDFs	ND	0.00126				
Total PeCDFs	ND	0.00551				
Total HxCDFs	ND	0.00551				
Total HpCDFs	ND	0.00551				
WHO-2005 TEQ (ND=0)	ND		ND			
WHO-2005 TEQ (ND=½)	0.00664		0.00664			

Client Information			**Sample Information**		
Project Name:	F51154		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F51154-12		Weight / Volume:	907 mL	
			Solids / Lipids:	NA	%
			Original pH :	7	
Laboratory Information			Batch ID:	WG14381	
Project ID:	G383-583		Instrument:	HRMS1	
Sample ID:	G383-583-7C		Filename:	a27jul07a_3-11	
Collection Date/Time:	07/18/07	13:15	Retchk:	a27jul07a_2-14	
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a27jul07a_2-14	
Extraction Date:	07/26/07		End ConCal:	a27jul07a_3-12	
Analysis Date/Time:	07/28/07	22:40	Initial Cal:	m8290-071007a	

Form I Corr

Method 8290
F51154-12
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.59	79.7	31:39	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.58	79.0	34:25	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.66	83.2	37:10	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.81	90.3	40:39	1.06	
13C12-OCDD	4.0	3.96	99.0	45:09	0.89	
13C12-2,3,7,8-TCDF	2.0	1.81	90.4	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.56	77.9	33:37	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.63	81.6	36:28	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.75	87.3	39:21	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.382	95.5	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.341	85.3	34:13	1.62	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.369	92.3	37:06	1.28	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.367	91.9	36:22	0.54	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.362	90.5	41:19	0.42	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.26	

Client Information			**Sample Information**	
Project Name:	F51154		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F51154-12		Weight / Volume:	907 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14381
Project ID:	G383-583		Instrument:	HRMS1
Sample ID:	G383-583-7C		Filename:	a27jul07a_3-11
Collection Date/Time:	07/18/07	13:15	Retchk:	a27jul07a_2-14
Receipt Date/Time:	07/21/07	10:35	Begin ConCal:	a27jul07a_2-14
Extraction Date:	07/26/07		End ConCal:	a27jul07a_3-12
Analysis Date/Time:	07/28/07	22:40	Initial Cal:	m8290-071007a

Report Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 08/08/07

Reviewed by: _____
Date: 8/9/07

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
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Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Explosives, PETN, & Nitroglycerin
Accutest Laboratories, Inc., SDG F51154

DATE: September 25, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on July 18, 2007 and July 19, 2007. Aqueous samples were analyzed for explosives, nitroglycerin, and PETN using USEPA SW-846 3535A/8330A. Solid samples were analyzed for explosives, nitroglycerin, and PETN using USEPA SW-846 8330B/8330A. A total of five aqueous samples and seventeen solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41SW08	F51154-6	41SD11	F51154-22
41SW09	F51154-7	49SS02	F51154-23
41SW10	F51154-8	49SS03	F51154-24
41SD08	F51154-9	49SS04	F51154-25
41SD09	F51154-10	49SS05	F51154-26
41SD10	F51154-11	59SS06	F51154-27
LFSD01	F51154-15	59SS07	F51154-28
TMSD01	F51154-16	59SS08	F51154-29
LFSW01	F51154-17	59SS09	F51154-30
APSD01	F51154-18	59SS10	F51154-31
TMSW01	F51154-20	TMSS05	F51154-32

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Blank Analysis
	X	Initial Calibration
	X	Continuing Calibration
	X	System Monitoring Compounds
	X	Laboratory Control Sample
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

Eric Malarek

Eric Malarek, Chemist

9/25/07

Date

RFAAP VALIDATION REPORT
EXPLOSIVES REVIEW
SDG F51154

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, explosive compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis. For solid samples, explosive compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 07/18/07 and 07/19/07, the coolers were received by the primary laboratory (Accutest) on 07/20/07 at 4.0°C, 4.0°C, 4.6°C, 4.6°C, 4.8°C, 5.0°C, 5.0°C, and 5.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.2°C, 4.0°C, and 3.6°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 3.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 5.5°C and 5.2°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The aqueous and solid samples were collected on 07/18/07 and 07/19/07. For the aqueous samples collected 07/18/07 and 07/19/07, the explosives were extracted on 07/25/07 and analyzed on 07/27/07. For the solid samples collected 07/18/07 and 07/19/07, the explosives were extracted on 08/01/07 and analyzed on 08/03/07. All criteria were met. No qualifiers were applied.

II-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5x) the maximum amount for explosive target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one and for solid matrices were converted to soil values (soil conversion factor = 10) if needed. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. The surface water "SW" samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the SW samples. Rinse blanks 072407R (F51275-1) and 072507R (F51300-31) apply to the surface soil "SS" and subsurface soil "SB" samples in this SDG. Rinse blank RB071807 (F51154-12) applies to the sediment "SD" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
07/27/07	OP21593-MB	All target explosives <½MRL	NA	NA	None
07/27/07	OP21593-MB	All target explosives <½MRL	NA	NA	None
07/27/07	OP21593-MB	PETN & NG <½MRL	NA	NA	None
07/27/07	OP21593-MB	PETN & NG <½MRL	NA	NA	None
09/11/07	RB083007	All target explosives <½MRL	NA	NA	None
09/07/07	RB083007	PETN & NG <½MRL	NA	NA	None
Analysis Date	**QC Blank ID**	**Compound**	**Max Conc. µg/kg**	**Action Level µg/kg**	**B qualified samples**
08/03/07	OP21693-MB	All target explosives <½MRL	NA	NA	None
08/03/07	OP21693-MB	PETN & NG <½MRL	NA	NA	None
07/27/07	RB071807	All target explosives <½MRL	NA	NA	None
07/27/07	RB071807	PETN & NG <½MRL	NA	NA	None
08/01/07	072407R	All target explosives <½MRL	NA	NA	None
08/01/07	072407R	PETN & NG <½MRL	NA	NA	None
08/01/07	072507R	All target explosives <½MRL	NA	NA	None
08/01/07	072507R	PETN & NG <½MRL	NA	NA	None

MRL = Method Reporting Limit
NA = Not Applicable

III-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The DoD QSM specifies that the correlation coefficient must be ≥0.995 and/or the percent relative standard deviation (%RSD) must be ≤20%. All detects were qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects were qualified as estimated "UJ" for where there were grossly exceeding recoveries. Grossly exceeding is defined as twice the established criteria limits.

- For the explosives initial calibration performed on 10/18/06 on instrument G1315B, all criteria were met for target explosives compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this initial calibration.

- For the explosives initial calibration performed on 10/20/06 on instrument G1315B, all criteria were met for target explosives compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this initial calibration.

- For the PETN and nitroglycerine initial calibration performed on 03/15/07 on instrument G1315B, all criteria were met for target compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), TMSW01 (F51154-20), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. Continuing calibration standards are analyzed after every 10 injections, and at the end of the analysis sequence. The DoD QSM specifies that the percent difference (%D) from initial calibration should be no greater than ±20%. All detects were qualified as estimated "J" for where there were exceeding %Ds, and all non-detects were qualified as estimated "UJ" for where there were grossly exceeding recoveries. Grossly exceeding is defined as twice the established criteria limits.

- For explosives initial calibration verification performed on 10/18/06 @17:39 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives initial calibration verification performed on 10/19/06 @13:44 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives initial calibration verification performed on 10/20/06 @14:03 on instrument G1315B, nitrobenzene (20.5%) was outside criteria. All samples were non-detect for this compound. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives initial calibration verification performed on 10/20/06 @15:10 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives continuing calibration performed on 07/27/07 @10:31 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples 41SW08 (F51154-6) and 41SW09 (F51154-7) apply to this continuing calibration.

- For explosives continuing calibration performed on 07/27/07 @14:11 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this continuing calibration.

- For explosives continuing calibration performed on 07/27/07 @16:57 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 07/27/07 @18:36 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this continuing calibration.

- For explosives continuing calibration performed on 07/27/07 @20:33 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples apply to this continuing calibration.

- For explosives continuing calibration performed on 08/02/07 @22:39 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), and APSD01 (F51154-18) apply to this continuing calibration.

- For explosives continuing calibration performed on 08/03/07 @04:11 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) apply to this continuing calibration.

- For explosives continuing calibration performed on 08/03/07 @09:41 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Sample TMSS05 (F51154-32) applies to this continuing calibration.

- For explosives continuing calibration performed on 08/03/07 @15:37 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PETN and nitroglycerin initial calibration verification performed on 03/15/07 @12:35 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PETN and nitroglycerin continuing calibration performed on 07/27/07 @13:19 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this continuing calibration.

- For PETN and nitroglycerin continuing calibration performed on 07/27/07 @15:29 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PETN and nitroglycerin continuing calibration performed on 08/03/07 @09:24 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), and APSD01 (F51154-18) apply to this continuing calibration.

- For PETN and nitroglycerin continuing calibration performed on 08/03/07 @10:59 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) apply to this continuing calibration.

- For PETN and nitroglycerin continuing calibration performed on 08/03/07 @12:41 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Sample TMSS05 (F51154-32) applies to this continuing calibration.

- For PETN and nitroglycerin continuing calibration performed on 08/03/07 @13:33 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

V-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the laboratory control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria: 3,4-dinitrotoluene (70-136%)
Solid Criteria: 3,4-dinitrotoluene (72-145%)

- All criteria were met for explosives, PETN, and nitroglycerin. No qualifiers were applied.

VI-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor long-term accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the laboratory control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-12 of the DoD QSM (DoD, 2006). DoD QSM solid LCS recovery limits are specified in Table D-2 and Table D-13 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP21593-BS was used as aqueous LCS for explosives analyzed on 07/27/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this LCS.

- Sample OP21593-BS was used as aqueous LCS for explosives analyzed on 07/27/07. HMX (136%) was outside DoD QSM criteria and within laboratory criteria. All samples were non-detect HMX; therefore, no qualifiers were applied based upon this outlier. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this LCS.

- Sample OP21693-BS was used as solid LCS for explosives analyzed on 08/02/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

- Sample OP21593-BS2 was used as aqueous LCS for PETN and nitroglycerin analyzed on 07/27/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this LCS.

- Sample OP21693-BS2 was used as solid LCS for PETN and nitroglycerin analyzed on 08/03/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the laboratory control limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-12 of the DoD QSM (DoD, 2006). DoD QSM solid MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-13 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample 41SW09 (F51154-7) was used as the aqueous MS/MSD for the explosive analysis on 07/27/07. HMX (121%, 118%) was outside DoD QSM criteria and within laboratory criteria. All samples were non-detect HMX; therefore, no qualifiers were applied based upon these outliers. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this MS/MSD.

- Sample APSD01 (F51154-18) was used as the solid MS/MSD for the explosive analysis on 08/03/07. 2,6-Dinitrotoluene (RPD=18%), 2,4-dinitrotoluene (131%, RPD=20%), 2-amino-4,6-dinitrotoluene (126%), and 4-amino-2,6-dinitrotoluene (RPD=19%) were outside DoD QSM criteria and/or laboratory criteria. All associated samples were non-detect for these compounds; therefore, no qualifiers were applied based upon these outliers. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

- Sample LFSW01 (F51154-17) was used as the aqueous MS/MSD for the PETN and nitroglycerin analysis on 07/27/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this MS/MSD.

- Sample TMSD01 (F51154-16) was used as the solid MS/MSD for the PETN and nitroglycerin analysis on 07/02-03/07. Nitroglycerin (RPD=27%) was above lab criteria. For PETN, all criteria were met. All associated samples were non-detect for nitroglycerin; therefore, no qualifiers were applied based upon this outlier. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous and solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field surface water sample duplicate pair LFSW01 (F51154-17) and TMSW01 (F51154-20) was collected for explosives, nitroglycerin, and PETN. All explosives, nitroglycerin, and PETN target compounds were non-detect. All criteria were met. No qualifiers were applied.

- Field surface soil sample duplicate pair 49SS05 (F51154-26) and TMSS05 (F51154-32) was collected for explosives, nitroglycerin, and PETN. All explosives, nitroglycerin, and PETN target compounds were non-detect. All criteria were met. No qualifiers were applied.

- Field sediment sample duplicate pair LFSD01 (F51154-15) and TMSD01 (F51154-16) was collected for explosives, nitroglycerin, and PETN. All explosives, nitroglycerin, and PETN target compounds were non-detect. All criteria were met. No qualifiers were applied.

IX-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. The calculation was based calibration factors. The absolute percent difference (%D) between the calculated and the reported value must be within 10% difference. All values >MDL and <MRL or <3*MDL (whichever was greater) were qualified as estimated "J".

- The %D between the primary and secondary columns was within criteria for all detected explosives, PETN, and nitroglycerin.

Sample: 41SW08 (F51154-6), 2-amino-4,6-dinitrotoluene

Conc. µg/L = (Ax * Vt * DF) / (CF * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area of characteristic ion for compound being measured.
Vt = Volume of total extract (mL).
CF = Average relative calibration factor for compound being measured (from ICAL)
Vs = Volume of sample extracted (mL).
DF = Dilution factor

Conc. µg/L = (199179 * 10 * 1) / (7177 * 1010) = 0.27 µg/L (Signal #1)

Reported Value = 0.27 µg/L
% Difference = 0.0%
Values were within 10% difference

Sample: LFSW01MS (F51154-17MS), nitroglycerin

Conc. µg/L = (Ax * Vt * DF) / (CF * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area of characteristic ion for compound being measured.
Vt = Volume of total extract (mL).
CF = Average relative calibration factor for compound being measured (from ICAL)
Vs = Volume of sample extracted (mL).
DF = Dilution factor

Conc. µg/L = (3198546 * 10 * 1) / (1228 * 430) = 60.6 µg/L (Signal #1)

Reported Value = 60.6 µg/L
% Difference = 0.0%
Values were within 10% difference

Sample: APSD01MS (F51154-18MS), nitrobenzene

Conc. mg/kg = (Ax * Vt * DF) / (CF * Ws * D)

where: Conc. = Sample concentration in mg/kg
Ax = Area of characteristic ion for compound being measured.
Vt = Volume of total extract (mL).
CF = Average relative calibration factor for compound being measured (from ICAL)
W(s) = Weight of sample in kilograms.
D = Percent dry weight (100 - % moisture in sample)/100
DF = Dilution factor

Conc. mg/kg = (4241037 * 20 * 1) / (7223 * 2.45 * 1) = 4970 µg/kg (Signal #1)
Reported Value = 4970 µg/kg
% Difference = 0.0%
Values were within 10% difference

Sample: TMSD01MS (F51154-16MS), nitroglycerin

Conc. mg/kg = (Ax * Vt * DF) / (CF * Ws * D)

where: Conc. = Sample concentration in mg/kg
Ax = Area of characteristic ion for compound being measured.
Vt = Volume of total extract (mL).
CF = Average relative calibration factor for compound being measured (from ICAL)
W(s) = Weight of sample in kilograms.
D = Percent dry weight (100 - % moisture in sample)/100
DF = Dilution factor

Conc. mg/kg = (3248217 * 20 * 1) / (1228 * 2.68 * 1) = 19700 µg/kg (Signal #1)
Reported Value = 19700 µg/kg
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: GG022998.D PP021775.D GG023013.D

Form I Cmy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG022998.D	1	07/27/07	MRE	07/25/07	OP21593	GGG987
Run #2	PP021775.D	1	07/27/07	MRE	07/25/07	OP21593	GPP751
Run #3 [b]	GG023013.D	1	07/27/07	MRE	07/25/07	OP21593	GGG988

	Initial Volume	Final Volume
Run #1	1010 ml	10.0 ml
Run #2	1010 ml	10.0 ml
Run #3	1010 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.20	0.059	ug/l	
121-82-4	RDX	ND	0.20	0.074	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.20	0.069	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.20	0.064	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.20	0.074	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	0.27	0.20	0.069	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	0.87	0.20	0.079	ug/l	
98-95-3	Nitrobenzene	ND	0.20	0.059	ug/l	
88-72-2	o-Nitrotoluene	ND	0.20	0.059	ug/l	
99-08-1	m-Nitrotoluene	ND	0.20	0.074	ug/l	
99-99-0	p-Nitrotoluene	ND	0.20	0.074	ug/l	
479-45-8	Tetryl	ND	0.20	0.074	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.20	0.094	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.20	0.079	ug/l	
55-63-0	Nitroglycerine	ND [c]	2.0	0.69	ug/l	
78-11-5	PETN	ND [c]	2.0	0.69	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Run# 3	Limits
610-39-9	3,4-Dinitrotoluene	102%	103%	101%	70-136%

(a) All hits confirmed by reanalysis on a dissimilar column.
(b) Confirmation run.
(c) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG022999.D PP021776.D GG023014.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG022999.D	1	07/27/07	MRE	07/25/07	OP21593	GGG987
Run #2	PP021776.D	1	07/27/07	MRE	07/25/07	OP21593	GPP751
Run #3 [b]	GG023014.D	1	07/27/07	MRE	07/25/07	OP21593	GGG988

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2	1000 ml	10.0 ml
Run #3	1000 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.20	0.060	ug/l	
121-82-4	RDX	ND	0.20	0.075	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.20	0.070	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.20	0.065	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.20	0.075	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	0.76	0.20	0.070	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	1.7	0.20	0.080	ug/l	
98-95-3	Nitrobenzene	ND	0.20	0.060	ug/l	
88-72-2	o-Nitrotoluene	ND	0.20	0.060	ug/l	
99-08-1	m-Nitrotoluene	ND	0.20	0.075	ug/l	
99-99-0	p-Nitrotoluene	ND	0.20	0.075	ug/l	
479-45-8	Tetryl	ND	0.20	0.075	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.20	0.095	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.20	0.080	ug/l	
55-63-0	Nitroglycerine	ND [c]	2.0	0.70	ug/l	
78-11-5	PETN	ND [c]	2.0	0.70	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Run# 3	Limits
610-39-9	3,4-Dinitrotoluene	97%	96%	101%	70-136%

(a) All hits confirmed by reanalysis on a dissimilar column.
(b) Confirmation run.
(c) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023004.D PP021777.D GG023015.D

Form I Corr

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG023004.D	1	07/27/07	MRE	07/25/07	OP21593	GGG987
Run #2	PP021777.D	1	07/27/07	MRE	07/25/07	OP21593	GPP751
Run #3 [b]	GG023015.D	1	07/27/07	MRE	07/25/07	OP21593	GGG988

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2	1000 ml	10.0 ml
Run #3	1000 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.20	0.060	ug/l	
121-82-4	RDX	ND	0.20	0.075	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.20	0.070	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.20	0.065	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.20	0.075	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	1.1	0.20	0.070	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	2.5	0.20	0.080	ug/l	
98-95-3	Nitrobenzene	ND	0.20	0.060	ug/l	
88-72-2	o-Nitrotoluene	ND	0.20	0.060	ug/l	
99-08-1	m-Nitrotoluene	ND	0.20	0.075	ug/l	
99-99-0	p-Nitrotoluene	ND	0.20	0.075	ug/l	
479-45-8	Tetryl	ND	0.20	0.075	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.20	0.095	ug/l	
118-96-7	2,4,6-Trinitrotoluene	1.3	0.20	0.080	ug/l	
55-63-0	Nitroglycerine	ND [c]	2.0	0.70	ug/l	
78-11-5	PETN	ND [c]	2.0	0.70	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Run# 3	Limits
610-39-9	3,4-Dinitrotoluene	97%	102%	104%	70-136%

(a) All hits confirmed by reanalysis on a dissimilar column.
(b) Confirmation run.
(c) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023079.D PP021960.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023079.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021960.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.37 g	20.0 ml
Run #2	2.37 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	210	44	ug/kg	
121-82-4	RDX	ND	210	42	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	210	42	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	210	75	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	210	42	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	210	42	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	210	46	ug/kg	
98-95-3	Nitrobenzene	ND	210	60	ug/kg	
88-72-2	o-Nitrotoluene	ND	210	65	ug/kg	
99-08-1	m-Nitrotoluene	ND	210	87	ug/kg	
99-99-0	p-Nitrotoluene	ND	210	58	ug/kg	
479-45-8	Tetryl	ND	420	120	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	210	50	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	210	42	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1700	630	ug/kg	
78-11-5	PETN	ND [a]	1700	630	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene		107%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023080.D PP021961.D

Form I OA

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023080.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021961.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.45 g	20.0 ml
Run #2	2.45 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	200	42	ug/kg	
121-82-4	RDX	ND	200	41	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	200	41	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	200	73	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	200	41	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	200	41	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	200	44	ug/kg	
98-95-3	Nitrobenzene	ND	200	58	ug/kg	
88-72-2	o-Nitrotoluene	ND	200	63	ug/kg	
99-08-1	m-Nitrotoluene	ND	200	84	ug/kg	
99-99-0	p-Nitrotoluene	ND	200	56	ug/kg	
479-45-8	Tetryl	ND	410	120	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	200	48	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	200	41	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1600	610	ug/kg	
78-11-5	PETN	ND [a]	1600	610	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	106%	102%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023081.D PP021962.D

Run I only

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023081.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021962.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.22 g	20.0 ml
Run #2	2.22 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	230	47	ug/kg	
121-82-4	RDX	ND	230	45	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	230	45	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	230	80	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	230	45	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	230	45	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	230	49	ug/kg	
98-95-3	Nitrobenzene	ND	230	64	ug/kg	
88-72-2	o-Nitrotoluene	ND	230	69	ug/kg	
99-08-1	m-Nitrotoluene	ND	230	93	ug/kg	
99-99-0	p-Nitrotoluene	ND	230	62	ug/kg	
479-45-8	Tetryl	ND	450	130	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	230	53	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	230	45	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1800	680	ug/kg	
78-11-5	PETN	ND [a]	1800	680	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	107%	104%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023005.D PP021778.D

for I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023005.D	1	07/27/07	MRE	07/25/07	OP21593	GGG987
Run #2	PP021778.D	1	07/27/07	MRE	07/25/07	OP21593	GPP751

	Initial Volume	Final Volume
Run #1	1040 ml	10.0 ml
Run #2	1040 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.19	0.058	ug/l	
121-82-4	RDX	ND	0.19	0.072	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.19	0.067	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.19	0.062	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.19	0.072	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.19	0.067	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.19	0.077	ug/l	
98-95-3	Nitrobenzene	ND	0.19	0.058	ug/l	
88-72-2	o-Nitrotoluene	ND	0.19	0.058	ug/l	
99-08-1	m-Nitrotoluene	ND	0.19	0.072	ug/l	
99-99-0	p-Nitrotoluene	ND	0.19	0.072	ug/l	
479-45-8	Tetryl	ND	0.19	0.072	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.19	0.091	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.19	0.077	ug/l	
55-63-0	Nitroglycerine	ND [a]	1.9	0.67	ug/l	
78-11-5	PETN	ND [a]	1.9	0.67	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	103%	113%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023082.D PP021963.D

Form I Corr

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023082.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021963.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.46 g	20.0 ml
Run #2	2.46 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	200	42	ug/kg	
121-82-4	RDX	ND	200	41	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	200	41	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	200	72	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	200	41	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	200	41	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	200	44	ug/kg	
98-95-3	Nitrobenzene	ND	200	58	ug/kg	
88-72-2	o-Nitrotoluene	ND	200	63	ug/kg	
99-08-1	m-Nitrotoluene	ND	200	84	ug/kg	
99-99-0	p-Nitrotoluene	ND	200	56	ug/kg	
479-45-8	Tetryl	ND	410	110	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	200	48	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	200	41	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1600	610	ug/kg	
78-11-5	PETN	ND [a]	1600	610	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	110%	108%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023083.D PP021964.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSD01		
Lab Sample ID:	F51154-16	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	65.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023083.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021964.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.62 g	20.0 ml
Run #2	2.62 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	190	40	ug/kg	
121-82-4	RDX	ND	190	38	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	190	38	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	68	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	38	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	190	38	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	190	41	ug/kg	
98-95-3	Nitrobenzene	ND	190	54	ug/kg	
88-72-2	o-Nitrotoluene	ND	190	59	ug/kg	
99-08-1	m-Nitrotoluene	ND	190	79	ug/kg	
99-99-0	p-Nitrotoluene	ND	190	53	ug/kg	
479-45-8	Tetryl	ND	380	110	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	190	45	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	190	38	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1500	570	ug/kg	
78-11-5	PETN	ND [a]	1500	570	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	107%	105%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023006.D PP021779.D

Form I OV

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023006.D	1	07/27/07	MRE	07/25/07	OP21593	GGG987
Run #2	PP021779.D	1	07/27/07	MRE	07/25/07	OP21593	GPP751

	Initial Volume	Final Volume
Run #1	860 ml	10.0 ml
Run #2	860 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.23	0.070	ug/l	
121-82-4	RDX	ND	0.23	0.087	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.23	0.081	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.23	0.076	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.23	0.087	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.23	0.081	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.23	0.093	ug/l	
98-95-3	Nitrobenzene	ND	0.23	0.070	ug/l	
88-72-2	o-Nitrotoluene	ND	0.23	0.070	ug/l	
99-08-1	m-Nitrotoluene	ND	0.23	0.087	ug/l	
99-99-0	p-Nitrotoluene	ND	0.23	0.087	ug/l	
479-45-8	Tetryl	ND	0.23	0.087	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.23	0.11	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.23	0.093	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.3	0.81	ug/l	
78-11-5	PETN	ND [a]	2.3	0.81	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	100%	106%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023084.D PP021967.D

Form I COM

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023084.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021967.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.70 g	20.0 ml
Run #2	2.70 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	190	39	ug/kg	
121-82-4	RDX	ND	190	37	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	190	37	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	66	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	37	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	190	37	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	190	40	ug/kg	
98-95-3	Nitrobenzene	ND	190	53	ug/kg	
88-72-2	o-Nitrotoluene	ND	190	57	ug/kg	
99-08-1	m-Nitrotoluene	ND	190	76	ug/kg	
99-99-0	p-Nitrotoluene	ND	190	51	ug/kg	
479-45-8	Tetryl	ND	370	100	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	190	44	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	190	37	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1500	560	ug/kg	
78-11-5	PETN	ND [a]	1500	560	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	107%	104%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023007.D PP021782.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-20	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023007.D	1	07/27/07	MRE	07/25/07	OP21593	GGG987
Run #2	PP021782.D	1	07/27/07	MRE	07/25/07	OP21593	GPP751

	Initial Volume	Final Volume
Run #1	850 ml	10.0 ml
Run #2	850 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.24	0.071	ug/l	
121-82-4	RDX	ND	0.24	0.088	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.24	0.082	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.24	0.076	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.24	0.088	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.24	0.082	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.24	0.094	ug/l	
98-95-3	Nitrobenzene	ND	0.24	0.071	ug/l	
88-72-2	o-Nitrotoluene	ND	0.24	0.071	ug/l	
99-08-1	m-Nitrotoluene	ND	0.24	0.088	ug/l	
99-99-0	p-Nitrotoluene	ND	0.24	0.088	ug/l	
479-45-8	Tetryl	ND	0.24	0.088	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.24	0.11	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.24	0.094	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.4	0.82	ug/l	
78-11-5	PETN	ND [a]	2.4	0.82	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	99%	110%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OBZ

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023089.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021970.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.43 g	20.0 ml
Run #2	2.43 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	210	43	ug/kg	
121-82-4	RDX	ND	210	41	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	210	41	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	210	73	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	210	41	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	210	41	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	210	44	ug/kg	
98-95-3	Nitrobenzene	ND	210	58	ug/kg	
88-72-2	o-Nitrotoluene	ND	210	63	ug/kg	
99-08-1	m-Nitrotoluene	ND	210	85	ug/kg	
99-99-0	p-Nitrotoluene	ND	210	57	ug/kg	
479-45-8	Tetryl	ND	410	120	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	210	49	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	210	41	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1600	620	ug/kg	
78-11-5	PETN	ND [a]	1600	620	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	111%	110%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I COA

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023090.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021971.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.39 g	20.0 ml
Run #2	2.39 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	210	44	ug/kg	
121-82-4	RDX	ND	210	42	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	210	42	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	210	74	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	210	42	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	210	42	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	210	45	ug/kg	
98-95-3	Nitrobenzene	ND	210	59	ug/kg	
88-72-2	o-Nitrotoluene	ND	210	64	ug/kg	
99-08-1	m-Nitrotoluene	ND	210	86	ug/kg	
99-99-0	p-Nitrotoluene	ND	210	58	ug/kg	
479-45-8	Tetryl	ND	420	120	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	210	49	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	210	42	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1700	630	ug/kg	
78-11-5	PETN	ND [a]	1700	630	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	109%	109%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023091.D PP021972.D

Run 1 only

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023091.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021972.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.42 g	20.0 ml
Run #2	2.42 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	210	43	ug/kg	
121-82-4	RDX	ND	210	41	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	210	41	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	210	74	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	210	41	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	210	41	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	210	45	ug/kg	
98-95-3	Nitrobenzene	ND	210	59	ug/kg	
88-72-2	o-Nitrotoluene	ND	210	64	ug/kg	
99-08-1	m-Nitrotoluene	ND	210	85	ug/kg	
99-99-0	p-Nitrotoluene	ND	210	57	ug/kg	
479-45-8	Tetryl	ND	410	120	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	210	49	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	210	41	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1700	620	ug/kg	
78-11-5	PETN	ND [a]	1700	620	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	111%	111%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023092.D PP021973.D

Form I Copy

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Report of Analysis

3.2.5

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023092.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021973.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.12 g	20.0 ml
Run #2	2.12 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	240	49	ug/kg	
121-82-4	RDX	ND	240	47	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	240	47	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	240	84	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	240	47	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	240	47	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	240	51	ug/kg	
98-95-3	Nitrobenzene	ND	240	67	ug/kg	
88-72-2	o-Nitrotoluene	ND	240	73	ug/kg	
99-08-1	m-Nitrotoluene	ND	240	97	ug/kg	
99-99-0	p-Nitrotoluene	ND	240	65	ug/kg	
479-45-8	Tetryl	ND	470	130	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	240	56	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	240	47	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1900	710	ug/kg	
78-11-5	PETN	ND [a]	1900	710	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	112%	112%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023093.D PP021974.D

Run I OA

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023093.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021974.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.27 g	20.0 ml
Run #2	2.27 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	220	46	ug/kg	
121-82-4	RDX	ND	220	44	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	220	44	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	220	78	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	220	44	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	220	44	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	220	48	ug/kg	
98-95-3	Nitrobenzene	ND	220	63	ug/kg	
88-72-2	o-Nitrotoluene	ND	220	68	ug/kg	
99-08-1	m-Nitrotoluene	ND	220	91	ug/kg	
99-99-0	p-Nitrotoluene	ND	220	61	ug/kg	
479-45-8	Tetryl	ND	440	120	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	220	52	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	220	44	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1800	660	ug/kg	
78-11-5	PETN	ND [a]	1800	660	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	111%	108%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023094.D PP021975.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023094.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021975.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.25 g	20.0 ml
Run #2	2.25 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	220	46	ug/kg	
121-82-4	RDX	ND	220	44	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	220	44	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	220	79	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	220	44	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	220	44	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	220	48	ug/kg	
98-95-3	Nitrobenzene	ND	220	63	ug/kg	
88-72-2	o-Nitrotoluene	ND	220	68	ug/kg	
99-08-1	m-Nitrotoluene	ND	220	92	ug/kg	
99-99-0	p-Nitrotoluene	ND	220	61	ug/kg	
479-45-8	Tetryl	ND	440	130	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	220	52	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	220	44	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1800	670	ug/kg	
78-11-5	PETN	ND [a]	1800	670	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	114%	116%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023095.D PP021976.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023095.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021976.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.37 g	20.0 ml
Run #2	2.37 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	210	44	ug/kg	
121-82-4	RDX	ND	210	42	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	210	42	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	210	75	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	210	42	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	210	42	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	210	46	ug/kg	
98-95-3	Nitrobenzene	ND	210	60	ug/kg	
88-72-2	o-Nitrotoluene	ND	210	65	ug/kg	
99-08-1	m-Nitrotoluene	ND	210	87	ug/kg	
99-99-0	p-Nitrotoluene	ND	210	58	ug/kg	
479-45-8	Tetryl	ND	420	120	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	210	50	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	210	42	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1700	630	ug/kg	
78-11-5	PETN	ND [a]	1700	630	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	119%	118%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023096.D PP021977.D

Form I CVR

Accutest Laboratories

Report of Analysis

3.2.3

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023096.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021977.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.33 g	20.0 ml
Run #2	2.33 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	210	45	ug/kg	
121-82-4	RDX	ND	210	43	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	210	43	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	210	76	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	210	43	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	210	43	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	210	46	ug/kg	
98-95-3	Nitrobenzene	ND	210	61	ug/kg	
88-72-2	o-Nitrotoluene	ND	210	66	ug/kg	
99-08-1	m-Nitrotoluene	ND	210	88	ug/kg	
99-99-0	p-Nitrotoluene	ND	210	59	ug/kg	
479-45-8	Tetryl	ND	430	120	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	210	51	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	210	43	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1700	640	ug/kg	
78-11-5	PETN	ND [a]	1700	640	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	106%	102%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023097.D PP021978.D

Form I OV

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023097.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021978.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.16 g	20.0 ml
Run #2	2.16 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	230	48	ug/kg	
121-82-4	RDX	ND	230	46	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	230	46	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	230	82	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	230	46	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	230	46	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	230	50	ug/kg	
98-95-3	Nitrobenzene	ND	230	66	ug/kg	
88-72-2	o-Nitrotoluene	ND	230	71	ug/kg	
99-08-1	m-Nitrotoluene	ND	230	95	ug/kg	
99-99-0	p-Nitrotoluene	ND	230	64	ug/kg	
479-45-8	Tetryl	ND	460	130	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	230	55	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	230	46	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1900	690	ug/kg	
78-11-5	PETN	ND [a]	1900	690	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	104%	111%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023098.D PP021979.D

Form I OP

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023098.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021979.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.30 g	20.0 ml
Run #2	2.30 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	220	45	ug/kg	
121-82-4	RDX	ND	220	43	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	220	43	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	220	77	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	220	43	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	220	43	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	220	47	ug/kg	
98-95-3	Nitrobenzene	ND	220	62	ug/kg	
88-72-2	o-Nitrotoluene	ND	220	67	ug/kg	
99-08-1	m-Nitrotoluene	ND	220	90	ug/kg	
99-99-0	p-Nitrotoluene	ND	220	60	ug/kg	
479-45-8	Tetryl	ND	430	120	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	220	51	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	220	43	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1700	650	ug/kg	
78-11-5	PETN	ND [a]	1700	650	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	106%	107%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG023101.D PP021982.D

Form I COA

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8330A SW846 8330B	Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG023101.D	1	08/03/07	NAF	08/01/07	OP21693	GGG991
Run #2	PP021982.D	1	08/03/07	NAF	08/01/07	OP21693	GPP759

	Initial Weight	Final Volume
Run #1	2.38 g	20.0 ml
Run #2	2.38 g	20.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	210	44	ug/kg	
121-82-4	RDX	ND	210	42	ug/kg	
99-65-0	1,3-Dinitrobenzene	ND	210	42	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	210	75	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	210	42	ug/kg	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	210	42	ug/kg	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	210	45	ug/kg	
98-95-3	Nitrobenzene	ND	210	60	ug/kg	
88-72-2	o-Nitrotoluene	ND	210	65	ug/kg	
99-08-1	m-Nitrotoluene	ND	210	87	ug/kg	
99-99-0	p-Nitrotoluene	ND	210	58	ug/kg	
479-45-8	Tetryl	ND	420	120	ug/kg	
99-35-4	1,3,5-Trinitrobenzene	ND	210	50	ug/kg	
118-96-7	2,4,6-Trinitrotoluene	ND	210	42	ug/kg	
55-63-0	Nitroglycerine	ND [a]	1700	630	ug/kg	
78-11-5	PETN	ND [a]	1700	630	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	116%	113%	72-145%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – Herbicides
Accutest Laboratories, Inc., SDG F51154

DATE: September 25, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on July 18, 2007 and July 19, 2007. Aqueous samples were analyzed for chlorinated herbicides using USEPA SW846 Method 3510C/8151A. Solid samples were analyzed for chlorinated herbicides using USEPA SW846 Method 3550B/8151A. A total of five aqueous samples and seventeen solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41SW08	F51154-6	41SD11	F51154-22
41SW09	F51154-7	49SS02	F51154-23
41SW10	F51154-8	49SS03	F51154-24
41SD08	F51154-9	49SS04	F51154-25
41SD09	F51154-10	49SS05	F51154-26
41SD10	F51154-11	59SS06	F51154-27
LFSD01	F51154-15	59SS07	F51154-28
TMSD01	F51154-16	59SS08	F51154-29
LFSW01	F51154-17	59SS09	F51154-30
APSD01	F51154-18	59SS10	F51154-31
TMSW01	F51154-20	TMSS05	F51154-32

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
X		Initial Calibration
X		Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
X		Laboratory Control Sample
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

9/25/07
Date

RFAAP VALIDATION REPORT
CHLORINATED HERBICIDES REVIEW
SDG F51154

I-Holding Times

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, chlorinated herbicides compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis. For solid samples, chlorinated herbicides compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 07/18/07 and 07/19/07, the coolers were received by the primary laboratory (Accutest) on 07/20/07 at 4.0°C, 4.0°C, 4.6°C, 4.6°C, 4.8°C, 5.0°C, 5.0°C, and 5.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.2°C, 4.0°C, and 3.6°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 3.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 5.5°C and 5.2°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The aqueous and solid samples were collected on 07/18/07 and 07/19/07. For aqueous samples collected 07/18/07 and 07/19/07, the herbicides were extracted on 07/24/07 and analyzed on 07/25/07. For solid samples collected 07/18/07 and 07/19/07, the herbicides were extracted on 07/24/07 and analyzed on 07/27/07 and 07/28/07. All criteria were met. No qualifiers were applied.

II-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The DoD QSM specifies that the percent relative standard deviation (%RSD) for a 5-point standard calibration should be ≤20% for each target compound.

- No initial calibration was provided for MCPP and MCPA on instrument GC-GG. During discussions with the laboratory, they indicated that they perform a daily single point calibration rather than a five point calibration. All samples were non-detect and qualified estimated "UJ" based upon this outlier. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), TMSW01 (F51154-20), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this single point calibration.

- For initial calibration performed on 07/25/07 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), TMSW01 (F51154-20), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this initial calibration.

III-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration establishes the response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The DoD QSM specifies that the percent difference (%D) between the initial calibration CF and the continuing calibration CF must be ≤20%.

- A single point calibration was provided for MCPP and MCPA on instrument GC-GG for 07/25/07 run. The calibration standard indicated adequate response for MCPP and MCPA. However, since a five point calibration was not performed, %D calculation could not be verified. All samples were non-detect and qualified estimated "UJ" based upon this outlier. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), TMSW01 (F51154-20), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this single point calibration.

- For continuing calibration performed on 07/25/07 @11:38 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this continuing calibration.

- For continuing calibration performed on 07/25/07 @17:37 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 07/25/07 @19:25 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 07/27/07 @12:05 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), and 49SS04 (F51154-25) apply to this continuing calibration.

- For continuing calibration performed on 07/27/07 @18:56 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. Samples 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this continuing calibration.

- For continuing calibration performed on 07/27/07 @23:27 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. Samples 49SS02 (F51154-23), 49SS03 (F51154-24) apply to this continuing calibration.

- For continuing calibration performed on 07/28/07 @02:08 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

IV-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field or laboratory activities. No contaminants should be detected in any of the associated blanks. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are qualified "B" if the concentration of the analyte is ≤ five times (5x) the absolute maximum blank concentration. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one and for solid matrices were converted to soil values (soil conversion factor = 33) if needed. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. The surface water "SW" samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the SW samples. Rinse blanks 072407R (F51275-1) and 072507R (F51300-31) apply to the surface soil "SS" and subsurface soil "SB" samples in this SDG. Rinse blank RB071807 (F51154-12) applies to the sediment "SD" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
07/25/07	OP7755-MB	All target compounds <½MRL	NA	NA	None
09/10/07	RB083007	All target compounds <½MRL	NA	NA	None
Analysis Date	**QC Blank ID**	**Compound**	**Max Conc. µg/kg**	**Action Level µg/kg**	**B qualified samples**
07/27/07	OP7756-MB	All target compounds <½MRL	NA	NA	None
07/25/07	RB071807	All target compounds <½MRL	NA	NA	None
08/03/07	072407R	All target compounds <½MRL	NA	NA	None
08/03/07	072507R	All target compounds <½MRL	NA	NA	None

V-System Monitoring Compounds (Surrogates)

Laboratory performance on individual samples is established by means of spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. Spike recoveries must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Control Limit: 2,4-DCAA (34-179%)
Solid Control Limit: 2,4-DCAA (34-179%)

- For sample 49SS02 (F51154-23), surrogate 2,4-DCAA was above criteria limits due to double spiking (lab error). The surrogate adjusted (145%) and within criteria. No qualifiers were applied based upon this outlier.

- For sample 49SS03 (F51154-24), surrogate 2,4-DCAA was above criteria limits due to double spiking (lab error). The surrogate adjusted (137%) and within criteria. No qualifiers were applied based upon this outlier.

- For sample 59SS10 (F51154-31), surrogate 2,4-DCAA (338%) was above criteria limits. The sample was non-detect for all target compounds; therefore, no qualifiers were applied based upon this outlier.

- For all other samples, all criteria were met.

VI-Laboratory Control Samples
Data for laboratory control samples (LCS) are generated to determine long-term precision and accuracy of the analytical method. Percent recoveries must be within the specified control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-8 of the DoD QSM (DoD, 2006). DoD QSM solid LCS recovery limits are specified in Table D-2 and Table D-9 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP7755-BS was used as the aqueous LCS for the 07/25/07 run. Dinoseb (98%) was above DoD QSM criteria and within laboratory criteria. All samples were non-detect for dinoseb; therefore, no qualifiers were applied based upon this outlier. All other herbicides were within criteria. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this LCS.

- Sample OP7756-BS was used as the solid LCS for the 07/27/07 run. Dicamba (150%) and dinoseb (55%) were above DoD QSM criteria and/or laboratory criteria. All samples were non-detect for dinoseb; therefore, no qualifiers were applied based upon this outlier. Dicamba was qualified estimated bias high "K" for detects and no qualifier for non-detects based upon the high recovery. All other herbicides were within criteria. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-8 of the DoD QSM (DoD, 2006). DoD QSM solid MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-9 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample LFSW01 (F51154-17) was used for the aqueous MS/MSD analysis on 07/25/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this MS/MSD.

- Sample TMSS05 (F51154-32) was used as the solid MS/MSD for the 07/27/07 run. 2,4-D (142%), 2,4,5-TP (149%; RPD=30%), dinoseb (RPD=40%), and dalapon (147%) were above DoD QSM criteria and/or laboratory criteria. All samples were non-detect for 2,4-D, 2,4,5-TP, dinoseb, and dalapon; therefore, no qualifiers were applied based upon these outliers. All other herbicides were within criteria. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous and solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field surface water sample duplicate pair LFSW01 (F51154-17) and TMSW01 (F51154-20) was collected for chlorinated herbicides. All chlorinated herbicides target compounds were non-detect. All criteria were met. No qualifiers were applied.

- Field surface soil sample duplicate pair 49SS05 (F51154-26) and TMSS05 (F51154-32) was collected for chlorinated herbicides. All chlorinated herbicides target compounds were non-detect. All criteria were met. No qualifiers were applied.

- Field sediment sample duplicate pair LFSD01 (F51154-15) and TMSD01 (F51154-16) was collected for chlorinated herbicides. All chlorinated herbicides target compounds were non-detect. All criteria were met. No qualifiers were applied.

IX-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. Percent difference (%D) between the calculated value and the reported value must be within 10%. All positive values must have less than or equal to 40% %D between the primary and secondary columns. Any sample value >MDL and <MRL is qualified as estimated, "J." All criteria were met. No qualifiers were applied.

- The %D between the primary and secondary columns was within criteria for all detected chlorinated herbicides.

Sample: LFSW01MS (F51154-17MS), 2,4-DB

Conc. µg/L = (Amt * DF * Vt) / (CF * Vo)

where: Amt = the response on column (ng/mL) of the sample
CF = Calibration Factor (from initial calibration)
Vt = volume of final extract (mL)
DF = dilution factor
Vo = volume of the sample extracted (mL)

Conc. µg/L = (1734556 ng/mL * 1 * 10 mL) / (4558* 1000 mL)
= 3.8 ng/mL = 3.8 µg/L

Reported Conc. = 3.8 µg/L
%D = 0.0%
Values were within 10% difference

Sample: 49SS03 (F51154-24), 2,4-DB

Conc. µg/kg = (Amt * Ve * DF) / (CF * Ws * D)

where: Amt = the response on column (µg/mL) of the sample
CF = Calibration Factor (from initial calibration)
Ve = Final Volume of extract (mL)
DF = Dilution factor
W(s) = Weight of sample in grams.
D = Percent dry weight (100 - % moisture in sample)/100

Conc. µg/kg = (1158430 * 10 * 1) / (4558* 30.0 * 0.920) = 92.1 µg/kg

Reported value = 92.1 µg/kg
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: GG36347.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36347.D	1	07/25/07	ATX	07/24/07	T:OP7755	T:GGG1135
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND UJ	50		ug/l	
94-74-6	MCPA	ND UJ	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	105%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GC36348.D

For I Op

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36348.D	1	07/25/07	ATX	07/24/07	T:OP7755	T:GGG1135
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND UJ	50		ug/l	
94-74-6	MCPA	ND UJ	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	109%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36349.D

Form I Cy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36349.D	1	07/25/07	ATX	07/24/07	T:OP7755	T:GGG1135
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND VT	50		ug/l	
94-74-6	MCPA	ND VT	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	104%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36366.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36366.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	90	36	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	36	32	ug/kg	
93-76-5	2,4,5-T	ND	18	9.0	ug/kg	
1918-00-9	Dicamba	ND	18	14	ug/kg	
88-85-7	Dinoseb	ND	18	12	ug/kg	
75-99-0	Dalapon	ND	90	63	ug/kg	
120-36-5	Dichloroprop	ND	90	24	ug/kg	
94-82-6	2,4-DB	ND	180	150	ug/kg	
93-65-2	MCPP	ND UJ	450		ug/kg	
94-74-6	MCPA	ND UJ	450		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	87%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36367.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36367.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	40	16	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	16	14	ug/kg	
93-76-5	2,4,5-T	ND	8.1	4.0	ug/kg	
1918-00-9	Dicamba	ND	8.1	6.1	ug/kg	
88-85-7	Dinoseb	ND	8.1	5.3	ug/kg	
75-99-0	Dalapon	ND	40	28	ug/kg	
120-36-5	Dichloroprop	ND	40	11	ug/kg	
94-82-6	2,4-DB	ND	81	66	ug/kg	
93-65-2	MCPP	ND UJ	200		ug/kg	
94-74-6	MCPA	ND UJ	200		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	85%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36368.D

For I 00Pz

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36368.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	42	17	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	17	15	ug/kg	
93-76-5	2,4,5-T	ND	8.4	4.2	ug/kg	
1918-00-9	Dicamba	ND	8.4	6.3	ug/kg	
88-85-7	Dinoseb	ND	8.4	5.5	ug/kg	
75-99-0	Dalapon	ND	42	29	ug/kg	
120-36-5	Dichloroprop	ND	42	11	ug/kg	
94-82-6	2,4-DB	ND	84	69	ug/kg	
93-65-2	MCPP	ND UJ	210		ug/kg	
94-74-6	MCPA	ND UJ	210		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	105%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36369.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36369.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	58	23	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	23	20	ug/kg	
93-76-5	2,4,5-T	ND	12	5.8	ug/kg	
1918-00-9	Dicamba	ND	12	8.6	ug/kg	
88-85-7	Dinoseb	ND	12	7.5	ug/kg	
75-99-0	Dalapon	ND	58	40	ug/kg	
120-36-5	Dichloroprop	ND	58	16	ug/kg	
94-82-6	2,4-DB	ND	120	94	ug/kg	
93-65-2	MCPP	ND VJ	290		ug/kg	
94-74-6	MCPA	ND VJ	290		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	105%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36370.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSD01		
Lab Sample ID:	F51154-16	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	65.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36370.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	51	21	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	21	18	ug/kg	
93-76-5	2,4,5-T	ND	10	5.1	ug/kg	
1918-00-9	Dicamba	ND	10	7.7	ug/kg	
88-85-7	Dinoseb	ND	10	6.7	ug/kg	
75-99-0	Dalapon	ND	51	36	ug/kg	
120-36-5	Dichloroprop	ND	51	14	ug/kg	
94-82-6	2,4-DB	ND	100	84	ug/kg	
93-65-2	MCPP	ND UJ	260		ug/kg	
94-74-6	MCPA	ND UJ	260		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	62%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36351.D

For I Cor

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36351.D	1	07/25/07	ATX	07/24/07	T:OP7755	T:GGG1135
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND UJ	50		ug/l	
94-74-6	MCPA	ND UJ	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	108%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36371.D

Form I OR4

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36371.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	38	15	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	15	13	ug/kg	
93-76-5	2,4,5-T	ND	7.7	3.8	ug/kg	
1918-00-9	Dicamba	14.5 K	7.7	5.8	ug/kg	
88-85-7	Dinoseb	ND	7.7	5.0	ug/kg	
75-99-0	Dalapon	ND	38	27	ug/kg	
120-36-5	Dichloroprop	ND	38	10	ug/kg	
94-82-6	2,4-DB	ND	77	63	ug/kg	
93-65-2	MCPP	ND UJ	190		ug/kg	
94-74-6	MCPA	ND UJ	190		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	113%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36352.D

Form I GC

Accutest Laboratories

Report of Analysis

3.20

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-20	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36352.D	1	07/25/07	ATX	07/24/07	T:OP7755	T:GGG1135
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND VJ	50		ug/l	
94-74-6	MCPA	ND VJ	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	146%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36372.D

Run I 08

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36372.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	38	15	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	15	13	ug/kg	
93-76-5	2,4,5-T	ND	7.7	3.8	ug/kg	
1918-00-9	Dicamba	ND	7.7	5.8	ug/kg	
88-85-7	Dinoseb	ND	7.7	5.0	ug/kg	
75-99-0	Dalapon	ND	38	27	ug/kg	
120-36-5	Dichloroprop	ND	38	10	ug/kg	
94-82-6	2,4-DB	ND	77	63	ug/kg	
93-65-2	MCPP	ND VJ	190		ug/kg	
94-74-6	MCPA	ND VJ	190		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	111%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36387.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36387.D	1	07/28/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	37	15	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	15	13	ug/kg	
93-76-5	2,4,5-T	ND	7.4	3.7	ug/kg	
1918-00-9	Dicamba	ND	7.4	5.6	ug/kg	
88-85-7	Dinoseb	ND	7.4	4.8	ug/kg	
75-99-0	Dalapon	ND	37	26	ug/kg	
120-36-5	Dichloroprop	ND	37	10	ug/kg	
94-82-6	2,4-DB	ND	74	61	ug/kg	
93-65-2	MCPP	ND UJ	190		ug/kg	
94-74-6	MCPA	ND UJ	190		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	145% [b]		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.
(b) Surrogate was adjusted due to double spiking

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36388.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36388.D	1	07/28/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	36	14	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	14	13	ug/kg	
93-76-5	2,4,5-T	ND	7.2	3.6	ug/kg	
1918-00-9	Dicamba	ND	7.2	5.4	ug/kg	
88-85-7	Dinoseb	ND	7.2	4.7	ug/kg	
75-99-0	Dalapon	ND	36	25	ug/kg	
120-36-5	Dichloroprop	ND	36	9.8	ug/kg	
94-82-6	2,4-DB	92.1	72	59	ug/kg	
93-65-2	MCPP	ND UJ	180		ug/kg	
94-74-6	MCPA	ND UJ	180		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	137% [b]		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.
(b) Surrogate was adjusted due to double spiking.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36373.D

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Report of Analysis

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3

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36373.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	38	15	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	15	13	ug/kg	
93-76-5	2,4,5-T	ND	7.6	3.8	ug/kg	
1918-00-9	Dicamba	ND	7.6	5.7	ug/kg	
88-85-7	Dinoseb	ND	7.6	5.0	ug/kg	
75-99-0	Dalapon	ND	38	27	ug/kg	
120-36-5	Dichloroprop	ND	38	10	ug/kg	
94-82-6	2,4-DB	ND	76	62	ug/kg	
93-65-2	MCPP	ND UJ	190		ug/kg	
94-74-6	MCPA	ND UJ	190		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	109%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36376.D

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Accutest Laboratories

Report of Analysis

3.2.6 3

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36376.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	39	16	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	16	14	ug/kg	
93-76-5	2,4,5-T	ND	7.8	3.9	ug/kg	
1918-00-9	Dicamba	ND	7.8	5.8	ug/kg	
88-85-7	Dinoseb	ND	7.8	5.0	ug/kg	
75-99-0	Dalapon	ND	39	27	ug/kg	
120-36-5	Dichloroprop	ND	39	10	ug/kg	
94-82-6	2,4-DB	ND	78	63	ug/kg	
93-65-2	MCPP	ND UJ	190		ug/kg	
94-74-6	MCPA	ND UJ	190		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	91%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36377.D

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Report of Analysis

3.2.7

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36377.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	36	14	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	14	13	ug/kg	
93-76-5	2,4,5-T	ND	7.2	3.6	ug/kg	
1918-00-9	Dicamba	ND	7.2	5.4	ug/kg	
88-85-7	Dinoseb	ND	7.2	4.7	ug/kg	
75-99-0	Dalapon	ND	36	25	ug/kg	
120-36-5	Dichloroprop	ND	36	9.8	ug/kg	
94-82-6	2,4-DB	ND	72	59	ug/kg	
93-65-2	MCPP	ND UJ	180		ug/kg	
94-74-6	MCPA	ND UJ	180		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	151%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36378.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36378.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	36	15	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	15	13	ug/kg	
93-76-5	2,4,5-T	ND	7.3	3.6	ug/kg	
1918-00-9	Dicamba	ND	7.3	5.5	ug/kg	
88-85-7	Dinoseb	ND	7.3	4.7	ug/kg	
75-99-0	Dalapon	ND	36	25	ug/kg	
120-36-5	Dichloroprop	ND	36	9.8	ug/kg	
94-82-6	2,4-DB	ND	73	59	ug/kg	
93-65-2	MCPP	ND UJ	180		ug/kg	
94-74-6	MCPA	ND UJ	180		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	143%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36379.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	37	15	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	15	13	ug/kg	
93-76-5	2,4,5-T	ND	7.5	3.7	ug/kg	
1918-00-9	Dicamba	ND	7.5	5.6	ug/kg	
88-85-7	Dinoseb	ND	7.5	4.9	ug/kg	
75-99-0	Dalapon	ND	37	26	ug/kg	
120-36-5	Dichloroprop	ND	37	10	ug/kg	
94-82-6	2,4-DB	ND	75	61	ug/kg	
93-65-2	MCPP	ND UJ	190		ug/kg	
94-74-6	MCPA	ND UJ	190		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	79%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36380.D

For 1 only

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36380.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	35	14	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	14	12	ug/kg	
93-76-5	2,4,5-T	ND	7.0	3.5	ug/kg	
1918-00-9	Dicamba	ND	7.0	5.3	ug/kg	
88-85-7	Dinoseb	ND	7.0	4.6	ug/kg	
75-99-0	Dalapon	ND	35	25	ug/kg	
120-36-5	Dichloroprop	ND	35	9.5	ug/kg	
94-82-6	2,4-DB	ND	70	57	ug/kg	
93-65-2	MCPP	ND VJ	180		ug/kg	
94-74-6	MCPA	ND VJ	180		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	134%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36381.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36381.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	35	14	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND	14	12	ug/kg	
93-76-5	2,4,5-T	ND	7.0	3.5	ug/kg	
1918-00-9	Dicamba	ND	7.0	5.2	ug/kg	
88-85-7	Dinoseb	ND	7.0	4.5	ug/kg	
75-99-0	Dalapon	ND	35	24	ug/kg	
120-36-5	Dichloroprop	ND	35	9.4	ug/kg	
94-82-6	2,4-DB	ND	70	57	ug/kg	
93-65-2	MCPP	ND UJ	170		ug/kg	
94-74-6	MCPA	ND UJ	170		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	338% [b]		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.
(b) Outside control limits due to matrix interference.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36382.D

Form I Copy

Accutest Laboratories

Report of Analysis

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3

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8151 SW846 3550B	Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36382.D	1	07/27/07	ATX	07/24/07	T:OP7756	T:GGG1136
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result		RL	MDL	Units	Q
94-75-7	2,4-D	ND		38	15	ug/kg	
93-72-1	2,4,5-TP (Silvex)	ND		15	13	ug/kg	
93-76-5	2,4,5-T	ND		7.7	3.8	ug/kg	
1918-00-9	Dicamba	ND		7.7	5.8	ug/kg	
88-85-7	Dinoseb	ND		7.7	5.0	ug/kg	
75-99-0	Dalapon	ND		38	27	ug/kg	
120-36-5	Dichloroprop	ND		38	10	ug/kg	
94-82-6	2,4-DB	ND		77	63	ug/kg	
93-65-2	MCPP	ND	UJ	190		ug/kg	
94-74-6	MCPA	ND	UJ	190		ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	174%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG36350.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG36350.D	1	07/25/07	ATX	07/24/07	T:OP7755	T:GGG1135
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND	50		ug/l	
94-74-6	MCPA	ND	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	92%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – TAL Metals
Accutest Laboratories, Inc., SDG F51154

DATE: September 25, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on July 18, 2007 and July 19, 2007. Aqueous samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3010A/6010B for ICP metals and SW-846 7470A for mercury. Solid samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3050B/6010B for ICP metals and SW-846 7471A for mercury. A total of five aqueous samples and seventeen solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41SW08	F51154-6	41SD11	F51154-22
41SW09	F51154-7	49SS02	F51154-23
41SW10	F51154-8	49SS03	F51154-24
41SD08	F51154-9	49SS04	F51154-25
41SD09	F51154-10	49SS05	F51154-26
41SD10	F51154-11	59SS06	F51154-27
LFSD01	F51154-15	59SS07	F51154-28
TMSD01	F51154-16	59SS08	F51154-29
LFSW01	F51154-17	59SS09	F51154-30
APSD01	F51154-18	59SS10	F51154-31
TMSW01	F51154-20	TMSS05	F51154-32

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
X		Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
	X	Laboratory Sample Duplicate
X		Matrix Spike and Spike Duplicate
X		ICP Serial Dilution
X		Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

9/25/07
Date

RFAAP VALIDATION REPORT
METALS REVIEW
SDG F51154

I-Holding Times

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. Holding time criteria: For aqueous matrices, the samples are shipped cool @4°C±2°C and preserved to pH<2 with HNO_3 with a maximum holding time is 180 days for ICP metals and 28 days for mercury. For solid matrices, the samples are shipped cool @4°C±2°C with a maximum holding time is 180 days for ICP metals and 28 days for mercury.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 07/18/07 and 07/19/07, the coolers were received by the primary laboratory (Accutest) on 07/20/07 at 4.0°C, 4.0°C, 4.6°C, 4.6°C, 4.8°C, 5.0°C, 5.0°C, and 5.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.2°C, 4.0°C, and 3.6°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 3.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 5.5°C and 5.2°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: Samples were collected 07/18/07 and 07/19/07 for metals analysis. For aqueous samples collected 07/18/07 and 07/19/07, they were digested on 07/26/07 and analyzed on 07/27/07 for ICP metals. For solid samples collected 07/18/07 and 07/19/07, they were digested on 07/25/07 and 07/26/07 and analyzed on 07/25/07, 07/26/07, and 07/27/07 (Mn & Zn) for ICP metals. For aqueous samples collected 07/18/07 and 07/19/07, they were digested on 07/25/07 and analyzed on 07/25/07 for mercury. For solid samples collected 07/18/07 and 07/19/07, they were digested on 07/26/07 and analyzed on 07/26/07 for mercury (two runs). All criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (DoD QSM <½ MRL) 3 – standards (r≥0.995) ICV/CCV (90-110%) (DoD QSM 90-110%) MRL (70-130%) (DoD QSM 80-120%) High Std. (95-105%)	Hg:	1 – blank (DoD QSM <½ MRL) 5 – standards (r≥0.995) ICV/CCV (80-120%)(DoD QSM ICV 90-110% & CCV 80-120%) MRL (80-120%) (DoD QSM 80-120%) High Std. (95-105%)

- The aqueous samples were analyzed for ICP metals on 07/27/07. The solid samples were analyzed for ICP metals on 07/25/07, 07/26/07, and 07/27/07 (Mn & Zn). Mercury was analyzed for the aqueous samples on 07/25/07 with a correlation coefficient of 0.9998. Mercury was analyzed for the solid samples on 07/26/07 with a correlation coefficient of 0.9998. Mercury was analyzed for the solid samples on 07/26/07 (second run) with a correlation coefficient of 0.9991. For 07/26/07 ICP run, zinc (CCV5=110.5%) was outside criteria; however, no samples were bracketed by this CCV for zinc. No qualifiers were applied based upon this outlier. For 07/27/07 ICP run, zinc (CCV14=88.5% and CCV18=89.5%) were outside criteria; however, no samples were bracketed by these CCVs for zinc. No qualifiers were applied based upon these outliers. All other ICV/CCV/High Standard criteria were met for all other metals and runs. **Table 2** summarizes the MRL standard analysis. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
07/25/07	Hg	1.0	65.0%	41SW08, 41SW09, 41SW10, LFSW01, TMSW01	L, UL
07/26/07	ICP-Al	200	71.0%	41SW08, 41SW09, 41SW10, TMSW01	L, UL
07/26/07	ICP-As	10	121%	None	K
07/26/07	ICP-Pb	10	126%	TMSW01	K
07/26/07	ICP-Se	10	126%	None	K
Analysis Date	**Analysis**	**MRL (mg/kg)**	**MRL %Recovery**	**Qualified samples @ <2xMRL**	**Validation Qualifiers**
07/25/07	ICP-Sb	3.0	32.0%	41SD08, 41SD09, 41SD10, 41SD11, 49SS02, 49SS03, 49SS04, 49SS05, 59SS06, 59SS07, 59SS08, 59SS09, 59SS10, APSD01, LFSD01, TMSD01, TMSS05	L, UL
07/25/07	ICP-As	0.4	123%	None	K
07/25/07	ICP-Pb	5.0	130%	41SD08, 41SD09, 41SD10, 49SS04, 49SS05, 59SS06, 59SS07, 59SS08, 59SS09, 59SS10, TMSS05	K
07/25/07	ICP-Se	5.0	130%; 122%	41SD08, 41SD09, 41SD10, 41SD11, 49SS02, 49SS03, 49SS04, 49SS05, 59SS06, 59SS07, 59SS08, 59SS09, 59SS10, APSD01, LFSD01, TMSD01, TMSS05	K
07/25/07	ICP-Tl	0.50	79.0%	41SD08, 41SD09, 41SD10, 49SS02, 49SS03, 49SS04, 49SS05, 59SS06, 59SS07, 59SS08, 59SS09, 59SS10, APSD01, LFSD01, TMSD01, TMSS05	L, UL
07/27/07	Mn & Zn	0.74 & 1.0	All within criteria	None	None
07/26/07	Hg	0.083	48.0%	41SD08, 41SD09, 41SD10, 41SD11, 49SS02, 49SS04, 49SS05, 59SS06, 59SS07, APSD01, LFSD01, TMSD01	L, UL
07/26/07	Hg	0.083	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. DoD QSM limits are <½MRL for the method blank and <2*MDL for the calibration blanks. Samples are qualified "B" when they are less than 5x the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one and for solid matrices were converted to soil values (soil conversion factor = 10 for ICP and Hg = 12) if needed. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. The surface water "SW" samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the SW samples. Rinse blanks 072407R (F51275-1) and 072507R (F51300-31) apply to the surface soil "SS" and subsurface soil "SB" samples in this SDG. Rinse blank RB071807 (F51154-12) applies to the sediment "SD" samples in this SDG.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. µg/L	Action Level µg/L	B qualified samples
07/26/07	Aluminum	ICB/CCBs	39.0J	195	41SW09, TMSW01
07/26/07	Antimony	ICB/CCBs	7.3	36.5	None
07/26/07	Copper	ICB/CCBs	1.9J	9.5	41SW10
07/26/07	Iron	ICB/CCBs	30.7J	154	41SW08, 41SW10
07/26/07	Magnesium	ICB/CCBs	10.5J	52.5	None
07/26/07	Nickel	ICB/CCBs	4.2J	21.0	41SW08, 41SW10
07/26/07	Potassium	ICB/CCBs	1740J	8700	41SW08, 41SW09, 41SW10, LFSW01, TMSW01
07/26/07	Selenium	ICB/CCBs	5.4J	27.0	None
07/26/07	Sodium	ICB/CCBs	2080J	10400	None
07/26/07	Thallium	ICB/CCBs	9.2J	46.0	None
07/25/07	Mercury	ICB/CCBs	0.19J	0.95	None
07/25/07	Mercury	MP12560-MB	<2*MDL	NA	None
07/27/07	Iron	MP12581-MB	25.7J	129	41SW08, 41SW10
07/27/07	Potassium	MP12581-MB	1700J	8500	41SW08, 41SW09, 41SW10, LFSW01, TMSW01
07/27/07	Sodium	MP12581-MB	2020J	10100	None
09/17/07	Potassium	RB083007	1740J	8700	41SW08, 41SW09, 41SW10, LFSW01, TMSW01
09/17/07	Sodium	RB083007	1860J	9300	None
09/05/07	Mercury	RB083007	<2*MDL	NA	None
Analysis Date	**Analysis**	**QC Blank ID**	**Max Conc. mg/kg**	**Action Level mg/kg**	**B qualified samples**
07/25/07	Antimony	ICB/CCBs	0.62	3.1	41SD09, 41SD10, 41SD11, 49SS02, 49SS03, 49SS04, 49SS05, 59SS06, 59SS07, 59SS08, 59SS09, 59SS10, APSD01, LFSD01, TMSD01, TMSS05
07/25/07	Copper	ICB/CCBs	0.22J	1.1	None
07/25/07	Lead	ICB/CCBs	0.43J	2.2	None
07/25/07	Nickel	ICB/CCBs	0.76J	3.8	None
07/25/07	Potassium	ICB/CCBs	171J	855	41SD08, 41SD09, 41SD10, 49SS02, 49SS03, 49SS05, 59SS06, 59SS07, 59SS09, 59SS10, LFSD01, TMSD01, TMSS05
07/25/07	Selenium	ICB/CCBs	0.52J	2.6	41SD08, 41SD10, 59SS09
07/25/07	Sodium	ICB/CCBs	190J	950	41SD08, 41SD09, 41SD10, 49SS02, 49SS03, 59SS06, 59SS07, 59SS08, 59SS10, APSD01, LFSD01, TMSD01
07/25/07	Thallium	ICB/CCBs	0.59J	3.0	41SD11
07/25/07	Zinc	ICB/CCBs	0.27J	1.4	None
07/27/07	Mn & Zn	ICB/CCBs	<2*MDL	NA	None
07/26/07	Mercury	ICB/CCBs	<2*MDL	NA	None
07/26/07	Mercury	ICB/CCBs	0.0208J	0.10	41SD08, 41SD09, 41SD10, 41SD11, 49SS04, 49SS05, 59SS06, 59SS07, APSD01, LFSD01, TMSD01
07/25/07	Lead	MP12567-MB	0.25J	1.3	None
07/25/07	Potassium	MP12567-MB	85.1J	426	59SS09
07/25/07	Sodium	MP12567-MB	112	560	41SD08, 41SD09, 41SD10, 49SS02, 49SS03, 59SS06, 59SS07, 59SS08, APSD01, LFSD01, TMSD01
07/25/07	Thallium	MP12567-MB	0.61J	3.1	41SD11
07/26/07	Mercury	MP12573-MB	0.016	0.080	41SD08, 41SD09, 41SD10, 41SD11, 49SS04, 49SS05, 59SS06, 59SS07, APSD01, LFSD01, TMSD01
07/26/07	Mercury	MP12574-MB	<2*MDL	NA	None
07/26/07	Copper	MP12577-MB	0.14J	0.70	None
07/26/07	Potassium	MP12577-MB	83.8J	419	59SS10
07/26/07	Sodium	MP12577-MB	113J	565	59SS10
07/26/07	Thallium	MP12577-MB	0.51J	2.6	None

Table 3 Blank Contamination Analysis Summary, Continued

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
07/27/07	Potassium	RB071807	177J	885	41SD08, 41SD09, 41SD10, 41SD11, LFSD01, TMSD01
07/27/07	Sodium	RB071807	206J	1030	41SD08, 41SD09, 41SD10, APSD01, LFSD01, TMSD01
07/27/07	Zinc	RB071807	0.19J	0.95	None
07/25/07	Mercury	RB071807	<2*MDL	NA	None
07/31/07	Lead	072407R	0.21J	1.1	None
07/31/07	Magnesium	072407R	0.53J	2.7	None
07/31/07	Potassium	072407R	176J	880	49SS02, 49SS03, 49SS05, 59SS06, 59SS07, 59SS09, 59SS10, TMSS05
07/28/07	Sodium	072407R	192J	960	49SS02, 49SS03, 59SS06, 59SS07, 59SS08, 59SS10
07/28/07	Mercury	072407R	<2*MDL	NA	None
07/28/07	Potassium	072507R	177J	885	49SS02, 49SS03, 49SS05, 59SS06, 59SS07, 59SS09, 59SS10, TMSS05
07/28/07	Sodium	072507R	213J	1065	49SS02, 49SS03, 59SS06, 59SS07, 59SS08, 59SS10
07/28/07	Mercury	072507R	<2*MDL	NA	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".

IV-ICP Interference Check Sample (ICS)

The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (DoD QSM limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)

The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All aqueous LCS results must fall within the control limits. The DoD QSM aqueous LCS recovery limits are specified in Table D-18 of the DoD QSM (DoD, 2006). The DoD QSM solid LCS recovery limits are specified in Table D-19 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample MP12581-BS was used as aqueous LCS for ICP metals analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this LCS.

- Sample MP12567-BS was used as solid LCS for ICP metals analysis on 07/25/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), and 59SS09 (F51154-30) apply to this LCS.

- Sample MP12577-BS was used as solid LCS for ICP metals analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples 59SS10 (F51154-31) and TMSS05 (F51154-32) apply to this LCS.

- Sample MP12560-BS was used as aqueous LCS for mercury analysis performed on 07/25/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this LCS.

- Sample MP12573-BS was used as solid LCS for mercury analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), and 59SS07 (F51154-28) apply to this LCS.

- Sample MP12574-BS was used as solid LCS for mercury analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

VI-Laboratory Duplicate Sample Analysis

Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analyses are also performed to generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. DoD QSM limits for metals are 20% RPD for ICP metals and mercury.

- Sample LFSW01 (F51154-17) was used as aqueous laboratory duplicate for ICP metals analysis on 07/27/07. Chromium (200%), manganese (23.7%), nickel (200%), and vanadium (200%) were above criteria. Chromium, manganese, nickel, and vanadium were outside due to low sample concentrations (i.e. <MRL); therefore, no qualifiers were applied based upon this outlier. All other metals were within criteria. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this laboratory duplicate.

- Sample F51150-6 was used as soil laboratory duplicate for ICP metals analysis on 07/25/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), and 59SS09 (F51154-30) apply to this laboratory duplicate.

- Sample 59SS10 (F51154-31) was used as solid laboratory duplicate for ICP metals analysis on 07/26/07. Silver (200%) was above criteria. Silver was outside due to low sample concentrations (i.e. <MRL); therefore, no qualifiers were applied based upon this outlier. All other metals were within criteria. No qualifiers were applied. Samples 59SS10 (F51154-31) and TMSS05 (F51154-32) apply to this laboratory duplicate.

- Sample LFSW01 (F51154-17) was used as aqueous laboratory duplicate for mercury analysis on 06/25/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this laboratory duplicate.

- Sample F51240-2 was used as soil laboratory duplicate for mercury analysis on 07/26/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), and 59SS07 (F51154-28) apply to this laboratory duplicate.

- Sample 59SS08 (F51154-29) was used as solid laboratory duplicate for mercury analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this laboratory duplicate.

VII-Matrix Spike/Spike Duplicate

MS/MSD are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS and MSD per 20 samples of similar matrix. MS and MSD recoveries and relative percent differences between MS and MSD recoveries should be within the specified limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-18 of the DoD QSM (DoD, 2006). DoD QSM solid MS/MSD recovery limits follow the LCS criteria and are specified in Table D-19 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used. Post digestion spikes limits are 75-125% for ICP metals and mercury.

- Sample LFSW01 (F51154-17) was used as aqueous laboratory MS/MSD for ICP metals analysis on 07/27/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this MS/MSD.

- Sample F51150-6 was used as laboratory solid MS/MSD for ICP metals analysis on 07/25/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), and 59SS09 (F51154-30) apply to this MS/MSD.

- Sample 59SS10 (F51154-31) was used as solid laboratory MS/MSD for ICP metals analysis on 07/26/07. Aluminum (138%), antimony (17.5%, 12.5%; RPD=31.0%), arsenic (78.4%, 74.5%), cadmium (78.9%), calcium (79.6%), chromium (55.5%, 64.1%), iron (33.9%), manganese (-23%, 1064%; RPD=57.1%), nickel (79.3%), potassium (78.8%, 79.6%), selenium (77.3%, 71.8%), silver (78.9%), sodium (79.7%), thallium (75.9%), and vanadium (75.0%, 75.3%) were outside criteria. The sample concentration was >4 times the spike added for iron and manganese; therefore, no qualifiers were applied based upon these outliers. Antimony, arsenic, cadmium, calcium, chromium, nickel, potassium, selenium, silver, sodium, thallium, and vanadium were qualified bias low "L" for detects and "UL" for non-detects based upon the low recoveries. Aluminum was qualified bias high "K" for detects and no qualifier for non-detects based upon the high recovery. All other metals were within criteria. Samples 59SS10 (F51154-31) and TMSS05 (F51154-32) apply to this MS/MSD.

- Sample LFSW01 (F51154-17) was used as laboratory aqueous MS/MSD for mercury analysis on 06/25/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this MS/MSD.

- Sample F51240-2 was used as solid MS/MSD for mercury analysis on 07/26/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), and 59SS07 (F51154-28) apply to this MS/MSD.

- Sample 59SS08 (F51154-29) was used as solid MS/MSD for mercury analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

VIII-ICP Serial Dilution
An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for ICP metals was analyzed on 07/27/07 using aqueous sample LFSW01 (F51154-17). Lead (100%), potassium (147%), sodium (29.7%), and zinc (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for lead, sodium, and zinc; therefore, no qualifiers were applied based upon these outliers. For potassium, all detects were qualified estimated "J" and non-detects no qualifier based upon this outlier. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this serial dilution.

- The serial dilution for total ICP metals was analyzed using solid sample F51150-6 on 07/25/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), and 59SS09 (F51154-30) apply to this serial dilution.

- The serial dilution for ICP metals was analyzed on 07/26/07 using solid sample 59SS10 (F51154-31). Antimony (100%), arsenic (15.2%), beryllium (17.9%), calcium (15.4%), chromium (13.5%), cobalt (16.4%), iron (14.5%), lead (19.0%), magnesium (14.3%), manganese (16.5%), nickel (13.5%), potassium (83.6%), selenium (24.4%), sodium (532%), vanadium (11.8%), and zinc (15.6%) were outside of criteria limits. Sample concentrations were <50 times MDL for antimony, beryllium, selenium, and sodium; therefore, no qualifiers were applied based upon these outliers. For arsenic, calcium, chromium, cobalt, iron, lead, magnesium, manganese, nickel, potassium, vanadium, and zinc, all detects were qualified estimated "J" and non-detects no qualifier based upon these outliers. Samples 59SS10 (F51154-31) and TMSS05 (F51154-32) apply to this serial dilution.

- The serial dilution for mercury was analyzed using aqueous sample LFSW01 (F51154-17) on 07/25/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this serial dilution.

- The serial dilution for mercury was analyzed using solid sample F51240-2 on 07/26/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), and 59SS07 (F51154-28) apply to this serial dilution.

- The serial dilution for mercury was analyzed using solid sample 59SS08 (F51154-29) on 07/26/07. Mercury (34.5%) was above criteria. Sample concentration was <50 times MDL for mercury; therefore, no qualifiers were applied based upon this outlier. Samples 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this serial dilution.

IX-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 35% RPD for the aqueous and solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field surface water sample duplicate pair LFSW01 (F51154-17) and TMSW01 (F51154-20) was collected for TAL metals. All detected TAL metals found in the sample and its duplicate pair and associated %RPD are noted in **Table 4**. All other TAL metals target compounds were non-detect. Manganese (86.2%) and zinc (69.5%) were above criteria due to low concentration levels detected below the MRL. Manganese and zinc were qualified estimated "J" for the original and duplicate pair samples based upon these outliers. For all other metals, all criteria were met.

Table 4 Field Precision Hits Analysis Summary for TAL Metals for Duplicate Pair LFSW01 (F51154-17) and TMSW01 (F51154-20)

Compound	Original Sample (µg/L)	Duplicate Pair (µg/L)	%RPD
Aluminum	18.0U	50.7J	NA
Lead	3.4U	3.4J	NA
Magnesium	30100	30900	2.6
Manganese	3.3J	8.3J	86.2
Potassium	4320J	4450J	3.0
Sodium	24100	24800	2.9
Barium	103J	108J	4.7
Chromium	0.6U	0.99J	NA
Zinc	7.6J	15.7J	69.5
Calcium	79600	81600	2.5

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
U = Non-detect as <MDL.
NA = Not Applicable

- Field sediment sample duplicate pair LFSD01 (F51154-15) and TMSD01 (F51154-16) was collected for TAL metals. All detected TAL metals found in the sample and its duplicate pair and associated %RPD are noted in **Table 5**. All other TAL metals target compounds were non-detect. Barium (49.3%) was above criteria probably due to sample non-homogeneity. Mercury (51.2%) was above criteria due to low concentration levels detected below the MRL. Barium and mercury were qualified estimated "J" for the original and duplicate pair samples based upon these outliers. For all other metals, all criteria were met.

Table 5 Field Precision Hits Analysis Summary for TAL Metals for Duplicate Pair LFSD01 (F51154-15) and TMSD01 (F51154-16)

Compound	Original Sample (mg/kg)	Duplicate Pair (mg/kg)	%RPD
Aluminum	10100	8710	14.8
Iron	29000	23200	22.2
Lead	195	143	30.8
Magnesium	2970	2910	2.0
Nickel	11.7	9.7	18.7
Potassium	1180	996	16.9
Silver	0.076U	0.081J	NA
Sodium	222J	200J	10.4
Antimony	1.8J	1.3J	32.3
Arsenic	3.4	2.9	15.9
Barium	167	101	49.3
Beryllium	1.1	0.94	15.7
Chromium	24.9	18.5	29.5
Cobalt	11.8	9.1	25.8
Copper	22.1	19.9	10.5
Vanadium	28	22	24.0
Calcium	2480	3100	22.2
Selenium	9.6	7.5	24.6
Manganese	1600	1190	29.4
Zinc	682	512	28.5
Mercury	0.076J	0.045J	51.2

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
U = Non-detect as <MDL.
NA = Not Applicable

- Field surface soil sample duplicate pair 49SS05 (F51154-26) and TMSS05 (F51154-32) was collected for TAL metals. All detected TAL metals found in the sample and its duplicate pair and associated %RPD are noted in **Table 6**. All other TAL metals target compounds were non-detect. All criteria were met. No qualifiers were applied.

Table 6 Field Precision Hits Analysis Summary for TAL Metals for Duplicate Pair 49SS05 (F51154-26) and TMSS05 (F51154-32)

Compound	Original Sample (mg/kg)	Duplicate Pair (mg/kg)	%RPD
Aluminum	15500	15900	2.6
Iron	17900	18300	2.2
Lead	20.5	20.3	1.0
Magnesium	863	872	1.0
Nickel	7.4	7.9	6.5
Potassium	776	791	1.9
Antimony	0.73J	0.89J	19.8
Arsenic	3.2	3.5	9.0
Barium	69.8	67.0	4.1
Beryllium	0.61	0.59	3.3
Chromium	14.9	17.6	16.6
Cobalt	3.7	4.0	7.8
Copper	12.8	13.0	1.6
Vanadium	37.7	37.6	0.3
Zinc	44.5	46.2	3.8
Calcium	1450	1420	2.1
Selenium	6.4	6.6	3.1
Manganese	358	356	0.6
Mercury	0.072J	0.093J	25.5

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".

X-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." The following calculations were performed for verification.

ICP Sample: 41SW08 (F51154-6), Barium

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (64.9 µg/L)*(50 mL)*(1) / (50 mL) = 64.9 µg/L

Reported concentration = 64.9 µg/L
%D = 0.0%
Values were within 10% difference.

CVAA Sample: LFSW01MS (F51154-17MS), Mercury

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (2.95 µg/L)*(50 mL)*(1) / (50 mL) = 3.0 µg/L

Reported concentration = 3.0 µg/L
%D = 0.0%.
Values were within 10% difference.

ICP Sample: 41SD08 (F51154-9), Barium

Conc. (mg/kg) = {(conc. µg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(985.6 µg/L)*(0.050 L)*(1)} / {(1.00 g)*(0.3690)} = 134 µg/g = 134 mg/kg

Reported concentration = 134 mg/kg
%D = 0.0%
Values were within 10% difference.

Hg Sample: 41SD08 (F51154-9), Mercury

Conc. (mg/kg) = {(conc. µg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(0.471 µg/L)*(0.050 L)*(1)} / {(0.63 g)*(0.3690)} = 0.10 µg/g = 0.10 mg/kg

Reported concentration = 0.10 mg/kg
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

D = Indicates sample was analyzed at a dilution.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

N (Metals) = Laboratory spike sample recovery not within control limits.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	208 L	200	18	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U	6.0	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	64.9 J J	200	5.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	50100	1000	42	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	0.60 U	10	0.60	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	50	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	88.1 J B	300	15	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	3.4 U	10	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	23800	5000	4.3	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	61.9	15	1.5	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U UL	1.0	0.10	ug/l	1	07/25/07	07/25/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	1.2 J B	40	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	4300 J B	10000	100	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	14300	10000	500	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium	2.9 U	10	2.9	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.1 J J	50	1.1	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	5.5 J J	20	1.6	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5873
(2) Instrument QC Batch: MA5878
(3) Prep QC Batch: MP12560
(4) Prep QC Batch: MP12581

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	170 J B	200	18	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U	6.0	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	62.6 J J	200	5.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	52700	1000	42	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	0.60 U	10	0.60	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	50	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	15 U	300	15	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	3.4 U	10	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	28100	5000	4.3	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	21.1	15	1.5	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U UL	1.0	0.10	ug/l	1	07/25/07	07/25/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	1.0 U	40	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	4020 J B	10000	100	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	15900	10000	500	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium	2.9 U	10	2.9	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.4 J J	50	1.1	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	6.7 J J	20	1.6	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5873
(2) Instrument QC Batch: MA5878
(3) Prep QC Batch: MP12560
(4) Prep QC Batch: MP12581

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Only

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Report of Analysis

3.8
3

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	235 L	200	18	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U	6.0	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	63.3 J J	200	5.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	53000	1000	42	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	0.60 U	10	0.60	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	50	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.2 J B	25	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	52.7 J B	300	15	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	3.4 U	10	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	30200	5000	4.3	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	39.5	15	1.5	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U UL	1.0	0.10	ug/l	1	07/25/07	07/25/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	1.1 J B	40	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	4060 J B	10000	100	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	16600	10000	500	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium	2.9 U	10	2.9	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.3 J J	50	1.1	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	2.6 J J	20	1.6	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5873
(2) Instrument QC Batch: MA5878
(3) Prep QC Batch: MP12560
(4) Prep QC Batch: MP12581

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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Report of Analysis

3.3

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
		Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	13300	27	3.0	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Antimony	0.72 U VL	8.1	0.72	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Arsenic	5.2	1.1	0.53	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Barium	134	27	0.68	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Beryllium	0.88	0.68	0.14	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Cadmium	0.14 U	0.54	0.14	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Calcium	25600	680	7.7	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Chromium	15.5	1.4	0.12	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Cobalt	10.4	6.8	0.14	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Copper	24.8	3.4	0.12	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Iron	18200	14	1.6	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Lead	20.1 K	14	0.27	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Magnesium	6440	680	1.0	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Manganese	299	2.0	0.081	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Mercury	0.10 J B	0.22	0.017	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [4]
Nickel	17.7	5.4	0.14	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Potassium	1890 B	1400	14	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Selenium	3.3 J B	14	0.27	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Silver	0.12 U	1.4	0.12	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Sodium	475 J B	1400	110	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Thallium [a]	1.2 U VL	5.6	1.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Vanadium	23.3	6.8	0.081	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Zinc	89.5	2.7	0.18	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Prep QC Batch: MP12567
(4) Prep QC Batch: MP12573

(a) Elevated RL/MDL due to negative bias of Method Blank.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Copy

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Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
		Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	10000	12	1.3	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Antimony	1.4 J B	3.5	0.31	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Arsenic	5.9	0.46	0.23	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Barium	102	12	0.29	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.76	0.29	0.058	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cadmium [a]	0.58 U	1.2	0.58	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Calcium	5590	290	3.3	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Chromium	13.6	0.58	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cobalt	13.4	2.9	0.058	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Copper	20.0	1.4	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Iron	24900	5.8	0.69	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Lead	10.4 K	5.8	0.12	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Magnesium	4900	290	0.43	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Manganese	854	4.3	0.17	mg/kg	5	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [4]
Mercury	0.030 J B	0.091	0.0072	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [5]
Nickel	24.0	2.3	0.058	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Potassium	939 B	580	5.8	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Selenium	7.7 K	5.8	0.12	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Silver	0.052 U	0.58	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Sodium	173 J B	580	48	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Thallium [b]	0.52 U VL	2.3	0.52	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Vanadium	15.4	2.9	0.035	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Zinc	81.5	1.2	0.075	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Instrument QC Batch: MA5878
(4) Prep QC Batch: MP12567
(5) Prep QC Batch: MP12573

(a) Elevated reporting limit(s) due to matrix interference.
(b) Elevated RL/MDL due to negative bias of Method Blank.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
		Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	6170	13	1.4	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Antimony	0.50 J B	3.8	0.33	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Arsenic	3.7	0.51	0.25	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Barium	63.0	13	0.32	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.54	0.32	0.063	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cadmium	0.063 U	0.25	0.063	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Calcium	10200	320	3.6	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Chromium	9.6	0.63	0.057	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cobalt	6.9	3.2	0.063	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Copper	12.7	1.6	0.057	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Iron	12500	6.3	0.76	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Lead	15.4 K	6.3	0.13	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Magnesium	3680	320	0.47	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Manganese	547	4.7	0.19	mg/kg	5	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [4]
Mercury	0.027 J B	0.093	0.0074	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [5]
Nickel	10.0	2.5	0.063	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Potassium	731 B	630	6.3	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Selenium	2.9 J B	6.3	0.13	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Silver	0.072 J J	0.63	0.057	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Sodium	199 J B	630	52	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Thallium [a]	0.60 U VL	2.5	0.60	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Vanadium	12.1	3.2	0.038	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Zinc	57.9	1.3	0.082	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Instrument QC Batch: MA5878
(4) Prep QC Batch: MP12567
(5) Prep QC Batch: MP12573

(a) Elevated RL/MDL due to negative bias of Method Blank.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

for I only

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
		Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	10100	17	1.9	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Antimony	1.8 J B	5.1	0.45	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Arsenic	3.4	0.68	0.33	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Barium	167 J	17	0.42	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Beryllium	1.1	0.42	0.085	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Cadmium	0.085 U	0.34	0.085	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Calcium	2480	420	4.8	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Chromium	24.9	0.85	0.076	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Cobalt	11.8	4.2	0.085	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Copper	22.1	2.1	0.076	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Iron	29000	8.5	1.0	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Lead	195	8.5	0.17	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Magnesium	2970	420	0.63	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Manganese	1600	6.3	0.25	mg/kg	5	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [5]
Mercury	0.076 J B	0.14	0.012	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [6]
Nickel	11.7	3.4	0.085	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Potassium	1180 B	850	8.5	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Selenium	9.6 K	8.5	0.17	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Silver	0.076 U	0.85	0.076	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Sodium	222 J B	850	70	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Thallium [a]	7.6 U VL	17	7.6	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Vanadium	28.0	4.2	0.051	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Zinc	682	8.5	0.55	mg/kg	5	07/25/07	07/27/07	RS	SW846 6010B [4]	SW846 3050B [5]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Instrument QC Batch: MA5878
(4) Instrument QC Batch: MA5883
(5) Prep QC Batch: MP12567
(6) Prep QC Batch: MP12573

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Form I only

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSD01		
Lab Sample ID:	F51154-16	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
		Percent Solids:	65.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	8710	15	1.6	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Antimony	1.3 J B	4.4	0.39	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Arsenic	2.9	0.59	0.29	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Barium	101 J	15	0.37	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Beryllium	0.94	0.37	0.073	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Cadmium	0.073 U	0.29	0.073	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Calcium	3100	370	4.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Chromium	18.5	0.73	0.066	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Cobalt	9.1	3.7	0.073	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Copper	19.9	1.8	0.066	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Iron	23200	7.3	0.88	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Lead	143	7.3	0.15	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Magnesium	2910	370	0.54	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Manganese	1190	5.5	0.22	mg/kg	5	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [5]
Mercury	0.045 J B	0.13	0.010	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [6]
Nickel	9.7	2.9	0.073	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Potassium	996 B	730	7.3	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Selenium	7.5 K	7.3	0.15	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Silver	0.081 J J	0.73	0.066	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Sodium	200 J B	730	60	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Thallium [a]	6.8 U VL	15	6.8	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Vanadium	22.0	3.7	0.044	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Zinc	512	7.3	0.48	mg/kg	5	07/25/07	07/27/07	RS	SW846 6010B [4]	SW846 3050B [5]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Instrument QC Batch: MA5878
(4) Instrument QC Batch: MA5883
(5) Prep QC Batch: MP12567
(6) Prep QC Batch: MP12573

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	18 U	200	18	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U	6.0	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	103 J J	200	5.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	79600	1000	42	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	0.60 U	10	0.60	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	50	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	15 U	300	15	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	3.4 U	10	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	30100	5000	4.3	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	3.3 J J	15	1.5	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U VL	1.0	0.10	ug/l	1	07/25/07	07/25/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	1.0 U	40	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	4320 J B	10000	100	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	24100	10000	500	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium	2.9 U	10	2.9	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.1 U	50	1.1	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	7.6 J J	20	1.6	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5873
(2) Instrument QC Batch: MA5878
(3) Prep QC Batch: MP12560
(4) Prep QC Batch: MP12581

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
		Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	8300	11	1.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Antimony	0.88 J B	3.3	0.29	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Arsenic	1.5	0.44	0.22	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Barium	132	11	0.28	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Beryllium	0.84	0.28	0.055	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Cadmium	0.064 J J	0.22	0.055	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Calcium	1260	280	3.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Chromium	13.4	0.55	0.050	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Cobalt	10.1	2.8	0.055	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Copper	9.8	1.4	0.050	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Iron	19500	5.5	0.66	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Lead	125	5.5	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Magnesium	1810	280	0.41	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Manganese	1470	8.3	0.33	mg/kg	10	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [5]
Mercury	0.038 J B	0.093	0.0074	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [6]
Nickel	9.0	2.2	0.055	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Potassium	1060	550	5.5	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Selenium	6.4 K	5.5	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Silver	0.050 U	0.55	0.050	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Sodium	111 J B	550	46	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Thallium [a]	6.5 U VL	11	6.5	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Vanadium	19.1	2.8	0.033	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [5]
Zinc	504	11	0.72	mg/kg	10	07/25/07	07/27/07	RS	SW846 6010B [4]	SW846 3050B [5]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Instrument QC Batch: MA5878
(4) Instrument QC Batch: MA5883
(5) Prep QC Batch: MP12567
(6) Prep QC Batch: MP12573

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Corp

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-20	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	50.7 J B	200	18	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U	6.0	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	108 J J	200	5.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	81600	1000	42	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	0.99 J J	10	0.60	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	50	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	15 U	300	15	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	3.4 J K	10	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	30900	5000	4.3	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	8.3 J J	15	1.5	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U VL	1.0	0.10	ug/l	1	07/25/07	07/25/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	1.0 U	40	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	4450 J B	10000	100	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	24800	10000	500	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium	2.9 U	10	2.9	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.1 U	50	1.1	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	15.7 J J	20	1.6	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5873
(2) Instrument QC Batch: MA5878
(3) Prep QC Batch: MP12560
(4) Prep QC Batch: MP12581

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
		Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	14300	11	1.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Antimony	1.1 J B	3.4	0.30	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Arsenic	16.6	0.45	0.22	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Barium	219	11	0.28	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Beryllium	1.0	0.28	0.056	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cadmium	0.056 U	0.23	0.056	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Calcium	20100	280	3.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Chromium	20.4	0.56	0.051	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cobalt	13.4	2.8	0.056	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Copper	38.4	1.4	0.051	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Iron	25900	5.6	0.68	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Lead	59.3	5.6	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Magnesium	12500	280	0.42	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Manganese	2800	17	0.68	mg/kg	20	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [4]
Mercury	0.056 J B	0.083	0.0067	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [5]
Nickel	13.4	2.3	0.056	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Potassium	1010 B	560	5.6	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Selenium	5.4 J K	5.6	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Silver	0.051 U	0.56	0.051	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Sodium	2150	560	47	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Thallium [a]	1.1 J B	2.2	0.52	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Vanadium	33.0	2.8	0.034	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Zinc	108	1.1	0.073	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Instrument QC Batch: MA5878
(4) Prep QC Batch: MP12567
(5) Prep QC Batch: MP12573

(a) Elevated RL/MDL due to negative bias of Method Blank.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Form I Corr

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
		Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	10300	11	1.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Antimony	0.86 J B	3.3	0.29	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Arsenic	6.2	0.44	0.21	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Barium	80.8	11	0.27	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.52	0.27	0.055	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cadmium	0.055 U	0.22	0.055	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Calcium	997	270	3.1	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Chromium	13.5	0.55	0.049	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cobalt	3.2	2.7	0.055	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Copper	17.6	1.4	0.049	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Iron	13800	5.5	0.66	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Lead	71.6	5.5	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Magnesium	706	270	0.40	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Manganese	299	4.1	0.16	mg/kg	5	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [4]
Mercury	0.17 L	0.089	0.0071	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [5]
Nickel	5.8	2.2	0.055	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Potassium	597 B	550	5.5	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Selenium	5.2 J K	5.5	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Silver	0.049 U	0.55	0.049	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Sodium	78.4 J B	550	45	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Thallium [a]	5.2 U VL	11	5.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Vanadium	25.6	2.7	0.033	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Zinc	56.5	1.1	0.071	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Instrument QC Batch: MA5878
(4) Prep QC Batch: MP12567
(5) Prep QC Batch: MP12573

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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Report of Analysis

3.2.4 3

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
		Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	9220	10	1.1	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Antimony	0.63 J B	3.1	0.28	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Arsenic	8.2	0.42	0.20	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Barium	67.7	10	0.26	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.55	0.26	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cadmium [a]	0.26 U	0.42	0.26	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Calcium	524	260	3.0	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Chromium	11.8	0.52	0.047	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cobalt	3.1	2.6	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Copper	14.4	1.3	0.047	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Iron	13800	5.2	0.63	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Lead	50.3	5.2	0.10	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Magnesium	518	260	0.39	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Manganese	293	3.9	0.16	mg/kg	5	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [4]
Mercury	0.31	0.086	0.0069	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [5]
Nickel	5.9	2.1	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Potassium	538 B	520	5.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Selenium	5.4 K	5.2	0.10	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Silver	0.047 U	0.52	0.047	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Sodium	73.4 J B	520	43	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Thallium [a]	4.8 U VL	10	4.8	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Vanadium	24.3	2.6	0.031	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Zinc	45.8	1.0	0.068	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Instrument QC Batch: MA5878
(4) Prep QC Batch: MP12567
(5) Prep QC Batch: MP12573

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Cpy

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Report of Analysis

3.2.5

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
		Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	22700	11	1.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Antimony	1.5 J B	3.3	0.29	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Arsenic	2.3	0.44	0.21	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Barium	57.5	11	0.27	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Beryllium	0.69	0.27	0.054	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Cadmium [a]	0.54 U	0.88	0.54	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Calcium	770	270	3.1	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Chromium	20.7	0.54	0.049	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Cobalt	4.0	2.7	0.054	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Copper	15.9	1.4	0.049	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Iron	26900	5.4	0.65	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Lead	13.4 K	5.4	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Magnesium	1120	270	0.40	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Manganese	165	0.82	0.033	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Mercury	0.058 J B	0.092	0.0074	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [4]
Nickel	9.6	2.2	0.054	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Potassium	1060	540	5.4	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Selenium	9.4 K	5.4	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Silver	0.049 U	0.54	0.049	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Sodium	45 U	540	45	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Thallium [a]	13 U VL	22	13	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Vanadium	56.3	2.7	0.033	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Zinc	49.1	1.1	0.071	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Prep QC Batch: MP12567
(4) Prep QC Batch: MP12573

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I 03

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
		Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	15500	12	1.3	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Antimony	0.73 J B	3.5	0.31	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Arsenic	3.2	0.47	0.23	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Barium	69.8	12	0.29	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.61	0.29	0.058	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cadmium [a]	0.29 U	0.46	0.29	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Calcium	1450	290	3.3	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Chromium	14.9	0.58	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cobalt	3.7	2.9	0.058	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Copper	12.8	1.5	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Iron	17900	5.8	0.70	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Lead	20.5 K	5.8	0.12	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Magnesium	863	290	0.43	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Manganese	358	4.4	0.17	mg/kg	5	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [4]
Mercury	0.072 J B	0.087	0.0070	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [5]
Nickel	7.4	2.3	0.058	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Potassium	776 B	580	5.8	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Selenium	6.4 K	5.8	0.12	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Silver	0.052 U	0.58	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Sodium	48 U	580	48	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Thallium [a]	5.2 U UL	12	5.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Vanadium	37.7	2.9	0.035	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Zinc	44.5	1.2	0.076	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Instrument QC Batch: MA5878
(4) Prep QC Batch: MP12567
(5) Prep QC Batch: MP12573

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I rev

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
		Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	13100	11	1.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Antimony	1.2 J B	3.2	0.28	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Arsenic	2.9	0.43	0.21	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Barium	62.8	11	0.27	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.61	0.27	0.053	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cadmium [a]	0.53 U	0.84	0.53	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Calcium	2550	270	3.0	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Chromium	21.1	0.53	0.048	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cobalt	5.1	2.7	0.053	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Copper	7.5	1.3	0.048	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Iron	18500	5.3	0.64	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Lead	17.0 K	5.3	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Magnesium	1910	270	0.39	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Manganese	367	4.0	0.16	mg/kg	5	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [4]
Mercury	0.047 J B	0.082	0.0066	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [5]
Nickel	5.8	2.1	0.053	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Potassium	693 B	530	5.3	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Selenium	6.3 K	5.3	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Silver	0.048 U	0.53	0.048	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Sodium	76.5 J B	530	44	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Thallium [a]	4.8 U VL	11	4.8	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Vanadium	35.8	2.7	0.032	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Zinc	34.3	1.1	0.069	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Instrument QC Batch: MA5878
(4) Prep QC Batch: MP12567
(5) Prep QC Batch: MP12573

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Corr

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
		Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	12300	10	1.1	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Antimony	0.73 J B	3.1	0.28	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Arsenic	2.8	0.42	0.20	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Barium	67.5	10	0.26	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.63	0.26	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cadmium [a]	0.26 U	0.42	0.26	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Calcium	2270	260	3.0	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Chromium	14.3	0.52	0.047	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cobalt	5.5	2.6	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Copper	7.7	1.3	0.047	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Iron	15000	5.2	0.62	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Lead	17.3 K	5.2	0.10	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Magnesium	1640	260	0.38	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Manganese	473	3.9	0.16	mg/kg	5	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [4]
Mercury	0.027 J B	0.091	0.0073	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [5]
Nickel	6.2	2.1	0.052	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Potassium	735 B	520	5.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Selenium	5.0 J K	5.2	0.10	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Silver	0.047 U	0.52	0.047	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Sodium	74.5 J B	520	43	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Thallium [a]	4.8 U VL	10	4.8	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Vanadium	30.5	2.6	0.031	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Zinc	33.2	1.0	0.068	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5877
(3) Instrument QC Batch: MA5878
(4) Prep QC Batch: MP12567
(5) Prep QC Batch: MP12573

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I copy

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Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
		Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	16200	11	1.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Antimony	0.98 J B	3.4	0.30	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Arsenic	4.4	0.45	0.22	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Barium	71.9	11	0.28	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.63	0.28	0.056	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cadmium [a]	0.56 U	0.88	0.56	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Calcium	1100	280	3.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Chromium	18.8	0.56	0.051	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Cobalt	5.0	2.8	0.056	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Copper	10.5	1.4	0.051	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Iron	19700	5.6	0.67	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Lead	17.1 K	5.6	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Magnesium	1230	280	0.42	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Manganese	276	4.2	0.17	mg/kg	5	07/25/07	07/26/07	RS	SW846 6010B [3]	SW846 3050B [4]
Mercury	0.068 J J	0.081	0.0065	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [5]
Nickel	7.7	2.2	0.056	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Potassium	1070	560	5.6	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Selenium	7.0 K	5.6	0.11	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Silver	0.051 U	0.56	0.051	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Sodium	56.8 J B	560	46	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Thallium [a]	5.2 U VL	11	5.2	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Vanadium	39.3	2.8	0.034	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]
Zinc	44.9	1.1	0.073	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5876
(3) Instrument QC Batch: MA5878
(4) Prep QC Batch: MP12567
(5) Prep QC Batch: MP12574

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Area I Corp

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
		Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	4430	10	1.1	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Antimony	0.39 J B	3.1	0.27	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Arsenic	5.6	0.41	0.20	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Barium	160	10	0.26	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Beryllium	0.85	0.26	0.051	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Cadmium	0.051 U	0.20	0.051	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Calcium	718	260	2.9	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Chromium	7.5	0.51	0.046	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Cobalt	4.8	2.6	0.051	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Copper	15.3	1.3	0.046	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Iron	6660	5.1	0.61	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Lead	5.9 K	5.1	0.10	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Magnesium	410	260	0.38	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Manganese	104	0.77	0.031	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Mercury	0.40	0.086	0.0069	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [2]	SW846 7471A [4]
Nickel	8.5	2.0	0.051	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Potassium	441 J B	510	5.1	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Selenium	2.7 J B	5.1	0.10	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Silver	0.046 U	0.51	0.046	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Sodium	42 U	510	42	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Thallium [a]	12 U VL	20	12	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Vanadium	17.6	2.6	0.031	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]
Zinc	15.9	1.0	0.066	mg/kg	1	07/25/07	07/25/07	RS	SW846 6010B [1]	SW846 3050B [3]

(1) Instrument QC Batch: MA5875
(2) Instrument QC Batch: MA5876
(3) Prep QC Batch: MP12567
(4) Prep QC Batch: MP12574

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
		Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	5020 K	10	1.1	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Antimony	0.64 J B	3.1	0.27	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Arsenic	24.1 J	0.41	0.20	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Barium	99.7	10	0.26	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Beryllium	0.85	0.26	0.051	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Cadmium	0.051 U VL	0.20	0.051	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Calcium	730 J	260	2.9	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Chromium	9.5 J	0.51	0.046	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Cobalt	3.6 J	2.6	0.051	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Copper	10.6	1.3	0.046	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Iron	9530 J	5.1	0.61	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Lead	9.2 J	5.1	0.10	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Magnesium	334 J	260	0.38	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Manganese	414 J	3.8	0.15	mg/kg	5	07/26/07	07/27/07	RS	SW846 6010B [3]	SW846 3050B [5]
Mercury	0.34	0.083	0.0066	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [1]	SW846 7471A [4]
Nickel	6.6 J	2.0	0.051	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Potassium	431 J B	510	5.1	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Selenium	4.8 J K	5.1	0.10	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Silver	0.046 U VL	0.51	0.046	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Sodium	69.8 J B	510	42	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Thallium [a]	4.8 U VL	10	4.8	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Vanadium	18.3 J	2.6	0.031	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Zinc	13.0 J	1.0	0.067	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]

(1) Instrument QC Batch: MA5876
(2) Instrument QC Batch: MA5878
(3) Instrument QC Batch: MA5883
(4) Prep QC Batch: MP12574
(5) Prep QC Batch: MP12577

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
		Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	15900 K	11	1.2	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Antimony	0.89 J B	3.4	0.30	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Arsenic	3.5 J	0.45	0.22	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Barium	67.0	11	0.28	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Beryllium	0.59	0.28	0.057	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Cadmium	0.057 U VL	0.23	0.057	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Calcium	1420 J	280	3.2	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Chromium	17.6 J	0.57	0.051	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Cobalt	4.0 J	2.8	0.057	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Copper	13.0	1.4	0.051	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Iron	18300 J	5.7	0.68	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Lead	20.3 J	5.7	0.11	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Magnesium	872 J	280	0.42	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Manganese	356 J	4.2	0.17	mg/kg	5	07/26/07	07/27/07	RS	SW846 6010B [3]	SW846 3050B [5]
Mercury	0.093 J J	0.095	0.0076	mg/kg	1	07/26/07	07/26/07	MS	SW846 7471A [1]	SW846 7471A [4]
Nickel	7.9 J	2.3	0.057	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Potassium	791 B	570	5.7	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Selenium	6.6 K	5.7	0.11	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Silver	0.051 U VL	0.57	0.051	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Sodium	47 U VL	570	47	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Thallium [a]	5.2 U VL	11	5.2	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Vanadium	37.6 J	2.8	0.034	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]
Zinc	46.2 J	1.1	0.074	mg/kg	1	07/26/07	07/26/07	RS	SW846 6010B [2]	SW846 3050B [5]

(1) Instrument QC Batch: MA5876
(2) Instrument QC Batch: MA5878
(3) Instrument QC Batch: MA5883
(4) Prep QC Batch: MP12574
(5) Prep QC Batch: MP12577

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Only

Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	18 U	200	18	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U	6.0	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	5.0 U	200	5.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	42 U	1000	42	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	0.60 U	10	0.60	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	50	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	15 U	300	15	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	3.4 U	10	3.4	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	4.3 U	5000	4.3	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	1.5 U	15	1.5	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	07/25/07	07/25/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	1.0 U	40	1.0	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	1770 J J	10000	100	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	2060 J J	10000	500	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium	2.9 U	10	2.9	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.1 U	50	1.1	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	1.9 J J	20	1.6	ug/l	1	07/26/07	07/27/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5873
(2) Instrument QC Batch: MA5878
(3) Prep QC Batch: MP12560
(4) Prep QC Batch: MP12581

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Shaw Environmental, Inc.
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MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Perchlorate
Datachem Laboratories, Inc. SDG 07E-0644-01
(Accutest Laboratories, Inc., SDG F51154)

DATE: September 27, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on July 18, 2007 and July 19, 2007. The aqueous samples were analyzed for perchlorate analysis using liquid chromatography mass spectroscopy (LC/MS) SW-846 method LC-MS-CLO4/6850 in selective ion monitoring (SIM) mode. A total of five aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41SW08	F51154-6	LFSW01	F51154-17
41SW09	F51154-7	TMSW01	F51154-20
41SW10	F51154-8		

Data were reviewed and validated using a combination of project QAPP, *DOD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006), *DoD Perchlorate Handbook August, Rev1, Change 1, 2007* (DoD, 2007), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
X		Initial and Continuing Calibration
	X	Blank Analysis
	X	Internal Standards
	X	Laboratory Control Sample (LCS)
	X	Matrix Spike (MS) and Spike Duplicate (MSD)
	X	Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

9/27/07
Date

RFAAP VALIDATION REPORT
PERCHLORATE REVIEW
SDG 07E-0644-01 (F51154)

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. For perchlorate analysis, aqueous samples are received and stored at cool @4°C±2°C with a maximum holding time of 28 days from collection (DoD Perchlorate Handbook criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 07/18/07 and 07/19/07, the coolers were received by the primary laboratory (Accutest) on 07/20/07 at 4.0°C, 4.0°C, 4.6°C, 4.6°C, 4.8°C, 5.0°C, 5.0°C, and 5.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.2°C, 4.0°C, and 3.6°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 3.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 5.5°C and 5.2°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The aqueous samples were collected on 07/18/07 and 07/19/07. The aqueous perchlorate samples were prepped on 08/06/07 and analyzed on 08/06/07 and 08/07/07. All holding time criteria were met. No qualifiers were applied.

II-Instrument Performance Check

GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, $^{35}Cl^{16}O_3$, met the mass calibration criteria. No qualification was applied.

III-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

Perchlorate:	1- blank (<1/2MRL DoD Perchlorate Handbook)
	5 – standards (r≥0.995 DoD Perchlorate Handbook)
	ICV (±10%D DoD Perchlorate Handbook)
	CCV/ICS (±30%D DoD Perchlorate Handbook)
	LODV (±30%D DoD Perchlorate Handbook)

- The perchlorate samples were analyzed on 08/06/07 and 08/07/07 for the aqueous samples. Perchlorate was calibrated second order for on 08/06/07 with a coefficient of 0.9995. Perchlorate for LODV2 (100%) and CCV2 (10.7%D) were above criteria, probably due to baseline noise. All other ICV/CCV/ICS/LODV standards were within criteria. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) were bracketed by LODV2; therefore, were qualified as estimated "J" for detects and "UJ" for non-detects based upon the high %D. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) were bracketed by CCV2; therefore, were qualified as estimated "J" for detects and "UJ" for non-detects based upon the high %D. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this calibration.

IV-Blanks

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be detected in any of the associated blanks >MDL. The DoD Perchlorate Handbook criterion specifies all concentrations should be less than ½ MRL for method blanks. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. µg/L	Action Level µg/L	B qualified samples
08/06/07	Perchlorate	BL-258879-1	<½MRL	NA	None
09/18/07	Perchlorate	RB083007	<½MRL	NA	None

MRL = Method Reporting Limit.
NA = Not Applicable.

V-Internal Standards

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The DoD Handbook specifies retention times (RT) 1.0 ± 2% of last calibration standard and the ratio of RT of sample to standard should be 3.06 and fall between 2.3 and 3.8. The laboratory 83:85 mass ratio limit range is 2.12 to 3.94. The internal standard peak area responses should fall between 50% to 150% recoveries.

- All criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples (LCS)

The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. DoD Perchlorate Handbook and laboratory aqueous limits are 85-115%.

- Sample QC-258879-1 was used as aqueous LCS for perchlorate analysis dated 08/06/07 and 08/07/07. All criteria were met. No qualifiers were applied.

VII-Matrix Spike (MS) and Spike Duplicate (MSD)

MS and MSD are generated to determine long-term accuracy and precision of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike samples at a frequency of one MS/MSD per 20 samples of similar matrix. MS/MSD recoveries and relative percent differences between MS recoveries should be within the specified limits. DoD Perchlorate Handbook aqueous limits are 75-125%; RPD≤20%. The laboratory limits are 80-120%; RPD≤15%.

- Sample LFSW01 (F51154-17) was used for the MS/MSD analysis for the 08/06/07 and 08/07/07 perchlorate analysis. All criteria were met. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this MS/MSD sample.

VIII-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field groundwater sample duplicate pair LFSW01 (F51154-17) and TMSW01 (F51154-20) was collected for perchlorate. The original sample was detected at 1.28 µg/L and the field duplicate was detected at 1.15 µg/L, resulting in a RPD of 10.7%. All criteria were met. No qualifiers were applied.

IX-Quantitation Verification

The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever was greater) was qualified as estimated, "J." The following calculations were performed for verification.

Sample: LFSW01 (F51154-17), Perchlorate

y (area ratio) = (Sample Area/Area EIC89) = (18400.4/52754.7) = 0.348792 = ax^2 + bx + c

Setting y = 0,
x = [-b ± SQRT(b^2-4ac)] / (2a)

where: x is the amount ratio

a = 0.0167903 b = 1.41217 (set to zero = c-y) c = - 0.0152267 - 0.348792 = -0.3640187

amount ratio ={-1.41217± [SQRT{(1.41217^2) – (4*0.0167903*-0.3640187)}] / (2*0.0167903)
= (-1.41217±1.4208) / (0.0335806)
= 0.256987

Conc. µg/L = (Amount ratio * Is * DF)

where: Conc. = Sample concentration in ug/L
I_s = Amount of internal standard (µg/L).
DF = Dilution factor

Conc. µg/L = (Amount ratio * Is * DF)
= (0.256987* 5 µg/L * 1) = 1.28 µg/L

Reported concentration = 1.28 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I Cony

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FORM A (TYPE I)
SINGLE METHOD ANALYSES

SAMPLE ANALYSIS DATA SHEET

Form RLIMS63A-V1.4
08080715501460
Page 3

S076Q00M

Date Printed.....: 08-AUG-07 15:50

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F51154
Release Number.....: Not Provided

Date Received.....: 21-JUL-07 00:00

Client Sample Name: F51154-6
DCL Sample Name...: 07M03738
DCL Report Group..: 07M-0644-01

Matrix.....: WATER
Date Sampled.....: 18-JUL-07 10:40
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 06-AUG-07 00:00
Preparation Method...: 6850
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G077500T
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	06-AUG-07 23:43	0.112	0.168	J	J	1	0.200

960 West LeVoy Drive / Salt Lake City, Utah 84123-2547
Phone (801) 266-7700 Web Page: www.datachem.com
FAX (801) 268-9992 E-mail: lab@datachem.com

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FORM A (TYPE I)
SINGLE METHOD ANALYSES

SAMPLE ANALYSIS DATA SHEET

Form RLIMS63A-V1.4
08080715501460
Page 4

S076Q00N

Date Printed.....: 08-AUG-07 15:50

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F51154
Release Number.....: Not Provided

Date Received.....: 21-JUL-07 00:00

Client Sample Name: F51154-7
DCL Sample Name...: 07E03739
DCL Report Group..: 07E-0644-01

Matrix.....: WATER
Date Sampled.....: 18-JUL-07 11:05
Reporting Units...: ug/L
Report Basis.....: ☒ As Received ☐ Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 06-AUG-07 00:00
Preparation Method...: 6850
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G077500T
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
☒ Primary
☐ Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-AUG-07 00:03	0.112	0.142	J	J	1	0.200

07

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Date Printed.....: 08-AUG-07 15:50

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F51154
Release Number.....: Not Provided

Date Received.....: 21-JUL-07 00:00

Client Sample Name: F51154-8
DCL Sample Name...: 07E03740
DCL Report Group..: 07E-0644-01

Matrix.....: WATER
Date Sampled.....: 18-JUL-07 11:45
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 06-AUG-07 00:00
Preparation Method...: 6850
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G077500T
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-AUG-07 00:22	0.112	0.135	J	J	1	0.200

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FORM A (TYPE I)
SINGLE METHOD ANALYSES

SAMPLE ANALYSIS DATA SHEET

Form RLIMS63A-V1.4
08080715501460

8076Q00R

Date Printed.....: 08-AUG-07 15:50

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F51154
Release Number.....: Not Provided

Date Received.....: 21-JUL-07 00:00

Client Sample Name: F51154-17
DCL Sample Name...: 07M03742
DCL Report Group..: 07M-0644-01

Matrix.....: WATER
Date Sampled.....: 18-JUL-07 11:20
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 06-AUG-07 00:00
Preparation Method...: 6850
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G077500T
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-AUG-07 01:02	0.112	1.28	J		1	0.200

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FORM A (TYPE I)
SINGLE METHOD ANALYSES

SAMPLE ANALYSIS DATA SHEET

Form RLIMS63A-V1.4
08080715501460
Page 8

8076Q00V

Date Printed.....: 08-AUG-07 15:50

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: FS1154
Release Number.....: Not Provided

Date Received.....: 21-JUL-07 00:00

Client Sample Name: FS1154-20
DCL Sample Name...: 07M03743
DCL Report Group..: 07M-0644-01

Matrix.....: WATER
Date Sampled.....: 19-JUL-07 11:20
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 06-AUG-07 00:00
Preparation Method...: 6850
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G077500T
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-AUG-07 02:01	0.112	1.15	J		1	0.200

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410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Pesticides and PCBs
Accutest Laboratories, Inc., SDG F51154

DATE: September 26, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on July 18, 2007 and July 19, 2007. Aqueous samples were analyzed for pesticides and PCBs using USEPA Method 3510C/8081A and 3510C/8082, respectively. Solid samples were analyzed for pesticides and PCBs using USEPA Method 3550B/8081A and 3550B/8082, respectively. A total of five aqueous samples and seventeen solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41SW08	F51154-6	41SD11	F51154-22
41SW09	F51154-7	49SS02	F51154-23
41SW10	F51154-8	49SS03	F51154-24
41SD08	F51154-9	49SS04	F51154-25
41SD09	F51154-10	49SS05	F51154-26
41SD10	F51154-11	59SS06	F51154-27
LFSD01	F51154-15	59SS07	F51154-28
TMSD01	F51154-16	59SS08	F51154-29
LFSW01	F51154-17	59SS09	F51154-30
APSD01	F5 1154-18	59SS10	F51154-31
TMSW01	F51154-20	TMSS05	F51154-32

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
X		Continuing Calibration
	X	Blank Analysis
X		System Monitoring Compounds
X		Laboratory Control Samples
X		Matrix Spike/Spike Duplicate
X		Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

9/26/07
Date

RFAAP VALIDATION REPORT
PESTICIDE/PCB REVIEW
SDG F51154

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, pesticide and PCB compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis. For solid samples, pesticide and PCB compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 07/18/07 and 07/19/07, the coolers were received by the primary laboratory (Accutest) on 07/20/07 at 4.0°C, 4.0°C, 4.6°C, 4.6°C, 4.8°C, 5.0°C, 5.0°C, and 5.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.2°C, 4.0°C, and 3.6°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 3.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 5.5°C and 5.2°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The aqueous samples were collected on 07/18/07 and 07/19/07. For aqueous samples collected 07/18/07 and 07/19/07, the pesticides and PCBs were extracted on 07/24/07 and analyzed on 07/26/07. For solid samples collected 07/18/07 and 07/19/07, the pesticides were extracted on 07/27/07 and analyzed on 07/31/07, 08/02/07, 08/06/07, and 08/08/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check (Degradation Standard)
Performance checks on the gas chromatograph with electron capture detector (GC/ECD) system are performed to ensure adequate resolution and instrument sensitivity. The performance evaluation mixture (PEM) must be analyzed at the beginning of the analytical sequence. The breakdown of Endrin and 4,4'-DDT must be ≤15% on both signals.

- For analysis performed on 07/24/07 @14:31, endrin and 4,4'-DDT percent breakdowns were 10.3% and 9.0% on signal #1 and 10.8% and 7.8% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 07/26/07 @11:10, endrin and 4,4'-DDT percent breakdowns were 12.4% and 4.2% on signal #1 and 13.8% and 3.7% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 08/01/07 @12:02, endrin and 4,4'-DDT percent breakdowns were 13.7% and 8.0% on signal #1 and 14.5% and 7.7% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 08/02/07 @11:19, endrin and 4,4'-DDT percent breakdowns were 13.3% and 7.7% on signal #1 and 14.5% and 7.2% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 08/04/07 @09:09, endrin and 4,4'-DDT percent breakdowns were 14.1% and 5.0% on signal #1 and 13.8% and 4.5% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 07/13/07 @13:24, endrin and 4,4'-DDT percent breakdowns were 11.8% and 6.5% on signal #1 and 12.0% and 5.6% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 07/31/07 @13:54, endrin and 4,4'-DDT percent breakdowns were 10.9% and 11.4% on signal #1 and 10.1% and 9.2% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 08/06/07 @09:25, endrin and 4,4'-DDT percent breakdowns were 11.2% and 7.1% on signal #1 and 10.7% and 5.6% on signal #2, respectively. All criteria were met. No qualifiers were applied.

III-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5 point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. Calibration factors are generated for each compound. The DoD QSM specifies that the percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016, 1242, 1254, and 1260 must be <20% or the mean %RSD for all analytes in the standard must be ≤20%. If linear regression is used, the correlation coefficient must be ≥0.990. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits.

- For the pesticide initial calibration performed on 07/24/07 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) were analyzed using this initial calibration.

- For the pesticide initial calibration performed on 08/01/07 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), and TMSS05 (F51154-32) were analyzed using this initial calibration.

- For the pesticide initial calibration performed on 08/04/07 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples TMSD01 (F51154-16), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) were analyzed using this initial calibration.

- For the pesticide initial calibration performed on 07/13/07 on instrument ECD6, all criteria were met. No qualifiers were applied. Samples LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS05 (F51154-26), and TMSS05 (F51154-32) were analyzed using this initial calibration.

- For the pesticide initial calibration performed on 08/06/07 on instrument ECD6, all criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), 49SS04 (F51154-25), 59SS06 (F51154-27), 59SS07 (F51154-28), and 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) were analyzed using this initial calibration.

- For the PCB initial calibration performed on 07/28/07 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) were analyzed using this initial calibration.

- For the PCB initial calibration performed on 07/26/07 on instrument ECD7, all criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) were analyzed using this initial calibration.

- For the PCB initial calibration performed on 08/02/07 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample 49SS02 (F51154-23) was analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for pesticide/PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The DoD QSM specifies that the percent difference (%D) or the average %Ds for all analytes in the standard from the initial calibration should be no greater than ±20%.

- For pesticide initial calibration verification performed on 07/24/07 @17:08 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 07/26/07 @15:31 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/26/07 @19:00 on instrument ECD5, endrin (25.4%) was outside criteria for the signal #1. Endrin (24.4%) was outside criteria for the signal #2. Endrin was non-detect for all associated samples; therefore, no qualifiers were applied based upon these outliers. No samples reported were analyzed using this continuing calibration.

- For pesticide initial calibration verification performed on 08/01/07 @15:15 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 08/02/07 @14:21 on instrument ECD5, all criteria were met for signal #1 and for the signal #2. No qualifiers were applied. Samples LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), and TMSS05 (F51154-32) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/02/07 @17:22 on instrument ECD5, 4,4'-DDT (23.5%) was outside criteria for the signal #1. 4,4'-DDT (24.1%) was outside criteria for the signal #2. 4,4'-DDT was non-detect for all associated samples; therefore, no qualifiers were applied based upon these outliers. No samples reported were analyzed using this continuing calibration.

- For pesticide initial calibration verification performed on 08/04/07 @12:47 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 08/08/07 @13:34 on instrument ECD5, all criteria were met for signal #1 and for the signal #2. No qualifiers were applied. Sample TMSD01 (F51154-16) was analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/08/07 @14:59 on instrument ECD5, all criteria were met for signal #1 and for the signal #2. No qualifiers were applied. Samples TMSD01 (F51154-16), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/08/07 @17:30 on instrument ECD5, heptachlor (30.4%), 4,4'-DDD (22.4%), 4,4'-DDT (87.0%; grossly exceeding), methoxychlor (82.0%; grossly exceeding), and endrin ketone (29.8%) were outside criteria for the signal #1. Heptachlor (31.3%), 4,4'-DDD (26.7%), 4,4'-DDT (88.2%; grossly exceeding), methoxychlor (83.0%; grossly exceeding), and endrin ketone (33.5%) were outside criteria for the signal #2. No samples reported was analyzed using this continuing calibration; therefore, no qualifiers were applied based upon these outliers.

- For pesticide initial calibration verification performed on 07/13/07 @15:47 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 07/31/07 @14:52 on instrument ECD6, all criteria were met for signal #1. 4,4'-DDT (25.4%) was outside criteria for the signal #2. 4,4'-DDT was non-detect for all associated samples; therefore, no qualifiers were applied based upon these outliers. Samples LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), and 49SS02 (F51154-23) were analyzed using this continuing calibration.

- For toxaphene pesticide continuing calibration performed on 07/31/07 @15:08 on instrument ECD6, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For chlordane pesticide continuing calibration performed on 07/31/07 @15:24 on instrument ECD6, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/31/07 @18:23 on instrument ECD6, 4,4'-DDT (65.7%; grossly exceeding) and methoxychlor (53.6%; grossly exceeding) were outside criteria for the signal #1. 4,4'-DDT (69.1%; grossly exceeding) and methoxychlor (57.7%; grossly exceeding) were outside criteria for the signal #2. 4,4'-DDT and methoxychlor were qualified estimated "UJ" for non-detects based upon the very high %Ds. Samples 49SS03 (F51154-24), 49SS05 (F51154-26), and TMSS05 (F51154-32) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/31/07 @19:42 on instrument ECD6, 4,4'-DDT (64.5%; grossly exceeding) and methoxychlor (53.9%; grossly exceeding) were outside criteria for the signal #1. 4,4'-DDT (67.9%; grossly exceeding) and methoxychlor (56.8%; grossly exceeding) were outside criteria for the signal #2. 4,4'-DDT and methoxychlor were qualified estimated "UJ" for non-detects based upon the very high %Ds. No samples reported were analyzed using this continuing calibration.

- For pesticide initial calibration verification performed on 08/06/07 @12:29 on instrument ECD6, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 08/06/07 @15:35 on instrument ECD6, all criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), 49SS04 (F51154-25), 59SS06 (F51154-27), 59SS07 (F51154-28), and 59SS08 (F51154-29) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/06/07 @18:29 on instrument ECD6, 4,4'-DDT (47.6%; grossly exceeding) and methoxychlor (43.5%; grossly exceeding) were outside criteria for the signal #1. 4,4'-DDT (45.2%; grossly exceeding) and methoxychlor (43.0%; grossly exceeding) were outside criteria for the signal #2. 4,4'-DDT and methoxychlor were qualified estimated "UJ" for non-detects based upon the very high %Ds. Samples 59SS09 (F51154-30) and 59SS10 (F51154-31) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/06/07 @19:32 on instrument ECD6, 4,4'-DDD (20.6%), 4,4'-DDT (51.2%; grossly exceeding), and methoxychlor (43.4%; grossly exceeding) were outside criteria for the signal #1. 4,4'-DDD (21.0%), 4,4'-DDT (67.9%; grossly exceeding), and methoxychlor (56.8%; grossly exceeding) were outside criteria for the signal #2. 4,4'-DDT and methoxychlor were qualified estimated "UJ" for non-detects based upon the very high %Ds. 4,4'-DDD was non-detect for all associated samples; therefore, no qualifiers were applied based upon these outliers. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), and 49SS04 (F51154-25) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/06/07 @22:42 on instrument ECD6, heptachlor (37.9%), 4,4'-DDD (30.8%), 4,4'-DDT (95.2%; grossly exceeding), methoxychlor (89.2%; grossly exceeding), and endrin ketone (50.6%; grossly exceeding) were outside criteria for the signal #1. Heptachlor (36.0%), 4,4'-DDE (21.1%), 4,4'-DDD (56.2%; grossly exceeding), 4,4'-DDT (88.8%; grossly exceeding), methoxychlor (80.5%; grossly exceeding), and endrin ketone (47.3%; grossly exceeding) were outside criteria for the signal #2. 4,4'-DDD, 4,4'-DDT, methoxychlor, and endrin ketone were qualified estimated "J" for detects and "UJ" for non-detects based upon the very high %Ds. Heptachlor and 4,4'-DDE were non-detect for all associated samples; therefore, no qualifiers were applied based upon these outliers. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 07/28/07 @14:59 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 07/31/07 @09:51 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), and 41SD11 (F51154-22) were analyzed using this continuing calibration.

- For PCB 1248 continuing calibration performed on 07/31/07 @10:13 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1242 continuing calibration performed on 07/31/07 @10:30 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1232/1268 continuing calibration performed on 07/31/07 @10:47 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1221/1254 continuing calibration performed on 07/31/07 @11:04 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 07/31/07 @14:29 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 07/31/07 @17:54 on instrument ECD3, all criteria were met. No qualifiers were applied. Sample TMSS05 (F51154-32) was analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 07/31/07 @18:45 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/01/07 @09:49 on instrument ECD3, all criteria were met. No qualifiers were applied. Sample 49SS03 (F51154-24) was analyzed using this continuing calibration.

- For PCB 1248 continuing calibration performed on 08/01/07 @10:06 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1242 continuing calibration performed on 08/01/07 @10:23 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1232/1268 continuing calibration performed on 08/01/07 @10:44 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1221/1254 continuing calibration performed on 08/01/07 @11:01 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/01/07 @13:56 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 07/26/07 @13:51 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 07/26/07 @18:39 on instrument ECD7, PCB1016-A (28.0%) was outside criteria for signal #1; however, the average %D for PCB1016 was 12.4%. PCB1016-A (40.6%), PCB1016-B (29.9%), and PCB1016-F (22.8%) were outside criteria for signal #2. The average %D for PCB1016 was 20.9% for signal #2. PCB 1016 was non-detect for all associated samples and was qualified estimated "UJ" for non-detects based upon the high %D. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 07/26/07 @21:45 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 08/02/07 @13:41 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample 49SS02 (F51154-23) was analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 08/02/07 @16:48 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

V-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for pesticide and PCB target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one and for solid matrices were converted to soil values (soil conversion factor = 33) if needed. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. The surface water "SW" samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the SW samples. Rinse blanks 072407R (F51275-1) and 072507R (F51300-31) apply to the surface soil "SS" and subsurface soil "SB" samples in this SDG. Rinse blank RB071807 (F51154-12) applies to the sediment "SD" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
Pesticides	07/26/07	OP21578-MB	All target <½MRL	NA	NA	None
Pesticides	09/24/07	RB083007	All target <½MRL	NA	NA	None
PCBs	06/27/07	OP21577-MB	All target <½MRL	NA	NA	None
PCBs	09/14/07	RB083007	All target <½MRL	NA	NA	None
Parameter	**Analysis Date**	**QC Blank ID**	**Compound**	**Max Conc. µg/kg**	**Action Level µg/kg**	**B qualified samples**
Pesticides	07/31/07	OP21640-MB	All target <½MRL	NA	NA	None
Pesticides	08/02/07	OP21640-MB	All target <½MRL	NA	NA	None
Pesticides	08/06/07	OP21640-MB	All target <½MRL	NA	NA	None
Pesticides	08/08/07	OP21640-MB	All target <½MRL	NA	NA	None
Pesticides	07/02/07	RB071807	All target <½MRL	NA	NA	None
Pesticides	07/02/07	072407R	All target <½MRL	NA	NA	None
Pesticides	07/02/07	072507R	All target <½MRL	NA	NA	None
PCBs	07/26/07	OP21641-MB	All target <½MRL	NA	NA	None
PCBs	07/27/07	OP21641-MB	All target <½MRL	NA	NA	None
PCBs	07/27/07	OP21641-MB	All target <½MRL	NA	NA	None
PCBs	06/27/07	RB071807	All target <½MRL	NA	NA	None
PCBs	06/27/07	072407R	All target <½MRL	NA	NA	None
PCBs	06/27/07	072507R	All target <½MRL	NA	NA	None

NA = Not Applicable
MRL = Method Reporting Limit

VI-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:	Tetrachloro-m-xylene:	Pesticides: 42-127% (DoD QSM 25-140%)
	Decachlorobiphenyl:	Pesticides: 27-127% (DoD QSM 30-135%)
Aqueous Criteria:	Tetrachloro-m-xylene:	PCBs: 38-127% (DoD QSM Not Listed)
	Decachlorobiphenyl:	PCBs: 25-137% (DoD QSM 40-135%)
Solid Criteria:	Tetrachloro-m-xylene:	Pesticides: 46-122% (DoD QSM 70-125%)
	Decachlorobiphenyl:	Pesticides: 50-133% (DoD QSM 55-130%)
Solid Criteria:	Tetrachloro-m-xylene:	PCBs: 44-126% (DoD QSM Not Listed)
	Decachlorobiphenyl:	PCBs: 39-157% (DoD QSM 60-125%)

- For pesticides sample 41SD10 (F51154-11), all criteria were met for the original run. For the confirmation, tetrachloro-m-xylene (69.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample TMSD01 (F51154-16), tetrachloro-m-xylene (50.0%) and decachlorobiphenyl (37.0%) were outside criteria. All detects were qualified "L" and non-detects "UL" based upon the low recoveries. Sample was re-analyzed for confirmation (run #2). For the confirmation, tetrachloro-m-xylene (62.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample 41SD11 (F51154-22), tetrachloro-m-xylene (69.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier. Sample was re-analyzed for confirmation (run #2). For the confirmation, tetrachloro-m-xylene (65.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample 49SS02 (F51154-23), tetrachloro-m-xylene (53.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier. Sample was re-analyzed for confirmation (run #2). For the confirmation, tetrachloro-m-xylene (51.0%) and decachlorobiphenyl (48.0%) were outside criteria. All detects were qualified "L" and non-detects "UL" based upon the low recoveries for run #2.

- For pesticides sample 49SS03 (F51154-24), tetrachloro-m-xylene (64.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier. For the confirmation, tetrachloro-m-xylene (62.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample 59SS07 (F51154-28), all criteria were met for the original run. For the confirmation, tetrachloro-m-xylene (67.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample 59SS09 (F51154-30), tetrachloro-m-xylene (66.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier. Sample was re-analyzed for confirmation (run #2). For the confirmation, tetrachloro-m-xylene (69.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample 59SS10 (F51154-31), tetrachloro-m-xylene (55.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier. Sample was re-analyzed for confirmation (run #2). For the confirmation, all criteria were met.

- For pesticides sample TMSS05 (F51154-32), all criteria were met for the original run. For the confirmation, tetrachloro-m-xylene (69.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For PCBs sample 41SD08 (F51154-9), decachlorobiphenyl (57.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For PCBs sample 41SD10 (F51154-11), decachlorobiphenyl (56.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For PCBs sample LFSD01 (F51154-15), decachlorobiphenyl (48.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For PCBs sample TMSD01 (F51154-16), decachlorobiphenyl (59.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For PCBs sample 59SS06 (F51154-27), decachlorobiphenyl (59.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For PCBs sample 59SS07 (F51154-28), decachlorobiphenyl (59.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For all other samples, all criteria were met for pesticides and PCBs analysis.

VII-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). DoD QSM solid LCS recovery limits are specified in Table D-15 and Table D-17 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP21578-BS was used as the aqueous LCS for the pesticide analysis on 07/26/07. Compound endrin aldehyde (12%) was outside DoD QSM criteria, however within laboratory criteria. Compound endrin aldehyde was non-detect for all associated samples and was qualified estimated bias "UL" for non-detects based upon very low recovery. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this LCS.

- Sample OP21640-BS was used as the solid LCS for the pesticide analysis on 07/31/07. Compound endrin aldehyde (8%) was outside DoD QSM criteria, however within laboratory criteria. Compound endrin aldehyde was non-detect for all associated samples and was qualified estimated bias "UL" for non-detects based upon very low recovery. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

- Sample OP21577-BS was used as the aqueous LCS for the PCB analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this LCS.

- Sample OP21641-BS was used as the solid LCS for the PCB analysis on 07/31/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

VIII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). DoD solid MS/MSD recovery limits follow the LCS criteria and are specified in Table D-15 and Table D-17 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample LFSW01 (F51154-17) was used as the MS/MSD for the pesticide analysis on 07/26/07. Compound endrin aldehyde (21%, 15%) was outside DoD QSM criteria, however within laboratory criteria. The LCS was also low in recovery (See Section VII). Compound endrin aldehyde was non-detect for all samples and qualified estimated bias low "UL" for non-detects for the spiked sample based upon very low recoveries. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this MS/MSD.

- Sample LFSW01 (F51154-17) was used as the MS/MSD for the PCB analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this MS/MSD.

- Sample 49SS04 (F51154-25) was used as the MS/MSD for the pesticide analysis on 08/06/07. Compounds delta-BHC (RPD=56%), alpha chlordane (72%), gamma chlordane (74%), dieldrin (70%), 4,4'-DDE (72%), 4,4'-DDT (48%, 0%; RPD=200%), endrin (70%), endosulfan sulfate (0%, RPD=200%), endrin aldehyde (0%, 0%), endrin ketone (62%), endosulfan II (70%), and methoxychlor (60%, 44%, RPD=29%) were outside DoD QSM criteria and/or laboratory criteria. The LCS was also low in recovery (See Section VII). Compounds 4,4'-DDT, endosulfan sulfate, and endrin aldehyde were rejected for the spiked sample based upon no recovery found. Compounds alpha chlordane, gamma chlordane, dieldrin, 4,4'-DDE, endrin, endrin ketone, endosulfan II, and methoxychlor were non-detect for the spiked sample and qualified estimated bias low "UL" for non-detects based upon low recoveries. Delta-BHC was qualified "UJ" for the spiked sample based upon the high RPD. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

- Sample 59SS06 (F51154-27) was used as the MS/MSD for the PCB analysis on 07/31/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

IX-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous and solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field surface water sample duplicate pair LFSW01 (F51154-17) and TMSW01 (F51154-20) was collected for chlorinated pesticides and PCBs. All chlorinated pesticides and PCBs target compounds were non-detect. All criteria were met. No qualifiers were applied.

- Field surface soil sample duplicate pair 49SS05 (F51154-26) and TMSS05 (F51154-32) was collected for chlorinated pesticides and PCBs. All chlorinated pesticides and PCBs target compounds were non-detect, except for Aroclor 1254. PCB 1254 was detected at 41.1 µg/kg in the original sample and 75.6 µg/kg in the duplicate pair resulting in a RPD of 59.1%. PCB 1254 was qualified estimated "J" for the duplicate pair based upon the high RPD.

- Field sediment sample duplicate pair LFSD01 (F51154-15) and TMSD01 (F51154-16) was collected for chlorinated pesticides and PCBs. All detected chlorinated pesticides and PCBs target compounds found in the sample and its duplicate pair and associated %RPD are noted in **Table 3**. All other chlorinated pesticides and PCBs target compounds were non-detect. alpha-Chlordane (88.4%), gamma-Chlordane (70.7%), and Aroclor 1260 (58.1%) were above criteria due to low concentration levels detected below the MRL and/or matrix effects. alpha-Chlordane, gamma-chlordane, and aroclor 1260 were qualified estimated "J" for the original and duplicate pair samples based upon these outliers. For all other compounds, all criteria were met.

Table 3 Field Precision Hits Analysis Summary for Chlorinated Pesticides and PCBs for Duplicate Pair LFSD01 (F51154-15) and TMSD01 (F51154-16)

Compound	Original Sample (µg/kg)	Duplicate Pair (µg/kg)	%RPD
Heptachlor epoxide	14U	1.7J	NA
alpha-Chlordane	13.7J	5.3	88.4
gamma-Chlordane	13.6J	6.5	70.7
Aroclor 1260	135	74.2	58.1

J = Estimated value <MRL and >MDL.
U = Non-detect as <MRL.
NA = Not Applicable

X-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All positive values must have less than or equal to 40% %D between the primary and secondary columns. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." All criteria were met.

- For sample 59SS07 (F51154-28), dieldrin (86.8%) and heptachlor epoxide (57.4%) were outside criteria. All other target compounds were within criteria. Dieldrin and heptachlor epoxide were qualified estimated "J" based upon the high %Ds.

- For sample 59SS08 (F51154-29), dieldrin (114%) and 4,4'-DDD (82.4%) were outside criteria. All other target compounds were within criteria. Dieldrin and 4,4'-DDD were qualified estimated "J" based upon the high %Ds.

- For all other samples with detected chlorinated pesticides and PCBs, the %D (average %D for multi-peak compounds) between the primary and secondary columns was within criteria.

Sample: LFSW01MS (F51154-17MS), alpha-chlordane

Conc. µg/L = (Amt * DF * Vt) / (CF * Vo)

where: Amt is the response on column (ng/mL) of the sample
CF = Calibration Factor (from initial calibration)
Vt is the volume of final extract (mL)
DF is the dilution factor
Vo is the volume of the sample extracted (mL)

Conc. µg/L = (9068815 ng/mL * 1 * 10 mL) / (212100 * 430 mL)
= 0.99 ng/mL = 0.99 µg/L

Reported Conc. = 0.99 µg/L
%D = 0.0%
Values were within 10% difference

Sample: LFSW01MS (F51154-17MS), Aroclor 1260

Conc. µg/L = (Ax * Vt * DF) / (CF * Vi * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 µL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (µL).
Vs = Volume of sample extracted (L).
DF = Dilution factor

Signal #1
Conc1 µg/L = (1118429 * 10000* 1) / (3120 *(1000000) * 1 * 0.44) = 8.15 µg/L
Conc2 µg/L = (1273241 * 10000* 1) / (3552 *(1000000) * 1 * 0.44) = 8.15 µg/L
Conc3 µg/L = (1179335 * 10000* 1) / (3200 *(1000000) * 1 * 0.44) = 8.38 µg/L
Conc4 µg/L = (944050 * 10000* 1) / (2782 *(1000000) * 1 * 0.44) = 8.07 µg/L
Conc5 µg/L = (2049224 * 10000* 1) / (5769 *(1000000) * 1 * 0.44) = 7.66 µg/L
Conc6 µg/L = (772955 * 10000* 1) / (2276 *(1000000) * 1 * 0.44) = 7.72 µg/L
Average concentration = 8.0 µg/L

Signal #2
Conc1 µg/L = (689475 * 10000* 1) / (1917 *(1000000) * 1 * 0.44) = 8.17 µg/L
Conc2 µg/L = (800449 * 10000* 1) / (2172 *(1000000) * 1 * 0.44) = 8.38 µg/L
Conc3 µg/L = (772763 * 10000* 1) / (2088 *(1000000) * 1 * 0.44) = 8.41 µg/L
Conc4 µg/L = (589063 * 10000* 1) / (1698 *(1000000) * 1 * 0.44) = 7.88 µg/L
Conc5 µg/L = (1340728 * 10000* 1) / (3820 *(1000000) * 1 * 0.44) = 7.98 µg/L
Conc6 µg/L = (504915 * 10000* 1) / (1482 *(1000000) * 1 * 0.44) = 7.74 µg/L
Average concentration = 8.1 µg/L

Reported Value = 8.0 µg/L (from signal #1)
% Difference = 0.0%
Values were within 10% difference.

Sample: LFSD01 (F51154-15), alpha-chlordane

Conc. µg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in µg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 µL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Conc. µg/kg = (166174 Area*10000µL*5) / (34180 Area/pg*(1000 pg/ng)*1 µL*30.7g*0.5790) = 13.7 µg/kg

Reported Value = 13.7 µg/kg
% Difference = 0.0%
Values were within 10% difference

Sample: 49SS03 (F51154-24), Aroclor 1260

Conc. µg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in µg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 µL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (µL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 µg/kg = (0*10000*2) / (8040*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc2 µg/kg = (0*10000*2) / (9920*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc3 µg/kg = (0*10000*2) / (9980*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc4 µg/kg = (685577*10000*2) / (7129*(1000)*1*29.9*0.9200) = 69.92 µg/kg
Conc5 µg/kg = (1484623*10000*2) / (16390*(1000)*1*29.9*0.9200) = 65.86 µg/kg
Conc6 µg/kg = (1094850*10000*2) / (9500*(1000)*1*29.9*0.9200) = 83.79 µg/kg
Average concentration = 73.2 µg/kg (Peaks 4 → 6)

Signal #2
Conc1 µg/kg = (0*10000*2) / (1276*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc2 µg/kg = (0*10000*2) / (1547*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc3 µg/kg = (0*10000*2) / (1420*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc4 µg/kg = (171305*10000*2) / (1103*(1000)*1*29.9*0.9200) = 112.92 µg/kg
Conc5 µg/kg = (238470*10000*2) / (2556*(1000)*1*29.9*0.9200) = 67.83 µg/kg
Conc6 µg/kg = (141537*10000*2) / (1028*(1000)*1*29.9*0.9200) = 100.10 µg/kg
Average concentration = 93.6 µg/kg (Peaks 4 → 6)

Reported Value = 73.2 µg/kg (signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

N (Metals) = Laboratory spike sample recovery not within control limits.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: KK20472.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20472.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.050	0.020	ug/l	
319-84-6	alpha-BHC	ND	0.050	0.015	ug/l	
319-85-7	beta-BHC	ND	0.050	0.020	ug/l	
319-86-8	delta-BHC	ND	0.050	0.020	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	0.015	ug/l	
5103-71-9	alpha-Chlordane	ND	0.050	0.015	ug/l	
5103-74-2	gamma-Chlordane	ND	0.050	0.015	ug/l	
60-57-1	Dieldrin	ND	0.050	0.015	ug/l	
72-54-8	4,4'-DDD	ND	0.10	0.020	ug/l	
72-55-9	4,4'-DDE	ND	0.10	0.020	ug/l	
50-29-3	4,4'-DDT	ND	0.10	0.020	ug/l	
72-20-8	Endrin	ND	0.10	0.040	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	0.020	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.10	0.040	ug/l	
53494-70-5	Endrin ketone	ND	0.10	0.020	ug/l	
959-98-8	Endosulfan-I	ND	0.050	0.015	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	0.020	ug/l	
76-44-8	Heptachlor	ND	0.050	0.020	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	0.015	ug/l	
72-43-5	Methoxychlor	ND	0.10	0.040	ug/l	
8001-35-2	Toxaphene	ND	2.5	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	74%		42-127%
2051-24-3	Decachlorobiphenyl	74%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022300.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022300.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND UJ	0.50	0.25	ug/l	
11104-28-2	Aroclor 1221	ND	0.50	0.40	ug/l	
11141-16-5	Aroclor 1232	ND	0.50	0.40	ug/l	
53469-21-9	Aroclor 1242	ND	0.50	0.25	ug/l	
12672-29-6	Aroclor 1248	ND	0.50	0.25	ug/l	
11097-69-1	Aroclor 1254	ND	0.50	0.25	ug/l	
11096-82-5	Aroclor 1260	ND	0.50	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	86%		38-127%
2051-24-3	Decachlorobiphenyl	78%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20473.D

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Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20473.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.053	0.021	ug/l	
319-84-6	alpha-BHC	ND	0.053	0.016	ug/l	
319-85-7	beta-BHC	ND	0.053	0.021	ug/l	
319-86-8	delta-BHC	ND	0.053	0.021	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.053	0.016	ug/l	
5103-71-9	alpha-Chlordane	ND	0.053	0.016	ug/l	
5103-74-2	gamma-Chlordane	ND	0.053	0.016	ug/l	
60-57-1	Dieldrin	ND	0.053	0.016	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.021	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.021	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.021	ug/l	
72-20-8	Endrin	ND	0.11	0.043	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.021	ug/l	
7421-93-4	Endrin aldehyde	ND	0.11	0.043	ug/l	VL
53494-70-5	Endrin ketone	ND	0.11	0.021	ug/l	
959-98-8	Endosulfan-I	ND	0.053	0.016	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.021	ug/l	
76-44-8	Heptachlor	ND	0.053	0.021	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.053	0.016	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.043	ug/l	
8001-35-2	Toxaphene	ND	2.7	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%		42-127%
2051-24-3	Decachlorobiphenyl	76%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022301.D

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Report of Analysis

3.7.3

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022301.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND VT	0.53	0.27	ug/l	
11104-28-2	Aroclor 1221	ND	0.53	0.43	ug/l	
11141-16-5	Aroclor 1232	ND	0.53	0.43	ug/l	
53469-21-9	Aroclor 1242	ND	0.53	0.27	ug/l	
12672-29-6	Aroclor 1248	ND	0.53	0.27	ug/l	
11097-69-1	Aroclor 1254	ND	0.53	0.27	ug/l	
11096-82-5	Aroclor 1260	ND	0.53	0.27	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	87%		38-127%
2051-24-3	Decachlorobiphenyl	81%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20474.D

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Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20474.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.049	0.020	ug/l	
319-84-6	alpha-BHC	ND	0.049	0.015	ug/l	
319-85-7	beta-BHC	ND	0.049	0.020	ug/l	
319-86-8	delta-BHC	ND	0.049	0.020	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.049	0.015	ug/l	
5103-71-9	alpha-Chlordane	ND	0.049	0.015	ug/l	
5103-74-2	gamma-Chlordane	ND	0.049	0.015	ug/l	
60-57-1	Dieldrin	ND	0.049	0.015	ug/l	
72-54-8	4,4'-DDD	ND	0.098	0.020	ug/l	
72-55-9	4,4'-DDE	ND	0.098	0.020	ug/l	
50-29-3	4,4'-DDT	ND	0.098	0.020	ug/l	
72-20-8	Endrin	ND	0.098	0.039	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.098	0.020	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.098	0.039	ug/l	
53494-70-5	Endrin ketone	ND	0.098	0.020	ug/l	
959-98-8	Endosulfan-I	ND	0.049	0.015	ug/l	
33213-65-9	Endosulfan-II	ND	0.098	0.020	ug/l	
76-44-8	Heptachlor	ND	0.049	0.020	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.049	0.015	ug/l	
72-43-5	Methoxychlor	ND	0.098	0.039	ug/l	
8001-35-2	Toxaphene	ND	2.5	1.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	75%		42-127%
2051-24-3	Decachlorobiphenyl	76%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022302.D

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Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022302.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND UT	0.49	0.25	ug/l	
11104-28-2	Aroclor 1221	ND	0.49	0.39	ug/l	
11141-16-5	Aroclor 1232	ND	0.49	0.39	ug/l	
53469-21-9	Aroclor 1242	ND	0.49	0.25	ug/l	
12672-29-6	Aroclor 1248	ND	0.49	0.25	ug/l	
11097-69-1	Aroclor 1254	ND	0.49	0.25	ug/l	
11096-82-5	Aroclor 1260	ND	0.49	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	85%		38-127%
2051-24-3	Decachlorobiphenyl	80%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT08193.D	1	08/06/07	FS	07/27/07	OP21640	GTT278
Run #2	TT08178.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2	30.7 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	4.4	1.1	ug/kg	
319-84-6	alpha-BHC	ND	4.4	1.2	ug/kg	
319-85-7	beta-BHC	ND	4.4	1.1	ug/kg	
319-86-8	delta-BHC	ND	4.4	1.9	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	4.4	1.5	ug/kg	
5103-71-9	alpha-Chlordane	ND	4.4	0.88	ug/kg	
5103-74-2	gamma-Chlordane	ND	4.4	0.97	ug/kg	
60-57-1	Dieldrin	ND	4.4	0.97	ug/kg	
72-54-8	4,4'-DDD	ND	8.8	1.8	ug/kg	
72-55-9	4,4'-DDE	ND	8.8	1.8	ug/kg	
50-29-3	4,4'-DDT	ND [a] UJ	88	20	ug/kg	
72-20-8	Endrin	ND	8.8	1.8	ug/kg	
1031-07-8	Endosulfan sulfate	ND	8.8	2.9	ug/kg	
7421-93-4	Endrin aldehyde	ND UL	8.8	2.6	ug/kg	
53494-70-5	Endrin ketone	ND	8.8	1.8	ug/kg	
959-98-8	Endosulfan-I	ND	4.4	0.97	ug/kg	
33213-65-9	Endosulfan-II	ND	8.8	1.3	ug/kg	
76-44-8	Heptachlor	ND [a]	44	12	ug/kg	
1024-57-3	Heptachlor epoxide	ND	4.4	0.88	ug/kg	
72-43-5	Methoxychlor	ND [a] UJ	88	18	ug/kg	
8001-35-2	Toxaphene	ND	220	110	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	72%	76%	46-122%
2051-24-3	Decachlorobiphenyl	78%	87%	50-133%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64232.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ST64232.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	44	22	ug/kg	
11104-28-2	Aroclor 1221	ND	44	35	ug/kg	
11141-16-5	Aroclor 1232	ND	44	35	ug/kg	
53469-21-9	Aroclor 1242	ND	44	22	ug/kg	
12672-29-6	Aroclor 1248	ND	44	22	ug/kg	
11097-69-1	Aroclor 1254	ND	44	22	ug/kg	
11096-82-5	Aroclor 1260	ND	44	22	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	69%		44-126%
2051-24-3	Decachlorobiphenyl	57%		39-157%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08194.D TT08179.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT08194.D	1	08/06/07	FS	07/27/07	OP21640	GTT278
Run #2	TT08179.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.3 g	10.0 ml
Run #2	30.3 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	2.0	0.48	ug/kg	
319-84-6	alpha-BHC	ND	2.0	0.56	ug/kg	
319-85-7	beta-BHC	ND	2.0	0.52	ug/kg	
319-86-8	delta-BHC	ND	2.0	0.88	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	2.0	0.68	ug/kg	
5103-71-9	alpha-Chlordane	ND	2.0	0.40	ug/kg	
5103-74-2	gamma-Chlordane	ND	2.0	0.44	ug/kg	
60-57-1	Dieldrin	ND	2.0	0.44	ug/kg	
72-54-8	4,4'-DDD	ND	4.0	0.80	ug/kg	
72-55-9	4,4'-DDE	ND	4.0	0.80	ug/kg	
50-29-3	4,4'-DDT	ND [a] VJ	40	9.2	ug/kg	
72-20-8	Endrin	ND	4.0	0.80	ug/kg	
1031-07-8	Endosulfan sulfate	ND	4.0	1.3	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	4.0	1.2	ug/kg	
53494-70-5	Endrin ketone	ND	4.0	0.80	ug/kg	
959-98-8	Endosulfan-I	ND	2.0	0.44	ug/kg	
33213-65-9	Endosulfan-II	ND	4.0	0.60	ug/kg	
76-44-8	Heptachlor	ND [a]	20	5.6	ug/kg	
1024-57-3	Heptachlor epoxide	ND	2.0	0.40	ug/kg	
72-43-5	Methoxychlor	ND [a] VJ	40	8.0	ug/kg	
8001-35-2	Toxaphene	ND	100	50	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	80%	70%	46-122%
2051-24-3	Decachlorobiphenyl	79%	77%	50-133%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64233.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ST64233.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.3 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	20	10	ug/kg	
11104-28-2	Aroclor 1221	ND	20	16	ug/kg	
11141-16-5	Aroclor 1232	ND	20	16	ug/kg	
53469-21-9	Aroclor 1242	ND	20	10	ug/kg	
12672-29-6	Aroclor 1248	ND	20	10	ug/kg	
11097-69-1	Aroclor 1254	ND	20	10	ug/kg	
11096-82-5	Aroclor 1260	ND	20	10	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	68%		44-126%
2051-24-3	Decachlorobiphenyl	66%		39-157%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08195.D TT08180.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT08195.D	1	08/06/07	FS	07/27/07	OP21640	GTT278
Run #2	TT08180.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.2 g	10.0 ml
Run #2	30.2 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	2.1	0.50	ug/kg	
319-84-6	alpha-BHC	ND	2.1	0.59	ug/kg	
319-85-7	beta-BHC	ND	2.1	0.54	ug/kg	
319-86-8	delta-BHC	ND	2.1	0.92	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	2.1	0.71	ug/kg	
5103-71-9	alpha-Chlordane	ND	2.1	0.42	ug/kg	
5103-74-2	gamma-Chlordane	ND	2.1	0.46	ug/kg	
60-57-1	Dieldrin	ND	2.1	0.46	ug/kg	
72-54-8	4,4'-DDD	ND	4.2	0.84	ug/kg	
72-55-9	4,4'-DDE	ND	4.2	0.84	ug/kg	
50-29-3	4,4'-DDT	ND [a] UJ	42	9.6	ug/kg	
72-20-8	Endrin	ND	4.2	0.84	ug/kg	
1031-07-8	Endosulfan sulfate	ND	4.2	1.4	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	4.2	1.3	ug/kg	
53494-70-5	Endrin ketone	ND	4.2	0.84	ug/kg	
959-98-8	Endosulfan-I	ND	2.1	0.46	ug/kg	
33213-65-9	Endosulfan-II	ND	4.2	0.63	ug/kg	
76-44-8	Heptachlor	ND [a]	21	5.9	ug/kg	
1024-57-3	Heptachlor epoxide	ND	2.1	0.42	ug/kg	
72-43-5	Methoxychlor	ND [a] UJ	42	8.4	ug/kg	
8001-35-2	Toxaphene	ND	100	52	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	77%	69%	46-122%
2051-24-3	Decachlorobiphenyl	78%	78%	50-133%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64234.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ST64234.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	21	10	ug/kg	
11104-28-2	Aroclor 1221	ND	21	17	ug/kg	
11141-16-5	Aroclor 1232	ND	21	17	ug/kg	
53469-21-9	Aroclor 1242	ND	21	10	ug/kg	
12672-29-6	Aroclor 1248	ND	21	10	ug/kg	
11097-69-1	Aroclor 1254	ND	21	10	ug/kg	
11096-82-5	Aroclor 1260	ND	21	10	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	74%		44-126%
2051-24-3	Decachlorobiphenyl	56%		39-157%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08068.D KK20593.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08068.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20593.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2	30.7 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	14	3.4	ug/kg	
319-84-6	alpha-BHC	ND	14	3.9	ug/kg	
319-85-7	beta-BHC	ND	14	3.7	ug/kg	
319-86-8	delta-BHC	ND	14	6.2	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	14	4.8	ug/kg	
5103-71-9	alpha-Chlordane	13.7 J	14	2.8	ug/kg	J
5103-74-2	gamma-Chlordane	13.6 J	14	3.1	ug/kg	J
60-57-1	Dieldrin	ND	14	3.1	ug/kg	
72-54-8	4,4'-DDD	ND	28	5.6	ug/kg	
72-55-9	4,4'-DDE	ND	28	5.6	ug/kg	
50-29-3	4,4'-DDT	ND [b]	56	13	ug/kg	
72-20-8	Endrin	ND	28	5.6	ug/kg	
1031-07-8	Endosulfan sulfate	ND	28	9.3	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	28	8.4	ug/kg	
53494-70-5	Endrin ketone	ND	28	5.6	ug/kg	
959-98-8	Endosulfan-I	ND	14	3.1	ug/kg	
33213-65-9	Endosulfan-II	ND	28	4.2	ug/kg	
76-44-8	Heptachlor	ND	14	3.9	ug/kg	
1024-57-3	Heptachlor epoxide	ND	14	2.8	ug/kg	
72-43-5	Methoxychlor	ND [b]	56	11	ug/kg	
8001-35-2	Toxaphene	ND	700	350	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%	70%	46-122%
2051-24-3	Decachlorobiphenyl	76%	57%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64235.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64235.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	28	14	ug/kg	
11104-28-2	Aroclor 1221	ND	28	23	ug/kg	
11141-16-5	Aroclor 1232	ND	28	23	ug/kg	
53469-21-9	Aroclor 1242	ND	28	14	ug/kg	
12672-29-6	Aroclor 1248	ND	28	14	ug/kg	
11097-69-1	Aroclor 1254	ND	28	14	ug/kg	
11096-82-5	Aroclor 1260	135 J	28	14	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	70%		44-126%
2051-24-3	Decachlorobiphenyl	48%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20783.D KK20775.D

Form I OCs

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSD01		
Lab Sample ID:	F51154-16	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	65.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	KK20783.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	KK20775.D	10	08/08/07	FS	07/27/07	OP21640	GKK761

	Initial Weight	Final Volume
Run #1	30.5 g	10.0 ml
Run #2	30.3 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND VL	2.5	0.61	ug/kg	
319-84-6	alpha-BHC	ND VL	2.5	0.71	ug/kg	
319-85-7	beta-BHC	ND VL	2.5	0.66	ug/kg	
319-86-8	delta-BHC	ND VL	2.5	1.1	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND VL	2.5	0.86	ug/kg	
5103-71-9	alpha-Chlordane	5.3 J	2.5	0.50	ug/kg	
5103-74-2	gamma-Chlordane	6.5 J	2.5	0.55	ug/kg	
60-57-1	Dieldrin	ND VL	2.5	0.55	ug/kg	
72-54-8	4,4'-DDD	ND VL	5.0	1.0	ug/kg	
72-55-9	4,4'-DDE	ND VL	5.0	1.0	ug/kg	
50-29-3	4,4'-DDT	ND [b]	51	12	ug/kg	
72-20-8	Endrin	ND VL	5.0	1.0	ug/kg	
1031-07-8	Endosulfan sulfate	ND VL	5.0	1.7	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	5.0	1.5	ug/kg	
53494-70-5	Endrin ketone	ND VL	5.0	1.0	ug/kg	
959-98-8	Endosulfan-I	ND VL	2.5	0.55	ug/kg	
33213-65-9	Endosulfan-II	ND VL	5.0	0.76	ug/kg	
76-44-8	Heptachlor	ND [b]	25	7.1	ug/kg	
1024-57-3	Heptachlor epoxide	1.7 L	2.5	0.50	ug/kg	J
72-43-5	Methoxychlor	ND [b]	51	10	ug/kg	
8001-35-2	Toxaphene	ND VL	130	63	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	50%	62%	46-122%
2051-24-3	Decachlorobiphenyl	37% [c]	61%	50-133%

(a) All hits confirmed by dual column analysis.
(b) Result is from Run# 2
(c) Outside control limits due to matrix interference.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64236.D

Form I OPA

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSD01		
Lab Sample ID:	F51154-16	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	65.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64236.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.5 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	25	13	ug/kg	
11104-28-2	Aroclor 1221	ND	25	20	ug/kg	
11141-16-5	Aroclor 1232	ND	25	20	ug/kg	
53469-21-9	Aroclor 1242	ND	25	13	ug/kg	
12672-29-6	Aroclor 1248	ND	25	13	ug/kg	
11097-69-1	Aroclor 1254	ND	25	13	ug/kg	
11096-82-5	Aroclor 1260	74.2 J	25	13	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	72%		44-126%
2051-24-3	Decachlorobiphenyl	59%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20476.D

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Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20476.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	1040 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.048	0.019	ug/l	
319-84-6	alpha-BHC	ND	0.048	0.014	ug/l	
319-85-7	beta-BHC	ND	0.048	0.019	ug/l	
319-86-8	delta-BHC	ND	0.048	0.019	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.048	0.014	ug/l	
5103-71-9	alpha-Chlordane	ND	0.048	0.014	ug/l	
5103-74-2	gamma-Chlordane	ND	0.048	0.014	ug/l	
60-57-1	Dieldrin	ND	0.048	0.014	ug/l	
72-54-8	4,4'-DDD	ND	0.096	0.019	ug/l	
72-55-9	4,4'-DDE	ND	0.096	0.019	ug/l	
50-29-3	4,4'-DDT	ND	0.096	0.019	ug/l	
72-20-8	Endrin	ND	0.096	0.038	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.096	0.019	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.096	0.038	ug/l	
53494-70-5	Endrin ketone	ND	0.096	0.019	ug/l	
959-98-8	Endosulfan-I	ND	0.048	0.014	ug/l	
33213-65-9	Endosulfan-II	ND	0.096	0.019	ug/l	
76-44-8	Heptachlor	ND	0.048	0.019	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.048	0.014	ug/l	
72-43-5	Methoxychlor	ND	0.096	0.038	ug/l	
8001-35-2	Toxaphene	ND	2.4	1.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	75%		42-127%
2051-24-3	Decachlorobiphenyl	78%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022304.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022304.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	1040 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND VJ	0.48	0.24	ug/l	
11104-28-2	Aroclor 1221	ND	0.48	0.38	ug/l	
11141-16-5	Aroclor 1232	ND	0.48	0.38	ug/l	
53469-21-9	Aroclor 1242	ND	0.48	0.24	ug/l	
12672-29-6	Aroclor 1248	ND	0.48	0.24	ug/l	
11097-69-1	Aroclor 1254	ND	0.48	0.24	ug/l	
11096-82-5	Aroclor 1260	ND	0.48	0.24	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	80%		38-127%
2051-24-3	Decachlorobiphenyl	82%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08066.D KK20586.D

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Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08066.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20586.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2	30.8 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.4	2.3	ug/kg	
319-84-6	alpha-BHC	ND	9.4	2.6	ug/kg	
319-85-7	beta-BHC	ND	9.4	2.4	ug/kg	
319-86-8	delta-BHC	ND	9.4	4.1	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.4	3.2	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.4	1.9	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.4	2.1	ug/kg	
60-57-1	Dieldrin	ND	9.4	2.1	ug/kg	
72-54-8	4,4'-DDD	ND	19	3.8	ug/kg	
72-55-9	4,4'-DDE	ND	19	3.8	ug/kg	
50-29-3	4,4'-DDT	ND [b]	37	8.6	ug/kg	
72-20-8	Endrin	ND	19	3.8	ug/kg	
1031-07-8	Endosulfan sulfate	ND	19	6.2	ug/kg	
7421-93-4	Endrin aldehyde	ND UL	19	5.6	ug/kg	
53494-70-5	Endrin ketone	ND	19	3.8	ug/kg	
959-98-8	Endosulfan-I	ND	9.4	2.1	ug/kg	
33213-65-9	Endosulfan-II	ND	19	2.8	ug/kg	
76-44-8	Heptachlor	ND	9.4	2.6	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.4	1.9	ug/kg	
72-43-5	Methoxychlor	ND [b]	37	7.5	ug/kg	
8001-35-2	Toxaphene	ND	470	230	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	75%	70%	46-122%
2051-24-3	Decachlorobiphenyl	80%	72%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64237.D

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Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64237.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.8 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.4	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.4	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.4	ug/kg	
11097-69-1	Aroclor 1254 [b]	42.0 J	19	9.4	ug/kg	J
11096-82-5	Aroclor 1260 [b]	41.8 J	19	9.4	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	77%		44-126%
2051-24-3	Decachlorobiphenyl	79%		39-157%

(a) All hits confirmed by dual column analysis.
(b) Estimated value due to the presence of multiple overlapping Aroclor patterns.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20479.D

Form I Org

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Report of Analysis

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-20	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20479.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	880 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.057	0.023	ug/l	
319-84-6	alpha-BHC	ND	0.057	0.017	ug/l	
319-85-7	beta-BHC	ND	0.057	0.023	ug/l	
319-86-8	delta-BHC	ND	0.057	0.023	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.057	0.017	ug/l	
5103-71-9	alpha-Chlordane	ND	0.057	0.017	ug/l	
5103-74-2	gamma-Chlordane	ND	0.057	0.017	ug/l	
60-57-1	Dieldrin	ND	0.057	0.017	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.023	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.023	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.023	ug/l	
72-20-8	Endrin	ND	0.11	0.045	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.023	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.11	0.045	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.023	ug/l	
959-98-8	Endosulfan-I	ND	0.057	0.017	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.023	ug/l	
76-44-8	Heptachlor	ND	0.057	0.023	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.057	0.017	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.045	ug/l	
8001-35-2	Toxaphene	ND	2.8	1.4	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%		42-127%
2051-24-3	Decachlorobiphenyl	82%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022307.D

Form I Org

Accutest Laboratories

Report of Analysis

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Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-20	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022307.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	880 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND UJ	0.57	0.28	ug/l	
11104-28-2	Aroclor 1221	ND	0.57	0.45	ug/l	
11141-16-5	Aroclor 1232	ND	0.57	0.45	ug/l	
53469-21-9	Aroclor 1242	ND	0.57	0.28	ug/l	
12672-29-6	Aroclor 1248	ND	0.57	0.28	ug/l	
11097-69-1	Aroclor 1254	ND	0.57	0.28	ug/l	
11096-82-5	Aroclor 1260	ND	0.57	0.28	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	80%		38-127%
2051-24-3	Decachlorobiphenyl	87%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08070.D KK20587.D

Form I Corg

Accutest Laboratories

Report of Analysis

3.22
3

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08070.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20587.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2	29.9 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.6	2.3	ug/kg	
319-84-6	alpha-BHC	ND	9.6	2.7	ug/kg	
319-85-7	beta-BHC	ND	9.6	2.5	ug/kg	
319-86-8	delta-BHC	ND	9.6	4.2	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.6	3.3	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.6	1.9	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.6	2.1	ug/kg	
60-57-1	Dieldrin	ND	9.6	2.1	ug/kg	
72-54-8	4,4'-DDD	ND	19	3.9	ug/kg	
72-55-9	4,4'-DDE	ND	19	3.9	ug/kg	
50-29-3	4,4'-DDT	ND [b]	39	8.9	ug/kg	
72-20-8	Endrin	ND	19	3.9	ug/kg	
1031-07-8	Endosulfan sulfate	ND	19	6.4	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	19	5.8	ug/kg	
53494-70-5	Endrin ketone	ND	19	3.9	ug/kg	
959-98-8	Endosulfan-I	ND	9.6	2.1	ug/kg	
33213-65-9	Endosulfan-II	ND	19	2.9	ug/kg	
76-44-8	Heptachlor	ND	9.6	2.7	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.6	1.9	ug/kg	
72-43-5	Methoxychlor	ND [b]	39	7.7	ug/kg	
8001-35-2	Toxaphene	ND	480	240	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	69%	65%	46-122%
2051-24-3	Decachlorobiphenyl	80%	72%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64238.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64238.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.6	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.6	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.6	ug/kg	
11097-69-1	Aroclor 1254	90.2	19	9.6	ug/kg	
11096-82-5	Aroclor 1260	ND	19	9.6	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	70%		44-126%
2051-24-3	Decachlorobiphenyl	76%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08071.D KK20588.D

Form I (OR)

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08071.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20588.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2	29.9 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.3	2.2	ug/kg	
319-84-6	alpha-BHC	ND	9.3	2.6	ug/kg	
319-85-7	beta-BHC	ND	9.3	2.4	ug/kg	
319-86-8	delta-BHC	ND	9.3	4.1	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.3	3.2	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.3	1.9	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.3	2.1	ug/kg	
60-57-1	Dieldrin	ND	9.3	2.1	ug/kg	
72-54-8	4,4'-DDD	ND	19	3.7	ug/kg	
72-55-9	4,4'-DDE	ND	19	3.7	ug/kg	
50-29-3	4,4'-DDT	ND [b] VL	37	8.6	ug/kg	
72-20-8	Endrin	ND	19	3.7	ug/kg	
1031-07-8	Endosulfan sulfate	ND	19	6.2	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	19	5.6	ug/kg	
53494-70-5	Endrin ketone	ND	19	3.7	ug/kg	
959-98-8	Endosulfan-I	ND	9.3	2.1	ug/kg	
33213-65-9	Endosulfan-II	ND	19	2.8	ug/kg	
76-44-8	Heptachlor	ND	9.3	2.6	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.3	1.9	ug/kg	
72-43-5	Methoxychlor	ND [b] VL	37	7.5	ug/kg	
8001-35-2	Toxaphene	ND	470	230	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	53%	51%	46-122%
2051-24-3	Decachlorobiphenyl	59%	48% [c]	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2
(c) Outside control limits due to dilution.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022594.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	XX022594.D	2	08/02/07	AC	07/27/07	OP21641	GXX189
Run #2							

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	37	19	ug/kg	
11104-28-2	Aroclor 1221	ND	37	30	ug/kg	
11141-16-5	Aroclor 1232	ND	37	30	ug/kg	
53469-21-9	Aroclor 1242	ND	37	19	ug/kg	
12672-29-6	Aroclor 1248	ND	37	19	ug/kg	
11097-69-1	Aroclor 1254	ND	37	37	ug/kg	
11096-82-5	Aroclor 1260	152	37	19	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	47%		44-126%
2051-24-3	Decachlorobiphenyl	59%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08076.D KK20589.D

Form I Cpy

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08076.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20589.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2	29.9 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.1	2.2	ug/kg	
319-84-6	alpha-BHC	ND	9.1	2.5	ug/kg	
319-85-7	beta-BHC	ND	9.1	2.4	ug/kg	
319-86-8	delta-BHC	ND	9.1	4.0	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.1	3.1	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.1	1.8	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.1	2.0	ug/kg	
60-57-1	Dieldrin	ND	9.1	2.0	ug/kg	
72-54-8	4,4'-DDD	ND	18	3.6	ug/kg	
72-55-9	4,4'-DDE	ND	18	3.6	ug/kg	
50-29-3	4,4'-DDT	ND [b] UJ	36	8.4	ug/kg	
72-20-8	Endrin	ND	18	3.6	ug/kg	
1031-07-8	Endosulfan sulfate	ND	18	6.0	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	18	5.5	ug/kg	
53494-70-5	Endrin ketone	ND	18	3.6	ug/kg	
959-98-8	Endosulfan-I	ND	9.1	2.0	ug/kg	
33213-65-9	Endosulfan-II	ND	18	2.7	ug/kg	
76-44-8	Heptachlor	ND [b]	18	5.1	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.1	1.8	ug/kg	
72-43-5	Methoxychlor	ND [b] UJ	36	7.3	ug/kg	
8001-35-2	Toxaphene	ND	450	230	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	64%	62%	46-122%
2051-24-3	Decachlorobiphenyl	67%	55%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64296.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64296.D	2	08/01/07	JB	07/27/07	OP21641	GST1698
Run #2							

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	36	18	ug/kg	
11104-28-2	Aroclor 1221	ND	36	29	ug/kg	
11141-16-5	Aroclor 1232	ND	36	29	ug/kg	
53469-21-9	Aroclor 1242	ND	36	18	ug/kg	
12672-29-6	Aroclor 1248	ND	36	18	ug/kg	
11097-69-1	Aroclor 1254 [b]	124 J	36	18	ug/kg	J
11096-82-5	Aroclor 1260 [b]	73.2 J	36	18	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	61%		44-126%
2051-24-3	Decachlorobiphenyl	62%		39-157%

(a) All hits confirmed by dual column analysis.
(b) Estimated value due to the presence of multiple overlapping Aroclor patterns.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08196.D TT08182.D

Form I copy

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Report of Analysis

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT08196.D	1	08/06/07	FS	07/27/07	OP21640	GTT278
Run #2	TT08182.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.6 g	10.0 ml
Run #2	30.6 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.9	0.45	ug/kg	
319-84-6	alpha-BHC	ND	1.9	0.52	ug/kg	
319-85-7	beta-BHC	ND	1.9	0.49	ug/kg	
319-86-8	delta-BHC	ND VJ	1.9	0.82	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.9	0.63	ug/kg	
5103-71-9	alpha-Chlordane	ND VL	1.9	0.37	ug/kg	
5103-74-2	gamma-Chlordane	ND VL	1.9	0.41	ug/kg	
60-57-1	Dieldrin	ND VL	1.9	0.41	ug/kg	
72-54-8	4,4'-DDD	ND	3.7	0.75	ug/kg	
72-55-9	4,4'-DDE	ND VL	3.7	0.75	ug/kg	
50-29-3	4,4'-DDT	ND [a] VJ	37	8.6	ug/kg	
72-20-8	Endrin	ND VL	3.7	0.75	ug/kg	
1031-07-8	Endosulfan sulfate	ND	3.7	1.2	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	3.7	1.1	ug/kg	
53494-70-5	Endrin ketone	ND VL	3.7	0.75	ug/kg	
959-98-8	Endosulfan-I	ND	1.9	0.41	ug/kg	
33213-65-9	Endosulfan-II	ND VL	3.7	0.56	ug/kg	
76-44-8	Heptachlor	ND [a]	19	5.2	ug/kg	
1024-57-3	Heptachlor epoxide	ND	1.9	0.37	ug/kg	
72-43-5	Methoxychlor	ND [a] VJ	37	7.5	ug/kg	
8001-35-2	Toxaphene	ND	93	47	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	76%	70%	46-122%
2051-24-3	Decachlorobiphenyl	68%	77%	50-133%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64243.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64243.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.6 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.3	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.3	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.3	ug/kg	
11097-69-1	Aroclor 1254	10.9 J	19	9.3	ug/kg	J
11096-82-5	Aroclor 1260	ND	19	9.3	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	67%		44-126%
2051-24-3	Decachlorobiphenyl	65%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08075.D KK20590.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08075.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20590.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	30.3 g	10.0 ml
Run #2	30.3 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.6	2.3	ug/kg	
319-84-6	alpha-BHC	ND	9.6	2.7	ug/kg	
319-85-7	beta-BHC	ND	9.6	2.5	ug/kg	
319-86-8	delta-BHC	ND	9.6	4.2	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.6	3.3	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.6	1.9	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.6	2.1	ug/kg	
60-57-1	Dieldrin	ND	9.6	2.1	ug/kg	
72-54-8	4,4'-DDD	ND	19	3.8	ug/kg	
72-55-9	4,4'-DDE	ND	19	3.8	ug/kg	
50-29-3	4,4'-DDT	ND [b] VJ	38	8.8	ug/kg	
72-20-8	Endrin	ND	19	3.8	ug/kg	
1031-07-8	Endosulfan sulfate	ND	19	6.3	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	19	5.8	ug/kg	
53494-70-5	Endrin ketone	ND	19	3.8	ug/kg	
959-98-8	Endosulfan-I	ND	9.6	2.1	ug/kg	
33213-65-9	Endosulfan-II	ND	19	2.9	ug/kg	
76-44-8	Heptachlor	ND [b]	19	5.4	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.6	1.9	ug/kg	
72-43-5	Methoxychlor	ND [b] VJ	38	7.7	ug/kg	
8001-35-2	Toxaphene	ND	480	240	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%	72%	46-122%
2051-24-3	Decachlorobiphenyl	87%	72%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64244.D

Form I copy

Accutest Laboratories

Report of Analysis

3.2.6

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64244.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.3 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.6	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.6	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.6	ug/kg	
11097-69-1	Aroclor 1254	41.1 J	19	9.6	ug/kg	
11096-82-5	Aroclor 1260	ND	19	9.6	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	68%		44-126%
2051-24-3	Decachlorobiphenyl	68%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20778.D TT08181.D

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Report of Analysis

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Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20778.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	TT08181.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.8 g	10.0 ml
Run #2	30.8 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.8	0.42	ug/kg	
319-84-6	alpha-BHC	ND	1.8	0.49	ug/kg	
319-85-7	beta-BHC	ND	1.8	0.46	ug/kg	
319-86-8	delta-BHC	ND	1.8	0.78	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.8	0.60	ug/kg	
5103-71-9	alpha-Chlordane	ND	1.8	0.35	ug/kg	
5103-74-2	gamma-Chlordane	ND	1.8	0.39	ug/kg	
60-57-1	Dieldrin	ND	1.8	0.39	ug/kg	
72-54-8	4,4'-DDD	ND	3.5	0.71	ug/kg	
72-55-9	4,4'-DDE	ND	3.5	0.71	ug/kg	
50-29-3	4,4'-DDT	ND [a]	35	8.1	ug/kg	
72-20-8	Endrin	ND	3.5	0.71	ug/kg	
1031-07-8	Endosulfan sulfate	ND	3.5	1.2	ug/kg	
7421-93-4	Endrin aldehyde	ND vL	3.5	1.1	ug/kg	
53494-70-5	Endrin ketone	ND	3.5	0.71	ug/kg	
959-98-8	Endosulfan-I	ND	1.8	0.39	ug/kg	
33213-65-9	Endosulfan-II	ND	3.5	0.53	ug/kg	
76-44-8	Heptachlor	ND [a]	18	4.9	ug/kg	
1024-57-3	Heptachlor epoxide	0.48 J	1.8	0.35	ug/kg	J
72-43-5	Methoxychlor	ND [a]	35	7.1	ug/kg	
8001-35-2	Toxaphene	ND	88	44	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	110%	70%	46-122%
2051-24-3	Decachlorobiphenyl	88%	78%	50-133%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64245.D

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Report of Analysis

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64245.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.8 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	18	8.8	ug/kg	
11104-28-2	Aroclor 1221	ND	18	14	ug/kg	
11141-16-5	Aroclor 1232	ND	18	14	ug/kg	
53469-21-9	Aroclor 1242	ND	18	8.8	ug/kg	
12672-29-6	Aroclor 1248	ND	18	8.8	ug/kg	
11097-69-1	Aroclor 1254	11.1 J	18	8.8	ug/kg	J
11096-82-5	Aroclor 1260	ND	18	8.8	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	66%		44-126%
2051-24-3	Decachlorobiphenyl	59%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20779.D TT08185.D

Form I COA

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	KK20779.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	TT08185.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.8 g	10.0 ml
Run #2	30.8 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.8	0.43	ug/kg	
319-84-6	alpha-BHC	ND	1.8	0.50	ug/kg	
319-85-7	beta-BHC	ND	1.8	0.46	ug/kg	
319-86-8	delta-BHC	ND	1.8	0.78	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.8	0.60	ug/kg	
5103-71-9	alpha-Chlordane	ND	1.8	0.35	ug/kg	
5103-74-2	gamma-Chlordane	ND	1.8	0.39	ug/kg	
60-57-1	Dieldrin	0.75 J	1.8	0.39	ug/kg	J
72-54-8	4,4'-DDD	ND	3.5	0.71	ug/kg	
72-55-9	4,4'-DDE	ND	3.5	0.71	ug/kg	
50-29-3	4,4'-DDT	ND [b]	35	8.2	ug/kg	
72-20-8	Endrin	ND	3.5	0.71	ug/kg	
1031-07-8	Endosulfan sulfate	ND	3.5	1.2	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	3.5	1.1	ug/kg	
53494-70-5	Endrin ketone	ND	3.5	0.71	ug/kg	
959-98-8	Endosulfan-I	ND	1.8	0.39	ug/kg	
33213-65-9	Endosulfan-II	ND	3.5	0.53	ug/kg	
76-44-8	Heptachlor	ND [b]	18	5.0	ug/kg	
1024-57-3	Heptachlor epoxide	0.46 J	1.8	0.35	ug/kg	J
72-43-5	Methoxychlor	ND [b]	35	7.1	ug/kg	
8001-35-2	Toxaphene	ND	89	44	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	75%	67%	46-122%
2051-24-3	Decachlorobiphenyl	62%	70%	50-133%

(a) All hits confirmed by dual column analysis.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64248.D

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Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64248.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.8 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result		RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND		18	8.9	ug/kg	
11104-28-2	Aroclor 1221	ND		18	14	ug/kg	
11141-16-5	Aroclor 1232	ND		18	14	ug/kg	
53469-21-9	Aroclor 1242	ND		18	8.9	ug/kg	
12672-29-6	Aroclor 1248	ND		18	8.9	ug/kg	
11097-69-1	Aroclor 1254 [b]	21.0	J	18	8.9	ug/kg	
11096-82-5	Aroclor 1260	ND		18	8.9	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	74%		44-126%
2051-24-3	Decachlorobiphenyl	59%		39-157%

(a) All hits confirmed by dual column analysis.
(b) Aroclor pattern appears to be weathered.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20780.D TT08186.D

Form I COR

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	KK20780.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	TT08186.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.1 g	10.0 ml
Run #2	30.1 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.9	0.45	ug/kg	
319-84-6	alpha-BHC	ND	1.9	0.52	ug/kg	
319-85-7	beta-BHC	ND	1.9	0.49	ug/kg	
319-86-8	delta-BHC	ND	1.9	0.82	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.9	0.63	ug/kg	
5103-71-9	alpha-Chlordane	ND	1.9	0.37	ug/kg	
5103-74-2	gamma-Chlordane	ND	1.9	0.41	ug/kg	
60-57-1	Dieldrin	0.44 J	1.9	0.41	ug/kg	J
72-54-8	4,4'-DDD	1.0 J	3.7	0.75	ug/kg	J
72-55-9	4,4'-DDE	ND	3.7	0.75	ug/kg	
50-29-3	4,4'-DDT	ND [b]	37	8.6	ug/kg	
72-20-8	Endrin	ND	3.7	0.75	ug/kg	
1031-07-8	Endosulfan sulfate	ND	3.7	1.2	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	3.7	1.1	ug/kg	
53494-70-5	Endrin ketone	ND	3.7	0.75	ug/kg	
959-98-8	Endosulfan-I	ND	1.9	0.41	ug/kg	
33213-65-9	Endosulfan-II	ND	3.7	0.56	ug/kg	
76-44-8	Heptachlor	ND [b]	19	5.2	ug/kg	
1024-57-3	Heptachlor epoxide	ND	1.9	0.37	ug/kg	
72-43-5	Methoxychlor	ND [b]	37	7.5	ug/kg	
8001-35-2	Toxaphene	ND	93	47	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	120%	77%	46-122%
2051-24-3	Decachlorobiphenyl	100%	78%	50-133%

(a) All hits confirmed by dual column analysis.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64249.D

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Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64249.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.3	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.3	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.3	ug/kg	
11097-69-1	Aroclor 1254 [b]	24.7 J	19	9.3	ug/kg	
11096-82-5	Aroclor 1260	ND	19	9.3	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	73%		44-126%
2051-24-3	Decachlorobiphenyl	66%		39-157%

(a) All hits confirmed by dual column analysis.
(b) Aroclor pattern appears to be weathered.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20781.D TT08189.D

Form I Copy

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Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	KK20781.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	TT08189.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.5 g	10.0 ml
Run #2	30.5 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.7	0.41	ug/kg	
319-84-6	alpha-BHC	ND	1.7	0.48	ug/kg	
319-85-7	beta-BHC	ND	1.7	0.45	ug/kg	
319-86-8	delta-BHC	ND	1.7	0.76	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.7	0.59	ug/kg	
5103-71-9	alpha-Chlordane	ND	1.7	0.34	ug/kg	
5103-74-2	gamma-Chlordane	ND	1.7	0.38	ug/kg	
60-57-1	Dieldrin	ND	1.7	0.38	ug/kg	
72-54-8	4,4'-DDD	ND	3.4	0.69	ug/kg	
72-55-9	4,4'-DDE	ND	3.4	0.69	ug/kg	
50-29-3	4,4'-DDT	ND [b] UJ	34	7.9	ug/kg	
72-20-8	Endrin	ND	3.4	0.69	ug/kg	
1031-07-8	Endosulfan sulfate	7.1	3.4	1.1	ug/kg	
7421-93-4	Endrin aldehyde	ND UL	3.4	1.0	ug/kg	
53494-70-5	Endrin ketone	ND	3.4	0.69	ug/kg	
959-98-8	Endosulfan-I	ND	1.7	0.38	ug/kg	
33213-65-9	Endosulfan-II	ND	3.4	0.52	ug/kg	
76-44-8	Heptachlor	ND [b]	17	4.8	ug/kg	
1024-57-3	Heptachlor epoxide	ND	1.7	0.34	ug/kg	
72-43-5	Methoxychlor	ND [b] UJ	34	6.9	ug/kg	
8001-35-2	Toxaphene	ND	86	43	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	66%	69%	46-122%
2051-24-3	Decachlorobiphenyl	73%	80%	50-133%

(a) All hits confirmed by dual column analysis.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64250.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ST64250.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.5 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	17	8.6	ug/kg	
11104-28-2	Aroclor 1221	ND	17	14	ug/kg	
11141-16-5	Aroclor 1232	ND	17	14	ug/kg	
53469-21-9	Aroclor 1242	ND	17	8.6	ug/kg	
12672-29-6	Aroclor 1248	ND	17	8.6	ug/kg	
11097-69-1	Aroclor 1254	ND	17	8.6	ug/kg	
11096-82-5	Aroclor 1260	ND	17	8.6	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	63%		44-126%
2051-24-3	Decachlorobiphenyl	72%		39-157%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20782.D TT08190.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	KK20782.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	TT08190.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2	31.7 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.7	0.41	ug/kg	
319-84-6	alpha-BHC	ND	1.7	0.48	ug/kg	
319-85-7	beta-BHC	ND	1.7	0.44	ug/kg	
319-86-8	delta-BHC	ND	1.7	0.75	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.7	0.58	ug/kg	
5103-71-9	alpha-Chlordane	ND	1.7	0.34	ug/kg	
5103-74-2	gamma-Chlordane	ND	1.7	0.37	ug/kg	
60-57-1	Dieldrin	ND	1.7	0.37	ug/kg	
72-54-8	4,4'-DDD	ND	3.4	0.68	ug/kg	
72-55-9	4,4'-DDE	ND	3.4	0.68	ug/kg	
50-29-3	4,4'-DDT	ND [b] UJ	33	7.6	ug/kg	
72-20-8	Endrin	ND	3.4	0.68	ug/kg	
1031-07-8	Endosulfan sulfate	2.1 J	3.4	1.1	ug/kg	J
7421-93-4	Endrin aldehyde	ND UL	3.4	1.0	ug/kg	
53494-70-5	Endrin ketone	ND	3.4	0.68	ug/kg	
959-98-8	Endosulfan-I	ND	1.7	0.37	ug/kg	
33213-65-9	Endosulfan-II	ND	3.4	0.51	ug/kg	
76-44-8	Heptachlor	ND [b]	16	4.6	ug/kg	
1024-57-3	Heptachlor epoxide	ND	1.7	0.34	ug/kg	
72-43-5	Methoxychlor	ND [b] UJ	33	6.6	ug/kg	
8001-35-2	Toxaphene	ND	85	43	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	55%	80%	46-122%
2051-24-3	Decachlorobiphenyl	57%	81%	50-133%

(a) All hits confirmed by dual column analysis.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64251.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ST64251.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	17	8.5	ug/kg	
11104-28-2	Aroclor 1221	ND	17	14	ug/kg	
11141-16-5	Aroclor 1232	ND	17	14	ug/kg	
53469-21-9	Aroclor 1242	ND	17	8.5	ug/kg	
12672-29-6	Aroclor 1248	ND	17	8.5	ug/kg	
11097-69-1	Aroclor 1254	ND	17	8.5	ug/kg	
11096-82-5	Aroclor 1260	ND	17	8.5	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	70%		44-126%
2051-24-3	Decachlorobiphenyl	80%		39-157%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08074.D KK20592.D

Form I OV

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08074.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20592.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2	29.9 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.7	2.3	ug/kg	
319-84-6	alpha-BHC	ND	9.7	2.7	ug/kg	
319-85-7	beta-BHC	ND	9.7	2.5	ug/kg	
319-86-8	delta-BHC	ND	9.7	4.2	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.7	3.3	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.7	1.9	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.7	2.1	ug/kg	
60-57-1	Dieldrin	ND	9.7	2.1	ug/kg	
72-54-8	4,4'-DDD	ND	19	3.9	ug/kg	
72-55-9	4,4'-DDE	ND	19	3.9	ug/kg	
50-29-3	4,4'-DDT	ND [b] UJ	39	8.9	ug/kg	
72-20-8	Endrin	ND	19	3.9	ug/kg	
1031-07-8	Endosulfan sulfate	ND	19	6.4	ug/kg	
7421-93-4	Endrin aldehyde	ND UL	19	5.8	ug/kg	
53494-70-5	Endrin ketone	ND	19	3.9	ug/kg	
959-98-8	Endosulfan-I	ND	9.7	2.1	ug/kg	
33213-65-9	Endosulfan-II	ND	19	2.9	ug/kg	
76-44-8	Heptachlor	ND [b]	19	5.4	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.7	1.9	ug/kg	
72-43-5	Methoxychlor	ND [b] UJ	39	7.7	ug/kg	
8001-35-2	Toxaphene	ND	480	240	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%	69%	46-122%
2051-24-3	Decachlorobiphenyl	86%	75%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64254.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64254.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.7	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.7	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.7	ug/kg	
11097-69-1	Aroclor 1254	75.6 J	19	9.7	ug/kg	
11096-82-5	Aroclor 1260	ND	19	9.7	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	65%		44-126%
2051-24-3	Decachlorobiphenyl	70%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20475.D

For I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20475.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	920 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.054	0.022	ug/l	
319-84-6	alpha-BHC	ND	0.054	0.016	ug/l	
319-85-7	beta-BHC	ND	0.054	0.022	ug/l	
319-86-8	delta-BHC	ND	0.054	0.022	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.054	0.016	ug/l	
5103-71-9	alpha-Chlordane	ND	0.054	0.016	ug/l	
5103-74-2	gamma-Chlordane	ND	0.054	0.016	ug/l	
60-57-1	Dieldrin	ND	0.054	0.016	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.022	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.022	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.022	ug/l	
72-20-8	Endrin	ND	0.11	0.043	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.022	ug/l	
7421-93-4	Endrin aldehyde	ND	0.11	0.043	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.022	ug/l	
959-98-8	Endosulfan-I	ND	0.054	0.016	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.022	ug/l	
76-44-8	Heptachlor	ND	0.054	0.022	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.054	0.016	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.043	ug/l	
8001-35-2	Toxaphene	ND	2.7	1.4	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%		42-127%
2051-24-3	Decachlorobiphenyl	71%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022303.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022303.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	920 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.54	0.27	ug/l	
11104-28-2	Aroclor 1221	ND	0.54	0.43	ug/l	
11141-16-5	Aroclor 1232	ND	0.54	0.43	ug/l	
53469-21-9	Aroclor 1242	ND	0.54	0.27	ug/l	
12672-29-6	Aroclor 1248	ND	0.54	0.27	ug/l	
11097-69-1	Aroclor 1254	ND	0.54	0.27	ug/l	
11096-82-5	Aroclor 1260	ND	0.54	0.27	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	87%		38-127%
2051-24-3	Decachlorobiphenyl	75%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Pesticides and PCBs
Accutest Laboratories, Inc., SDG F51154

DATE: September 26, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on July 18, 2007 and July 19, 2007. Aqueous samples were analyzed for pesticides and PCBs using USEPA Method 3510C/8081A and 3510C/8082, respectively. Solid samples were analyzed for pesticides and PCBs using USEPA Method 3550B/8081A and 3550B/8082, respectively. A total of five aqueous samples and seventeen solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41SW08	F51154-6	41SD11	F51154-22
41SW09	F51154-7	49SS02	F51154-23
41SW10	F51154-8	49SS03	F51154-24
41SD08	F51154-9	49SS04	F51154-25
41SD09	F51154-10	49SS05	F51154-26
41SD10	F51154-11	59SS06	F51154-27
LFSD01	F51154-15	59SS07	F51154-28
TMSD01	F51154-16	59SS08	F51154-29
LFSW01	F51154-17	59SS09	F51154-30
APSD01	F5 1154-18	59SS10	F51154-31
TMSW01	F51154-20	TMSS05	F51154-32

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
X		Continuing Calibration
	X	Blank Analysis
X		System Monitoring Compounds
X		Laboratory Control Samples
X		Matrix Spike/Spike Duplicate
X		Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

9/26/07
Date

RFAAP VALIDATION REPORT
PESTICIDE/PCB REVIEW
SDG F51154

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, pesticide and PCB compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis. For solid samples, pesticide and PCB compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 07/18/07 and 07/19/07, the coolers were received by the primary laboratory (Accutest) on 07/20/07 at 4.0°C, 4.0°C, 4.6°C, 4.6°C, 4.8°C, 5.0°C, 5.0°C, and 5.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.2°C, 4.0°C, and 3.6°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 3.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 5.5°C and 5.2°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The aqueous samples were collected on 07/18/07 and 07/19/07. For aqueous samples collected 07/18/07 and 07/19/07, the pesticides and PCBs were extracted on 07/24/07 and analyzed on 07/26/07. For solid samples collected 07/18/07 and 07/19/07, the pesticides were extracted on 07/27/07 and analyzed on 07/31/07, 08/02/07, 08/06/07, and 08/08/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check (Degradation Standard)

Performance checks on the gas chromatograph with electron capture detector (GC/ECD) system are performed to ensure adequate resolution and instrument sensitivity. The performance evaluation mixture (PEM) must be analyzed at the beginning of the analytical sequence. The breakdown of Endrin and 4,4'-DDT must be ≤15% on both signals.

- For analysis performed on 07/24/07 @14:31, endrin and 4,4'-DDT percent breakdowns were 10.3% and 9.0% on signal #1 and 10.8% and 7.8% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 07/26/07 @11:10, endrin and 4,4'-DDT percent breakdowns were 12.4% and 4.2% on signal #1 and 13.8% and 3.7% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 08/01/07 @12:02, endrin and 4,4'-DDT percent breakdowns were 13.7% and 8.0% on signal #1 and 14.5% and 7.7% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 08/02/07 @11:19, endrin and 4,4'-DDT percent breakdowns were 13.3% and 7.7% on signal #1 and 14.5% and 7.2% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 08/04/07 @09:09, endrin and 4,4'-DDT percent breakdowns were 14.1% and 5.0% on signal #1 and 13.8% and 4.5% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 07/13/07 @13:24, endrin and 4,4'-DDT percent breakdowns were 11.8% and 6.5% on signal #1 and 12.0% and 5.6% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 07/31/07 @13:54, endrin and 4,4'-DDT percent breakdowns were 10.9% and 11.4% on signal #1 and 10.1% and 9.2% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 08/06/07 @09:25, endrin and 4,4'-DDT percent breakdowns were 11.2% and 7.1% on signal #1 and 10.7% and 5.6% on signal #2, respectively. All criteria were met. No qualifiers were applied.

III-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5 point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. Calibration factors are generated for each compound. The DoD QSM specifies that the percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016, 1242, 1254, and 1260 must be <20% or the mean %RSD for all analytes in the standard must be ≤20%. If linear regression is used, the correlation coefficient must be ≥0.995. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits.

- For the pesticide initial calibration performed on 07/24/07 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) were analyzed using this initial calibration.

- For the pesticide initial calibration performed on 08/01/07 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), and TMSS05 (F51154-32) were analyzed using this initial calibration.

- For the pesticide initial calibration performed on 08/04/07 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples TMSD01 (F51154-16), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) were analyzed using this initial calibration.

- For the pesticide initial calibration performed on 07/13/07 on instrument ECD6, all criteria were met. No qualifiers were applied. Samples LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS05 (F51154-26), and TMSS05 (F51154-32) were analyzed using this initial calibration.

- For the pesticide initial calibration performed on 08/06/07 on instrument ECD6, all criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), 49SS04 (F51154-25), 59SS06 (F51154-27), 59SS07 (F51154-28), and 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) were analyzed using this initial calibration.

- For the PCB initial calibration performed on 07/28/07 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) were analyzed using this initial calibration.

- For the PCB initial calibration performed on 07/26/07 on instrument ECD7, all criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) were analyzed using this initial calibration.

- For the PCB initial calibration performed on 08/02/07 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample 49SS02 (F51154-23) was analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for pesticide/PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The DoD QSM specifies that the percent difference (%D) or the average %Ds for all analytes in the standard from the initial calibration should be no greater than ±20%.

- For pesticide initial calibration verification performed on 07/24/07 @17:08 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 07/26/07 @15:31 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/26/07 @19:00 on instrument ECD5, endrin (25.4%) was outside criteria for the signal #1. Endrin (24.4%) was outside criteria for the signal #2. Endrin was non-detect for all associated samples; therefore, no qualifiers were applied based upon these outliers. No samples reported were analyzed using this continuing calibration.

- For pesticide initial calibration verification performed on 08/01/07 @15:15 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 08/02/07 @14:21 on instrument ECD5, all criteria were met for signal #1 and for the signal #2. No qualifiers were applied. Samples LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), and TMSS05 (F51154-32) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/02/07 @17:22 on instrument ECD5, 4,4'-DDT (23.5%) was outside criteria for the signal #1. 4,4'-DDT (24.1%) was outside criteria for the signal #2. 4,4'-DDT was non-detect for all associated samples; therefore, no qualifiers were applied based upon these outliers. No samples reported were analyzed using this continuing calibration.

- For pesticide initial calibration verification performed on 08/04/07 @12:47 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 08/08/07 @13:34 on instrument ECD5, all criteria were met for signal #1 and for the signal #2. No qualifiers were applied. Sample TMSD01 (F51154-16) was analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/08/07 @14:59 on instrument ECD5, all criteria were met for signal #1 and for the signal #2. No qualifiers were applied. Samples TMSD01 (F51154-16), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/08/07 @17:30 on instrument ECD5, heptachlor (30.4%), 4,4'-DDD (22.4%), 4,4'-DDT (87.0%; grossly exceeding), methoxychlor (82.0%; grossly exceeding), and endrin ketone (29.8%) were outside criteria for the signal #1. Heptachlor (31.3%), 4,4'-DDD (26.7%), 4,4'-DDT (88.2%; grossly exceeding), methoxychlor (83.0%; grossly exceeding), and endrin ketone (33.5%) were outside criteria for the signal #2. No samples reported was analyzed using this continuing calibration; therefore, no qualifiers were applied based upon these outliers.

- For pesticide initial calibration verification performed on 07/13/07 @15:47 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 07/31/07 @14:52 on instrument ECD6, all criteria were met for signal #1. 4,4'-DDT (25.4%) was outside criteria for the signal #2. 4,4'-DDT was non-detect for all associated samples; therefore, no qualifiers were applied based upon these outliers. Samples LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), and 49SS02 (F51154-23) were analyzed using this continuing calibration.

- For toxaphene pesticide continuing calibration performed on 07/31/07 @15:08 on instrument ECD6, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For chlordane pesticide continuing calibration performed on 07/31/07 @15:24 on instrument ECD6, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/31/07 @18:23 on instrument ECD6, 4,4'-DDT (65.7%; grossly exceeding) and methoxychlor (53.6%; grossly exceeding) were outside criteria for the signal #1. 4,4'-DDT (69.1%; grossly exceeding) and methoxychlor (57.7%; grossly exceeding) were outside criteria for the signal #2. 4,4'-DDT and methoxychlor were qualified estimated "UJ" for non-detects based upon the very high %Ds. Samples 49SS03 (F51154-24), 49SS05 (F51154-26), and TMSS05 (F51154-32) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/31/07 @19:42 on instrument ECD6, 4,4'-DDT (64.5%; grossly exceeding) and methoxychlor (53.9%; grossly exceeding) were outside criteria for the signal #1. 4,4'-DDT (67.9%; grossly exceeding) and methoxychlor (56.8%; grossly exceeding) were outside criteria for the signal #2. 4,4'-DDT and methoxychlor were qualified estimated "UJ" for non-detects based upon the very high %Ds. No samples reported were analyzed using this continuing calibration.

- For pesticide initial calibration verification performed on 08/06/07 @12:29 on instrument ECD6, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 08/06/07 @15:35 on instrument ECD6, all criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), 49SS04 (F51154-25), 59SS06 (F51154-27), 59SS07 (F51154-28), and 59SS08 (F51154-29) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/06/07 @18:29 on instrument ECD6, 4,4'-DDT (47.6%; grossly exceeding) and methoxychlor (43.5%; grossly exceeding) were outside criteria for the signal #1. 4,4'-DDT (45.2%; grossly exceeding) and methoxychlor (43.0%; grossly exceeding) were outside criteria for the signal #2. 4,4'-DDT and methoxychlor were qualified estimated "UJ" for non-detects based upon the very high %Ds. Samples 59SS09 (F51154-30) and 59SS10 (F51154-31) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/06/07 @19:32 on instrument ECD6, 4,4'-DDD (20.6%), 4,4'-DDT (51.2%; grossly exceeding), and methoxychlor (43.4%; grossly exceeding) were outside criteria for the signal #1. 4,4'-DDD (21.0%), 4,4'-DDT (67.9%; grossly exceeding), and methoxychlor (56.8%; grossly exceeding) were outside criteria for the signal #2. 4,4'-DDT and methoxychlor were qualified estimated "UJ" for non-detects based upon the very high %Ds. 4,4'-DDD was non-detect for all associated samples; therefore, no qualifiers were applied based upon these outliers. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), and 49SS04 (F51154-25) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 08/06/07 @22:42 on instrument ECD6, heptachlor (37.9%), 4,4'-DDD (30.8%), 4,4'-DDT (95.2%; grossly exceeding), methoxychlor (89.2%; grossly exceeding), and endrin ketone (50.6%; grossly exceeding) were outside criteria for the signal #1. Heptachlor (36.0%), 4,4'-DDE (21.1%), 4,4'-DDD (56.2%; grossly exceeding), 4,4'-DDT (88.8%; grossly exceeding), methoxychlor (80.5%; grossly exceeding), and endrin ketone (47.3%; grossly exceeding) were outside criteria for the signal #2. 4,4'-DDD, 4,4'-DDT, methoxychlor, and endrin ketone were qualified estimated "J" for detects and "UJ" for non-detects based upon the very high %Ds. Heptachlor and 4,4'-DDE were non-detect for all associated samples; therefore, no qualifiers were applied based upon these outliers. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 07/28/07 @14:59 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 07/31/07 @09:51 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), and 41SD11 (F51154-22) were analyzed using this continuing calibration.

- For PCB 1248 continuing calibration performed on 07/31/07 @10:13 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1242 continuing calibration performed on 07/31/07 @10:30 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1232/1268 continuing calibration performed on 07/31/07 @10:47 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1221/1254 continuing calibration performed on 07/31/07 @11:04 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 07/31/07 @14:29 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 07/31/07 @17:54 on instrument ECD3, all criteria were met. No qualifiers were applied. Sample TMSS05 (F51154-32) was analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 07/31/07 @18:45 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/01/07 @09:49 on instrument ECD3, all criteria were met. No qualifiers were applied. Sample 49SS03 (F51154-24) was analyzed using this continuing calibration.

- For PCB 1248 continuing calibration performed on 08/01/07 @10:06 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1242 continuing calibration performed on 08/01/07 @10:23 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1232/1268 continuing calibration performed on 08/01/07 @10:44 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1221/1254 continuing calibration performed on 08/01/07 @11:01 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/01/07 @13:56 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 07/26/07 @13:51 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 07/26/07 @18:39 on instrument ECD7, PCB1016-A (28.0%) was outside criteria for signal #1; however, the average %D for PCB1016 was 12.4%. PCB1016-A (40.6%), PCB1016-B (29.9%), and PCB1016-F (22.8%) were outside criteria for signal #2. The average %D for PCB1016 was 20.9% for signal #2. PCB 1016 was non-detect for all associated samples and was qualified estimated "UJ" for non-detects based upon the high %D. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 07/26/07 @21:45 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 08/02/07 @13:41 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample 49SS02 (F51154-23) was analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 08/02/07 @16:48 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

V-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for pesticide and PCB target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one and for solid matrices were converted to soil values (soil conversion factor = 33) if needed. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. The surface water "SW" samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the SW samples. Rinse blanks 072407R (F51275-1) and 072507R (F51300-31) apply to the surface soil "SS" and subsurface soil "SB" samples in this SDG. Rinse blank RB071807 (F51154-12) applies to the sediment "SD" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
Pesticides	07/26/07	OP21578-MB	All target <½MRL	NA	NA	None
Pesticides	09/24/07	RB083007	All target <½MRL	NA	NA	None
PCBs	06/27/07	OP21577-MB	All target <½MRL	NA	NA	None
PCBs	09/14/07	RB083007	All target <½MRL	NA	NA	None
Parameter	**Analysis Date**	**QC Blank ID**	**Compound**	**Max Conc. µg/kg**	**Action Level µg/kg**	**B qualified samples**
Pesticides	07/31/07	OP21640-MB	All target <½MRL	NA	NA	None
Pesticides	08/02/07	OP21640-MB	All target <½MRL	NA	NA	None
Pesticides	08/06/07	OP21640-MB	All target <½MRL	NA	NA	None
Pesticides	08/08/07	OP21640-MB	All target <½MRL	NA	NA	None
Pesticides	07/02/07	RB071807	All target <½MRL	NA	NA	None
Pesticides	07/02/07	072407R	All target <½MRL	NA	NA	None
Pesticides	07/02/07	072507R	All target <½MRL	NA	NA	None
PCBs	07/26/07	OP21641-MB	All target <½MRL	NA	NA	None
PCBs	07/27/07	OP21641-MB	All target <½MRL	NA	NA	None
PCBs	07/27/07	OP21641-MB	All target <½MRL	NA	NA	None
PCBs	06/27/07	RB071807	All target <½MRL	NA	NA	None
PCBs	06/27/07	072407R	All target <½MRL	NA	NA	None
PCBs	06/27/07	072507R	All target <½MRL	NA	NA	None

NA = Not Applicable
MRL = Method Reporting Limit

VI-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:	Tetrachloro-m-xylene:	Pesticides: 42-127% (DoD QSM 25-140%)
	Decachlorobiphenyl:	Pesticides: 27-127% (DoD QSM 30-135%)
Aqueous Criteria:	Tetrachloro-m-xylene:	PCBs: 38-127% (DoD QSM Not Listed)
	Decachlorobiphenyl:	PCBs: 25-137% (DoD QSM 40-135%)
Solid Criteria:	Tetrachloro-m-xylene:	Pesticides: 46-122% (DoD QSM 70-125%)
	Decachlorobiphenyl:	Pesticides: 50-133% (DoD QSM 55-130%)
Solid Criteria:	Tetrachloro-m-xylene:	PCBs: 44-126% (DoD QSM Not Listed)
	Decachlorobiphenyl:	PCBs: 39-157% (DoD QSM 60-125%)

- For pesticides sample 41SD10 (F51154-11), all criteria were met for the original run. For the confirmation, tetrachloro-m-xylene (69.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample TMSD01 (F51154-16), tetrachloro-m-xylene (50.0%) and decachlorobiphenyl (37.0%) were outside criteria. All detects were qualified "L" and non-detects "UL" based upon the low recoveries. Sample was re-analyzed for confirmation (run #2). For the confirmation, tetrachloro-m-xylene (62.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample 41SD11 (F51154-22), tetrachloro-m-xylene (69.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier. Sample was re-analyzed for confirmation (run #2). For the confirmation, tetrachloro-m-xylene (65.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample 49SS02 (F51154-23), tetrachloro-m-xylene (53.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier. Sample was re-analyzed for confirmation (run #2). For the confirmation, tetrachloro-m-xylene (51.0%) and decachlorobiphenyl (48.0%) were outside criteria. All detects were qualified "L" and non-detects "UL" based upon the low recoveries for run #2.

- For pesticides sample 49SS03 (F51154-24), tetrachloro-m-xylene (64.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier. For the confirmation, tetrachloro-m-xylene (62.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample 59SS07 (F51154-28), all criteria were met for the original run. For the confirmation, tetrachloro-m-xylene (67.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample 59SS09 (F51154-30), tetrachloro-m-xylene (66.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier. Sample was re-analyzed for confirmation (run #2). For the confirmation, tetrachloro-m-xylene (69.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For pesticides sample 59SS10 (F51154-31), tetrachloro-m-xylene (55.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier. Sample was re-analyzed for confirmation (run #2). For the confirmation, all criteria were met.

- For pesticides sample TMSS05 (F51154-32), all criteria were met for the original run. For the confirmation, tetrachloro-m-xylene (69.0%) was below DoD QSM criteria and within laboratory criteria. Decachlorobiphenyl was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier for run #2.

- For PCBs sample 41SD08 (F51154-9), decachlorobiphenyl (57.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For PCBs sample 41SD10 (F51154-11), decachlorobiphenyl (56.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For PCBs sample LFSD01 (F51154-15), decachlorobiphenyl (48.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For PCBs sample TMSD01 (F51154-16), decachlorobiphenyl (59.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For PCBs sample 59SS06 (F51154-27), decachlorobiphenyl (59.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For PCBs sample 59SS07 (F51154-28), decachlorobiphenyl (59.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For all other samples, all criteria were met for pesticides and PCBs analysis.

VII-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). DoD QSM solid LCS recovery limits are specified in Table D-15 and Table D-17 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP21578-BS was used as the aqueous LCS for the pesticide analysis on 07/26/07. Compound endrin aldehyde (12%) was outside DoD QSM criteria, however within laboratory criteria. Compound endrin aldehyde was non-detect for all associated samples and was qualified estimated bias "UL" for non-detects based upon very low recovery. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this LCS.

- Sample OP21640-BS was used as the solid LCS for the pesticide analysis on 07/31/07. Compound endrin aldehyde (8%) was outside DoD QSM criteria, however within laboratory criteria. Compound endrin aldehyde was non-detect for all associated samples and was qualified estimated bias "UL" for non-detects based upon very low recovery. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

- Sample OP21577-BS was used as the aqueous LCS for the PCB analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this LCS.

- Sample OP21641-BS was used as the solid LCS for the PCB analysis on 07/31/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

VIII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). DoD solid MS/MSD recovery limits follow the LCS criteria and are specified in Table D-15 and Table D-17 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample LFSW01 (F51154-17) was used as the MS/MSD for the pesticide analysis on 07/26/07. Compound endrin aldehyde (21%, 15%) was outside DoD QSM criteria, however within laboratory criteria. The LCS was also low in recovery (See Section VII). Compound endrin aldehyde was non-detect for all samples and qualified estimated bias low "UL" for non-detects for the spiked sample based upon very low recoveries. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this MS/MSD.

- Sample LFSW01 (F51154-17) was used as the MS/MSD for the PCB analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), LFSW01 (F51154-17), and TMSW01 (F51154-20) apply to this MS/MSD.

- Sample 49SS04 (F51154-25) was used as the MS/MSD for the pesticide analysis on 08/06/07. Compounds delta-BHC (RPD=56%), alpha chlordane (72%), gamma chlordane (74%), dieldrin (70%), 4,4'-DDE (72%), 4,4'-DDT (48%, 0%; RPD=200%), endrin (70%), endosulfan sulfate (0%, RPD=200%), endrin aldehyde (0%, 0%), endrin ketone (62%), endosulfan II (70%), and methoxychlor (60%, 44%, RPD=29%) were outside DoD QSM criteria and/or laboratory criteria. The LCS was also low in recovery (See Section VII). Compounds 4,4'-DDT, endosulfan sulfate, and endrin aldehyde were rejected for the spiked sample based upon no recovery found. Compounds alpha chlordane, gamma chlordane, dieldrin, 4,4'-DDE, endrin, endrin ketone, endosulfan II, and methoxychlor were non-detect for the spiked sample and qualified estimated bias low "UL" for non-detects based upon low recoveries. Delta-BHC was qualified "UJ" for the spiked sample based upon the high RPD. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

- Sample 59SS06 (F51154-27) was used as the MS/MSD for the PCB analysis on 07/31/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

IX-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous and solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field surface water sample duplicate pair LFSW01 (F51154-17) and TMSW01 (F51154-20) was collected for chlorinated pesticides and PCBs. All chlorinated pesticides and PCBs target compounds were non-detect. All criteria were met. No qualifiers were applied.

- Field surface soil sample duplicate pair 49SS05 (F51154-26) and TMSS05 (F51154-32) was collected for chlorinated pesticides and PCBs. All chlorinated pesticides and PCBs target compounds were non-detect, except for Aroclor 1254. PCB 1254 was detected at 41.1 µg/kg in the original sample and 75.6 µg/kg in the duplicate pair resulting in a RPD of 59.1%. PCB 1254 was qualified estimated "J" for the duplicate pair based upon the high RPD.

- Field sediment sample duplicate pair LFSD01 (F51154-15) and TMSD01 (F51154-16) was collected for chlorinated pesticides and PCBs. All detected chlorinated pesticides and PCBs target compounds found in the sample and its duplicate pair and associated %RPD are noted in **Table 3**. All other chlorinated pesticides and PCBs target compounds were non-detect. alpha-Chlordane (88.4%), gamma-Chlordane (70.7%), and Aroclor 1260 (58.1%) were above criteria due to low concentration levels detected below the MRL and/or matrix effects. alpha-Chlordane, gamma-chlordane, and aroclor 1260 were qualified estimated "J" for the original and duplicate pair samples based upon these outliers. For all other compounds, all criteria were met.

Table 3 Field Precision Hits Analysis Summary for Chlorinated Pesticides and PCBs for Duplicate Pair LFSD01 (F51154-15) and TMSD01 (F51154-16)

Compound	Original Sample (µg/kg)	Duplicate Pair (µg/kg)	%RPD
Heptachlor epoxide	14U	1.7J	NA
alpha-Chlordane	13.7J	5.3	88.4
gamma-Chlordane	13.6J	6.5	70.7
Aroclor 1260	135	74.2	58.1

J = Estimated value <MRL and >MDL.
U = Non-detect as <MRL.
NA = Not Applicable

X-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All positive values must have less than or equal to 40% %D between the primary and secondary columns. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." All criteria were met.

- For sample 59SS07 (F51154-28), dieldrin (86.8%) and heptachlor epoxide (57.4%) were outside criteria. All other target compounds were within criteria. Dieldrin and heptachlor epoxide were qualified estimated "J" based upon the high %Ds.

- For sample 59SS08 (F51154-29), dieldrin (114%) and 4,4'-DDD (82.4%) were outside criteria. All other target compounds were within criteria. Dieldrin and 4,4'-DDD were qualified estimated "J" based upon the high %Ds.

- For all other samples with detected chlorinated pesticides and PCBs, the %D (average %D for multi-peak compounds) between the primary and secondary columns was within criteria.

Sample: LFSW01MS (F51154-17MS), alpha-chlordane

Conc. µg/L = (Amt * DF * Vt) / (CF * Vo)

where: Amt is the response on column (ng/mL) of the sample
CF = Calibration Factor (from initial calibration)
Vt is the volume of final extract (mL)
DF is the dilution factor
Vo is the volume of the sample extracted (mL)

Conc. µg/L = (9068815 ng/mL * 1 * 10 mL) / (212100 * 430 mL)
= 0.99 ng/mL = 0.99 µg/L

Reported Conc. = 0.99 µg/L
%D = 0.0%
Values were within 10% difference

Sample: **LFSW01MS (F51154-17MS), Aroclor 1260**

Conc. µg/L = (Ax * Vt * DF) / (CF * Vi * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 µL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (µL).
Vs = Volume of sample extracted (L).
DF = Dilution factor

Signal #1
Conc1 µg/L = (1118429 * 10000* 1) / (3120 *(1000000) * 1 * 0.44) = 8.15 µg/L
Conc2 µg/L = (1273241 * 10000* 1) / (3552 *(1000000) * 1 * 0.44) = 8.15 µg/L
Conc3 µg/L = (1179335 * 10000* 1) / (3200 *(1000000) * 1 * 0.44) = 8.38 µg/L
Conc4 µg/L = (944050 * 10000* 1) / (2782 *(1000000) * 1 * 0.44) = 8.07 µg/L
Conc5 µg/L = (2049224 * 10000* 1) / (5769 *(1000000) * 1 * 0.44) = 7.66 µg/L
Conc6 µg/L = (772955 * 10000* 1) / (2276 *(1000000) * 1 * 0.44) = 7.72 µg/L
Average concentration = 8.0 µg/L

Signal #2
Conc1 µg/L = (689475 * 10000* 1) / (1917 *(1000000) * 1 * 0.44) = 8.17 µg/L
Conc2 µg/L = (800449 * 10000* 1) / (2172 *(1000000) * 1 * 0.44) = 8.38 µg/L
Conc3 µg/L = (772763 * 10000* 1) / (2088 *(1000000) * 1 * 0.44) = 8.41 µg/L
Conc4 µg/L = (589063 * 10000* 1) / (1698 *(1000000) * 1 * 0.44) = 7.88 µg/L
Conc5 µg/L = (1340728 * 10000* 1) / (3820 *(1000000) * 1 * 0.44) = 7.98 µg/L
Conc6 µg/L = (504915 * 10000* 1) / (1482 *(1000000) * 1 * 0.44) = 7.74 µg/L
Average concentration = 8.1 µg/L

Reported Value = 8.0 µg/L (from signal #1)
% Difference = 0.0%
Values were within 10% difference.

Sample: LFSD01 (F51154-15), alpha-chlordane

Conc. µg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in µg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 µL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Conc. µg/kg = (166174 Area*10000µL*5) / (34180 Area/pg*(1000 pg/ng)*1 µL*30.7g*0.5790) = 13.7 µg/kg

Reported Value = 13.7 µg/kg
% Difference = 0.0%
Values were within 10% difference

Sample: 49SS03 (F51154-24), Aroclor 1260

Conc. µg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in µg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 µL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (µL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 µg/kg = (0*10000*2) / (8040*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc2 µg/kg = (0*10000*2) / (9920*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc3 µg/kg = (0*10000*2) / (9980*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc4 µg/kg = (685577*10000*2) / (7129*(1000)*1*29.9*0.9200) = 69.92 µg/kg
Conc5 µg/kg = (1484623*10000*2) / (16390*(1000)*1*29.9*0.9200) = 65.86 µg/kg
Conc6 µg/kg = (1094850*10000*2) / (9500*(1000)*1*29.9*0.9200) = 83.79 µg/kg
Average concentration = 73.2 µg/kg (Peaks 4 → 6)

Signal #2
Conc1 µg/kg = (0*10000*2) / (1276*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc2 µg/kg = (0*10000*2) / (1547*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc3 µg/kg = (0*10000*2) / (1420*(1000)*1*29.9*0.9200) = 0.00 µg/kg
Conc4 µg/kg = (171305*10000*2) / (1103*(1000)*1*29.9*0.9200) = 112.92 µg/kg
Conc5 µg/kg = (238470*10000*2) / (2556*(1000)*1*29.9*0.9200) = 67.83 µg/kg
Conc6 µg/kg = (141537*10000*2) / (1028*(1000)*1*29.9*0.9200) = 100.10 µg/kg
Average concentration = 93.6 µg/kg (Peaks 4 → 6)

Reported Value = 73.2 µg/kg (signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

N (Metals) = Laboratory spike sample recovery not within control limits.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: KK20472.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20472.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.050	0.020	ug/l	
319-84-6	alpha-BHC	ND	0.050	0.015	ug/l	
319-85-7	beta-BHC	ND	0.050	0.020	ug/l	
319-86-8	delta-BHC	ND	0.050	0.020	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	0.015	ug/l	
5103-71-9	alpha-Chlordane	ND	0.050	0.015	ug/l	
5103-74-2	gamma-Chlordane	ND	0.050	0.015	ug/l	
60-57-1	Dieldrin	ND	0.050	0.015	ug/l	
72-54-8	4,4'-DDD	ND	0.10	0.020	ug/l	
72-55-9	4,4'-DDE	ND	0.10	0.020	ug/l	
50-29-3	4,4'-DDT	ND	0.10	0.020	ug/l	
72-20-8	Endrin	ND	0.10	0.040	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	0.020	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.10	0.040	ug/l	
53494-70-5	Endrin ketone	ND	0.10	0.020	ug/l	
959-98-8	Endosulfan-I	ND	0.050	0.015	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	0.020	ug/l	
76-44-8	Heptachlor	ND	0.050	0.020	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	0.015	ug/l	
72-43-5	Methoxychlor	ND	0.10	0.040	ug/l	
8001-35-2	Toxaphene	ND	2.5	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	74%		42-127%
2051-24-3	Decachlorobiphenyl	74%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022300.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022300.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND UJ	0.50	0.25	ug/l	
11104-28-2	Aroclor 1221	ND	0.50	0.40	ug/l	
11141-16-5	Aroclor 1232	ND	0.50	0.40	ug/l	
53469-21-9	Aroclor 1242	ND	0.50	0.25	ug/l	
12672-29-6	Aroclor 1248	ND	0.50	0.25	ug/l	
11097-69-1	Aroclor 1254	ND	0.50	0.25	ug/l	
11096-82-5	Aroclor 1260	ND	0.50	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	86%		38-127%
2051-24-3	Decachlorobiphenyl	78%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20473.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20473.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.053	0.021	ug/l	
319-84-6	alpha-BHC	ND	0.053	0.016	ug/l	
319-85-7	beta-BHC	ND	0.053	0.021	ug/l	
319-86-8	delta-BHC	ND	0.053	0.021	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.053	0.016	ug/l	
5103-71-9	alpha-Chlordane	ND	0.053	0.016	ug/l	
5103-74-2	gamma-Chlordane	ND	0.053	0.016	ug/l	
60-57-1	Dieldrin	ND	0.053	0.016	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.021	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.021	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.021	ug/l	
72-20-8	Endrin	ND	0.11	0.043	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.021	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.11	0.043	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.021	ug/l	
959-98-8	Endosulfan-I	ND	0.053	0.016	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.021	ug/l	
76-44-8	Heptachlor	ND	0.053	0.021	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.053	0.016	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.043	ug/l	
8001-35-2	Toxaphene	ND	2.7	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%		42-127%
2051-24-3	Decachlorobiphenyl	76%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022301.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022301.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND VJ	0.53	0.27	ug/l	
11104-28-2	Aroclor 1221	ND	0.53	0.43	ug/l	
11141-16-5	Aroclor 1232	ND	0.53	0.43	ug/l	
53469-21-9	Aroclor 1242	ND	0.53	0.27	ug/l	
12672-29-6	Aroclor 1248	ND	0.53	0.27	ug/l	
11097-69-1	Aroclor 1254	ND	0.53	0.27	ug/l	
11096-82-5	Aroclor 1260	ND	0.53	0.27	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	87%		38-127%
2051-24-3	Decachlorobiphenyl	81%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20474.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20474.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.049	0.020	ug/l	
319-84-6	alpha-BHC	ND	0.049	0.015	ug/l	
319-85-7	beta-BHC	ND	0.049	0.020	ug/l	
319-86-8	delta-BHC	ND	0.049	0.020	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.049	0.015	ug/l	
5103-71-9	alpha-Chlordane	ND	0.049	0.015	ug/l	
5103-74-2	gamma-Chlordane	ND	0.049	0.015	ug/l	
60-57-1	Dieldrin	ND	0.049	0.015	ug/l	
72-54-8	4,4'-DDD	ND	0.098	0.020	ug/l	
72-55-9	4,4'-DDE	ND	0.098	0.020	ug/l	
50-29-3	4,4'-DDT	ND	0.098	0.020	ug/l	
72-20-8	Endrin	ND	0.098	0.039	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.098	0.020	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.098	0.039	ug/l	
53494-70-5	Endrin ketone	ND	0.098	0.020	ug/l	
959-98-8	Endosulfan-I	ND	0.049	0.015	ug/l	
33213-65-9	Endosulfan-II	ND	0.098	0.020	ug/l	
76-44-8	Heptachlor	ND	0.049	0.020	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.049	0.015	ug/l	
72-43-5	Methoxychlor	ND	0.098	0.039	ug/l	
8001-35-2	Toxaphene	ND	2.5	1.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	75%		42-127%
2051-24-3	Decachlorobiphenyl	76%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022302.D

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Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022302.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND UT	0.49	0.25	ug/l	
11104-28-2	Aroclor 1221	ND	0.49	0.39	ug/l	
11141-16-5	Aroclor 1232	ND	0.49	0.39	ug/l	
53469-21-9	Aroclor 1242	ND	0.49	0.25	ug/l	
12672-29-6	Aroclor 1248	ND	0.49	0.25	ug/l	
11097-69-1	Aroclor 1254	ND	0.49	0.25	ug/l	
11096-82-5	Aroclor 1260	ND	0.49	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	85%		38-127%
2051-24-3	Decachlorobiphenyl	80%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT08193.D	1	08/06/07	FS	07/27/07	OP21640	GTT278
Run #2	TT08178.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2	30.7 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	4.4	1.1	ug/kg	
319-84-6	alpha-BHC	ND	4.4	1.2	ug/kg	
319-85-7	beta-BHC	ND	4.4	1.1	ug/kg	
319-86-8	delta-BHC	ND	4.4	1.9	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	4.4	1.5	ug/kg	
5103-71-9	alpha-Chlordane	ND	4.4	0.88	ug/kg	
5103-74-2	gamma-Chlordane	ND	4.4	0.97	ug/kg	
60-57-1	Dieldrin	ND	4.4	0.97	ug/kg	
72-54-8	4,4'-DDD	ND	8.8	1.8	ug/kg	
72-55-9	4,4'-DDE	ND	8.8	1.8	ug/kg	
50-29-3	4,4'-DDT	ND [a] UJ	88	20	ug/kg	
72-20-8	Endrin	ND	8.8	1.8	ug/kg	
1031-07-8	Endosulfan sulfate	ND	8.8	2.9	ug/kg	
7421-93-4	Endrin aldehyde	ND UL	8.8	2.6	ug/kg	
53494-70-5	Endrin ketone	ND	8.8	1.8	ug/kg	
959-98-8	Endosulfan-I	ND	4.4	0.97	ug/kg	
33213-65-9	Endosulfan-II	ND	8.8	1.3	ug/kg	
76-44-8	Heptachlor	ND [a]	44	12	ug/kg	
1024-57-3	Heptachlor epoxide	ND	4.4	0.88	ug/kg	
72-43-5	Methoxychlor	ND [a] UJ	88	18	ug/kg	
8001-35-2	Toxaphene	ND	220	110	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	72%	76%	46-122%
2051-24-3	Decachlorobiphenyl	78%	87%	50-133%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64232.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ST64232.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	44	22	ug/kg	
11104-28-2	Aroclor 1221	ND	44	35	ug/kg	
11141-16-5	Aroclor 1232	ND	44	35	ug/kg	
53469-21-9	Aroclor 1242	ND	44	22	ug/kg	
12672-29-6	Aroclor 1248	ND	44	22	ug/kg	
11097-69-1	Aroclor 1254	ND	44	22	ug/kg	
11096-82-5	Aroclor 1260	ND	44	22	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	69%		44-126%
2051-24-3	Decachlorobiphenyl	57%		39-157%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08194.D TT08179.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT08194.D	1	08/06/07	FS	07/27/07	OP21640	GTT278
Run #2	TT08179.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.3 g	10.0 ml
Run #2	30.3 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	2.0	0.48	ug/kg	
319-84-6	alpha-BHC	ND	2.0	0.56	ug/kg	
319-85-7	beta-BHC	ND	2.0	0.52	ug/kg	
319-86-8	delta-BHC	ND	2.0	0.88	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	2.0	0.68	ug/kg	
5103-71-9	alpha-Chlordane	ND	2.0	0.40	ug/kg	
5103-74-2	gamma-Chlordane	ND	2.0	0.44	ug/kg	
60-57-1	Dieldrin	ND	2.0	0.44	ug/kg	
72-54-8	4,4'-DDD	ND	4.0	0.80	ug/kg	
72-55-9	4,4'-DDE	ND	4.0	0.80	ug/kg	
50-29-3	4,4'-DDT	ND [a] VJ	40	9.2	ug/kg	
72-20-8	Endrin	ND	4.0	0.80	ug/kg	
1031-07-8	Endosulfan sulfate	ND	4.0	1.3	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	4.0	1.2	ug/kg	
53494-70-5	Endrin ketone	ND	4.0	0.80	ug/kg	
959-98-8	Endosulfan-I	ND	2.0	0.44	ug/kg	
33213-65-9	Endosulfan-II	ND	4.0	0.60	ug/kg	
76-44-8	Heptachlor	ND [a]	20	5.6	ug/kg	
1024-57-3	Heptachlor epoxide	ND	2.0	0.40	ug/kg	
72-43-5	Methoxychlor	ND [a] VJ	40	8.0	ug/kg	
8001-35-2	Toxaphene	ND	100	50	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	80%	70%	46-122%
2051-24-3	Decachlorobiphenyl	79%	77%	50-133%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64233.D

For I Carey

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ST64233.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.3 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	20	10	ug/kg	
11104-28-2	Aroclor 1221	ND	20	16	ug/kg	
11141-16-5	Aroclor 1232	ND	20	16	ug/kg	
53469-21-9	Aroclor 1242	ND	20	10	ug/kg	
12672-29-6	Aroclor 1248	ND	20	10	ug/kg	
11097-69-1	Aroclor 1254	ND	20	10	ug/kg	
11096-82-5	Aroclor 1260	ND	20	10	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	68%		44-126%
2051-24-3	Decachlorobiphenyl	66%		39-157%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08195.D TT08180.D

Run I Opy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT08195.D	1	08/06/07	FS	07/27/07	OP21640	GTT278
Run #2	TT08180.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.2 g	10.0 ml
Run #2	30.2 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	2.1	0.50	ug/kg	
319-84-6	alpha-BHC	ND	2.1	0.59	ug/kg	
319-85-7	beta-BHC	ND	2.1	0.54	ug/kg	
319-86-8	delta-BHC	ND	2.1	0.92	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	2.1	0.71	ug/kg	
5103-71-9	alpha-Chlordane	ND	2.1	0.42	ug/kg	
5103-74-2	gamma-Chlordane	ND	2.1	0.46	ug/kg	
60-57-1	Dieldrin	ND	2.1	0.46	ug/kg	
72-54-8	4,4'-DDD	ND	4.2	0.84	ug/kg	
72-55-9	4,4'-DDE	ND	4.2	0.84	ug/kg	
50-29-3	4,4'-DDT	ND [a] UJ	42	9.6	ug/kg	
72-20-8	Endrin	ND	4.2	0.84	ug/kg	
1031-07-8	Endosulfan sulfate	ND	4.2	1.4	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	4.2	1.3	ug/kg	
53494-70-5	Endrin ketone	ND	4.2	0.84	ug/kg	
959-98-8	Endosulfan-I	ND	2.1	0.46	ug/kg	
33213-65-9	Endosulfan-II	ND	4.2	0.63	ug/kg	
76-44-8	Heptachlor	ND [a]	21	5.9	ug/kg	
1024-57-3	Heptachlor epoxide	ND	2.1	0.42	ug/kg	
72-43-5	Methoxychlor	ND [a] UJ	42	8.4	ug/kg	
8001-35-2	Toxaphene	ND	100	52	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	77%	69%	46-122%
2051-24-3	Decachlorobiphenyl	78%	78%	50-133%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64234.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ST64234.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	21	10	ug/kg	
11104-28-2	Aroclor 1221	ND	21	17	ug/kg	
11141-16-5	Aroclor 1232	ND	21	17	ug/kg	
53469-21-9	Aroclor 1242	ND	21	10	ug/kg	
12672-29-6	Aroclor 1248	ND	21	10	ug/kg	
11097-69-1	Aroclor 1254	ND	21	10	ug/kg	
11096-82-5	Aroclor 1260	ND	21	10	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	74%		44-126%
2051-24-3	Decachlorobiphenyl	56%		39-157%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08068.D KK20593.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08068.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20593.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2	30.7 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	14	3.4	ug/kg	
319-84-6	alpha-BHC	ND	14	3.9	ug/kg	
319-85-7	beta-BHC	ND	14	3.7	ug/kg	
319-86-8	delta-BHC	ND	14	6.2	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	14	4.8	ug/kg	
5103-71-9	alpha-Chlordane	13.7 J	14	2.8	ug/kg	J
5103-74-2	gamma-Chlordane	13.6 J	14	3.1	ug/kg	J
60-57-1	Dieldrin	ND	14	3.1	ug/kg	
72-54-8	4,4'-DDD	ND	28	5.6	ug/kg	
72-55-9	4,4'-DDE	ND	28	5.6	ug/kg	
50-29-3	4,4'-DDT	ND [b]	56	13	ug/kg	
72-20-8	Endrin	ND	28	5.6	ug/kg	
1031-07-8	Endosulfan sulfate	ND	28	9.3	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	28	8.4	ug/kg	
53494-70-5	Endrin ketone	ND	28	5.6	ug/kg	
959-98-8	Endosulfan-I	ND	14	3.1	ug/kg	
33213-65-9	Endosulfan-II	ND	28	4.2	ug/kg	
76-44-8	Heptachlor	ND	14	3.9	ug/kg	
1024-57-3	Heptachlor epoxide	ND	14	2.8	ug/kg	
72-43-5	Methoxychlor	ND [b]	56	11	ug/kg	
8001-35-2	Toxaphene	ND	700	350	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%	70%	46-122%
2051-24-3	Decachlorobiphenyl	76%	57%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64235.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64235.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	28	14	ug/kg	
11104-28-2	Aroclor 1221	ND	28	23	ug/kg	
11141-16-5	Aroclor 1232	ND	28	23	ug/kg	
53469-21-9	Aroclor 1242	ND	28	14	ug/kg	
12672-29-6	Aroclor 1248	ND	28	14	ug/kg	
11097-69-1	Aroclor 1254	ND	28	14	ug/kg	
11096-82-5	Aroclor 1260	135 J	28	14	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	70%		44-126%
2051-24-3	Decachlorobiphenyl	48%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20783.D KK20775.D

Form I OCs

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSD01		
Lab Sample ID:	F51154-16	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	65.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	KK20783.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	KK20775.D	10	08/08/07	FS	07/27/07	OP21640	GKK761

	Initial Weight	Final Volume
Run #1	30.5 g	10.0 ml
Run #2	30.3 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND UL	2.5	0.61	ug/kg	
319-84-6	alpha-BHC	ND UL	2.5	0.71	ug/kg	
319-85-7	beta-BHC	ND UL	2.5	0.66	ug/kg	
319-86-8	delta-BHC	ND UL	2.5	1.1	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND UL	2.5	0.86	ug/kg	
5103-71-9	alpha-Chlordane	5.3 J	2.5	0.50	ug/kg	
5103-74-2	gamma-Chlordane	6.5 J	2.5	0.55	ug/kg	
60-57-1	Dieldrin	ND UL	2.5	0.55	ug/kg	
72-54-8	4,4'-DDD	ND UL	5.0	1.0	ug/kg	
72-55-9	4,4'-DDE	ND UL	5.0	1.0	ug/kg	
50-29-3	4,4'-DDT	ND [b]	51	12	ug/kg	
72-20-8	Endrin	ND UL	5.0	1.0	ug/kg	
1031-07-8	Endosulfan sulfate	ND UL	5.0	1.7	ug/kg	
7421-93-4	Endrin aldehyde	ND UL	5.0	1.5	ug/kg	
53494-70-5	Endrin ketone	ND UL	5.0	1.0	ug/kg	
959-98-8	Endosulfan-I	ND UL	2.5	0.55	ug/kg	
33213-65-9	Endosulfan-II	ND UL	5.0	0.76	ug/kg	
76-44-8	Heptachlor	ND [b]	25	7.1	ug/kg	
1024-57-3	Heptachlor epoxide	1.7 L	2.5	0.50	ug/kg	J
72-43-5	Methoxychlor	ND [b]	51	10	ug/kg	
8001-35-2	Toxaphene	ND UL	130	63	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	50%	62%	46-122%
2051-24-3	Decachlorobiphenyl	37% [c]	61%	50-133%

(a) All hits confirmed by dual column analysis.
(b) Result is from Run# 2
(c) Outside control limits due to matrix interference.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64236.D

Final Copy

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Report of Analysis

Client Sample ID:	TMSD01		
Lab Sample ID:	F51154-16	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	65.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64236.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.5 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	25	13	ug/kg	
11104-28-2	Aroclor 1221	ND	25	20	ug/kg	
11141-16-5	Aroclor 1232	ND	25	20	ug/kg	
53469-21-9	Aroclor 1242	ND	25	13	ug/kg	
12672-29-6	Aroclor 1248	ND	25	13	ug/kg	
11097-69-1	Aroclor 1254	ND	25	13	ug/kg	
11096-82-5	Aroclor 1260	74.2 J	25	13	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	72%		44-126%
2051-24-3	Decachlorobiphenyl	59%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20476.D

Form I Copy

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Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20476.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	1040 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.048	0.019	ug/l	
319-84-6	alpha-BHC	ND	0.048	0.014	ug/l	
319-85-7	beta-BHC	ND	0.048	0.019	ug/l	
319-86-8	delta-BHC	ND	0.048	0.019	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.048	0.014	ug/l	
5103-71-9	alpha-Chlordane	ND	0.048	0.014	ug/l	
5103-74-2	gamma-Chlordane	ND	0.048	0.014	ug/l	
60-57-1	Dieldrin	ND	0.048	0.014	ug/l	
72-54-8	4,4'-DDD	ND	0.096	0.019	ug/l	
72-55-9	4,4'-DDE	ND	0.096	0.019	ug/l	
50-29-3	4,4'-DDT	ND	0.096	0.019	ug/l	
72-20-8	Endrin	ND	0.096	0.038	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.096	0.019	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.096	0.038	ug/l	
53494-70-5	Endrin ketone	ND	0.096	0.019	ug/l	
959-98-8	Endosulfan-I	ND	0.048	0.014	ug/l	
33213-65-9	Endosulfan-II	ND	0.096	0.019	ug/l	
76-44-8	Heptachlor	ND	0.048	0.019	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.048	0.014	ug/l	
72-43-5	Methoxychlor	ND	0.096	0.038	ug/l	
8001-35-2	Toxaphene	ND	2.4	1.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	75%		42-127%
2051-24-3	Decachlorobiphenyl	78%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022304.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022304.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	1040 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND UJ	0.48	0.24	ug/l	
11104-28-2	Aroclor 1221	ND	0.48	0.38	ug/l	
11141-16-5	Aroclor 1232	ND	0.48	0.38	ug/l	
53469-21-9	Aroclor 1242	ND	0.48	0.24	ug/l	
12672-29-6	Aroclor 1248	ND	0.48	0.24	ug/l	
11097-69-1	Aroclor 1254	ND	0.48	0.24	ug/l	
11096-82-5	Aroclor 1260	ND	0.48	0.24	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	80%		38-127%
2051-24-3	Decachlorobiphenyl	82%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08066.D KK20586.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08066.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20586.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2	30.8 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.4	2.3	ug/kg	
319-84-6	alpha-BHC	ND	9.4	2.6	ug/kg	
319-85-7	beta-BHC	ND	9.4	2.4	ug/kg	
319-86-8	delta-BHC	ND	9.4	4.1	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.4	3.2	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.4	1.9	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.4	2.1	ug/kg	
60-57-1	Dieldrin	ND	9.4	2.1	ug/kg	
72-54-8	4,4'-DDD	ND	19	3.8	ug/kg	
72-55-9	4,4'-DDE	ND	19	3.8	ug/kg	
50-29-3	4,4'-DDT	ND [b]	37	8.6	ug/kg	
72-20-8	Endrin	ND	19	3.8	ug/kg	
1031-07-8	Endosulfan sulfate	ND	19	6.2	ug/kg	
7421-93-4	Endrin aldehyde	ND UL	19	5.6	ug/kg	
53494-70-5	Endrin ketone	ND	19	3.8	ug/kg	
959-98-8	Endosulfan-I	ND	9.4	2.1	ug/kg	
33213-65-9	Endosulfan-II	ND	19	2.8	ug/kg	
76-44-8	Heptachlor	ND	9.4	2.6	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.4	1.9	ug/kg	
72-43-5	Methoxychlor	ND [b]	37	7.5	ug/kg	
8001-35-2	Toxaphene	ND	470	230	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	75%	70%	46-122%
2051-24-3	Decachlorobiphenyl	80%	72%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64237.D

Form I Cpkg

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64237.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.8 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.4	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.4	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.4	ug/kg	
11097-69-1	Aroclor 1254 [b]	42.0 J	19	9.4	ug/kg	J
11096-82-5	Aroclor 1260 [b]	41.8 J	19	9.4	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	77%		44-126%
2051-24-3	Decachlorobiphenyl	79%		39-157%

(a) All hits confirmed by dual column analysis.
(b) Estimated value due to the presence of multiple overlapping Aroclor patterns.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20479.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-20	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20479.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	880 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.057	0.023	ug/l	
319-84-6	alpha-BHC	ND	0.057	0.017	ug/l	
319-85-7	beta-BHC	ND	0.057	0.023	ug/l	
319-86-8	delta-BHC	ND	0.057	0.023	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.057	0.017	ug/l	
5103-71-9	alpha-Chlordane	ND	0.057	0.017	ug/l	
5103-74-2	gamma-Chlordane	ND	0.057	0.017	ug/l	
60-57-1	Dieldrin	ND	0.057	0.017	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.023	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.023	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.023	ug/l	
72-20-8	Endrin	ND	0.11	0.045	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.023	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.11	0.045	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.023	ug/l	
959-98-8	Endosulfan-I	ND	0.057	0.017	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.023	ug/l	
76-44-8	Heptachlor	ND	0.057	0.023	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.057	0.017	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.045	ug/l	
8001-35-2	Toxaphene	ND	2.8	1.4	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%		42-127%
2051-24-3	Decachlorobiphenyl	82%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022307.D

Run I Cal

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-20	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022307.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	880 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND UJ	0.57	0.28	ug/l	
11104-28-2	Aroclor 1221	ND	0.57	0.45	ug/l	
11141-16-5	Aroclor 1232	ND	0.57	0.45	ug/l	
53469-21-9	Aroclor 1242	ND	0.57	0.28	ug/l	
12672-29-6	Aroclor 1248	ND	0.57	0.28	ug/l	
11097-69-1	Aroclor 1254	ND	0.57	0.28	ug/l	
11096-82-5	Aroclor 1260	ND	0.57	0.28	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	80%		38-127%
2051-24-3	Decachlorobiphenyl	87%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08070.D KK20587.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08070.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20587.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2	29.9 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.6	2.3	ug/kg	
319-84-6	alpha-BHC	ND	9.6	2.7	ug/kg	
319-85-7	beta-BHC	ND	9.6	2.5	ug/kg	
319-86-8	delta-BHC	ND	9.6	4.2	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.6	3.3	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.6	1.9	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.6	2.1	ug/kg	
60-57-1	Dieldrin	ND	9.6	2.1	ug/kg	
72-54-8	4,4'-DDD	ND	19	3.9	ug/kg	
72-55-9	4,4'-DDE	ND	19	3.9	ug/kg	
50-29-3	4,4'-DDT	ND [b]	39	8.9	ug/kg	
72-20-8	Endrin	ND	19	3.9	ug/kg	
1031-07-8	Endosulfan sulfate	ND	19	6.4	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	19	5.8	ug/kg	
53494-70-5	Endrin ketone	ND	19	3.9	ug/kg	
959-98-8	Endosulfan-I	ND	9.6	2.1	ug/kg	
33213-65-9	Endosulfan-II	ND	19	2.9	ug/kg	
76-44-8	Heptachlor	ND	9.6	2.7	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.6	1.9	ug/kg	
72-43-5	Methoxychlor	ND [b]	39	7.7	ug/kg	
8001-35-2	Toxaphene	ND	480	240	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	69%	65%	46-122%
2051-24-3	Decachlorobiphenyl	80%	72%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64238.D

Run I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64238.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.6	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.6	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.6	ug/kg	
11097-69-1	Aroclor 1254	90.2	19	9.6	ug/kg	
11096-82-5	Aroclor 1260	ND	19	9.6	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	70%		44-126%
2051-24-3	Decachlorobiphenyl	76%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08071.D KK20588.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08071.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20588.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2	29.9 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.3	2.2	ug/kg	
319-84-6	alpha-BHC	ND	9.3	2.6	ug/kg	
319-85-7	beta-BHC	ND	9.3	2.4	ug/kg	
319-86-8	delta-BHC	ND	9.3	4.1	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.3	3.2	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.3	1.9	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.3	2.1	ug/kg	
60-57-1	Dieldrin	ND	9.3	2.1	ug/kg	
72-54-8	4,4'-DDD	ND	19	3.7	ug/kg	
72-55-9	4,4'-DDE	ND	19	3.7	ug/kg	
50-29-3	4,4'-DDT	ND [b] VL	37	8.6	ug/kg	
72-20-8	Endrin	ND	19	3.7	ug/kg	
1031-07-8	Endosulfan sulfate	ND	19	6.2	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	19	5.6	ug/kg	
53494-70-5	Endrin ketone	ND	19	3.7	ug/kg	
959-98-8	Endosulfan-I	ND	9.3	2.1	ug/kg	
33213-65-9	Endosulfan-II	ND	19	2.8	ug/kg	
76-44-8	Heptachlor	ND	9.3	2.6	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.3	1.9	ug/kg	
72-43-5	Methoxychlor	ND [b] VL	37	7.5	ug/kg	
8001-35-2	Toxaphene	ND	470	230	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	53%	51%	46-122%
2051-24-3	Decachlorobiphenyl	59%	48% [c]	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2
(c) Outside control limits due to dilution.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022594.D

Form I OV

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	XX022594.D	2	08/02/07	AC	07/27/07	OP21641	GXX189
Run #2							

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	37	19	ug/kg	
11104-28-2	Aroclor 1221	ND	37	30	ug/kg	
11141-16-5	Aroclor 1232	ND	37	30	ug/kg	
53469-21-9	Aroclor 1242	ND	37	19	ug/kg	
12672-29-6	Aroclor 1248	ND	37	19	ug/kg	
11097-69-1	Aroclor 1254	ND	37	37	ug/kg	
11096-82-5	Aroclor 1260	152	37	19	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	47%		44-126%
2051-24-3	Decachlorobiphenyl	59%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08076.D KK20589.D

Form I Cpy

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08076.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20589.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2	29.9 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.1	2.2	ug/kg	
319-84-6	alpha-BHC	ND	9.1	2.5	ug/kg	
319-85-7	beta-BHC	ND	9.1	2.4	ug/kg	
319-86-8	delta-BHC	ND	9.1	4.0	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.1	3.1	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.1	1.8	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.1	2.0	ug/kg	
60-57-1	Dieldrin	ND	9.1	2.0	ug/kg	
72-54-8	4,4'-DDD	ND	18	3.6	ug/kg	
72-55-9	4,4'-DDE	ND	18	3.6	ug/kg	
50-29-3	4,4'-DDT	ND [b] UJ	36	8.4	ug/kg	
72-20-8	Endrin	ND	18	3.6	ug/kg	
1031-07-8	Endosulfan sulfate	ND	18	6.0	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	18	5.5	ug/kg	
53494-70-5	Endrin ketone	ND	18	3.6	ug/kg	
959-98-8	Endosulfan-I	ND	9.1	2.0	ug/kg	
33213-65-9	Endosulfan-II	ND	18	2.7	ug/kg	
76-44-8	Heptachlor	ND [b]	18	5.1	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.1	1.8	ug/kg	
72-43-5	Methoxychlor	ND [b] UJ	36	7.3	ug/kg	
8001-35-2	Toxaphene	ND	450	230	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	64%	62%	46-122%
2051-24-3	Decachlorobiphenyl	67%	55%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64296.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64296.D	2	08/01/07	JB	07/27/07	OP21641	GST1698
Run #2							

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	36	18	ug/kg	
11104-28-2	Aroclor 1221	ND	36	29	ug/kg	
11141-16-5	Aroclor 1232	ND	36	29	ug/kg	
53469-21-9	Aroclor 1242	ND	36	18	ug/kg	
12672-29-6	Aroclor 1248	ND	36	18	ug/kg	
11097-69-1	Aroclor 1254 [b]	124 J	36	18	ug/kg	J
11096-82-5	Aroclor 1260 [b]	73.2 J	36	18	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	61%		44-126%
2051-24-3	Decachlorobiphenyl	62%		39-157%

(a) All hits confirmed by dual column analysis.
(b) Estimated value due to the presence of multiple overlapping Aroclor patterns.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08196.D TT08182.D

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Report of Analysis

3.2.5

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT08196.D	1	08/06/07	FS	07/27/07	OP21640	GTT278
Run #2	TT08182.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.6 g	10.0 ml
Run #2	30.6 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.9	0.45	ug/kg	
319-84-6	alpha-BHC	ND	1.9	0.52	ug/kg	
319-85-7	beta-BHC	ND	1.9	0.49	ug/kg	
319-86-8	delta-BHC	ND VJ	1.9	0.82	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.9	0.63	ug/kg	
5103-71-9	alpha-Chlordane	ND VL	1.9	0.37	ug/kg	
5103-74-2	gamma-Chlordane	ND VL	1.9	0.41	ug/kg	
60-57-1	Dieldrin	ND VL	1.9	0.41	ug/kg	
72-54-8	4,4'-DDD	ND	3.7	0.75	ug/kg	
72-55-9	4,4'-DDE	ND VL	3.7	0.75	ug/kg	
50-29-3	4,4'-DDT	ND [a] VJ	37	8.6	ug/kg	
72-20-8	Endrin	ND VL	3.7	0.75	ug/kg	
1031-07-8	Endosulfan sulfate	ND	3.7	1.2	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	3.7	1.1	ug/kg	
53494-70-5	Endrin ketone	ND VL	3.7	0.75	ug/kg	
959-98-8	Endosulfan-I	ND	1.9	0.41	ug/kg	
33213-65-9	Endosulfan-II	ND VL	3.7	0.56	ug/kg	
76-44-8	Heptachlor	ND [a]	19	5.2	ug/kg	
1024-57-3	Heptachlor epoxide	ND	1.9	0.37	ug/kg	
72-43-5	Methoxychlor	ND [a] VJ	37	7.5	ug/kg	
8001-35-2	Toxaphene	ND	93	47	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	76%	70%	46-122%
2051-24-3	Decachlorobiphenyl	68%	77%	50-133%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64243.D

Form I GC

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64243.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.6 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.3	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.3	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.3	ug/kg	
11097-69-1	Aroclor 1254	10.9 J	19	9.3	ug/kg	J
11096-82-5	Aroclor 1260	ND	19	9.3	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	67%		44-126%
2051-24-3	Decachlorobiphenyl	65%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08075.D KK20590.D

For L Coq

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08075.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20590.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	30.3 g	10.0 ml
Run #2	30.3 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.6	2.3	ug/kg	
319-84-6	alpha-BHC	ND	9.6	2.7	ug/kg	
319-85-7	beta-BHC	ND	9.6	2.5	ug/kg	
319-86-8	delta-BHC	ND	9.6	4.2	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.6	3.3	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.6	1.9	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.6	2.1	ug/kg	
60-57-1	Dieldrin	ND	9.6	2.1	ug/kg	
72-54-8	4,4'-DDD	ND	19	3.8	ug/kg	
72-55-9	4,4'-DDE	ND	19	3.8	ug/kg	
50-29-3	4,4'-DDT	ND [b] VJ	38	8.8	ug/kg	
72-20-8	Endrin	ND	19	3.8	ug/kg	
1031-07-8	Endosulfan sulfate	ND	19	6.3	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	19	5.8	ug/kg	
53494-70-5	Endrin ketone	ND	19	3.8	ug/kg	
959-98-8	Endosulfan-I	ND	9.6	2.1	ug/kg	
33213-65-9	Endosulfan-II	ND	19	2.9	ug/kg	
76-44-8	Heptachlor	ND [b]	19	5.4	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.6	1.9	ug/kg	
72-43-5	Methoxychlor	ND [b] VJ	38	7.7	ug/kg	
8001-35-2	Toxaphene	ND	480	240	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%	72%	46-122%
2051-24-3	Decachlorobiphenyl	87%	72%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64244.D

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Report of Analysis

3.2.6

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64244.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.3 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.6	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.6	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.6	ug/kg	
11097-69-1	Aroclor 1254	41.1 J	19	9.6	ug/kg	
11096-82-5	Aroclor 1260	ND	19	9.6	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	68%		44-126%
2051-24-3	Decachlorobiphenyl	68%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20778.D TT08181.D

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Report of Analysis

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20778.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	TT08181.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.8 g	10.0 ml
Run #2	30.8 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.8	0.42	ug/kg	
319-84-6	alpha-BHC	ND	1.8	0.49	ug/kg	
319-85-7	beta-BHC	ND	1.8	0.46	ug/kg	
319-86-8	delta-BHC	ND	1.8	0.78	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.8	0.60	ug/kg	
5103-71-9	alpha-Chlordane	ND	1.8	0.35	ug/kg	
5103-74-2	gamma-Chlordane	ND	1.8	0.39	ug/kg	
60-57-1	Dieldrin	ND	1.8	0.39	ug/kg	
72-54-8	4,4'-DDD	ND	3.5	0.71	ug/kg	
72-55-9	4,4'-DDE	ND	3.5	0.71	ug/kg	
50-29-3	4,4'-DDT	ND [a]	35	8.1	ug/kg	
72-20-8	Endrin	ND	3.5	0.71	ug/kg	
1031-07-8	Endosulfan sulfate	ND	3.5	1.2	ug/kg	
7421-93-4	Endrin aldehyde	ND vL	3.5	1.1	ug/kg	
53494-70-5	Endrin ketone	ND	3.5	0.71	ug/kg	
959-98-8	Endosulfan-I	ND	1.8	0.39	ug/kg	
33213-65-9	Endosulfan-II	ND	3.5	0.53	ug/kg	
76-44-8	Heptachlor	ND [a]	18	4.9	ug/kg	
1024-57-3	Heptachlor epoxide	0.48 J	1.8	0.35	ug/kg	J
72-43-5	Methoxychlor	ND [a]	35	7.1	ug/kg	
8001-35-2	Toxaphene	ND	88	44	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	110%	70%	46-122%
2051-24-3	Decachlorobiphenyl	88%	78%	50-133%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64245.D

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Report of Analysis

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64245.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.8 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	18	8.8	ug/kg	
11104-28-2	Aroclor 1221	ND	18	14	ug/kg	
11141-16-5	Aroclor 1232	ND	18	14	ug/kg	
53469-21-9	Aroclor 1242	ND	18	8.8	ug/kg	
12672-29-6	Aroclor 1248	ND	18	8.8	ug/kg	
11097-69-1	Aroclor 1254	11.1 J	18	8.8	ug/kg	J
11096-82-5	Aroclor 1260	ND	18	8.8	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	66%		44-126%
2051-24-3	Decachlorobiphenyl	59%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20779.D TT08185.D

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Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	KK20779.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	TT08185.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.8 g	10.0 ml
Run #2	30.8 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.8	0.43	ug/kg	
319-84-6	alpha-BHC	ND	1.8	0.50	ug/kg	
319-85-7	beta-BHC	ND	1.8	0.46	ug/kg	
319-86-8	delta-BHC	ND	1.8	0.78	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.8	0.60	ug/kg	
5103-71-9	alpha-Chlordane	ND	1.8	0.35	ug/kg	
5103-74-2	gamma-Chlordane	ND	1.8	0.39	ug/kg	
60-57-1	Dieldrin	0.75 J	1.8	0.39	ug/kg	J
72-54-8	4,4'-DDD	ND	3.5	0.71	ug/kg	
72-55-9	4,4'-DDE	ND	3.5	0.71	ug/kg	
50-29-3	4,4'-DDT	ND [b]	35	8.2	ug/kg	
72-20-8	Endrin	ND	3.5	0.71	ug/kg	
1031-07-8	Endosulfan sulfate	ND	3.5	1.2	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	3.5	1.1	ug/kg	
53494-70-5	Endrin ketone	ND	3.5	0.71	ug/kg	
959-98-8	Endosulfan-I	ND	1.8	0.39	ug/kg	
33213-65-9	Endosulfan-II	ND	3.5	0.53	ug/kg	
76-44-8	Heptachlor	ND [b]	18	5.0	ug/kg	
1024-57-3	Heptachlor epoxide	0.46 J	1.8	0.35	ug/kg	J
72-43-5	Methoxychlor	ND [b]	35	7.1	ug/kg	
8001-35-2	Toxaphene	ND	89	44	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	75%	67%	46-122%
2051-24-3	Decachlorobiphenyl	62%	70%	50-133%

(a) All hits confirmed by dual column analysis.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64248.D

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Report of Analysis

3.2.3

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64248.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.8 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result		RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND		18	8.9	ug/kg	
11104-28-2	Aroclor 1221	ND		18	14	ug/kg	
11141-16-5	Aroclor 1232	ND		18	14	ug/kg	
53469-21-9	Aroclor 1242	ND		18	8.9	ug/kg	
12672-29-6	Aroclor 1248	ND		18	8.9	ug/kg	
11097-69-1	Aroclor 1254 [b]	21.0	J	18	8.9	ug/kg	
11096-82-5	Aroclor 1260	ND		18	8.9	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	74%		44-126%
2051-24-3	Decachlorobiphenyl	59%		39-157%

(a) All hits confirmed by dual column analysis.
(b) Aroclor pattern appears to be weathered.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20780.D TT08186.D

Form I COR

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	KK20780.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	TT08186.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.1 g	10.0 ml
Run #2	30.1 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.9	0.45	ug/kg	
319-84-6	alpha-BHC	ND	1.9	0.52	ug/kg	
319-85-7	beta-BHC	ND	1.9	0.49	ug/kg	
319-86-8	delta-BHC	ND	1.9	0.82	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.9	0.63	ug/kg	
5103-71-9	alpha-Chlordane	ND	1.9	0.37	ug/kg	
5103-74-2	gamma-Chlordane	ND	1.9	0.41	ug/kg	
60-57-1	Dieldrin	0.44 J	1.9	0.41	ug/kg	J
72-54-8	4,4'-DDD	1.0 J	3.7	0.75	ug/kg	J
72-55-9	4,4'-DDE	ND	3.7	0.75	ug/kg	
50-29-3	4,4'-DDT	ND [b]	37	8.6	ug/kg	
72-20-8	Endrin	ND	3.7	0.75	ug/kg	
1031-07-8	Endosulfan sulfate	ND	3.7	1.2	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	3.7	1.1	ug/kg	
53494-70-5	Endrin ketone	ND	3.7	0.75	ug/kg	
959-98-8	Endosulfan-I	ND	1.9	0.41	ug/kg	
33213-65-9	Endosulfan-II	ND	3.7	0.56	ug/kg	
76-44-8	Heptachlor	ND [b]	19	5.2	ug/kg	
1024-57-3	Heptachlor epoxide	ND	1.9	0.37	ug/kg	
72-43-5	Methoxychlor	ND [b]	37	7.5	ug/kg	
8001-35-2	Toxaphene	ND	93	47	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	120%	77%	46-122%
2051-24-3	Decachlorobiphenyl	100%	78%	50-133%

(a) All hits confirmed by dual column analysis.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64249.D

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Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64249.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.3	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.3	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.3	ug/kg	
11097-69-1	Aroclor 1254 [b]	24.7 J	19	9.3	ug/kg	
11096-82-5	Aroclor 1260	ND	19	9.3	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	73%		44-126%
2051-24-3	Decachlorobiphenyl	66%		39-157%

(a) All hits confirmed by dual column analysis.
(b) Aroclor pattern appears to be weathered.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20781.D TT08189.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	KK20781.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	TT08189.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.5 g	10.0 ml
Run #2	30.5 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.7	0.41	ug/kg	
319-84-6	alpha-BHC	ND	1.7	0.48	ug/kg	
319-85-7	beta-BHC	ND	1.7	0.45	ug/kg	
319-86-8	delta-BHC	ND	1.7	0.76	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.7	0.59	ug/kg	
5103-71-9	alpha-Chlordane	ND	1.7	0.34	ug/kg	
5103-74-2	gamma-Chlordane	ND	1.7	0.38	ug/kg	
60-57-1	Dieldrin	ND	1.7	0.38	ug/kg	
72-54-8	4,4'-DDD	ND	3.4	0.69	ug/kg	
72-55-9	4,4'-DDE	ND	3.4	0.69	ug/kg	
50-29-3	4,4'-DDT	ND [b] UJ	34	7.9	ug/kg	
72-20-8	Endrin	ND	3.4	0.69	ug/kg	
1031-07-8	Endosulfan sulfate	7.1	3.4	1.1	ug/kg	
7421-93-4	Endrin aldehyde	ND VL	3.4	1.0	ug/kg	
53494-70-5	Endrin ketone	ND	3.4	0.69	ug/kg	
959-98-8	Endosulfan-I	ND	1.7	0.38	ug/kg	
33213-65-9	Endosulfan-II	ND	3.4	0.52	ug/kg	
76-44-8	Heptachlor	ND [b]	17	4.8	ug/kg	
1024-57-3	Heptachlor epoxide	ND	1.7	0.34	ug/kg	
72-43-5	Methoxychlor	ND [b] UJ	34	6.9	ug/kg	
8001-35-2	Toxaphene	ND	86	43	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	66%	69%	46-122%
2051-24-3	Decachlorobiphenyl	73%	80%	50-133%

(a) All hits confirmed by dual column analysis.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64250.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ST64250.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.5 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	17	8.6	ug/kg	
11104-28-2	Aroclor 1221	ND	17	14	ug/kg	
11141-16-5	Aroclor 1232	ND	17	14	ug/kg	
53469-21-9	Aroclor 1242	ND	17	8.6	ug/kg	
12672-29-6	Aroclor 1248	ND	17	8.6	ug/kg	
11097-69-1	Aroclor 1254	ND	17	8.6	ug/kg	
11096-82-5	Aroclor 1260	ND	17	8.6	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	63%		44-126%
2051-24-3	Decachlorobiphenyl	72%		39-157%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	KK20782.D	1	08/08/07	FS	07/27/07	OP21640	GKK761
Run #2	TT08190.D	10	08/06/07	FS	07/27/07	OP21640	GTT278

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2	31.7 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	1.7	0.41	ug/kg	
319-84-6	alpha-BHC	ND	1.7	0.48	ug/kg	
319-85-7	beta-BHC	ND	1.7	0.44	ug/kg	
319-86-8	delta-BHC	ND	1.7	0.75	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	1.7	0.58	ug/kg	
5103-71-9	alpha-Chlordane	ND	1.7	0.34	ug/kg	
5103-74-2	gamma-Chlordane	ND	1.7	0.37	ug/kg	
60-57-1	Dieldrin	ND	1.7	0.37	ug/kg	
72-54-8	4,4'-DDD	ND	3.4	0.68	ug/kg	
72-55-9	4,4'-DDE	ND	3.4	0.68	ug/kg	
50-29-3	4,4'-DDT	ND [b] UJ	33	7.6	ug/kg	
72-20-8	Endrin	ND	3.4	0.68	ug/kg	
1031-07-8	Endosulfan sulfate	2.1 J	3.4	1.1	ug/kg	J
7421-93-4	Endrin aldehyde	ND UL	3.4	1.0	ug/kg	
53494-70-5	Endrin ketone	ND	3.4	0.68	ug/kg	
959-98-8	Endosulfan-I	ND	1.7	0.37	ug/kg	
33213-65-9	Endosulfan-II	ND	3.4	0.51	ug/kg	
76-44-8	Heptachlor	ND [b]	16	4.6	ug/kg	
1024-57-3	Heptachlor epoxide	ND	1.7	0.34	ug/kg	
72-43-5	Methoxychlor	ND [b] UJ	33	6.6	ug/kg	
8001-35-2	Toxaphene	ND	85	43	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	55%	80%	46-122%
2051-24-3	Decachlorobiphenyl	57%	81%	50-133%

(a) All hits confirmed by dual column analysis.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64251.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ST64251.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	17	8.5	ug/kg	
11104-28-2	Aroclor 1221	ND	17	14	ug/kg	
11141-16-5	Aroclor 1232	ND	17	14	ug/kg	
53469-21-9	Aroclor 1242	ND	17	8.5	ug/kg	
12672-29-6	Aroclor 1248	ND	17	8.5	ug/kg	
11097-69-1	Aroclor 1254	ND	17	8.5	ug/kg	
11096-82-5	Aroclor 1260	ND	17	8.5	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	70%		44-126%
2051-24-3	Decachlorobiphenyl	80%		39-157%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT08074.D KK20592.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TT08074.D	5	07/31/07	FS	07/27/07	OP21640	GTT274
Run #2	KK20592.D	10	08/02/07	FS	07/27/07	OP21640	GKK756

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2	29.9 g	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	9.7	2.3	ug/kg	
319-84-6	alpha-BHC	ND	9.7	2.7	ug/kg	
319-85-7	beta-BHC	ND	9.7	2.5	ug/kg	
319-86-8	delta-BHC	ND	9.7	4.2	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	9.7	3.3	ug/kg	
5103-71-9	alpha-Chlordane	ND	9.7	1.9	ug/kg	
5103-74-2	gamma-Chlordane	ND	9.7	2.1	ug/kg	
60-57-1	Dieldrin	ND	9.7	2.1	ug/kg	
72-54-8	4,4'-DDD	ND	19	3.9	ug/kg	
72-55-9	4,4'-DDE	ND	19	3.9	ug/kg	
50-29-3	4,4'-DDT	ND [b] UJ	39	8.9	ug/kg	
72-20-8	Endrin	ND	19	3.9	ug/kg	
1031-07-8	Endosulfan sulfate	ND	19	6.4	ug/kg	
7421-93-4	Endrin aldehyde	ND UL	19	5.8	ug/kg	
53494-70-5	Endrin ketone	ND	19	3.9	ug/kg	
959-98-8	Endosulfan-I	ND	9.7	2.1	ug/kg	
33213-65-9	Endosulfan-II	ND	19	2.9	ug/kg	
76-44-8	Heptachlor	ND [b]	19	5.4	ug/kg	
1024-57-3	Heptachlor epoxide	ND	9.7	1.9	ug/kg	
72-43-5	Methoxychlor	ND [b] UJ	39	7.7	ug/kg	
8001-35-2	Toxaphene	ND	480	240	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%	69%	46-122%
2051-24-3	Decachlorobiphenyl	86%	75%	50-133%

(a) Dilution required due to matrix interference.
(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST64254.D

Form I OV

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8082 SW846 3550B	Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST64254.D	1	07/31/07	JB	07/27/07	OP21641	GST1697
Run #2							

	Initial Weight	Final Volume
Run #1	29.9 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.7	ug/kg	
11104-28-2	Aroclor 1221	ND	19	15	ug/kg	
11141-16-5	Aroclor 1232	ND	19	15	ug/kg	
53469-21-9	Aroclor 1242	ND	19	9.7	ug/kg	
12672-29-6	Aroclor 1248	ND	19	9.7	ug/kg	
11097-69-1	Aroclor 1254	75.6	19	9.7	ug/kg	J
11096-82-5	Aroclor 1260	ND	19	9.7	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	65%		44-126%
2051-24-3	Decachlorobiphenyl	70%		39-157%

(a) All hits confirmed by dual column analysis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20475.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20475.D	1	07/26/07	FS	07/24/07	OP21578	GKK752
Run #2							

	Initial Volume	Final Volume
Run #1	920 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.054	0.022	ug/l	
319-84-6	alpha-BHC	ND	0.054	0.016	ug/l	
319-85-7	beta-BHC	ND	0.054	0.022	ug/l	
319-86-8	delta-BHC	ND	0.054	0.022	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.054	0.016	ug/l	
5103-71-9	alpha-Chlordane	ND	0.054	0.016	ug/l	
5103-74-2	gamma-Chlordane	ND	0.054	0.016	ug/l	
60-57-1	Dieldrin	ND	0.054	0.016	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.022	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.022	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.022	ug/l	
72-20-8	Endrin	ND	0.11	0.043	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.022	ug/l	
7421-93-4	Endrin aldehyde	ND	0.11	0.043	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.022	ug/l	
959-98-8	Endosulfan-I	ND	0.054	0.016	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.022	ug/l	
76-44-8	Heptachlor	ND	0.054	0.022	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.054	0.016	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.043	ug/l	
8001-35-2	Toxaphene	ND	2.7	1.4	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%		42-127%
2051-24-3	Decachlorobiphenyl	71%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX022303.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX022303.D	1	07/26/07	AC	07/24/07	OP21577	GXX184
Run #2							

	Initial Volume	Final Volume
Run #1	920 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.54	0.27	ug/l	
11104-28-2	Aroclor 1221	ND	0.54	0.43	ug/l	
11141-16-5	Aroclor 1232	ND	0.54	0.43	ug/l	
53469-21-9	Aroclor 1242	ND	0.54	0.27	ug/l	
12672-29-6	Aroclor 1248	ND	0.54	0.27	ug/l	
11097-69-1	Aroclor 1254	ND	0.54	0.27	ug/l	
11096-82-5	Aroclor 1260	ND	0.54	0.27	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	87%		38-127%
2051-24-3	Decachlorobiphenyl	75%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Semi-Volatiles & Polynuclear Aromatic Hydrocarbons Accutest Laboratories, Inc., SDG F51154

DATE: September 25, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on July 18, 2007 and July 19, 2007. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW846 Methods 3510C/8270C for aqueous matrices and USEPA SW846 Methods 3550B/8270C for solid matrices. The polynuclear aromatic hydrocarbons (PAHs) were analyzed using selective ion monitoring (SIM) techniques. A total of seven aqueous samples and nineteen solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
AOSW01	F51154-1	LFSW01	F51154-17
AOSW02	F51154-2	APSD01	F51154-18
TMSW01	F51154-3	41SD11	F51154-22
AOSD01	F51154-4	49SS02	F51154-23
AOSD02	F51154-5	49SS03	F51154-24
41SW08	F51154-6	49SS04	F51154-25
41SW09	F51154-7	49SS05	F51154-26
41SW10	F51154-8	59SS06	F51154-27
41SD08	F51154-9	59SS07	F51154-28
41SD09	F51154-10	59SS08	F51154-29
41SD10	F51154-11	59SS09	F51154-30
LFSD01	F51154-15	59SS10	F51154-31
TMSD01	F51154-16	TMSS05	F51154-32

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
X		Laboratory Control Sample
X		Matrix Spike/Spike Duplicate
X		Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications, except for the following. Benzoic acid was qualified rejected "R" for samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) based upon the grossly low (i.e. <10% recovery) found in the associated LCS (see Section VIII).

Eric Malarek, Chemist

9/25/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F51154

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For semivolatile (SVOC) and polynuclear aromatic hydrocarbons (PAH) compounds , the samples are cooled @4°C ± 2°C for aqueous samples with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis. For solid matrices, the samples are cooled @4°C ± 2°C with a maximum holding time of 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 07/18/07 and 07/19/07, the coolers were received by the primary laboratory (Accutest) on 07/20/07 at 4.0°C, 4.0°C, 4.6°C, 4.6°C, 4.8°C, 5.0°C, 5.0°C, and 5.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.2°C, 4.0°C, and 3.6°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 3.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 5.5°C and 5.2°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The aqueous samples were collected on 07/18/07 and 07/19/07. For the surface water samples collected 07/18/07 and 07/19/07, the SVOCs were extracted on 07/24/07 and 07/26/07 and analyzed on 07/31/07. For the surface water samples collected 07/18/07 and 07/19/07, the PAHs by SIM were extracted on 07/24/07 and 07/26/07 and analyzed on 07/30/07 and 07/31/07. For the sediment and soil samples collected 07/18/07 and 07/19/07, the SVOCs were extracted on 07/25/07, 07/27/07, and 08/06/07 (49SS03 (F51154-24) confirmation) and analyzed on 07/26/07, 07/30/07, and 08/06/07 (49SS03 (F51154-24) confirmation). Sample 49SS03 (F51154-24) was re-extracted and re-analyzed for confirmation out of holding time for compound di-n-butylphthalate; however, the original sample was reported. No qualifiers were applied based upon this outlier. For the sediment and soil samples collected 07/18/07 and 07/19/07, the PAHs by SIM were extracted on 07/27/07 and analyzed on 07/27/07, 07/31/07, and 08/01/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check

GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for compounds on the semivolatile target compound list (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. The minimum relative response factor (RRF) criteria must be ≥0.05. The DoD QSM specifies that the initial calibration percent relative standard deviation (%RSD) must be ≤15% on the average for all compounds (<30% for CCCs). All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- Initial calibration for the SVOCs was performed on 07/05/07 on instrument MSBNA02. Target compounds 2,4-dinitrophenol (19.7%) and 4,6-dinitro-2-methylphenol (25.9%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 2,4-dinitrophenol (r=0.9950) and 4,6-dinitro-2-methylphenol (r=0.9975) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Sample LFSW01 (F51154-17) was analyzed using this initial calibration.

- Initial calibration for the SVOCs was performed on 07/23/07 on instrument MSBNA03. Target compounds 2,4-dinitrophenol (49.6%; grossly exceeding) and 4,6-dinitro-2-methylphenol (32.7%; grossly exceeding) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 2,4-dinitrophenol (r=0.9956) and 4,6-dinitro-2-methylphenol (r=0.9972) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Samples AOSD01 (F51154-4), AOSD02 (F51154-5), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) were analyzed using this initial calibration.

- Initial calibration for the SVOCs was performed on 07/31/07 on instrument MSBNA03. Target compounds 2,4-dinitrophenol (43.8%; grossly exceeding) and 4,6-dinitro-2-methylphenol (22.8%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 2,4-dinitrophenol (r=0.9962) and 4,6-dinitro-2-methylphenol (r=0.9982) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. No samples reported were analyzed using this initial calibration.

- Initial calibration for the SVOCs was performed on 07/13/07 on instrument MSBNA04. Target compounds 2,4-dinitrophenol (42.0%; grossly exceeding) and 4,6-dinitro-2-methylphenol (24.0%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 2,4-dinitrophenol (r=0.9988) and 4,6-dinitro-2-methylphenol (r=0.9995) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) as well as the confirmation for sample 49SS03 (F51154-24) were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 07/27/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. Samples AOSD01 (F51154-4), AOSD02 (F51154-5), LFSW01 (F51154-17), AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥0.05. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ±20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For SVOC initial calibration verification performed on 07/05/07 @15:27 on instrument MSBNA02, 3-nitroaniline (26.0%) was outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 3-nitroaniline. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC initial calibration verification performed on 07/05/07 @15:55 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 07/31/07 @09:50 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. Sample LFSW01 (F51154-17) applies to this continuing calibration.

- For SVOC initial calibration verification performed on 07/23/07 @18:28 on instrument MSBNA03, 4-chloroaniline (44.6%; grossly exceeding) and 3-nitroaniline (27.8%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 4-chloroaniline and 3-nitroaniline. No samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 07/23/07 @18:58 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 07/26/07 @09:59 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this continuing calibration.

- For SVOC continuing calibration performed on 07/30/07 @09:46 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this continuing calibration.

- For SVOC initial calibration verification performed on 07/31/07 @16:11 on instrument MSBNA03, 4-chloroaniline (43.4%; grossly exceeding) and 3-nitroaniline (35.4%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 4-chloroaniline and 3-nitroaniline. No samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 07/31/07 @16:42 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 08/01/07 @12:32 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For SVOC initial calibration verification performed on 07/13/07 @13:48 on instrument MSBNA04, 4-chloroaniline (38.2%) and 3-nitroaniline (39.0%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 4-chloroaniline and 3-nitroaniline. No samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 07/13/07 @14:19 on instrument MSBNA04, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 07/31/07 @11:19 on instrument MSBNA04, all criteria were met for all target compounds. No qualifiers were applied. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this continuing calibration.

- For SVOC continuing calibration performed on 08/06/07 @11:28 on instrument MSBNA04, all criteria were met for all target compounds. No qualifiers were applied. Confirmation for sample 49SS03 (F51154-24) applies to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 07/27/07 @20:02 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 07/30/07 @11:52 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples apply to this continuing calibration.

- For PAH by SIM continuing calibration performed on 07/30/07 @23:02 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Sample LFSW01 (F51154-17) applies to this continuing calibration.

- For PAH by SIM continuing calibration performed on 07/30/07 @11:52 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this continuing calibration.

- For PAH by SIM continuing calibration performed on 07/31/07 @09:58 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples 41SD08 (F51154-9) and 41SD09 (F51154-10) apply to this continuing calibration.

- For PAH by SIM continuing calibration performed on 08/01/07 @13:31 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one and for solid matrices were converted to soil values (soil conversion factor = 33) if needed. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. The surface water "SW" samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the SW samples. Rinse blanks 072407R (F51275-1) and 072507R (F51300-31) apply to the surface soil "SS" and subsurface soil "SB" samples in this SDG. Rinse blank RB071807 (F51154-12) applies to the sediment "SD" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
07/31/07	OP21580-MB	All SVOC target <½MRL	NA	NA	None
08/01/07	OP21580-MB	All SVOC target <½MRL	NA	NA	None
07/31/07	OP21610-MB	All SVOC target <½MRL	NA	NA	None
07/30/07	OP21581-MB	All PAH SIM target <½MRL	NA	NA	None
07/30/07	OP21611-MB	All PAH SIM target <½MRL	NA	NA	None
07/05/07	OP21206-MB	All PAH SIM target <½MRL	NA	NA	None
09/15/07	RB083007	All SVOC target <½MRL	NA	NA	None
09/20/07	RB083007	All PAH SIM target <½MRL	NA	NA	None

Table 2 Blank Contamination Analysis Summary, Continued

Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
07/26/07	OP21602-MB	All SVOC target <½MRL	NA	NA	None
07/30/07	OP21634-MB	All SVOC target <½MRL	NA	NA	None
07/27/07	OP21630-MB	All PAH SIM target <½MRL	NA	NA	None
07/31/07	OP21636-MB	All PAH SIM target <½MRL	NA	NA	None
08/01/07	OP21636-MB	All PAH SIM target <½MRL	NA	NA	None
07/31/07	RB071807	All SVOC target <½MRL	NA	NA	None
07/30/07	RB071807	All PAH SIM target <½MRL	NA	NA	None
08/02/07	072407R	All SVOC target <½MRL	NA	NA	None
08/02/07	072407R	All PAH SIM target <½MRL	NA	NA	None
08/02/07	072507R	All SVOC target <½MRL	NA	NA	None
08/02/07	072507R	All PAH SIM target <½MRL	NA	NA	None

NA = Not applicable.
MRL = Method reporting limit.

VI-Surrogate Spikes

Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-2 and Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:
2-Fluorophenol (14-62%) – (DoD QSM = 20-110%)
Phenol – d5 (10-40%) – (DoD QSM = 10-115%)
2,4,6-Tribromophenol (33-118%) – (DoD QSM = 40-125%)
Nitrobenzene-d5 (42-108%) – (DoD QSM = 40-110%)
2-Fluorobiphenyl (40-106%) – (DoD QSM = 50-110%)
p-Terphenyl – d14 (39-121%) – (DoD QSM = 50-135%)

Solid Criteria:
2-Fluorophenol (40-102%) – (DoD QSM = 35-105%)
Phenol – d5 (41-100%) – (DoD QSM = 40-100%)
2,4,6-Tribromophenol (42-108%) – (DoD QSM = 35-125%)
Nitrobenzene-d5 (40-105%) – (DoD QSM = 35-100%)
2-Fluorobiphenyl (43-107%) – (DoD QSM = 45-105%)
p-Terphenyl – d14 (45-119%) – (DoD QSM = 30-125%)

- For soil sample 49SS03 (F51154-24), 2,4,6-tribromophenol (41.0%) was outside lab criteria; however within DoD QSM criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier. The sample was rerun for confirmation with 59.0% recovery.

- For all other field samples, all surrogates were within criteria limits. No qualifiers were applied.

VII-Internal Standards

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Sample

Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD LCS aqueous recovery limits are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). DoD LCS solid recovery limits are specified in Table D-2 and Table D-7 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP21580-BS was used as the aqueous LCS for the SVOC analysis on 07/31/07. Benzoic acid (8%) was grossly below (i.e. <10%R) the laboratory and/or the DoD QSM criteria. Benzoic acid was qualified rejected "R" based upon the very low recovery. All other compounds were within criteria. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this LCS.

- Sample OP21610-BS was used as the aqueous LCS for the SVOC analysis on 07/31/07. All criteria were met. No qualifiers were applied. Sample LFSW01 (F51154-17) applies to this LCS.

- Sample OP21602-BS was used as the solid LCS for the SVOC analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this LCS.

- Sample OP21634-BS was used as the solid LCS for the SVOC analysis on 07/30/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

- Sample OP21581-BS was used as the aqueous LCS for the PAH SIM analysis on 07/30/07. All criteria were met. No qualifiers were applied. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this LCS.

- Sample OP21611-BS was used as the aqueous LCS for the PAH SIM analysis on 07/30/07. 1-Methylnaphthalene (57%) and 2-methylnaphthalene (55%) were below laboratory criteria. The associated sample was non-detect for these compounds and was qualified bias low "UL" based upon the low recoveries. Sample LFSW01 (F51154-17) applies to this LCS.

- Sample OP21630-BS was used as the solid LCS for the PAH SIM analysis on 07/27/07. All criteria were met. No qualifiers were applied. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this LCS.

- Sample OP21636-BS was used as the solid LCS for the PAH SIM analysis on 07/31/07. All criteria were met. No qualifiers were applied. No samples reported were analyzed using this LCS.

- Sample OP21636-BS was used as the solid LCS for the PAH SIM analysis on 08/01/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate

Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). DoD solid MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-7 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample AOSW02 (F51154-2) was used for the aqueous MS/MSD for SVOC analysis on 07/31/07. All criteria were met. No qualifiers were applied. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this MS/MSD.

- Sample LFSW01 (F51154-17) was used for the aqueous MS/MSD for SVOC analysis on 07/31/07. 4-Nitrophenol (56%) and phenol (56%, 56%) were above laboratory accuracy criteria; however, within DoD QSM criteria. All other target compounds were within criteria. The associated aqueous LCS was within criteria and all surface water samples were non-detect for these compounds. No qualifiers were applied for 4-nitrophenol and phenol based upon these outliers. Sample LFSW01 (F51154-17) applies to this MS/MSD.

- Sample F51123-5 was used for the MS/MSD for the solid SVOC analysis on 07/26/07. The spiked sample was not a RFAAP site sample; therefore, it was not evaluated. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this MS/MSD.

- Sample APSD01 (F51154-18) was used for the solid MS/MSD for SVOC analysis on 07/30/07. Benzoic acid (RPD=37%), 1,3-dichlorobenzene (43%), 1,4-dichlorobenzene (44%), 3,3'-dichlorobenzidine (25%, 24%), hexachlorocyclopentadiene (13%, 10%), and hexachloroethane (41%, 33%) were below laboratory and/or DoD QSM accuracy criteria. All other target compounds were within criteria. The associated solid LCS was within criteria and all solid samples were non-detect for these compounds. 1,3-Dichlorobenzene, 1,4-dichlorobenzene, 3,3'-dichlorobenzidine, hexachlorocyclopentadiene, and hexachloroethane were non-detect for the spiked sample and qualified "UL" based upon the low recoveries. No qualifiers were applied for benzoic acid based upon this outlier. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

- Sample AOSW02 (F51154-2) was used for the aqueous MS/MSD for PAH SIM analysis on 07/03/07. All criteria were met. No qualifiers were applied. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this MS/MSD.

- Sample LFSW01 (F51154-17) was used for the aqueous MS/MSD for PAH SIM analysis on 07/03/07. All criteria were met. No qualifiers were applied. Sample LFSW01 (F51154-17) applies to this MS/MSD.

- Sample F51296-22 was used for the MS/MSD for the solid PAH SIM analysis on 07/28/07. The spiked sample was not a RFAAP site sample; therefore, it was not evaluated. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this MS/MSD.

- Sample 41SD09 (F51154-10) was used for the solid MS/MSD for PAH SIM analysis on 07/31/07. Benzo(g,h,i)perylene (53%), indeno(1,2,3-cd)pyrene (56%), benzo(b)fluoranthene (67%, 65%), benzo(k)fluoranthene (60%), chrysene (57%), benzo(a)pyrene (68%), and benzo(a)anthracene (61%) were below laboratory; however, within DoD QSM accuracy criteria. All other target compounds were within criteria. The associated solid LCS was within criteria. Benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, benzo(a)pyrene, and benzo(a)anthracene were detected for the spiked sample and qualified "L" based upon the low recoveries. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

X-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous and solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field surface water sample duplicate pair AOSW01 (F51154-1) and TMSW01 (F51154-3) was collected for TCL SVOCs and PAHs. All detected TCL SVOCs and PAHs found in the sample and its duplicate pair and associated %RPD are noted in **Table 3**. All other TCL SVOC and PAH target compounds were non-detect. Phenanthrene (58.5%) was above criteria due to low concentration levels detected below the MRL. Phenanthrene was qualified estimated "J" for the original and duplicate pair samples based upon this outlier. For all other compounds, all criteria were met.

Table 3 Field Precision Hits Analysis Summary for TCL SVOCs and PAHs for Duplicate Pair AOSW01 (F51154-1) and TMSW01 (F51154-3)

Compound	Original Sample (µg/L)	Duplicate Pair (µg/L)	%RPD
Acenaphthene	0.91J	0.75J	19.3
Phenanthrene	0.95J	0.52J	58.5
Fluorene	1.7	1.3	26.7
1-Methylnaphthalene	4.8	3.4	34.2

J = Estimated value <MRL and >MDL.

- Field surface soil sample duplicate pair 49SS05 (F51154-26) and TMSS05 (F51154-32) was collected for TCL SVOCs and PAHs. All TCL SVOC and PAH target compounds were non-detect. All criteria were met. No qualifiers were applied.

- Field sediment sample duplicate pair LFSD01 (F51154-15) and TMSD01 (F51154-16) was collected for TCL SVOCs and PAHs. All detected TCL SVOCs and PAHs found in the sample and its duplicate pair and associated %RPD are noted in **Table 4**. All other TCL SVOC and PAH target compounds were non-detect. All criteria were met. No qualifiers were applied.

Table 4 Field Precision Hits Analysis Summary for TCL SVOCs and PAHs for Duplicate Pair LFSD01 (F51154-15) and TMSD01 (F51154-16)

Compound	Original Sample (µg/kg)	Duplicate Pair (µg/kg)	%RPD
Benzo(g,h,i)perylene	92U	20.8J	NA
Indeno(1,2,3-cd)pyrene	92U	20.2J	NA
Benzo(b)fluoranthene	45.6J	37.5J	19.5
Benzo(k)fluoranthene	31.2J	26.9J	14.8
Chrysene	43.0J	32.8J	26.9
Benzo(a)pyrene	31.9J	27.9J	13.4
Benzo(a)anthracene	29.0J	26.2J	10.1

J = Estimated value <MRL and >MDL.
U = Non-detect as <MRL.
NA = Not Applicable

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: AOSW02MS (F51154-2MS), bis(2-ethylhexyl)phthalate

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:

	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (381474 * 40 * 1000 * 1) / (413841 * 0.892 * 480 * 1) = 86.1 ng/mL
= 86.1 µg/L

Reported Value = 86.2 µg/L
% Difference = 0.1%
Values were within 10% difference.

Sample: AOSW01 (F51154-1), fluorene

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (71366 * 4 * 1000 * 1) / (128124 * 1.333 * 980 * 1) = 1.7 ng/mL
= 1.7 µg/L

Reported Value = 1.7 µg/L
% Difference = 0.0%
Values were within 10% difference.

Sample: 49SS02 (F51154-23), di-n-butyl phthalate

Conc. µg/kg = (Ax * Is * Vt * DF) / (Ais * RRF * Vi * Ws * D)

where:	Conc.	= Sample concentration in µg/kg
	Ax	= Area of characteristic ion for compound being measured.
	Is	= Amount of internal standard injected (ng).
	Vt	= Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 uL.
	Ais	= Area of characteristic ion for the internal standard.
	RRF	= Average relative response factor for compound being measured (from ICAL)
	Vi	= Volume of extract injected (uL).
	W(s)	= Weight of sample extracted or diluted in grams.
	D	= Percent dry weight (100 - % moisture in sample)/100
	DF	= Dilution factor

Conc. µg/kg = (47730 * 40 * 1000 * 1) / (452232 * 1.278 * 1 * 30.0 * 0.8960) = 123 µg/kg
Reported Value = 123 µg/kg
% Difference = 0.0%
Values were within 10% difference

Sample: 49SS02 (F51154-23), chrysene

Conc. µg/kg = (Ax * Is * Vt * DF) / (Ais * RRF * Vi * Ws * D)

where: Conc. = Sample concentration in µg/kg
Ax = Area of characteristic ion for compound being measured.
Is = Amount of internal standard injected (ng).
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 uL.
Ais = Area of characteristic ion for the internal standard.
RRF = Average relative response factor for compound being measured (from ICAL)
Vi = Volume of extract injected (uL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100
DF = Dilution factor

Conc. µg/kg = (3895 * 4.0 * 1000 * 4) / (81063 * 1.670 * 1 * 30.0 * 0.8960) = 17.1 µg/kg
Reported Value = 17.1 µg/kg
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: U003663.D

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Report of Analysis

Client Sample ID:	AOSW01		
Lab Sample ID:	F51154-1	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U003663.D	1	07/31/07	NJ	07/24/07	OP21580	SU180
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND R	26	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.1	1.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.1	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.1	1.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.1	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	26	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	2.0	ug/l	
95-48-7	2-Methylphenol	ND	5.1	1.0	ug/l	
	3&4-Methylphenol	ND	5.1	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	5.1	1.0	ug/l	
100-02-7	4-Nitrophenol	ND	26	10	ug/l	
87-86-5	Pentachlorophenol	ND	26	10	ug/l	
108-95-2	Phenol	ND	5.1	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.1	1.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.1	1.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.1	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.1	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.1	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.1	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	5.1	2.0	ug/l	
86-74-8	Carbazole	ND	5.1	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.1	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.1	1.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.1	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.1	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.1	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.1	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.1	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.1	1.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.1	1.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	2.0	ug/l	
132-64-9	Dibenzofuran	ND	5.1	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	AOSW01		
Lab Sample ID:	F51154-1	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.1	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.1	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.1	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.1	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.1	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.1	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.1	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.1	1.5	ug/l	
67-72-1	Hexachloroethane	ND	5.1	1.9	ug/l	
78-59-1	Isophorone	ND	5.1	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	10	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	10	2.0	ug/l	
98-95-3	Nitrobenzene	ND	5.1	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.1	1.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.1	1.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.1	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	41%		14-62%
4165-62-2	Phenol-d5	28%		10-40%
118-79-6	2,4,6-Tribromophenol	84%		33-118%
4165-60-0	Nitrobenzene-d5	69%		42-108%
321-60-8	2-Fluorobiphenyl	73%		40-106%
1718-51-0	Terphenyl-d14	81%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035898.D

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Report of Analysis

Client Sample ID:	AOSW01		
Lab Sample ID:	F51154-1	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035898.D	1	07/30/07	RB	07/24/07	OP21581	SW1859
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	0.91 J	1.0	0.51	ug/l	J
208-96-8	Acenaphthylene	ND	1.0	0.51	ug/l	
120-12-7	Anthracene	ND	1.0	0.51	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.051	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.051	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.051	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.26	ug/l	
86-73-7	Fluorene	1.7	1.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.051	ug/l	
90-12-0	1-Methylnaphthalene	4.8	1.0	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-20-3	Naphthalene	ND	1.0	0.26	ug/l	
85-01-8	Phenanthrene	0.95 J	1.0	0.51	ug/l	J
129-00-0	Pyrene	ND	1.0	0.26	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: U003664.D

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Report of Analysis

Client Sample ID:	AOSW02		
Lab Sample ID:	F51154-2	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U003664.D	1	07/31/07	NJ	07/24/07	OP21580	SU180
Run #2							

	Initial Volume	Final Volume
Run #1	990 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND R	25	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.1	1.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.1	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.1	1.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.1	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	2.0	ug/l	
95-48-7	2-Methylphenol	ND	5.1	1.0	ug/l	
	3&4-Methylphenol	ND	5.1	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	5.1	1.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	10	ug/l	
87-86-5	Pentachlorophenol	ND	25	10	ug/l	
108-95-2	Phenol	ND	5.1	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.1	1.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.1	1.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.1	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.1	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.1	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.1	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	5.1	2.0	ug/l	
86-74-8	Carbazole	ND	5.1	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.1	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.1	1.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.1	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.1	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.1	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.1	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.1	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.1	1.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.1	1.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	2.0	ug/l	
132-64-9	Dibenzofuran	ND	5.1	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	AOSW02		
Lab Sample ID:	F51154-2	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.1	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.1	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.1	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.1	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.1	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.1	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.1	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.1	1.5	ug/l	
67-72-1	Hexachloroethane	ND	5.1	1.9	ug/l	
78-59-1	Isophorone	ND	5.1	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	10	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	10	2.0	ug/l	
98-95-3	Nitrobenzene	ND	5.1	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.1	1.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.1	1.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.1	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	42%		14-62%
4165-62-2	Phenol-d5	30%		10-40%
118-79-6	2,4,6-Tribromophenol	73%		33-118%
4165-60-0	Nitrobenzene-d5	71%		42-108%
321-60-8	2-Fluorobiphenyl	71%		40-106%
1718-51-0	Terphenyl-d14	72%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035899.D

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Report of Analysis

Client Sample ID:	AOSW02		
Lab Sample ID:	F51154-2	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035899.D	1	07/30/07	RB	07/24/07	OP21581	SW1859
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.1	0.53	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.53	ug/l	
120-12-7	Anthracene	ND	1.1	0.53	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.21	0.053	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.21	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.21	0.053	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.21	0.11	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.21	0.11	ug/l	
218-01-9	Chrysene	ND	0.21	0.11	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.21	0.053	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.27	ug/l	
86-73-7	Fluorene	ND	1.1	0.27	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.21	0.053	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.1	0.27	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.1	0.27	ug/l	
91-20-3	Naphthalene	ND	1.1	0.27	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.53	ug/l	
129-00-0	Pyrene	ND	1.1	0.27	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: U003667.D

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Report of Analysis

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-3	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U003667.D	1	07/31/07	NJ	07/24/07	OP21580	SU180
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND R	26	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.1	1.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.1	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.1	1.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.1	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	26	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	2.0	ug/l	
95-48-7	2-Methylphenol	ND	5.1	1.0	ug/l	
	3&4-Methylphenol	ND	5.1	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	5.1	1.0	ug/l	
100-02-7	4-Nitrophenol	ND	26	10	ug/l	
87-86-5	Pentachlorophenol	ND	26	10	ug/l	
108-95-2	Phenol	ND	5.1	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.1	1.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.1	1.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.1	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.1	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.1	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.1	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	5.1	2.0	ug/l	
86-74-8	Carbazole	ND	5.1	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.1	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.1	1.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.1	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.1	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.1	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.1	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.1	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.1	1.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.1	1.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	2.0	ug/l	
132-64-9	Dibenzofuran	ND	5.1	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-3	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.1	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.1	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.1	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.1	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.1	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.1	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.1	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.1	1.5	ug/l	
67-72-1	Hexachloroethane	ND	5.1	1.9	ug/l	
78-59-1	Isophorone	ND	5.1	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	10	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	10	2.0	ug/l	
98-95-3	Nitrobenzene	ND	5.1	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.1	1.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.1	1.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.1	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	44%		14-62%
4165-62-2	Phenol-d5	31%		10-40%
118-79-6	2,4,6-Tribromophenol	81%		33-118%
4165-60-0	Nitrobenzene-d5	74%		42-108%
321-60-8	2-Fluorobiphenyl	75%		40-106%
1718-51-0	Terphenyl-d14	77%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035902.D

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Report of Analysis

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-3	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035902.D	1	07/30/07	RB	07/24/07	OP21581	SW1859
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	0.75 J	1.0	0.51	ug/l	J
208-96-8	Acenaphthylene	ND	1.0	0.51	ug/l	
120-12-7	Anthracene	ND	1.0	0.51	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.051	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.051	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.051	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.26	ug/l	
86-73-7	Fluorene	1.3	1.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.051	ug/l	
90-12-0	1-Methylnaphthalene	3.4	1.0	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-20-3	Naphthalene	ND	1.0	0.26	ug/l	
85-01-8	Phenanthrene	0.52 J	1.0	0.51	ug/l	J
129-00-0	Pyrene	ND	1.0	0.26	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09439.D

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Report of Analysis

Client Sample ID:	AOSD01		
Lab Sample ID:	F51154-4	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	66.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09439.D	1	07/26/07	NJ	07/25/07	OP21602	SR446
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	1300	500	ug/kg	
95-57-8	2-Chlorophenol	ND	250	50	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	250	50	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	250	50	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	250	50	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1300	500	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	500	100	ug/kg	
95-48-7	2-Methylphenol	ND	250	50	ug/kg	
	3&4-Methylphenol	ND	250	50	ug/kg	
88-75-5	2-Nitrophenol	ND	250	50	ug/kg	
100-02-7	4-Nitrophenol	ND	1300	500	ug/kg	
87-86-5	Pentachlorophenol	ND	1300	500	ug/kg	
108-95-2	Phenol	ND	250	50	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	250	50	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	250	50	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	250	50	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	500	130	ug/kg	
100-51-6	Benzyl Alcohol	ND	250	50	ug/kg	
91-58-7	2-Chloronaphthalene	ND	250	50	ug/kg	
106-47-8	4-Chloroaniline	ND	500	200	ug/kg	
86-74-8	Carbazole	ND	250	50	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	250	50	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	250	100	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	250	50	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	250	50	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	250	50	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	250	50	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	250	50	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	250	100	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	250	100	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	500	250	ug/kg	
132-64-9	Dibenzofuran	ND	250	50	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	AOSD01		
Lab Sample ID:	F51154-4	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	66.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	500	130	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	500	250	ug/kg	
84-66-2	Diethyl phthalate	ND	500	130	ug/kg	
131-11-3	Dimethyl phthalate	ND	500	130	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	500	250	ug/kg	
118-74-1	Hexachlorobenzene	ND	250	50	ug/kg	
87-68-3	Hexachlorobutadiene	ND	250	100	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	250	100	ug/kg	
67-72-1	Hexachloroethane	ND	250	100	ug/kg	
78-59-1	Isophorone	ND	250	50	ug/kg	
88-74-4	2-Nitroaniline	ND	500	130	ug/kg	
99-09-2	3-Nitroaniline	ND	500	130	ug/kg	
100-01-6	4-Nitroaniline	ND	500	180	ug/kg	
98-95-3	Nitrobenzene	ND	250	50	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	250	100	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	250	50	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	250	50	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	68%		40-102%
4165-62-2	Phenol-d5	75%		41-100%
118-79-6	2,4,6-Tribromophenol	85%		42-108%
4165-60-0	Nitrobenzene-d5	65%		40-105%
321-60-8	2-Fluorobiphenyl	68%		43-107%
1718-51-0	Terphenyl-d14	84%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035879.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD01		
Lab Sample ID:	F51154-4	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	66.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035879.D	4	07/27/07	RB	07/27/07	OP21630	SW1858
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	400	100	ug/kg	
208-96-8	Acenaphthylene	ND	400	100	ug/kg	
120-12-7	Anthracene	ND	400	60	ug/kg	
56-55-3	Benzo(a)anthracene	ND	80	20	ug/kg	
50-32-8	Benzo(a)pyrene	ND	80	20	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	80	20	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	80	20	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	80	20	ug/kg	
218-01-9	Chrysene	ND	80	20	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	80	20	ug/kg	
206-44-0	Fluoranthene	ND	400	70	ug/kg	
86-73-7	Fluorene	ND	400	60	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	80	20	ug/kg	
90-12-0	1-Methylnaphthalene	ND	400	60	ug/kg	
91-57-6	2-Methylnaphthalene	ND	400	60	ug/kg	
91-20-3	Naphthalene	ND	400	60	ug/kg	
85-01-8	Phenanthrene	ND	400	60	ug/kg	
129-00-0	Pyrene	ND	400	70	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	76%		40-105%
321-60-8	2-Fluorobiphenyl	82%		43-107%
1718-51-0	Terphenyl-d14	78%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09440.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD02		
Lab Sample ID:	F51154-5	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	59.3
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09440.D	1	07/26/07	NJ	07/25/07	OP21602	SR446
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	1400	560	ug/kg	
95-57-8	2-Chlorophenol	ND	280	56	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	280	56	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	280	56	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	280	56	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1400	560	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	560	110	ug/kg	
95-48-7	2-Methylphenol	ND	280	56	ug/kg	
	3&4-Methylphenol	ND	280	56	ug/kg	
88-75-5	2-Nitrophenol	ND	280	56	ug/kg	
100-02-7	4-Nitrophenol	ND	1400	560	ug/kg	
87-86-5	Pentachlorophenol	ND	1400	560	ug/kg	
108-95-2	Phenol	ND	280	56	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	280	56	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	280	56	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	280	56	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	560	140	ug/kg	
100-51-6	Benzyl Alcohol	ND	280	56	ug/kg	
91-58-7	2-Chloronaphthalene	ND	280	56	ug/kg	
106-47-8	4-Chloroaniline	ND	560	220	ug/kg	
86-74-8	Carbazole	ND	280	56	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	280	56	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	280	110	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	280	56	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	280	56	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	280	56	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	280	56	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	280	56	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	280	110	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	280	110	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	560	280	ug/kg	
132-64-9	Dibenzofuran	ND	280	56	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	AOSD02		
Lab Sample ID:	F51154-5	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	59.3
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	560	140	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	560	280	ug/kg	
84-66-2	Diethyl phthalate	ND	560	140	ug/kg	
131-11-3	Dimethyl phthalate	ND	560	140	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	560	280	ug/kg	
118-74-1	Hexachlorobenzene	ND	280	56	ug/kg	
87-68-3	Hexachlorobutadiene	ND	280	110	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	280	110	ug/kg	
67-72-1	Hexachloroethane	ND	280	110	ug/kg	
78-59-1	Isophorone	ND	280	56	ug/kg	
88-74-4	2-Nitroaniline	ND	560	140	ug/kg	
99-09-2	3-Nitroaniline	ND	560	140	ug/kg	
100-01-6	4-Nitroaniline	ND	560	200	ug/kg	
98-95-3	Nitrobenzene	ND	280	56	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	280	110	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	280	56	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	280	56	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	67%		40-102%
4165-62-2	Phenol-d5	73%		41-100%
118-79-6	2,4,6-Tribromophenol	76%		42-108%
4165-60-0	Nitrobenzene-d5	64%		40-105%
321-60-8	2-Fluorobiphenyl	66%		43-107%
1718-51-0	Terphenyl-d14	72%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035880.D

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Report of Analysis

Client Sample ID:	AOSD02		
Lab Sample ID:	F51154-5	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	59.3
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035880.D	4	07/27/07	RB	07/27/07	OP21630	SW1858
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	450	110	ug/kg	
208-96-8	Acenaphthylene	ND	450	110	ug/kg	
120-12-7	Anthracene	ND	450	67	ug/kg	
56-55-3	Benzo(a)anthracene	ND	90	22	ug/kg	
50-32-8	Benzo(a)pyrene	ND	90	22	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	90	22	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	90	22	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	90	22	ug/kg	
218-01-9	Chrysene	ND	90	22	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	90	22	ug/kg	
206-44-0	Fluoranthene	ND	450	78	ug/kg	
86-73-7	Fluorene	ND	450	67	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	90	22	ug/kg	
90-12-0	1-Methylnaphthalene	ND	450	67	ug/kg	
91-57-6	2-Methylnaphthalene	ND	450	67	ug/kg	
91-20-3	Naphthalene	ND	450	67	ug/kg	
85-01-8	Phenanthrene	ND	450	67	ug/kg	
129-00-0	Pyrene	ND	450	78	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	78%		40-105%
321-60-8	2-Fluorobiphenyl	79%		43-107%
1718-51-0	Terphenyl-d14	81%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: U003668.D

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Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U003668.D	1	07/31/07	NJ	07/24/07	OP21580	SU180
Run #2							

	Initial Volume	Final Volume
Run #1	1030 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND R	24	9.7	ug/l	
95-57-8	2-Chlorophenol	ND	4.9	0.97	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.9	1.9	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.9	0.97	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.9	1.9	ug/l	
51-28-5	2,4-Dinitrophenol	ND	24	9.7	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.7	1.9	ug/l	
95-48-7	2-Methylphenol	ND	4.9	0.97	ug/l	
	3&4-Methylphenol	ND	4.9	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	4.9	0.97	ug/l	
100-02-7	4-Nitrophenol	ND	24	9.7	ug/l	
87-86-5	Pentachlorophenol	ND	24	9.7	ug/l	
108-95-2	Phenol	ND	4.9	1.9	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.9	0.97	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.9	0.97	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.9	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.9	1.9	ug/l	
100-51-6	Benzyl Alcohol	ND	4.9	0.97	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.9	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	4.9	1.9	ug/l	
86-74-8	Carbazole	ND	4.9	0.97	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.9	0.97	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.9	0.97	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.9	0.97	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.9	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.9	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	4.9	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	4.9	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.9	0.97	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.9	0.97	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.7	1.9	ug/l	
132-64-9	Dibenzofuran	ND	4.9	0.97	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	4.9	1.9	ug/l	
117-84-0	Di-n-octyl phthalate	ND	4.9	1.9	ug/l	
84-66-2	Diethyl phthalate	ND	4.9	1.9	ug/l	
131-11-3	Dimethyl phthalate	ND	4.9	1.9	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	4.9	1.9	ug/l	
118-74-1	Hexachlorobenzene	ND	4.9	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	4.9	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.9	1.5	ug/l	
67-72-1	Hexachloroethane	ND	4.9	1.8	ug/l	
78-59-1	Isophorone	ND	4.9	0.97	ug/l	
88-74-4	2-Nitroaniline	ND	9.7	1.9	ug/l	
99-09-2	3-Nitroaniline	ND	9.7	1.9	ug/l	
100-01-6	4-Nitroaniline	ND	9.7	1.9	ug/l	
98-95-3	Nitrobenzene	ND	4.9	0.97	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.9	0.97	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.9	0.97	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	4.9	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	41%		14-62%
4165-62-2	Phenol-d5	28%		10-40%
118-79-6	2,4,6-Tribromophenol	78%		33-118%
4165-60-0	Nitrobenzene-d5	73%		42-108%
321-60-8	2-Fluorobiphenyl	75%		40-106%
1718-51-0	Terphenyl-d14	73%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035903.D	1	07/30/07	RB	07/24/07	OP21581	SW1859
Run #2							

	Initial Volume	Final Volume
Run #1	1030 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.97	0.49	ug/l	
208-96-8	Acenaphthylene	ND	0.97	0.49	ug/l	
120-12-7	Anthracene	ND	0.97	0.49	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.19	0.049	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.19	0.097	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.19	0.049	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.19	0.097	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.19	0.097	ug/l	
218-01-9	Chrysene	ND	0.19	0.097	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.19	0.049	ug/l	
206-44-0	Fluoranthene	ND	0.97	0.24	ug/l	
86-73-7	Fluorene	ND	0.97	0.24	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.19	0.049	ug/l	
90-12-0	1-Methylnaphthalene	ND	0.97	0.24	ug/l	
91-57-6	2-Methylnaphthalene	ND	0.97	0.24	ug/l	
91-20-3	Naphthalene	ND	0.97	0.24	ug/l	
85-01-8	Phenanthrene	ND	0.97	0.49	ug/l	
129-00-0	Pyrene	ND	0.97	0.24	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: U003669.D

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Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U003669.D	1	07/31/07	NJ	07/24/07	OP21580	SU180
Run #2							

	Initial Volume	Final Volume
Run #1	880 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND R	28	11	ug/l	
95-57-8	2-Chlorophenol	ND	5.7	1.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.7	2.3	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.7	1.1	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.7	2.3	ug/l	
51-28-5	2,4-Dinitrophenol	ND	28	11	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	11	2.3	ug/l	
95-48-7	2-Methylphenol	ND	5.7	1.1	ug/l	
	3&4-Methylphenol	ND	5.7	1.5	ug/l	
88-75-5	2-Nitrophenol	ND	5.7	1.1	ug/l	
100-02-7	4-Nitrophenol	ND	28	11	ug/l	
87-86-5	Pentachlorophenol	ND	28	11	ug/l	
108-95-2	Phenol	ND	5.7	2.3	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.7	1.1	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.7	1.1	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.7	1.4	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.7	2.3	ug/l	
100-51-6	Benzyl Alcohol	ND	5.7	1.1	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.7	1.5	ug/l	
106-47-8	4-Chloroaniline	ND	5.7	2.3	ug/l	
86-74-8	Carbazole	ND	5.7	1.1	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.7	1.1	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.7	1.1	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.7	1.1	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.7	1.5	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.7	1.7	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.7	1.8	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.7	1.7	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.7	1.1	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.7	1.1	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	11	2.3	ug/l	
132-64-9	Dibenzofuran	ND	5.7	1.1	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.7	2.3	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.7	2.3	ug/l	
84-66-2	Diethyl phthalate	ND	5.7	2.3	ug/l	
131-11-3	Dimethyl phthalate	ND	5.7	2.3	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.7	2.3	ug/l	
118-74-1	Hexachlorobenzene	ND	5.7	1.4	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.7	1.9	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.7	1.7	ug/l	
67-72-1	Hexachloroethane	ND	5.7	2.2	ug/l	
78-59-1	Isophorone	ND	5.7	1.1	ug/l	
88-74-4	2-Nitroaniline	ND	11	2.3	ug/l	
99-09-2	3-Nitroaniline	ND	11	2.3	ug/l	
100-01-6	4-Nitroaniline	ND	11	2.3	ug/l	
98-95-3	Nitrobenzene	ND	5.7	1.1	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.7	1.1	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.7	1.1	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.7	1.7	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	44%		14-62%
4165-62-2	Phenol-d5	32%		10-40%
118-79-6	2,4,6-Tribromophenol	76%		33-118%
4165-60-0	Nitrobenzene-d5	69%		42-108%
321-60-8	2-Fluorobiphenyl	70%		40-106%
1718-51-0	Terphenyl-d14	79%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035904.D

Form I OW7

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035904.D	1	07/30/07	RB	07/24/07	OP21581	SW1859
Run #2							

	Initial Volume	Final Volume
Run #1	880 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.1	0.57	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.57	ug/l	
120-12-7	Anthracene	ND	1.1	0.57	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.23	0.057	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.23	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.23	0.057	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.23	0.11	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.23	0.11	ug/l	
218-01-9	Chrysene	ND	0.23	0.11	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.23	0.057	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.28	ug/l	
86-73-7	Fluorene	ND	1.1	0.28	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.23	0.057	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-20-3	Naphthalene	ND	1.1	0.28	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.57	ug/l	
129-00-0	Pyrene	ND	1.1	0.28	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: U003670.D

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Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U003670.D	1	07/31/07	NJ	07/24/07	OP21580	SU180
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND R	25	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.0	1.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	1.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.0	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	2.0	ug/l	
95-48-7	2-Methylphenol	ND	5.0	1.0	ug/l	
	3&4-Methylphenol	ND	5.0	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	1.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	10	ug/l	
87-86-5	Pentachlorophenol	ND	25	10	ug/l	
108-95-2	Phenol	ND	5.0	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	1.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	1.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.0	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	2.0	ug/l	
86-74-8	Carbazole	ND	5.0	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	1.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.0	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.0	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.0	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	1.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	1.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	2.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.0	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	1.5	ug/l	
67-72-1	Hexachloroethane	ND	5.0	1.9	ug/l	
78-59-1	Isophorone	ND	5.0	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	10	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	10	2.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	1.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	1.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.0	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	42%		14-62%
4165-62-2	Phenol-d5	28%		10-40%
118-79-6	2,4,6-Tribromophenol	80%		33-118%
4165-60-0	Nitrobenzene-d5	74%		42-108%
321-60-8	2-Fluorobiphenyl	75%		40-106%
1718-51-0	Terphenyl-d14	80%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035905.D

Form I Only

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Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035905.D	1	07/30/07	RB	07/24/07	OP21581	SW1859
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.50	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.50	ug/l	
120-12-7	Anthracene	ND	1.0	0.50	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.050	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.050	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.050	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.25	ug/l	
86-73-7	Fluorene	ND	1.0	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.050	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.25	ug/l	
91-20-3	Naphthalene	ND	1.0	0.25	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.50	ug/l	
129-00-0	Pyrene	ND	1.0	0.25	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09468.D

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Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09468.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	2300	900	ug/kg	
95-57-8	2-Chlorophenol	ND	450	90	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	450	90	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	450	90	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	450	90	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	2300	900	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	900	180	ug/kg	
95-48-7	2-Methylphenol	ND	450	90	ug/kg	
	3&4-Methylphenol	ND	450	90	ug/kg	
88-75-5	2-Nitrophenol	ND	450	90	ug/kg	
100-02-7	4-Nitrophenol	ND	2300	900	ug/kg	
87-86-5	Pentachlorophenol	ND	2300	900	ug/kg	
108-95-2	Phenol	ND	450	90	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	450	90	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	450	90	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	450	90	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	900	230	ug/kg	
100-51-6	Benzyl Alcohol	ND	450	90	ug/kg	
91-58-7	2-Chloronaphthalene	ND	450	90	ug/kg	
106-47-8	4-Chloroaniline	ND	900	360	ug/kg	
86-74-8	Carbazole	ND	450	90	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	450	90	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	450	180	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	450	90	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	450	90	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	450	90	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	450	90	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	450	90	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	450	180	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	450	180	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	900	450	ug/kg	
132-64-9	Dibenzofuran	ND	450	90	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	900	230	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	900	450	ug/kg	
84-66-2	Diethyl phthalate	ND	900	230	ug/kg	
131-11-3	Dimethyl phthalate	ND	900	230	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	900	450	ug/kg	
118-74-1	Hexachlorobenzene	ND	450	90	ug/kg	
87-68-3	Hexachlorobutadiene	ND	450	180	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	450	180	ug/kg	
67-72-1	Hexachloroethane	ND	450	180	ug/kg	
78-59-1	Isophorone	ND	450	90	ug/kg	
88-74-4	2-Nitroaniline	ND	900	230	ug/kg	
99-09-2	3-Nitroaniline	ND	900	230	ug/kg	
100-01-6	4-Nitroaniline	ND	900	320	ug/kg	
98-95-3	Nitrobenzene	ND	450	90	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	450	180	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	450	90	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	450	90	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	47%		40-102%
4165-62-2	Phenol-d5	53%		41-100%
118-79-6	2,4,6-Tribromophenol	55%		42-108%
4165-60-0	Nitrobenzene-d5	44%		40-105%
321-60-8	2-Fluorobiphenyl	49%		43-107%
1718-51-0	Terphenyl-d14	57%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035942.D

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Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035942.D	4	07/31/07	RB	07/27/07	OP21636	SW1861
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	720	180	ug/kg	
208-96-8	Acenaphthylene	ND	720	180	ug/kg	
120-12-7	Anthracene	ND	720	110	ug/kg	
56-55-3	Benzo(a)anthracene	50.9 J	140	36	ug/kg	J
50-32-8	Benzo(a)pyrene	72.0 J	140	36	ug/kg	J
205-99-2	Benzo(b)fluoranthene	120 J	140	36	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	62.2 J	140	36	ug/kg	J
207-08-9	Benzo(k)fluoranthene	66.9 J	140	36	ug/kg	J
218-01-9	Chrysene	98.2 J	140	36	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	140	36	ug/kg	
206-44-0	Fluoranthene	174 J	720	130	ug/kg	J
86-73-7	Fluorene	ND	720	110	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	67.1 J	140	36	ug/kg	J
90-12-0	1-Methylnaphthalene	ND	720	110	ug/kg	
91-57-6	2-Methylnaphthalene	ND	720	110	ug/kg	
91-20-3	Naphthalene	ND	720	110	ug/kg	
85-01-8	Phenanthrene	ND	720	110	ug/kg	
129-00-0	Pyrene	135 J	720	130	ug/kg	J

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09469.D

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Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09469.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	1000	400	ug/kg	
95-57-8	2-Chlorophenol	ND	200	40	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	200	40	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	200	40	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	200	40	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1000	400	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	400	81	ug/kg	
95-48-7	2-Methylphenol	ND	200	40	ug/kg	
	3&4-Methylphenol	ND	200	40	ug/kg	
88-75-5	2-Nitrophenol	ND	200	40	ug/kg	
100-02-7	4-Nitrophenol	ND	1000	400	ug/kg	
87-86-5	Pentachlorophenol	ND	1000	400	ug/kg	
108-95-2	Phenol	ND	200	40	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	200	40	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	200	40	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	200	40	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	400	100	ug/kg	
100-51-6	Benzyl Alcohol	ND	200	40	ug/kg	
91-58-7	2-Chloronaphthalene	ND	200	40	ug/kg	
106-47-8	4-Chloroaniline	ND	400	160	ug/kg	
86-74-8	Carbazole	ND	200	40	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	200	40	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	200	81	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	200	40	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	200	40	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	200	40	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	200	40	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	200	40	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	200	81	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	200	81	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	400	200	ug/kg	
132-64-9	Dibenzofuran	ND	200	40	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	400	100	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	400	200	ug/kg	
84-66-2	Diethyl phthalate	ND	400	100	ug/kg	
131-11-3	Dimethyl phthalate	ND	400	100	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	400	200	ug/kg	
118-74-1	Hexachlorobenzene	ND	200	40	ug/kg	
87-68-3	Hexachlorobutadiene	ND	200	81	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	200	81	ug/kg	
67-72-1	Hexachloroethane	ND	200	81	ug/kg	
78-59-1	Isophorone	ND	200	40	ug/kg	
88-74-4	2-Nitroaniline	ND	400	100	ug/kg	
99-09-2	3-Nitroaniline	ND	400	100	ug/kg	
100-01-6	4-Nitroaniline	ND	400	140	ug/kg	
98-95-3	Nitrobenzene	ND	200	40	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	200	81	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	200	40	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	200	40	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	66%		40-102%
4165-62-2	Phenol-d5	73%		41-100%
118-79-6	2,4,6-Tribromophenol	72%		42-108%
4165-60-0	Nitrobenzene-d5	60%		40-105%
321-60-8	2-Fluorobiphenyl	62%		43-107%
1718-51-0	Terphenyl-d14	76%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035943.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035943.D	4	07/31/07	RB	07/27/07	OP21636	SW1861
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	320	81	ug/kg	
208-96-8	Acenaphthylene	ND	320	81	ug/kg	
120-12-7	Anthracene	ND	320	49	ug/kg	
56-55-3	Benzo(a)anthracene	17.4 L	65	16	ug/kg	J
50-32-8	Benzo(a)pyrene	22.9 L	65	16	ug/kg	J
205-99-2	Benzo(b)fluoranthene	40.2 L	65	16	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	20.0 L	65	16	ug/kg	J
207-08-9	Benzo(k)fluoranthene	24.2 L	65	16	ug/kg	J
218-01-9	Chrysene	34.0 L	65	16	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	65	16	ug/kg	
206-44-0	Fluoranthene	ND	320	57	ug/kg	
86-73-7	Fluorene	ND	320	49	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	21.0 L	65	16	ug/kg	J
90-12-0	1-Methylnaphthalene	ND	320	49	ug/kg	
91-57-6	2-Methylnaphthalene	ND	320	49	ug/kg	
91-20-3	Naphthalene	ND	320	49	ug/kg	
85-01-8	Phenanthrene	ND	320	49	ug/kg	
129-00-0	Pyrene	ND	320	57	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09470.D

Run 1 only

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09470.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.4 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	1000	420	ug/kg	
95-57-8	2-Chlorophenol	ND	210	42	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	210	42	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	210	42	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	210	42	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1000	420	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	420	83	ug/kg	
95-48-7	2-Methylphenol	ND	210	42	ug/kg	
	3&4-Methylphenol	ND	210	42	ug/kg	
88-75-5	2-Nitrophenol	ND	210	42	ug/kg	
100-02-7	4-Nitrophenol	ND	1000	420	ug/kg	
87-86-5	Pentachlorophenol	ND	1000	420	ug/kg	
108-95-2	Phenol	ND	210	42	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	210	42	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	210	42	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	210	42	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	420	100	ug/kg	
100-51-6	Benzyl Alcohol	ND	210	42	ug/kg	
91-58-7	2-Chloronaphthalene	ND	210	42	ug/kg	
106-47-8	4-Chloroaniline	ND	420	170	ug/kg	
86-74-8	Carbazole	ND	210	42	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	210	42	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	210	83	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	210	42	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	210	42	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	210	42	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	210	42	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	210	42	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	210	83	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	210	83	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	420	210	ug/kg	
132-64-9	Dibenzofuran	ND	210	42	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	420	100	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	420	210	ug/kg	
84-66-2	Diethyl phthalate	ND	420	100	ug/kg	
131-11-3	Dimethyl phthalate	ND	420	100	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	420	210	ug/kg	
118-74-1	Hexachlorobenzene	ND	210	42	ug/kg	
87-68-3	Hexachlorobutadiene	ND	210	83	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	210	83	ug/kg	
67-72-1	Hexachloroethane	ND	210	83	ug/kg	
78-59-1	Isophorone	ND	210	42	ug/kg	
88-74-4	2-Nitroaniline	ND	420	100	ug/kg	
99-09-2	3-Nitroaniline	ND	420	100	ug/kg	
100-01-6	4-Nitroaniline	ND	420	150	ug/kg	
98-95-3	Nitrobenzene	ND	210	42	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	210	83	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	210	42	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	210	42	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	68%		40-102%
4165-62-2	Phenol-d5	77%		41-100%
118-79-6	2,4,6-Tribromophenol	80%		42-108%
4165-60-0	Nitrobenzene-d5	64%		40-105%
321-60-8	2-Fluorobiphenyl	69%		43-107%
1718-51-0	Terphenyl-d14	81%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035973.D

Form I COM

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035973.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.4 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	330	83	ug/kg	
208-96-8	Acenaphthylene	ND	330	83	ug/kg	
120-12-7	Anthracene	ND	330	50	ug/kg	
56-55-3	Benzo(a)anthracene	46.3 J	66	17	ug/kg	J
50-32-8	Benzo(a)pyrene	67.3	66	17	ug/kg	
205-99-2	Benzo(b)fluoranthene	113	66	17	ug/kg	
191-24-2	Benzo(g,h,i)perylene	53.9 J	66	17	ug/kg	J
207-08-9	Benzo(k)fluoranthene	64.7 J	66	17	ug/kg	J
218-01-9	Chrysene	90.1	66	17	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	66	17	ug/kg	
206-44-0	Fluoranthene	154 J	330	58	ug/kg	J
86-73-7	Fluorene	ND	330	50	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	57.2 J	66	17	ug/kg	J
90-12-0	1-Methylnaphthalene	ND	330	50	ug/kg	
91-57-6	2-Methylnaphthalene	ND	330	50	ug/kg	
91-20-3	Naphthalene	ND	330	50	ug/kg	
85-01-8	Phenanthrene	60.2 J	330	50	ug/kg	J
129-00-0	Pyrene	141 J	330	58	ug/kg	J

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09471.D

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Report of Analysis

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Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09471.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	1400	570	ug/kg	
95-57-8	2-Chlorophenol	ND	290	57	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	290	57	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	290	57	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	290	57	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1400	570	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	570	110	ug/kg	
95-48-7	2-Methylphenol	ND	290	57	ug/kg	
	3&4-Methylphenol	ND	290	57	ug/kg	
88-75-5	2-Nitrophenol	ND	290	57	ug/kg	
100-02-7	4-Nitrophenol	ND	1400	570	ug/kg	
87-86-5	Pentachlorophenol	ND	1400	570	ug/kg	
108-95-2	Phenol	ND	290	57	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	290	57	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	290	57	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	290	57	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	570	140	ug/kg	
100-51-6	Benzyl Alcohol	ND	290	57	ug/kg	
91-58-7	2-Chloronaphthalene	ND	290	57	ug/kg	
106-47-8	4-Chloroaniline	ND	570	230	ug/kg	
86-74-8	Carbazole	ND	290	57	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	290	57	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	290	110	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	290	57	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	290	57	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	290	57	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	290	57	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	290	57	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	290	110	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	290	110	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	570	290	ug/kg	
132-64-9	Dibenzofuran	ND	290	57	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	570	140	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	570	290	ug/kg	
84-66-2	Diethyl phthalate	ND	570	140	ug/kg	
131-11-3	Dimethyl phthalate	ND	570	140	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	570	290	ug/kg	
118-74-1	Hexachlorobenzene	ND	290	57	ug/kg	
87-68-3	Hexachlorobutadiene	ND	290	110	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	290	110	ug/kg	
67-72-1	Hexachloroethane	ND	290	110	ug/kg	
78-59-1	Isophorone	ND	290	57	ug/kg	
88-74-4	2-Nitroaniline	ND	570	140	ug/kg	
99-09-2	3-Nitroaniline	ND	570	140	ug/kg	
100-01-6	4-Nitroaniline	ND	570	200	ug/kg	
98-95-3	Nitrobenzene	ND	290	57	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	290	110	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	290	57	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	290	57	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	66%		40-102%
4165-62-2	Phenol-d5	74%		41-100%
118-79-6	2,4,6-Tribromophenol	76%		42-108%
4165-60-0	Nitrobenzene-d5	61%		40-105%
321-60-8	2-Fluorobiphenyl	66%		43-107%
1718-51-0	Terphenyl-d14	76%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035974.D

Form I OR

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Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035974.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	460	110	ug/kg	
208-96-8	Acenaphthylene	ND	460	110	ug/kg	
120-12-7	Anthracene	ND	460	69	ug/kg	
56-55-3	Benzo(a)anthracene	29.0 J	92	23	ug/kg	J
50-32-8	Benzo(a)pyrene	31.9 J	92	23	ug/kg	J
205-99-2	Benzo(b)fluoranthene	45.6 J	92	23	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	ND	92	23	ug/kg	
207-08-9	Benzo(k)fluoranthene	31.2 J	92	23	ug/kg	J
218-01-9	Chrysene	43.0 J	92	23	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	92	23	ug/kg	
206-44-0	Fluoranthene	ND	460	80	ug/kg	
86-73-7	Fluorene	ND	460	69	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	92	23	ug/kg	
90-12-0	1-Methylnaphthalene	ND	460	69	ug/kg	
91-57-6	2-Methylnaphthalene	ND	460	69	ug/kg	
91-20-3	Naphthalene	ND	460	69	ug/kg	
85-01-8	Phenanthrene	ND	460	69	ug/kg	
129-00-0	Pyrene	ND	460	80	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09472.D

Form I Cor

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSD01		
Lab Sample ID:	F51154-16	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	65.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09472.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.9 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	1200	500	ug/kg	
95-57-8	2-Chlorophenol	ND	250	50	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	250	50	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	250	50	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	250	50	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1200	500	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	500	100	ug/kg	
95-48-7	2-Methylphenol	ND	250	50	ug/kg	
	3&4-Methylphenol	ND	250	50	ug/kg	
88-75-5	2-Nitrophenol	ND	250	50	ug/kg	
100-02-7	4-Nitrophenol	ND	1200	500	ug/kg	
87-86-5	Pentachlorophenol	ND	1200	500	ug/kg	
108-95-2	Phenol	ND	250	50	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	250	50	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	250	50	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	250	50	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	500	120	ug/kg	
100-51-6	Benzyl Alcohol	ND	250	50	ug/kg	
91-58-7	2-Chloronaphthalene	ND	250	50	ug/kg	
106-47-8	4-Chloroaniline	ND	500	200	ug/kg	
86-74-8	Carbazole	ND	250	50	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	250	50	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	250	100	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	250	50	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	250	50	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	250	50	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	250	50	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	250	50	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	250	100	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	250	100	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	500	250	ug/kg	
132-64-9	Dibenzofuran	ND	250	50	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OR1

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Report of Analysis

Client Sample ID:	TMSD01		
Lab Sample ID:	F51154-16	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	65.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	500	120	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	500	250	ug/kg	
84-66-2	Diethyl phthalate	ND	500	120	ug/kg	
131-11-3	Dimethyl phthalate	ND	500	120	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	500	250	ug/kg	
118-74-1	Hexachlorobenzene	ND	250	50	ug/kg	
87-68-3	Hexachlorobutadiene	ND	250	100	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	250	100	ug/kg	
67-72-1	Hexachloroethane	ND	250	100	ug/kg	
78-59-1	Isophorone	ND	250	50	ug/kg	
88-74-4	2-Nitroaniline	ND	500	120	ug/kg	
99-09-2	3-Nitroaniline	ND	500	120	ug/kg	
100-01-6	4-Nitroaniline	ND	500	170	ug/kg	
98-95-3	Nitrobenzene	ND	250	50	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	250	100	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	250	50	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	250	50	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	47%		40-102%
4165-62-2	Phenol-d5	51%		41-100%
118-79-6	2,4,6-Tribromophenol	54%		42-108%
4165-60-0	Nitrobenzene-d5	44%		40-105%
321-60-8	2-Fluorobiphenyl	46%		43-107%
1718-51-0	Terphenyl-d14	54%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSD01		
Lab Sample ID:	F51154-16	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	65.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035975.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.9 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	400	100	ug/kg	
208-96-8	Acenaphthylene	ND	400	100	ug/kg	
120-12-7	Anthracene	ND	400	60	ug/kg	
56-55-3	Benzo(a)anthracene	26.2 J	80	20	ug/kg	J
50-32-8	Benzo(a)pyrene	27.9 J	80	20	ug/kg	J
205-99-2	Benzo(b)fluoranthene	37.5 J	80	20	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	20.8 J	80	20	ug/kg	J
207-08-9	Benzo(k)fluoranthene	26.9 J	80	20	ug/kg	J
218-01-9	Chrysene	32.8 J	80	20	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	80	20	ug/kg	
206-44-0	Fluoranthene	ND	400	70	ug/kg	
86-73-7	Fluorene	ND	400	60	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	20.2 J	80	20	ug/kg	J
90-12-0	1-Methylnaphthalene	ND	400	60	ug/kg	
91-57-6	2-Methylnaphthalene	ND	400	60	ug/kg	
91-20-3	Naphthalene	ND	400	60	ug/kg	
85-01-8	Phenanthrene	ND	400	60	ug/kg	
129-00-0	Pyrene	ND	400	70	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L037535.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L037535.D	1	07/31/07	RB	07/26/07	OP21610	SL1920
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	9.8	ug/l	
95-57-8	2-Chlorophenol	ND	4.9	0.98	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.9	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.9	0.98	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.9	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	9.8	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.8	2.0	ug/l	
95-48-7	2-Methylphenol	ND	4.9	0.98	ug/l	
	3&4-Methylphenol	ND	4.9	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	4.9	0.98	ug/l	
100-02-7	4-Nitrophenol	ND	25	9.8	ug/l	
87-86-5	Pentachlorophenol	ND	25	9.8	ug/l	
108-95-2	Phenol	ND	4.9	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.9	0.98	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.9	0.98	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.9	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.9	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	4.9	0.98	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.9	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	4.9	2.0	ug/l	
86-74-8	Carbazole	ND	4.9	0.98	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.9	0.98	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.9	0.98	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.9	0.98	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.9	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.9	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	4.9	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	4.9	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.9	0.98	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.9	0.98	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.8	2.0	ug/l	
132-64-9	Dibenzofuran	ND	4.9	0.98	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form 1 only

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	4.9	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	4.9	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	4.9	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	4.9	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	4.9	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	4.9	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	4.9	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.9	1.5	ug/l	
67-72-1	Hexachloroethane	ND	4.9	1.9	ug/l	
78-59-1	Isophorone	ND	4.9	0.98	ug/l	
88-74-4	2-Nitroaniline	ND	9.8	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	9.8	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	9.8	2.0	ug/l	
98-95-3	Nitrobenzene	ND	4.9	0.98	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.9	0.98	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.9	0.98	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	4.9	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	46%		14-62%
4165-62-2	Phenol-d5	32%		10-40%
118-79-6	2,4,6-Tribromophenol	80%		33-118%
4165-60-0	Nitrobenzene-d5	79%		42-108%
321-60-8	2-Fluorobiphenyl	79%		40-106%
1718-51-0	Terphenyl-d14	76%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035923.D

Form I GC/MS

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035923.D	1	07/31/07	RB	07/26/07	OP21611	SW1860
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result		RL	MDL	Units	Q
83-32-9	Acenaphthene	ND		0.98	0.49	ug/l	
208-96-8	Acenaphthylene	ND		0.98	0.49	ug/l	
120-12-7	Anthracene	ND		0.98	0.49	ug/l	
56-55-3	Benzo(a)anthracene	ND		0.20	0.049	ug/l	
50-32-8	Benzo(a)pyrene	ND		0.20	0.098	ug/l	
205-99-2	Benzo(b)fluoranthene	ND		0.20	0.049	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND		0.20	0.098	ug/l	
207-08-9	Benzo(k)fluoranthene	ND		0.20	0.098	ug/l	
218-01-9	Chrysene	ND		0.20	0.098	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND		0.20	0.049	ug/l	
206-44-0	Fluoranthene	ND		0.98	0.25	ug/l	
86-73-7	Fluorene	ND		0.98	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND		0.20	0.049	ug/l	
90-12-0	1-Methylnaphthalene	ND	VL	0.98	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	VL	0.98	0.25	ug/l	
91-20-3	Naphthalene	ND		0.98	0.25	ug/l	
85-01-8	Phenanthrene	ND		0.98	0.49	ug/l	
129-00-0	Pyrene	ND		0.98	0.25	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09473.D

For I COA

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09473.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	940	380	ug/kg	
95-57-8	2-Chlorophenol	ND	190	38	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	38	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	38	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	38	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	940	380	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	380	75	ug/kg	
95-48-7	2-Methylphenol	ND	190	38	ug/kg	
	3&4-Methylphenol	ND	190	38	ug/kg	
88-75-5	2-Nitrophenol	ND	190	38	ug/kg	
100-02-7	4-Nitrophenol	ND	940	380	ug/kg	
87-86-5	Pentachlorophenol	ND	940	380	ug/kg	
108-95-2	Phenol	ND	190	38	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	38	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	38	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	38	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	380	94	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	38	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	38	ug/kg	
106-47-8	4-Chloroaniline	ND	380	150	ug/kg	
86-74-8	Carbazole	ND	190	38	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	38	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	75	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	38	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	38	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	38	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND VL	190	38	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND VL	190	38	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	75	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	75	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND VL	380	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	38	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	380	94	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	380	190	ug/kg	
84-66-2	Diethyl phthalate	ND	380	94	ug/kg	
131-11-3	Dimethyl phthalate	ND	380	94	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	380	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	38	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	75	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND VL	190	75	ug/kg	
67-72-1	Hexachloroethane	ND VL	190	75	ug/kg	
78-59-1	Isophorone	ND	190	38	ug/kg	
88-74-4	2-Nitroaniline	ND	380	94	ug/kg	
99-09-2	3-Nitroaniline	ND	380	94	ug/kg	
100-01-6	4-Nitroaniline	ND	380	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	38	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	75	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	38	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	38	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	66%		40-102%
4165-62-2	Phenol-d5	71%		41-100%
118-79-6	2,4,6-Tribromophenol	66%		42-108%
4165-60-0	Nitrobenzene-d5	59%		40-105%
321-60-8	2-Fluorobiphenyl	60%		43-107%
1718-51-0	Terphenyl-d14	64%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035976.D

Form I OM

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035976.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	300	75	ug/kg	
208-96-8	Acenaphthylene	ND	300	75	ug/kg	
120-12-7	Anthracene	ND	300	45	ug/kg	
56-55-3	Benzo(a)anthracene	16.2 J	60	15	ug/kg	J
50-32-8	Benzo(a)pyrene	18.0 J	60	15	ug/kg	J
205-99-2	Benzo(b)fluoranthene	24.7 J	60	15	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	15.1 J	60	15	ug/kg	J
207-08-9	Benzo(k)fluoranthene	15.2 J	60	15	ug/kg	J
218-01-9	Chrysene	21.1 J	60	15	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	60	15	ug/kg	
206-44-0	Fluoranthene	ND	300	53	ug/kg	
86-73-7	Fluorene	ND	300	45	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	15.1 J	60	15	ug/kg	J
90-12-0	1-Methylnaphthalene	ND	300	45	ug/kg	
91-57-6	2-Methylnaphthalene	ND	300	45	ug/kg	
91-20-3	Naphthalene	ND	300	45	ug/kg	
85-01-8	Phenanthrene	ND	300	45	ug/kg	
129-00-0	Pyrene	ND	300	53	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09476.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	950	380	ug/kg	
95-57-8	2-Chlorophenol	ND	190	38	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	38	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	38	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	38	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	950	380	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	380	76	ug/kg	
95-48-7	2-Methylphenol	ND	190	38	ug/kg	
	3&4-Methylphenol	ND	190	38	ug/kg	
88-75-5	2-Nitrophenol	ND	190	38	ug/kg	
100-02-7	4-Nitrophenol	ND	950	380	ug/kg	
87-86-5	Pentachlorophenol	ND	950	380	ug/kg	
108-95-2	Phenol	ND	190	38	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	38	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	38	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	38	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	380	95	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	38	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	38	ug/kg	
106-47-8	4-Chloroaniline	ND	380	150	ug/kg	
86-74-8	Carbazole	ND	190	38	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	38	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	76	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	38	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	38	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	38	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	190	38	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	190	38	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	76	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	76	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	380	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	38	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	380	95	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	380	190	ug/kg	
84-66-2	Diethyl phthalate	ND	380	95	ug/kg	
131-11-3	Dimethyl phthalate	ND	380	95	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	380	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	38	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	76	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	190	76	ug/kg	
67-72-1	Hexachloroethane	ND	190	76	ug/kg	
78-59-1	Isophorone	ND	190	38	ug/kg	
88-74-4	2-Nitroaniline	ND	380	95	ug/kg	
99-09-2	3-Nitroaniline	ND	380	95	ug/kg	
100-01-6	4-Nitroaniline	ND	380	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	38	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	76	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	38	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	38	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	67%		40-102%
4165-62-2	Phenol-d5	72%		41-100%
118-79-6	2,4,6-Tribromophenol	70%		42-108%
4165-60-0	Nitrobenzene-d5	64%		40-105%
321-60-8	2-Fluorobiphenyl	63%		43-107%
1718-51-0	Terphenyl-d14	82%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035977.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035977.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	310	76	ug/kg	
208-96-8	Acenaphthylene	ND	310	76	ug/kg	
120-12-7	Anthracene	ND	310	46	ug/kg	
56-55-3	Benzo(a)anthracene	ND	61	15	ug/kg	
50-32-8	Benzo(a)pyrene	ND	61	15	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	61	15	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	61	15	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	61	15	ug/kg	
218-01-9	Chrysene	ND	61	15	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	61	15	ug/kg	
206-44-0	Fluoranthene	ND	310	53	ug/kg	
86-73-7	Fluorene	ND	310	46	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	61	15	ug/kg	
90-12-0	1-Methylnaphthalene	ND	310	46	ug/kg	
91-57-6	2-Methylnaphthalene	ND	310	46	ug/kg	
91-20-3	Naphthalene	ND	310	46	ug/kg	
85-01-8	Phenanthrene	ND	310	46	ug/kg	
129-00-0	Pyrene	ND	310	53	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09477.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	930	370	ug/kg	
95-57-8	2-Chlorophenol	ND	190	37	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	37	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	37	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	37	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	930	370	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	370	74	ug/kg	
95-48-7	2-Methylphenol	ND	190	37	ug/kg	
	3&4-Methylphenol	ND	190	37	ug/kg	
88-75-5	2-Nitrophenol	ND	190	37	ug/kg	
100-02-7	4-Nitrophenol	ND	930	370	ug/kg	
87-86-5	Pentachlorophenol	ND	930	370	ug/kg	
108-95-2	Phenol	ND	190	37	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	37	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	37	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	37	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	370	93	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	37	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	37	ug/kg	
106-47-8	4-Chloroaniline	ND	370	150	ug/kg	
86-74-8	Carbazole	ND	190	37	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	37	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	74	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	37	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	37	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	37	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	190	37	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	190	37	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	74	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	74	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	370	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	37	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	123 J	370	93	ug/kg	J
117-84-0	Di-n-octyl phthalate	ND	370	190	ug/kg	
84-66-2	Diethyl phthalate	ND	370	93	ug/kg	
131-11-3	Dimethyl phthalate	ND	370	93	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	370	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	37	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	74	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	190	74	ug/kg	
67-72-1	Hexachloroethane	ND	190	74	ug/kg	
78-59-1	Isophorone	ND	190	37	ug/kg	
88-74-4	2-Nitroaniline	ND	370	93	ug/kg	
99-09-2	3-Nitroaniline	ND	370	93	ug/kg	
100-01-6	4-Nitroaniline	ND	370	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	37	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	74	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	37	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	37	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	69%		40-102%
4165-62-2	Phenol-d5	79%		41-100%
118-79-6	2,4,6-Tribromophenol	79%		42-108%
4165-60-0	Nitrobenzene-d5	66%		40-105%
321-60-8	2-Fluorobiphenyl	74%		43-107%
1718-51-0	Terphenyl-d14	77%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035978.D

Form I Cpy

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035978.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	300	74	ug/kg	
208-96-8	Acenaphthylene	ND	300	74	ug/kg	
120-12-7	Anthracene	ND	300	45	ug/kg	
56-55-3	Benzo(a)anthracene	ND	60	15	ug/kg	
50-32-8	Benzo(a)pyrene	ND	60	15	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	60	15	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	60	15	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	60	15	ug/kg	
218-01-9	Chrysene	17.1 J	60	15	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	60	15	ug/kg	
206-44-0	Fluoranthene	ND	300	52	ug/kg	
86-73-7	Fluorene	ND	300	45	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	60	15	ug/kg	
90-12-0	1-Methylnaphthalene	65.4 J	300	45	ug/kg	J
91-57-6	2-Methylnaphthalene	117 J	300	45	ug/kg	J
91-20-3	Naphthalene	ND	300	45	ug/kg	
85-01-8	Phenanthrene	75.1 J	300	45	ug/kg	J
129-00-0	Pyrene	ND	300	52	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09478.D U003771.D

Run 1 OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	R09478.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2 [b]	U003771.D	1	08/06/07	NJ	08/03/07	OP21735	SU184

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2	30.0 g	1.0 ml

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	910	360	ug/kg	
95-57-8	2-Chlorophenol	ND	180	36	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	180	36	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	180	36	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	180	36	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	910	360	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	360	72	ug/kg	
95-48-7	2-Methylphenol	ND	180	36	ug/kg	
	3&4-Methylphenol	ND	180	36	ug/kg	
88-75-5	2-Nitrophenol	ND	180	36	ug/kg	
100-02-7	4-Nitrophenol	ND	910	360	ug/kg	
87-86-5	Pentachlorophenol	ND	910	360	ug/kg	
108-95-2	Phenol	ND	180	36	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	180	36	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	180	36	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	180	36	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	360	91	ug/kg	
100-51-6	Benzyl Alcohol	ND	180	36	ug/kg	
91-58-7	2-Chloronaphthalene	ND	180	36	ug/kg	
106-47-8	4-Chloroaniline	ND	360	140	ug/kg	
86-74-8	Carbazole	ND	180	36	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	180	36	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	180	72	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	180	36	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	180	36	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	180	36	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	180	36	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	180	36	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	180	72	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	180	72	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	360	180	ug/kg	
132-64-9	Dibenzofuran	ND	180	36	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	128 J	360	91	ug/kg	J
117-84-0	Di-n-octyl phthalate	ND	360	180	ug/kg	
84-66-2	Diethyl phthalate	ND	360	91	ug/kg	
131-11-3	Dimethyl phthalate	ND	360	91	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	360	180	ug/kg	
118-74-1	Hexachlorobenzene	ND	180	36	ug/kg	
87-68-3	Hexachlorobutadiene	ND	180	72	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	180	72	ug/kg	
67-72-1	Hexachloroethane	ND	180	72	ug/kg	
78-59-1	Isophorone	ND	180	36	ug/kg	
88-74-4	2-Nitroaniline	ND	360	91	ug/kg	
99-09-2	3-Nitroaniline	ND	360	91	ug/kg	
100-01-6	4-Nitroaniline	ND	360	130	ug/kg	
98-95-3	Nitrobenzene	ND	180	36	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	180	72	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	180	36	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	180	36	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	45%	53%	40-102%
4165-62-2	Phenol-d5	48%	62%	41-100%
118-79-6	2,4,6-Tribromophenol	41%	59%	42-108%
4165-60-0	Nitrobenzene-d5	50%	56%	40-105%
321-60-8	2-Fluorobiphenyl	49%	60%	43-107%
1718-51-0	Terphenyl-d14	51%	64%	45-119%

(a) All hits confirmed by re-extraction and reanalysis beyond holdtime.
(b) Confirmation run.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OM

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035979.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	290	72	ug/kg	
208-96-8	Acenaphthylene	ND	290	72	ug/kg	
120-12-7	Anthracene	ND	290	43	ug/kg	
56-55-3	Benzo(a)anthracene	ND	58	14	ug/kg	
50-32-8	Benzo(a)pyrene	ND	58	14	ug/kg	
205-99-2	Benzo(b)fluoranthene	21.1 J	58	14	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	ND	58	14	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	58	14	ug/kg	
218-01-9	Chrysene	22.9 J	58	14	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	58	14	ug/kg	
206-44-0	Fluoranthene	ND	290	51	ug/kg	
86-73-7	Fluorene	ND	290	43	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	58	14	ug/kg	
90-12-0	1-Methylnaphthalene	49.5 J	290	43	ug/kg	J
91-57-6	2-Methylnaphthalene	60.7 J	290	43	ug/kg	J
91-20-3	Naphthalene	ND	290	43	ug/kg	
85-01-8	Phenanthrene	60.9 J	290	43	ug/kg	J
129-00-0	Pyrene	ND	290	51	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09479.D

Form I OM

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09479.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	950	380	ug/kg	
95-57-8	2-Chlorophenol	ND	190	38	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	38	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	38	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	38	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	950	380	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	380	76	ug/kg	
95-48-7	2-Methylphenol	ND	190	38	ug/kg	
	3&4-Methylphenol	ND	190	38	ug/kg	
88-75-5	2-Nitrophenol	ND	190	38	ug/kg	
100-02-7	4-Nitrophenol	ND	950	380	ug/kg	
87-86-5	Pentachlorophenol	ND	950	380	ug/kg	
108-95-2	Phenol	ND	190	38	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	38	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	38	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	38	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	380	95	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	38	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	38	ug/kg	
106-47-8	4-Chloroaniline	ND	380	150	ug/kg	
86-74-8	Carbazole	ND	190	38	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	38	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	76	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	38	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	38	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	38	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	190	38	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	190	38	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	76	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	76	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	380	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	38	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	380	95	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	380	190	ug/kg	
84-66-2	Diethyl phthalate	ND	380	95	ug/kg	
131-11-3	Dimethyl phthalate	ND	380	95	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	380	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	38	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	76	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	190	76	ug/kg	
67-72-1	Hexachloroethane	ND	190	76	ug/kg	
78-59-1	Isophorone	ND	190	38	ug/kg	
88-74-4	2-Nitroaniline	ND	380	95	ug/kg	
99-09-2	3-Nitroaniline	ND	380	95	ug/kg	
100-01-6	4-Nitroaniline	ND	380	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	38	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	76	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	38	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	38	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	73%		40-102%
4165-62-2	Phenol-d5	78%		41-100%
118-79-6	2,4,6-Tribromophenol	82%		42-108%
4165-60-0	Nitrobenzene-d5	69%		40-105%
321-60-8	2-Fluorobiphenyl	70%		43-107%
1718-51-0	Terphenyl-d14	83%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035980.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035980.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	300	76	ug/kg	
208-96-8	Acenaphthylene	ND	300	76	ug/kg	
120-12-7	Anthracene	ND	300	46	ug/kg	
56-55-3	Benzo(a)anthracene	ND	61	15	ug/kg	
50-32-8	Benzo(a)pyrene	ND	61	15	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	61	15	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	61	15	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	61	15	ug/kg	
218-01-9	Chrysene	ND	61	15	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	61	15	ug/kg	
206-44-0	Fluoranthene	ND	300	53	ug/kg	
86-73-7	Fluorene	ND	300	46	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	61	15	ug/kg	
90-12-0	1-Methylnaphthalene	ND	300	46	ug/kg	
91-57-6	2-Methylnaphthalene	ND	300	46	ug/kg	
91-20-3	Naphthalene	ND	300	46	ug/kg	
85-01-8	Phenanthrene	ND	300	46	ug/kg	
129-00-0	Pyrene	ND	300	53	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09480.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09480.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.6 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	950	380	ug/kg	
95-57-8	2-Chlorophenol	ND	190	38	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	38	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	38	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	38	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	950	380	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	380	76	ug/kg	
95-48-7	2-Methylphenol	ND	190	38	ug/kg	
	3&4-Methylphenol	ND	190	38	ug/kg	
88-75-5	2-Nitrophenol	ND	190	38	ug/kg	
100-02-7	4-Nitrophenol	ND	950	380	ug/kg	
87-86-5	Pentachlorophenol	ND	950	380	ug/kg	
108-95-2	Phenol	ND	190	38	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	38	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	38	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	38	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	380	95	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	38	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	38	ug/kg	
106-47-8	4-Chloroaniline	ND	380	150	ug/kg	
86-74-8	Carbazole	ND	190	38	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	38	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	76	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	38	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	38	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	38	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	190	38	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	190	38	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	76	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	76	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	380	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	38	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	380	95	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	380	190	ug/kg	
84-66-2	Diethyl phthalate	ND	380	95	ug/kg	
131-11-3	Dimethyl phthalate	ND	380	95	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	380	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	38	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	76	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	190	76	ug/kg	
67-72-1	Hexachloroethane	ND	190	76	ug/kg	
78-59-1	Isophorone	ND	190	38	ug/kg	
88-74-4	2-Nitroaniline	ND	380	95	ug/kg	
99-09-2	3-Nitroaniline	ND	380	95	ug/kg	
100-01-6	4-Nitroaniline	ND	380	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	38	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	76	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	38	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	38	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	64%		40-102%
4165-62-2	Phenol-d5	69%		41-100%
118-79-6	2,4,6-Tribromophenol	66%		42-108%
4165-60-0	Nitrobenzene-d5	59%		40-105%
321-60-8	2-Fluorobiphenyl	60%		43-107%
1718-51-0	Terphenyl-d14	66%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035981.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035981.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.6 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	300	76	ug/kg	
208-96-8	Acenaphthylene	ND	300	76	ug/kg	
120-12-7	Anthracene	ND	300	46	ug/kg	
56-55-3	Benzo(a)anthracene	ND	61	15	ug/kg	
50-32-8	Benzo(a)pyrene	ND	61	15	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	61	15	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	61	15	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	61	15	ug/kg	
218-01-9	Chrysene	ND	61	15	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	61	15	ug/kg	
206-44-0	Fluoranthene	ND	300	53	ug/kg	
86-73-7	Fluorene	ND	300	46	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	61	15	ug/kg	
90-12-0	1-Methylnaphthalene	ND	300	46	ug/kg	
91-57-6	2-Methylnaphthalene	ND	300	46	ug/kg	
91-20-3	Naphthalene	ND	300	46	ug/kg	
85-01-8	Phenanthrene	ND	300	46	ug/kg	
129-00-0	Pyrene	ND	300	53	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09481.D

Form I copy

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Report of Analysis

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09481.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	900	360	ug/kg	
95-57-8	2-Chlorophenol	ND	180	36	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	180	36	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	180	36	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	180	36	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	900	360	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	360	72	ug/kg	
95-48-7	2-Methylphenol	ND	180	36	ug/kg	
	3&4-Methylphenol	ND	180	36	ug/kg	
88-75-5	2-Nitrophenol	ND	180	36	ug/kg	
100-02-7	4-Nitrophenol	ND	900	360	ug/kg	
87-86-5	Pentachlorophenol	ND	900	360	ug/kg	
108-95-2	Phenol	ND	180	36	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	180	36	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	180	36	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	180	36	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	360	90	ug/kg	
100-51-6	Benzyl Alcohol	ND	180	36	ug/kg	
91-58-7	2-Chloronaphthalene	ND	180	36	ug/kg	
106-47-8	4-Chloroaniline	ND	360	140	ug/kg	
86-74-8	Carbazole	ND	180	36	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	180	36	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	180	72	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	180	36	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	180	36	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	180	36	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	180	36	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	180	36	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	180	72	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	180	72	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	360	180	ug/kg	
132-64-9	Dibenzofuran	ND	180	36	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Corr

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	360	90	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	360	180	ug/kg	
84-66-2	Diethyl phthalate	ND	360	90	ug/kg	
131-11-3	Dimethyl phthalate	ND	360	90	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	360	180	ug/kg	
118-74-1	Hexachlorobenzene	ND	180	36	ug/kg	
87-68-3	Hexachlorobutadiene	ND	180	72	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	180	72	ug/kg	
67-72-1	Hexachloroethane	ND	180	72	ug/kg	
78-59-1	Isophorone	ND	180	36	ug/kg	
88-74-4	2-Nitroaniline	ND	360	90	ug/kg	
99-09-2	3-Nitroaniline	ND	360	90	ug/kg	
100-01-6	4-Nitroaniline	ND	360	130	ug/kg	
98-95-3	Nitrobenzene	ND	180	36	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	180	72	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	180	36	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	180	36	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	60%		40-102%
4165-62-2	Phenol-d5	67%		41-100%
118-79-6	2,4,6-Tribromophenol	73%		42-108%
4165-60-0	Nitrobenzene-d5	59%		40-105%
321-60-8	2-Fluorobiphenyl	63%		43-107%
1718-51-0	Terphenyl-d14	75%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035982.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035982.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	290	72	ug/kg	
208-96-8	Acenaphthylene	ND	290	72	ug/kg	
120-12-7	Anthracene	ND	290	43	ug/kg	
56-55-3	Benzo(a)anthracene	38.2 J	58	14	ug/kg	J
50-32-8	Benzo(a)pyrene	35.6 J	58	14	ug/kg	J
205-99-2	Benzo(b)fluoranthene	42.4 J	58	14	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	18.9 J	58	14	ug/kg	J
207-08-9	Benzo(k)fluoranthene	31.1 J	58	14	ug/kg	J
218-01-9	Chrysene	40.1 J	58	14	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	58	14	ug/kg	
206-44-0	Fluoranthene	90.6 J	290	51	ug/kg	J
86-73-7	Fluorene	ND	290	43	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	21.3 J	58	14	ug/kg	J
90-12-0	1-Methylnaphthalene	ND	290	43	ug/kg	
91-57-6	2-Methylnaphthalene	ND	290	43	ug/kg	
91-20-3	Naphthalene	ND	290	43	ug/kg	
85-01-8	Phenanthrene	67.0 J	290	43	ug/kg	J
129-00-0	Pyrene	83.8 J	290	51	ug/kg	J

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09482.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09482.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	890	360	ug/kg	
95-57-8	2-Chlorophenol	ND	180	36	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	180	36	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	180	36	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	180	36	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	890	360	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	360	71	ug/kg	
95-48-7	2-Methylphenol	ND	180	36	ug/kg	
	3&4-Methylphenol	ND	180	36	ug/kg	
88-75-5	2-Nitrophenol	ND	180	36	ug/kg	
100-02-7	4-Nitrophenol	ND	890	360	ug/kg	
87-86-5	Pentachlorophenol	ND	890	360	ug/kg	
108-95-2	Phenol	ND	180	36	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	180	36	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	180	36	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	180	36	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	360	89	ug/kg	
100-51-6	Benzyl Alcohol	ND	180	36	ug/kg	
91-58-7	2-Chloronaphthalene	ND	180	36	ug/kg	
106-47-8	4-Chloroaniline	ND	360	140	ug/kg	
86-74-8	Carbazole	ND	180	36	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	180	36	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	180	71	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	180	36	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	180	36	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	180	36	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	180	36	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	180	36	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	180	71	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	180	71	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	360	180	ug/kg	
132-64-9	Dibenzofuran	ND	180	36	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OZ

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	360	89	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	360	180	ug/kg	
84-66-2	Diethyl phthalate	ND	360	89	ug/kg	
131-11-3	Dimethyl phthalate	ND	360	89	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	360	180	ug/kg	
118-74-1	Hexachlorobenzene	ND	180	36	ug/kg	
87-68-3	Hexachlorobutadiene	ND	180	71	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	180	71	ug/kg	
67-72-1	Hexachloroethane	ND	180	71	ug/kg	
78-59-1	Isophorone	ND	180	36	ug/kg	
88-74-4	2-Nitroaniline	ND	360	89	ug/kg	
99-09-2	3-Nitroaniline	ND	360	89	ug/kg	
100-01-6	4-Nitroaniline	ND	360	120	ug/kg	
98-95-3	Nitrobenzene	ND	180	36	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	180	71	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	180	36	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	180	36	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	71%		40-102%
4165-62-2	Phenol-d5	79%		41-100%
118-79-6	2,4,6-Tribromophenol	77%		42-108%
4165-60-0	Nitrobenzene-d5	66%		40-105%
321-60-8	2-Fluorobiphenyl	65%		43-107%
1718-51-0	Terphenyl-d14	87%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035983.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035983.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	280	71	ug/kg	
208-96-8	Acenaphthylene	ND	280	71	ug/kg	
120-12-7	Anthracene	ND	280	43	ug/kg	
56-55-3	Benzo(a)anthracene	21.0 J	57	14	ug/kg	J
50-32-8	Benzo(a)pyrene	19.6 J	57	14	ug/kg	J
205-99-2	Benzo(b)fluoranthene	22.6 J	57	14	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	ND	57	14	ug/kg	
207-08-9	Benzo(k)fluoranthene	18.0 J	57	14	ug/kg	J
218-01-9	Chrysene	22.7 J	57	14	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	57	14	ug/kg	
206-44-0	Fluoranthene	ND	280	50	ug/kg	
86-73-7	Fluorene	ND	280	43	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	57	14	ug/kg	
90-12-0	1-Methylnaphthalene	ND	280	43	ug/kg	
91-57-6	2-Methylnaphthalene	ND	280	43	ug/kg	
91-20-3	Naphthalene	ND	280	43	ug/kg	
85-01-8	Phenanthrene	ND	280	43	ug/kg	
129-00-0	Pyrene	ND	280	50	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Cap

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09483.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.3 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	930	370	ug/kg	
95-57-8	2-Chlorophenol	ND	190	37	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	37	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	37	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	37	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	930	370	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	370	74	ug/kg	
95-48-7	2-Methylphenol	ND	190	37	ug/kg	
	3&4-Methylphenol	ND	190	37	ug/kg	
88-75-5	2-Nitrophenol	ND	190	37	ug/kg	
100-02-7	4-Nitrophenol	ND	930	370	ug/kg	
87-86-5	Pentachlorophenol	ND	930	370	ug/kg	
108-95-2	Phenol	ND	190	37	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	37	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	37	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	37	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	370	93	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	37	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	37	ug/kg	
106-47-8	4-Chloroaniline	ND	370	150	ug/kg	
86-74-8	Carbazole	ND	190	37	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	37	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	74	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	37	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	37	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	37	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	190	37	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	190	37	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	74	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	74	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	370	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	37	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I 03

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	370	93	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	370	190	ug/kg	
84-66-2	Diethyl phthalate	ND	370	93	ug/kg	
131-11-3	Dimethyl phthalate	ND	370	93	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	370	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	37	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	74	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	190	74	ug/kg	
67-72-1	Hexachloroethane	ND	190	74	ug/kg	
78-59-1	Isophorone	ND	190	37	ug/kg	
88-74-4	2-Nitroaniline	ND	370	93	ug/kg	
99-09-2	3-Nitroaniline	ND	370	93	ug/kg	
100-01-6	4-Nitroaniline	ND	370	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	37	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	74	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	37	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	37	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	75%		40-102%
4165-62-2	Phenol-d5	82%		41-100%
118-79-6	2,4,6-Tribromophenol	83%		42-108%
4165-60-0	Nitrobenzene-d5	72%		40-105%
321-60-8	2-Fluorobiphenyl	73%		43-107%
1718-51-0	Terphenyl-d14	90%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035984.D

Form I OR

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Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035984.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.3 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	300	74	ug/kg	
208-96-8	Acenaphthylene	ND	300	74	ug/kg	
120-12-7	Anthracene	ND	300	44	ug/kg	
56-55-3	Benzo(a)anthracene	39.2 J	59	15	ug/kg	J
50-32-8	Benzo(a)pyrene	40.0 J	59	15	ug/kg	J
205-99-2	Benzo(b)fluoranthene	45.0 J	59	15	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	23.5 J	59	15	ug/kg	J
207-08-9	Benzo(k)fluoranthene	32.3 J	59	15	ug/kg	J
218-01-9	Chrysene	41.7 J	59	15	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	59	15	ug/kg	
206-44-0	Fluoranthene	81.7 J	300	52	ug/kg	J
86-73-7	Fluorene	ND	300	44	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	26.3 J	59	15	ug/kg	J
90-12-0	1-Methylnaphthalene	ND	300	44	ug/kg	
91-57-6	2-Methylnaphthalene	ND	300	44	ug/kg	
91-20-3	Naphthalene	ND	300	44	ug/kg	
85-01-8	Phenanthrene	48.8 J	300	44	ug/kg	J
129-00-0	Pyrene	74.7 J	300	52	ug/kg	J

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09484.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	880	350	ug/kg	
95-57-8	2-Chlorophenol	ND	180	35	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	180	35	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	180	35	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	180	35	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	880	350	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	350	70	ug/kg	
95-48-7	2-Methylphenol	ND	180	35	ug/kg	
	3&4-Methylphenol	ND	180	35	ug/kg	
88-75-5	2-Nitrophenol	ND	180	35	ug/kg	
100-02-7	4-Nitrophenol	ND	880	350	ug/kg	
87-86-5	Pentachlorophenol	ND	880	350	ug/kg	
108-95-2	Phenol	ND	180	35	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	180	35	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	180	35	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	180	35	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	350	88	ug/kg	
100-51-6	Benzyl Alcohol	ND	180	35	ug/kg	
91-58-7	2-Chloronaphthalene	ND	180	35	ug/kg	
106-47-8	4-Chloroaniline	ND	350	140	ug/kg	
86-74-8	Carbazole	ND	180	35	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	180	35	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	180	70	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	180	35	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	180	35	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	180	35	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	180	35	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	180	35	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	180	70	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	180	70	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	350	180	ug/kg	
132-64-9	Dibenzofuran	ND	180	35	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I only

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	350	88	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	350	180	ug/kg	
84-66-2	Diethyl phthalate	ND	350	88	ug/kg	
131-11-3	Dimethyl phthalate	ND	350	88	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	350	180	ug/kg	
118-74-1	Hexachlorobenzene	ND	180	35	ug/kg	
87-68-3	Hexachlorobutadiene	ND	180	70	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	180	70	ug/kg	
67-72-1	Hexachloroethane	ND	180	70	ug/kg	
78-59-1	Isophorone	ND	180	35	ug/kg	
88-74-4	2-Nitroaniline	ND	350	88	ug/kg	
99-09-2	3-Nitroaniline	ND	350	88	ug/kg	
100-01-6	4-Nitroaniline	ND	350	120	ug/kg	
98-95-3	Nitrobenzene	ND	180	35	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	180	70	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	180	35	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	180	35	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	62%		40-102%
4165-62-2	Phenol-d5	72%		41-100%
118-79-6	2,4,6-Tribromophenol	72%		42-108%
4165-60-0	Nitrobenzene-d5	67%		40-105%
321-60-8	2-Fluorobiphenyl	67%		43-107%
1718-51-0	Terphenyl-d14	82%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035985.D

Form I Cor

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035985.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result		RL	MDL	Units	Q
83-32-9	Acenaphthene	ND		280	70	ug/kg	
208-96-8	Acenaphthylene	ND		280	70	ug/kg	
120-12-7	Anthracene	ND		280	42	ug/kg	
56-55-3	Benzo(a)anthracene	ND		56	14	ug/kg	
50-32-8	Benzo(a)pyrene	ND		56	14	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND		56	14	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND		56	14	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND		56	14	ug/kg	
218-01-9	Chrysene	ND		56	14	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND		56	14	ug/kg	
206-44-0	Fluoranthene	ND		280	49	ug/kg	
86-73-7	Fluorene	ND		280	42	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND		56	14	ug/kg	
90-12-0	1-Methylnaphthalene	92.0	J	280	42	ug/kg	J
91-57-6	2-Methylnaphthalene	115	J	280	42	ug/kg	J
91-20-3	Naphthalene	82.2	J	280	42	ug/kg	J
85-01-8	Phenanthrene	65.4	J	280	42	ug/kg	J
129-00-0	Pyrene	ND		280	49	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09485.D

Form I OA

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09485.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	870	350	ug/kg	
95-57-8	2-Chlorophenol	ND	170	35	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	170	35	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	170	35	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	170	35	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	870	350	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	350	69	ug/kg	
95-48-7	2-Methylphenol	ND	170	35	ug/kg	
	3&4-Methylphenol	ND	170	35	ug/kg	
88-75-5	2-Nitrophenol	ND	170	35	ug/kg	
100-02-7	4-Nitrophenol	ND	870	350	ug/kg	
87-86-5	Pentachlorophenol	ND	870	350	ug/kg	
108-95-2	Phenol	ND	170	35	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	170	35	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	170	35	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	170	35	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	350	87	ug/kg	
100-51-6	Benzyl Alcohol	ND	170	35	ug/kg	
91-58-7	2-Chloronaphthalene	ND	170	35	ug/kg	
106-47-8	4-Chloroaniline	ND	350	140	ug/kg	
86-74-8	Carbazole	ND	170	35	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	170	35	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	170	69	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	170	35	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	170	35	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	170	35	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	170	35	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	170	35	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	170	69	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	170	69	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	350	170	ug/kg	
132-64-9	Dibenzofuran	ND	170	35	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	350	87	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	350	170	ug/kg	
84-66-2	Diethyl phthalate	ND	350	87	ug/kg	
131-11-3	Dimethyl phthalate	ND	350	87	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	350	170	ug/kg	
118-74-1	Hexachlorobenzene	ND	170	35	ug/kg	
87-68-3	Hexachlorobutadiene	ND	170	69	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	170	69	ug/kg	
67-72-1	Hexachloroethane	ND	170	69	ug/kg	
78-59-1	Isophorone	ND	170	35	ug/kg	
88-74-4	2-Nitroaniline	ND	350	87	ug/kg	
99-09-2	3-Nitroaniline	ND	350	87	ug/kg	
100-01-6	4-Nitroaniline	ND	350	120	ug/kg	
98-95-3	Nitrobenzene	ND	170	35	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	170	69	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	170	35	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	170	35	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	44%		40-102%
4165-62-2	Phenol-d5	49%		41-100%
118-79-6	2,4,6-Tribromophenol	55%		42-108%
4165-60-0	Nitrobenzene-d5	46%		40-105%
321-60-8	2-Fluorobiphenyl	49%		43-107%
1718-51-0	Terphenyl-d14	57%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035986.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035986.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	280	69	ug/kg	
208-96-8	Acenaphthylene	ND	280	69	ug/kg	
120-12-7	Anthracene	ND	280	42	ug/kg	
56-55-3	Benzo(a)anthracene	ND	56	14	ug/kg	
50-32-8	Benzo(a)pyrene	ND	56	14	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	56	14	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	56	14	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	56	14	ug/kg	
218-01-9	Chrysene	ND	56	14	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	56	14	ug/kg	
206-44-0	Fluoranthene	ND	280	49	ug/kg	
86-73-7	Fluorene	ND	280	42	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	56	14	ug/kg	
90-12-0	1-Methylnaphthalene	51.4 J	280	42	ug/kg	J
91-57-6	2-Methylnaphthalene	56.4 J	280	42	ug/kg	J
91-20-3	Naphthalene	ND	280	42	ug/kg	
85-01-8	Phenanthrene	45.3 J	280	42	ug/kg	J
129-00-0	Pyrene	ND	280	49	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09486.D

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Report of Analysis

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09486.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	960	380	ug/kg	
95-57-8	2-Chlorophenol	ND	190	38	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	38	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	38	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	38	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	960	380	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	380	76	ug/kg	
95-48-7	2-Methylphenol	ND	190	38	ug/kg	
	3&4-Methylphenol	ND	190	38	ug/kg	
88-75-5	2-Nitrophenol	ND	190	38	ug/kg	
100-02-7	4-Nitrophenol	ND	960	380	ug/kg	
87-86-5	Pentachlorophenol	ND	960	380	ug/kg	
108-95-2	Phenol	ND	190	38	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	38	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	38	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	38	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	380	96	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	38	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	38	ug/kg	
106-47-8	4-Chloroaniline	ND	380	150	ug/kg	
86-74-8	Carbazole	ND	190	38	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	38	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	76	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	38	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	38	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	38	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	190	38	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	190	38	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	76	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	76	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	380	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	38	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	380	96	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	380	190	ug/kg	
84-66-2	Diethyl phthalate	ND	380	96	ug/kg	
131-11-3	Dimethyl phthalate	ND	380	96	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	380	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	38	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	76	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	190	76	ug/kg	
67-72-1	Hexachloroethane	ND	190	76	ug/kg	
78-59-1	Isophorone	ND	190	38	ug/kg	
88-74-4	2-Nitroaniline	ND	380	96	ug/kg	
99-09-2	3-Nitroaniline	ND	380	96	ug/kg	
100-01-6	4-Nitroaniline	ND	380	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	38	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	76	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	38	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	38	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	74%		40-102%
4165-62-2	Phenol-d5	84%		41-100%
118-79-6	2,4,6-Tribromophenol	84%		42-108%
4165-60-0	Nitrobenzene-d5	71%		40-105%
321-60-8	2-Fluorobiphenyl	75%		43-107%
1718-51-0	Terphenyl-d14	85%		45-119%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035987.D

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Report of Analysis

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035987.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	310	76	ug/kg	
208-96-8	Acenaphthylene	ND	310	76	ug/kg	
120-12-7	Anthracene	ND	310	46	ug/kg	
56-55-3	Benzo(a)anthracene	ND	61	15	ug/kg	
50-32-8	Benzo(a)pyrene	ND	61	15	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	61	15	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	61	15	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	61	15	ug/kg	
218-01-9	Chrysene	ND	61	15	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	61	15	ug/kg	
206-44-0	Fluoranthene	ND	310	54	ug/kg	
86-73-7	Fluorene	ND	310	46	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	61	15	ug/kg	
90-12-0	1-Methylnaphthalene	ND	310	46	ug/kg	
91-57-6	2-Methylnaphthalene	ND	310	46	ug/kg	
91-20-3	Naphthalene	ND	310	46	ug/kg	
85-01-8	Phenanthrene	ND	310	46	ug/kg	
129-00-0	Pyrene	ND	310	54	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: U003671.D

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Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U003671.D	1	07/31/07	NJ	07/24/07	OP21580	SU180
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.0	1.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	1.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.0	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	2.0	ug/l	
95-48-7	2-Methylphenol	ND	5.0	1.0	ug/l	
	3&4-Methylphenol	ND	5.0	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	1.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	10	ug/l	
87-86-5	Pentachlorophenol	ND	25	10	ug/l	
108-95-2	Phenol	ND	5.0	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	1.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	1.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.0	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	2.0	ug/l	
86-74-8	Carbazole	ND	5.0	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	1.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.0	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.0	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.0	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	1.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	1.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	2.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.0	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	1.5	ug/l	
67-72-1	Hexachloroethane	ND	5.0	1.9	ug/l	
78-59-1	Isophorone	ND	5.0	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	10	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	10	2.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	1.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	1.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.0	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	43%		14-62%
4165-62-2	Phenol-d5	27%		10-40%
118-79-6	2,4,6-Tribromophenol	80%		33-118%
4165-60-0	Nitrobenzene-d5	76%		42-108%
321-60-8	2-Fluorobiphenyl	79%		40-106%
1718-51-0	Terphenyl-d14	83%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035906.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035906.D	1	07/30/07	RB	07/24/07	OP21581	SW1859
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.50	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.50	ug/l	
120-12-7	Anthracene	ND	1.0	0.50	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.050	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.050	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.050	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.25	ug/l	
86-73-7	Fluorene	ND	1.0	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.050	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.25	ug/l	
91-20-3	Naphthalene	ND	1.0	0.25	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.50	ug/l	
129-00-0	Pyrene	ND	1.0	0.25	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation - Volatiles
Accutest Laboratories, Inc., SDG F51154

DATE: September 25, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on July 18, 2007 and July 19, 2007. The samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) using USEPA SW846 Method 5030B/8260B for aqueous matrices and USEPA SW846 Method 5035/8260B for solid matrices. A total of seven aqueous samples and eighteen solid samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
AOSW01	F51154-1	APSD01	F51154-18
AOSW02	F51154-2	41SD11	F51154-22
TMSW01	F51154-3	49SS02	F51154-23
AOSD01	F51154-4	49SS03	F51154-24
AOSD02	F51154-5	49SS04	F51154-25
41SW08	F51154-6	49SS05	F51154-26
41SW09	F51154-7	59SS06	F51154-27
41SW10	F51154-8	59SS07	F51154-28
41SD08	F51154-9	59SS08	F51154-29
41SD09	F51154-10	59SS09	F51154-30
41SD10	F51154-11	59SS10	F51154-31
LFSD01	F51154-15	TMSS05	F51154-32
LFSW01	F51154-17		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Results
	X	Initial Calibration
X		Continuing Calibration
	X	Blank Analysis
X		Laboratory Control Sample
X		Matrix Spike / Spike Duplicate Sample
	X	System Monitoring Compounds
	X	Internal Standards
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

9/25/07
Date

RFAAP VALIDATION REPORT
VOLATILES REVIEW
SDG F51154

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of analysis. Holding time criteria: For aqueous samples cooled @ 4°C±2°C; pH<2 HCl, the maximum holding time is 14 days (7 days if no HCl added) from sample collection to analysis. For soil samples cooled @ 4°C±2°C; the maximum holding time is 14 days from sample collection to analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 07/18/07 and 07/19/07, the coolers were received by the primary laboratory (Accutest) on 07/20/07 at 4.0°C, 4.0°C, 4.6°C, 4.6°C, 4.8°C, 5.0°C, 5.0°C, and 5.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.2°C, 4.0°C, and 3.6°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 3.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 5.5°C and 5.2°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The aqueous samples were collected for TCL VOCs on 07/18/07 and 07/19/07. For the aqueous samples collected 07/18/07, the VOCs were prepped and analyzed on 07/26/07 and 07/31/07 (LFSW01). For the solid samples collected 07/18/07 and 07/19/07, the VOCs were prepped and analyzed on 07/26/07, 07/27/07, and 07/28/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, bromofluorobenzene (BFB), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent relative standard deviation (%RSD) must be ≤15% for each target compound and must be ≤30% for each calibration check compound. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration performed on 07/25/07 on instrument MSVOA9, target compounds methylene chloride (49.2%; grossly exceeding) and acetone (21.3%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds methylene chloride (r=0.9984) and acetone (r=0.9995) were quantified using linear or second order regression with correlation coefficients >0.995; therefore, no qualifiers were applied based upon these outliers. Samples 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) were analyzed using this initial calibration.

- For initial calibration performed on 07/16/07 on instrument MSVOA3, target compounds acetone (18.5%), methylene chloride (32.0%; grossly exceeding), ethylbenzene (15.1%), m,p-xylene (16.6%), and o-xylene (15.4%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds acetone (r=0.9962), methylene chloride (r=1.0000), ethylbenzene (r=0.9985), m,p-xylene (r=0.9988), and o-xylene (r=0.9990) were quantified using linear or second order regression with correlation coefficients >0.995; therefore, no qualifiers were applied based upon these outliers. Samples AOSD01 (F51154-4), AOSD02 (F51154-5), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), and 49SS05 (F51154-26) as well as the sample confirmations for samples 41SD08 (F51154-9), 41SD10 (F51154-11), 49SS02 (F51154-23), 49SS03 (F51154-24), and 49SS05 (F51154-26) were analyzed using this initial calibration.

- For initial calibration performed on 07/18/07 on instrument MSVOA6, target compounds bromomethane (24.2%), chloroethane (30.7%; grossly exceeding), carbon disulfide (17.4%), methylene chloride (39.6%; grossly exceeding), acetone (22.6%), trans-1,2-dichloroethene (18.2%), and benzene (16.8%) were outside %RSD/RRF criteria. All RSDs/RRFs (RRF≥0.05) were within criteria for all other target compounds. Compounds bromomethane (r=0.9982), chloroethane (r=0.9974), carbon disulfide (r=0.9994), methylene chloride (r=0.9995), acetone (r=0.9989), trans-1,2-dichloroethene (r=1.0000), and benzene (r=1.0000) were quantified using linear or higher order with correlations >0.995; therefore, no qualifiers were applied based upon these outliers. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) were analyzed using this initial calibration.

- For initial calibration performed on 07/31/07 on instrument MSVOA6, target compounds bromomethane (22.0%), chloroethane (21.9%), methylene chloride (123%; grossly exceeding), and trans-1,3-dichloropropene (21.2%) were outside %RSD/RRF criteria. All RSDs/RRFs (RRF≥0.05) were within criteria for all other target compounds. Compounds bromomethane (r=0.9954), chloroethane (r=0.9957), methylene chloride (r=0.9962), and trans-1,3-dichloropropene (r=0.9998) were quantified using linear or higher order with correlations >0.995; therefore, no qualifiers were applied based upon these outliers. Sample LFSW01 (F51154-17) was analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Continuing calibration establishes the 12-hour relative response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within 20% for all target compounds. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration verification performed on 07/25/07 @15:34 on instrument MSVOA9, bromomethane (28.8%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Bromomethane was non-detect for all samples; therefore, no qualifiers were applied based upon the high %D. No samples reported apply to this initial calibration verification. No qualifiers were applied based upon this outlier.

- For continuing calibration performed on 07/27/07 @11:30 on instrument MSVOA9, target compounds bromomethane (20.8%) and acetone (59.9%; grossly exceeding) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Acetone was qualified estimated "J" for detects and "UJ" for non-detects based upon the very high %Drift. Bromomethane was non-detect for all associated samples; therefore no qualifiers were applied based upon this outlier. Samples 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) apply to this continuing calibration.

- For continuing calibration performed on 07/28/07 @12:33 on instrument MSVOA9, all criteria were met. No qualifiers were applied. Sample TMSS05 (F51154-32) applies to this continuing calibration.

- For initial calibration verification performed on 07/16/07 @18:20 on instrument MSVOA3, bromomethane (36.1%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Bromomethane was non-detect for all samples; therefore, no qualifiers were applied based upon the high %D. No samples reported apply to this initial calibration verification. No qualifiers were applied based upon this outlier.

- For continuing calibration performed on 07/26/07 @10:18 on instrument MSVOA3, target compounds acetone (77.6%; grossly exceeding) and 2-butanone (23.6%) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Acetone was qualified estimated "J" for detects and "UJ" for non-detects based upon the very high %Drift. 2-Butanone (MEK) was qualified estimated "J" for detects and no qualifier for non-detects based upon the high %Drift. Samples AOSD01 (F51154-4), AOSD02 (F51154-5), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), and 49SS05 (F51154-26) apply to this continuing calibration.

- For continuing calibration performed on 07/27/07 @11:02 on instrument MSVOA3, target compounds acetone (55.4%; grossly exceeding), 1,1,1-trichloroethane (25.9%) and carbon tetrachloride (30.4%) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Acetone was qualified estimated "J" for detects and "UJ" for non-detects based upon the very high %Drift. 1,1,1-Trichloroethane and carbon tetrachloride were non-detect for all associated confirmation samples; therefore, no qualifiers were applied based upon these outliers. Sample confirmations 41SD08 (F51154-9), 41SD10 (F51154-11), 49SS02 (F51154-23), 49SS03 (F51154-24), and 49SS05 (F51154-26) apply to this continuing calibration.

- For initial calibration verification performed on 07/18/07 @12:59 on instrument MSVOA6, target compound bromomethane (31.1%) was outside criteria. All criteria (%D≤20%; %Drift≤20%; RRF≥0.05) were met for all other target compounds. No samples reported apply to this initial calibration verification. No qualifiers were applied based upon this outlier.

- For continuing calibration performed on 07/26/07 @10:10 on instrument MSVOA6, target compound chloroethane (27.8%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Chloroethane was non-detect for all associated samples; therefore no qualifiers were applied based upon the high %D. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this continuing calibration.

- For initial calibration verification performed on 07/31/07 @13:39 on instrument MSVOA6, target compound bromomethane (21.8%), acetone (22.5%), and trans-1,3-dichloropropene (20.5%) were outside criteria. All criteria (%D≤20%; %Drift≤20%; RRF≥0.05) were met for all other target compounds. No samples reported apply to this initial calibration verification. No qualifiers were applied based upon these outliers.

- For continuing calibration performed on 07/31/07 @14:27 on instrument MSVOA6, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No qualifiers were applied. Sample LFSW01 (F51154-17) applies to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of BFB. No contaminants should be detected in any of the associated blanks > the MDL. The DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants methylene chloride, acetone, and 2-butanone). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants methylene chloride, acetone, and 2-butanone (MEK), or 5 times (5X) the maximum amount for other volatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one and for solid matrices were converted to soil values (soil conversion factor = 1) as needed. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. The surface water "SW" samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the SW samples. Rinse blanks 072407R (F51275-1) and 072507R (F51300-31) apply to the surface soil "SS" and subsurface soil "SB" samples in this SDG. Rinse blank RB071807 (F51154-12) applies to the sediment "SD" samples in this SDG. The trip blanks 071807TW (F51154-13) and TB071907W (F51154-21) apply to the aqueous samples collected 07/18/07 and 07/19/07, respectively. The trip blanks 071807TS (F51154-14) and TB071907S (F51154-19) apply to the solid samples collected 07/18/07 and 07/19/07, respectively.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
07/26/07	VJ2187-MB	All target <½MRL	NA	NA	None
07/31/07	VJ2191-MB	All target <½MRL	NA	NA	None
09/13/07	RB083007	All target <½MRL	NA	NA	None
07/26/07	071807TW	All target <½MRL	NA	NA	None
07/26/07	071907TW	Chloroform	1.3	6.5	None
Analysis Date	**QC Blank ID**	**Compound**	**Max Conc. µg/kg**	**Action Level µg/kg**	**B qualified samples**
07/26/07	VH1662-MB	All target <½MRL	NA	NA	None
07/27/07	VF413-MB	All target <½MRL	NA	NA	None
07/28/07	VF414-MB	All target <½MRL	NA	NA	None
07/31/07	072407R	All target <½MRL	NA	NA	None
08/02/07	072507R	All target <½MRL	NA	NA	None
07/26/07	RB071807	Methylene chloride	2.7J	27	None
07/26/07	071807TS	All target <½MRL	NA	NA	None
07/26/07	071907TS	All target <½MRL	NA	NA	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
NA = Not Applicable
MRL = Method Reporting Limit

VI-Laboratory Control Sample

Data for laboratory control samples (LCS) are evaluated to determine long-term accuracy of the analytical method on various matrices. Percent recoveries (%Rs) should be within the specified control limits. The DoD aqueous LCS recovery limits are specified in Table D-4 of the DoD QSM (DoD, 2006). DoD LCS soil recovery limits are specified in Table D-5 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample VJ2187-BS was used as the aqueous LCS for the VOC analysis on 07/26/07. Trans-1,3-dichloropropene (83%) was below lab limits and within DoD QSM criteria. Trans-1,3-dichloropropene was non-detect for all associated samples; therefore, the samples were qualified bias low "UL" for these compounds based upon this outlier. All other percent recoveries were within criteria for all target compounds. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this LCS.

- Sample VJ2191-BS was used as the aqueous LCS for the VOC analysis on 07/31/07. All criteria were met. No qualifiers were applied. Sample LFSW01 (F51154-17) applies to this LCS.

- Sample VH1662-BS was used as the solid LCS for the VOC analysis on 07/26/07. Chloromethane (56%) was below the lab limits and within DoD QSM criteria and vinyl chloride (58%) was below both the DoD QSM and lab limits. Chloromethane and vinyl chloride were non-detect for all associated samples; therefore, the samples were qualified bias low "UL" for these compounds based upon these outliers. All other percent recoveries were within criteria for all target compounds. Samples AOSD01 (F51154-4), AOSD02 (F51154-5), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), and 49SS05 (F51154-26) apply to this LCS.

- Sample VF413-BS was used as the solid LCS for the VOC analysis on 07/27/07. All criteria were met. No qualifiers were applied. Samples 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) apply to this LCS.

- Sample VF414-BS was used as the solid LCS for the VOC analysis on 07/28/07. All criteria were met. No qualifiers were applied. Sample TMSS05 (F51154-32) applies to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate

Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. The DoD MS/MSD aqueous recovery limits follow the LCS criteria and are specified in Table D-4 of the DoD QSM (DoD, 2006). The DoD MS/MSD solid recovery limits follow the LCS criteria and are specified in Table D-5 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample AOSW02 (F51154-2) was used for the aqueous MS/MSD analysis on 07/26/07. Cis-1,3-dichloropropene (81%) and trans-1,3-dichloropropene (80%, 82%) were outside lab criteria and within DoD QSM criteria for the MS/MSD sample. The associated LCS was within criteria for these compounds (See Section VI). The associated samples were non-detect for these compounds; therefore, the spiked sample was qualified bias low "UL" for these compounds based upon these outliers. All other percent recoveries were within criteria for all target compounds. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this MS/MSD.

- Sample LFSW01 (F51154-17) was used for the aqueous MS/MSD analysis on 07/31/07. Bromomethane (146%, 148%) was outside DoD QSM criteria and within lab criteria for the MS/MSD sample. The associated LCS was within criteria for these compounds (See Section VI). The associated sample was non-detect for this compound; therefore, no qualifiers were applied based upon this outlier. All other percent recoveries were within criteria for all target compounds. Sample LFSW01 (F51154-17) applies to this MS/MSD.

- Sample AOSD02 (F51154-5) was used for the solid MS/MSD analysis on 07/26/07. Acetone (51%, 48%), bromoform (52%, 47%), chloroethane (56%, 60%), carbon tetrachloride (71%, 56%), dibromochloromethane (70%, 66%), trans-1,3-dichloropropene (82%), 2-hexanone (58%), 4-methyl-2-pentanone (65%), methyl bromide (52%, 56%), methyl chloride (39%, 46%), methylene chloride (202%, 171%), methyl ethyl ketone (48%, 55%), toluene (125%), and vinyl chloride (43%, 46%) were outside lab criteria and/or DoD QSM criteria for the MS/MSD sample. The associated LCS was within criteria for these compounds (See Section VI) except for methyl chloride and vinyl chloride. The associated samples were non-detect for all of these compounds. All associated samples were qualified bias low "UL" for methyl chloride and vinyl chloride based upon these outliers. The spiked sample was qualified bias low "L" for detects and "UL" for non-detects for acetone, bromoform, chloroethane, carbon tetrachloride, dibromochloromethane, trans-1,3-dichloropropene, 2-hexanone, 4-methyl-2-pentanone, methyl bromide, and methyl ethyl ketone based upon these outliers. No qualifiers were applied for methylene chloride and toluene based upon the high recoveries (spiked sample was non-detect for these compounds). All other percent recoveries were within criteria for all target compounds. Samples AOSD01 (F51154-4), AOSD02 (F51154-5), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), and 49SS05 (F51154-26) apply to this MS/MSD.

- Sample F51158-1 was used for the solid MS/MSD analysis for analysis on 07/27/07. Since this sample is not a RFAAP site sample, it was not evaluated. No qualifiers were applied. Samples 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), and 59SS10 (F51154-31) apply to this MS/MSD.

- Sample F51333-1 was used for the solid MS/MSD analysis for analysis on 07/28/07. Since this sample is not a RFAAP site sample, it was not evaluated. No qualifiers were applied. Sample TMSS05 (F51154-32) applies to this MS/MSD.

VIII-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Recoveries for system monitoring compounds in volatile samples and blanks must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:	Dibromofluoromethane (87-116%) (DoD QSM = 85-115%) 1,2-Dichloroethane-d4 (76-127%) (DoD QSM = 70-120%) Toluene-d8 (86-112%) (DoD QSM = 85-120%) 4-Bromofluorobenzene (84-120%) (DoD QSM = 75-120%)
Solid Criteria:	Dibromofluoromethane (80-121%) (DoD QSM = None Listed) 1,2-Dichloroethane-d4 (77-123%) (DoD QSM = None Listed) Toluene-d8 (71-130%) (DoD QSM = 85-115%) 4-Bromofluorobenzene (59-148%) (DoD QSM = 85-120%)

- For sample AOSD02 (F51154-5), 4-bromofluorobenzene (125%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier.

- For sample AOSD02 (F51154-5), 4-bromofluorobenzene (125%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier.

- For sample 41SD08 (F51154-9), 4-bromofluorobenzene (134%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier. The sample was rerun for confirmation with 129% recovery.

- For sample 41SD09 (F51154-10), 4-bromofluorobenzene (131%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier.

- For sample 41SD10 (F51154-11), 4-bromofluorobenzene (145%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier. The sample was rerun for confirmation with 134% recovery.

- For sample LFSD01 (F51154-15), 4-bromofluorobenzene (126%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier.

- For sample 41SD11 (F51154-22), 4-bromofluorobenzene (135%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier.

- For sample 49SS02 (F51154-23), 4-bromofluorobenzene (146%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier. The sample was rerun for confirmation with 134% recovery.

- For sample 49SS03 (F51154-24), 4-bromofluorobenzene (162%) was outside DoD QSM criteria and outside lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier. The sample was rerun for confirmation with 133% recovery.

- For sample 49SS04 (F51154-25), 4-bromofluorobenzene (125%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier.

- For sample 49SS05 (F51154-26), 4-bromofluorobenzene (130%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier. The sample was rerun for confirmation with 138% recovery.

- For sample 59SS09 (F51154-30), 4-bromofluorobenzene (132%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier.

- For sample TMSS05 (F51154-32), 4-bromofluorobenzene (121%) was outside DoD QSM criteria and within lab criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier.

- For all other samples, all criteria were met. No qualifiers were applied.

IX-Internal Standards (IS)
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- For sample AOSD01 (F51154-4), internal standard 4 tert-butyl-alcohol-d10 was below criteria limits. No target analytes were quantified using this internal standard; therefore, no qualifiers were applied based upon this outlier. All other internal standards were within criteria.

- For sample AOSD02 (F51154-5), internal standard 4 tert-butyl-alcohol-d10 was below criteria limits. No target analytes were quantified using this internal standard; therefore, no qualifiers were applied based upon this outlier. All other internal standards were within criteria.

- For sample 41SD08 (F51154-9), internal standard 3 1,4-dichlorobenzene-d4 and internal standard 4 tert-butyl-alcohol-d10 were below criteria limits. No target analytes were quantified using 1,4-dichlorobenzene-d4 or tert-butyl-alcohol-d10; therefore, no qualifiers were applied based upon this outlier. All other internal standards were within criteria. The sample was rerun for confirmation.

- For sample 41SD10 (F51154-11), internal standard 3 1,4-dichlorobenzene-d4 and internal standard 4 tert-butyl-alcohol-d10 were below criteria limits. No target analytes were quantified using 1,4-dichlorobenzene-d4 or tert-butyl-alcohol-d10; therefore, no qualifiers were applied based upon this outlier. All other internal standards were within criteria. The sample was rerun for confirmation.

- For sample LFSD01 (F51154-15), internal standard 4 tert-butyl-alcohol-d10 was below criteria limits. No target analytes were quantified using this internal standard; therefore, no qualifiers were applied based upon this outlier. All other internal standards were within criteria.

- For sample 41SD11 (F51154-22), internal standard 4 tert-butyl-alcohol-d10 was below criteria limits. No target analytes were quantified using this internal standard; therefore, no qualifiers were applied based upon this outlier. All other internal standards were within criteria.

- For sample 49SS02 (F51154-23), internal standard 3 1,4-dichlorobenzene-d4 and internal standard 4 tert-butyl-alcohol-d10 were below criteria limits. No target analytes were quantified using 1,4-dichlorobenzene-d4 or tert-butyl-alcohol-d10; therefore, no qualifiers were applied based upon this outlier. All other internal standards were within criteria. The sample was rerun for confirmation.

- For sample 49SS03 (F51154-24), internal standard 3 1,4-dichlorobenzene-d4 and internal standard 4 tert-butyl-alcohol-d10 were below criteria limits. No target analytes were quantified using 1,4-dichlorobenzene-d4 or tert-butyl-alcohol-d10; therefore, no qualifiers were applied based upon this outlier. All other internal standards were within criteria. The sample was rerun for confirmation.

- For sample 49SS05 (F51154-26), internal standard 3 1,4-dichlorobenzene-d4 and internal standard 4 tert-butyl-alcohol-d10 were below criteria limits. No target analytes were quantified using 1,4-dichlorobenzene-d4 or tert-butyl-alcohol-d10; therefore, no qualifiers were applied based upon this outlier. All other internal standards were within criteria. The sample was rerun for confirmation.

- For all other samples, all criteria were met. No qualifiers were applied.

X-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous and solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field surface water sample duplicate pair AOSW01 (F51154-1) and TMSW01 (F51154-3) was collected for TCL VOCs. All TCL VOCs target compounds were non-detect. All criteria were met. No qualifiers were applied.

- Field surface soil sample duplicate pair 49SS05 (F51154-26) and TMSS05 (F51154-32) was collected for TCL VOCs. Acetone was non-detect in the original sample and detected at a concentration below the MRL at 78.2J ug/kg in the duplicate pair. All other TCL VOCs target compounds were non-detect. All criteria were met. No qualifiers were applied.

XI-Quantitation Verification

The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: TB071907W (F51154-21), chloroform

Conc. (µg/L) = (Ax)*(Is) *(DF)/(Ais)*(RRF)

where: Ax is the compound area
Ais is the corresponding internal standard area
Is is the corresponding internal standard concentration (µg/L)
DF is the dilution factor
RRF is the relative response factor.

Conc. µg/L = (27317 * 50 µg/L * 1) / (2460609 * 0.423) = 1.3 µg/L

Reported Conc. = 1.3 µg/L
%D = 0.0%
Values were within 10% difference.

Sample: 41SD08 (F51154-9), methyl ethyl ketone

Conc. (µg/kg) = {(Ax)*(Is)*(DF)*(Vp)} / {(Ais)*(RRF)*(Ws)*Fs)}
where:
Ax is the compound area
Is is the corresponding internal standard concentration (ng/mL)
DF is the dilution factor
Vp is the volume purged (mL)
Ais is the corresponding internal standard area
RRF is the relative response factor
Ws is the weight of the sample (g)
Fs is the fraction solids for the sample

Conc. µg/kg = (73706 * 50 ng/mL * 1 * 5mL) / (919966 * 0.284 * 3.92g * 0.369) =
= 48.8 µg/kg

Reported Conc. = 48.8 µg/kg
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: J031452.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSW01		
Lab Sample ID:	F51154-1	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031452.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSW01		
Lab Sample ID:	F51154-1	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	95%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	109%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J031449.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSW02		
Lab Sample ID:	F51154-2	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031449.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	7.0 J	25	5.0	ug/l	J
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	AOSW02		
Lab Sample ID:	F51154-2	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	93%		76-127%
2037-26-5	Toluene-D8	99%		86-112%
460-00-4	4-Bromofluorobenzene	108%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-3	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031453.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-3		
Matrix:	AQ - Surface Water	Date Sampled:	07/18/07
Method:	SW846 8260B	Date Received:	07/19/07
Project:	WPA 019 Field Investigation; Radford AAP, VA	Percent Solids:	n/a

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	97%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	106%		84-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
MDL - Method Detection Limit
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044667.D

For I Only

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD01		
Lab Sample ID:	F51154-4	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	66.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044667.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	3.53 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND UJ	110	53	ug/kg	
71-43-2	Benzene	ND	11	4.3	ug/kg	
75-27-4	Bromodichloromethane	ND	11	4.3	ug/kg	
75-25-2	Bromoform	ND	11	4.3	ug/kg	
108-90-7	Chlorobenzene	ND	11	4.3	ug/kg	
75-00-3	Chloroethane	ND	11	6.4	ug/kg	
67-66-3	Chloroform	ND	11	4.3	ug/kg	
75-15-0	Carbon disulfide	ND	11	4.3	ug/kg	
56-23-5	Carbon tetrachloride	ND	11	4.3	ug/kg	
75-34-3	1,1-Dichloroethane	ND	11	4.3	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	11	4.3	ug/kg	
107-06-2	1,2-Dichloroethane	ND	11	4.3	ug/kg	
78-87-5	1,2-Dichloropropane	ND	11	4.3	ug/kg	
124-48-1	Dibromochloromethane	ND	11	4.3	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	11	4.3	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	11	4.3	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	11	4.3	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	11	4.3	ug/kg	
100-41-4	Ethylbenzene	ND	11	4.3	ug/kg	
591-78-6	2-Hexanone	ND	53	21	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	53	21	ug/kg	
74-83-9	Methyl bromide	ND	11	4.3	ug/kg	
74-87-3	Methyl chloride	ND UL	11	4.3	ug/kg	
75-09-2	Methylene chloride	ND	21	11	ug/kg	
78-93-3	Methyl ethyl ketone	ND	53	21	ug/kg	
100-42-5	Styrene	ND	11	4.3	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	11	4.3	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	11	4.3	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	11	4.3	ug/kg	
127-18-4	Tetrachloroethylene	ND	11	4.3	ug/kg	
108-88-3	Toluene	ND	11	4.3	ug/kg	
79-01-6	Trichloroethylene	ND	11	4.3	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I COM

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD01		
Lab Sample ID:	F51154-4	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	66.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	11	4.3	ug/kg	
	m,p-Xylene	ND	21	6.4	ug/kg	
95-47-6	o-Xylene	ND	11	4.3	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		80-121%
2037-26-5	Toluene-D8	99%		71-130%
460-00-4	4-Bromofluorobenzene	109%		59-148%
17060-07-0	1,2-Dichloroethane-D4	105%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044668.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD02		
Lab Sample ID:	F51154-5	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	59.3
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044668.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	4.36 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	87.7 J	97	48	ug/kg	J
71-43-2	Benzene	ND	9.7	3.9	ug/kg	
75-27-4	Bromodichloromethane	ND	9.7	3.9	ug/kg	
75-25-2	Bromoform	ND VL	9.7	3.9	ug/kg	
108-90-7	Chlorobenzene	ND	9.7	3.9	ug/kg	
75-00-3	Chloroethane	ND VL	9.7	5.8	ug/kg	
67-66-3	Chloroform	ND	9.7	3.9	ug/kg	
75-15-0	Carbon disulfide	ND	9.7	3.9	ug/kg	
56-23-5	Carbon tetrachloride	ND VL	9.7	3.9	ug/kg	
75-34-3	1,1-Dichloroethane	ND	9.7	3.9	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	9.7	3.9	ug/kg	
107-06-2	1,2-Dichloroethane	ND	9.7	3.9	ug/kg	
78-87-5	1,2-Dichloropropane	ND	9.7	3.9	ug/kg	
124-48-1	Dibromochloromethane	ND VL	9.7	3.9	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	9.7	3.9	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	9.7	3.9	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	9.7	3.9	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND VL	9.7	3.9	ug/kg	
100-41-4	Ethylbenzene	ND	9.7	3.9	ug/kg	
591-78-6	2-Hexanone	ND VL	48	19	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND VL	48	19	ug/kg	
74-83-9	Methyl bromide	ND VL	9.7	3.9	ug/kg	
74-87-3	Methyl chloride	ND VL	9.7	3.9	ug/kg	
75-09-2	Methylene chloride	ND	19	9.7	ug/kg	
78-93-3	Methyl ethyl ketone	ND VL	48	19	ug/kg	
100-42-5	Styrene	ND	9.7	3.9	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	9.7	3.9	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	9.7	3.9	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	9.7	3.9	ug/kg	
127-18-4	Tetrachloroethylene	ND	9.7	3.9	ug/kg	
108-88-3	Toluene	ND	9.7	3.9	ug/kg	
79-01-6	Trichloroethylene	ND	9.7	3.9	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD02		
Lab Sample ID:	F51154-5	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	59.3
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	9.7	3.9	ug/kg	
	m,p-Xylene	ND	19	5.8	ug/kg	
95-47-6	o-Xylene	ND	9.7	3.9	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		80-121%
2037-26-5	Toluene-D8	101%		71-130%
460-00-4	4-Bromofluorobenzene	125%		59-148%
17060-07-0	1,2-Dichloroethane-D4	104%		77-123%

(a) CCV outside of control limits; results may be biased high.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J031454.D

Form 1 Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031454.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OA1

Accutest Laboratories

Report of Analysis

3.3
3

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	97%		76-127%
2037-26-5	Toluene-D8	99%		86-112%
460-00-4	4-Bromofluorobenzene	107%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J031455.D

Form I COA

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031455.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

For I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	97%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	109%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J031456.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031456.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I only

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		87-116%
17060-07-0	1,2-Dichloroethane-D4	95%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	109%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044671.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2 [a]	H044689.D	1	07/27/07	SH	n/a	n/a	VH1663

	Initial Weight
Run #1	3.92 g
Run #2	4.24 g

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [b]	253 J	170	86	ug/kg	
71-43-2	Benzene	ND	17	6.9	ug/kg	
75-27-4	Bromodichloromethane	ND	17	6.9	ug/kg	
75-25-2	Bromoform	ND	17	6.9	ug/kg	
108-90-7	Chlorobenzene	ND	17	6.9	ug/kg	
75-00-3	Chloroethane	ND	17	10	ug/kg	
67-66-3	Chloroform	ND	17	6.9	ug/kg	
75-15-0	Carbon disulfide	ND	17	6.9	ug/kg	
56-23-5	Carbon tetrachloride	ND	17	6.9	ug/kg	
75-34-3	1,1-Dichloroethane	ND	17	6.9	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	17	6.9	ug/kg	
107-06-2	1,2-Dichloroethane	ND	17	6.9	ug/kg	
78-87-5	1,2-Dichloropropane	ND	17	6.9	ug/kg	
124-48-1	Dibromochloromethane	ND	17	6.9	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	17	6.9	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	17	6.9	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	17	6.9	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	17	6.9	ug/kg	
100-41-4	Ethylbenzene	ND	17	6.9	ug/kg	
591-78-6	2-Hexanone	ND	86	35	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	86	35	ug/kg	
74-83-9	Methyl bromide	ND	17	6.9	ug/kg	
74-87-3	Methyl chloride	ND VL	17	6.9	ug/kg	
75-09-2	Methylene chloride	ND	35	17	ug/kg	
78-93-3	Methyl ethyl ketone	48.8 J	86	35	ug/kg	J
100-42-5	Styrene	ND	17	6.9	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	17	6.9	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	17	6.9	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	17	6.9	ug/kg	
127-18-4	Tetrachloroethylene	ND	17	6.9	ug/kg	
108-88-3	Toluene	ND	17	6.9	ug/kg	
79-01-6	Trichloroethylene	ND	17	6.9	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

For I Corr

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	17	6.9	ug/kg	
	m,p-Xylene	ND	35	10	ug/kg	
95-47-6	o-Xylene	ND	17	6.9	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%	101%	80-121%
2037-26-5	Toluene-D8	110%	105%	71-130%
460-00-4	4-Bromofluorobenzene	129%	134%	59-148%
17060-07-0	1,2-Dichloroethane-D4	98%	100%	77-123%

(a) Confirmation run.
(b) CCV outside of control limits; results may be biased high.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044672.D

Form I OV

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044672.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	5.48 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND UJ	55	28	ug/kg	
71-43-2	Benzene	ND	5.5	2.2	ug/kg	
75-27-4	Bromodichloromethane	ND	5.5	2.2	ug/kg	
75-25-2	Bromoform	ND	5.5	2.2	ug/kg	
108-90-7	Chlorobenzene	ND	5.5	2.2	ug/kg	
75-00-3	Chloroethane	ND	5.5	3.3	ug/kg	
67-66-3	Chloroform	ND	5.5	2.2	ug/kg	
75-15-0	Carbon disulfide	ND	5.5	2.2	ug/kg	
56-23-5	Carbon tetrachloride	ND	5.5	2.2	ug/kg	
75-34-3	1,1-Dichloroethane	ND	5.5	2.2	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	5.5	2.2	ug/kg	
107-06-2	1,2-Dichloroethane	ND	5.5	2.2	ug/kg	
78-87-5	1,2-Dichloropropane	ND	5.5	2.2	ug/kg	
124-48-1	Dibromochloromethane	ND	5.5	2.2	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	5.5	2.2	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	5.5	2.2	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	5.5	2.2	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	5.5	2.2	ug/kg	
100-41-4	Ethylbenzene	ND	5.5	2.2	ug/kg	
591-78-6	2-Hexanone	ND	28	11	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	28	11	ug/kg	
74-83-9	Methyl bromide	ND	5.5	2.2	ug/kg	
74-87-3	Methyl chloride	ND UL	5.5	2.2	ug/kg	
75-09-2	Methylene chloride	ND	11	5.5	ug/kg	
78-93-3	Methyl ethyl ketone	ND	28	11	ug/kg	
100-42-5	Styrene	ND	5.5	2.2	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	5.5	2.2	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	5.5	2.2	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	5.5	2.2	ug/kg	
127-18-4	Tetrachloroethylene	ND	5.5	2.2	ug/kg	
108-88-3	Toluene	ND	5.5	2.2	ug/kg	
79-01-6	Trichloroethylene	ND	5.5	2.2	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

For I Only

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	5.5	2.2	ug/kg	
	m,p-Xylene	ND	11	3.3	ug/kg	
95-47-6	o-Xylene	ND	5.5	2.2	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		80-121%
2037-26-5	Toluene-D8	104%		71-130%
460-00-4	4-Bromofluorobenzene	131%		59-148%
17060-07-0	1,2-Dichloroethane-D4	108%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044673.D H044690.D

Form I Copy

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Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044673.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2 [a]	H044690.D	1	07/27/07	SH	n/a	n/a	VH1663

	Initial Weight
Run #1	4.31 g
Run #2	4.39 g

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND UJ	73	37	ug/kg	
71-43-2	Benzene	ND	7.3	2.9	ug/kg	
75-27-4	Bromodichloromethane	ND	7.3	2.9	ug/kg	
75-25-2	Bromoform	ND	7.3	2.9	ug/kg	
108-90-7	Chlorobenzene	ND	7.3	2.9	ug/kg	
75-00-3	Chloroethane	ND	7.3	4.4	ug/kg	
67-66-3	Chloroform	ND	7.3	2.9	ug/kg	
75-15-0	Carbon disulfide	ND	7.3	2.9	ug/kg	
56-23-5	Carbon tetrachloride	ND	7.3	2.9	ug/kg	
75-34-3	1,1-Dichloroethane	ND	7.3	2.9	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	7.3	2.9	ug/kg	
107-06-2	1,2-Dichloroethane	ND	7.3	2.9	ug/kg	
78-87-5	1,2-Dichloropropane	ND	7.3	2.9	ug/kg	
124-48-1	Dibromochloromethane	ND	7.3	2.9	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	7.3	2.9	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	7.3	2.9	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	7.3	2.9	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	7.3	2.9	ug/kg	
100-41-4	Ethylbenzene	ND	7.3	2.9	ug/kg	
591-78-6	2-Hexanone	ND	37	15	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	37	15	ug/kg	
74-83-9	Methyl bromide	ND	7.3	2.9	ug/kg	
74-87-3	Methyl chloride	ND VL	7.3	2.9	ug/kg	
75-09-2	Methylene chloride	ND	15	7.3	ug/kg	
78-93-3	Methyl ethyl ketone	ND	37	15	ug/kg	
100-42-5	Styrene	ND	7.3	2.9	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	7.3	2.9	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	7.3	2.9	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	7.3	2.9	ug/kg	
127-18-4	Tetrachloroethylene	ND	7.3	2.9	ug/kg	
108-88-3	Toluene	ND	7.3	2.9	ug/kg	
79-01-6	Trichloroethylene	ND	7.3	2.9	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OA7

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	7.3	2.9	ug/kg	
	m,p-Xylene	ND	15	4.4	ug/kg	
95-47-6	o-Xylene	ND	7.3	2.9	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	106%	104%	80-121%
2037-26-5	Toluene-D8	106%	110%	71-130%
460-00-4	4-Bromofluorobenzene	134%	145%	59-148%
17060-07-0	1,2-Dichloroethane-D4	108%	102%	77-123%

(a) Confirmation run.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044674.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044674.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	5.78 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND UJ	75	37	ug/kg	
71-43-2	Benzene	ND	7.5	3.0	ug/kg	
75-27-4	Bromodichloromethane	ND	7.5	3.0	ug/kg	
75-25-2	Bromoform	ND	7.5	3.0	ug/kg	
108-90-7	Chlorobenzene	ND	7.5	3.0	ug/kg	
75-00-3	Chloroethane	ND	7.5	4.5	ug/kg	
67-66-3	Chloroform	ND	7.5	3.0	ug/kg	
75-15-0	Carbon disulfide	ND	7.5	3.0	ug/kg	
56-23-5	Carbon tetrachloride	ND	7.5	3.0	ug/kg	
75-34-3	1,1-Dichloroethane	ND	7.5	3.0	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	7.5	3.0	ug/kg	
107-06-2	1,2-Dichloroethane	ND	7.5	3.0	ug/kg	
78-87-5	1,2-Dichloropropane	ND	7.5	3.0	ug/kg	
124-48-1	Dibromochloromethane	ND	7.5	3.0	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	7.5	3.0	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	7.5	3.0	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	7.5	3.0	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	7.5	3.0	ug/kg	
100-41-4	Ethylbenzene	ND	7.5	3.0	ug/kg	
591-78-6	2-Hexanone	ND	37	15	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	37	15	ug/kg	
74-83-9	Methyl bromide	ND	7.5	3.0	ug/kg	
74-87-3	Methyl chloride	ND VL	7.5	3.0	ug/kg	
75-09-2	Methylene chloride	ND	15	7.5	ug/kg	
78-93-3	Methyl ethyl ketone	ND	37	15	ug/kg	
100-42-5	Styrene	ND	7.5	3.0	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	7.5	3.0	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	7.5	3.0	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	7.5	3.0	ug/kg	
127-18-4	Tetrachloroethylene	ND	7.5	3.0	ug/kg	
108-88-3	Toluene	ND	7.5	3.0	ug/kg	
79-01-6	Trichloroethylene	ND	7.5	3.0	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	7.5	3.0	ug/kg	
	m,p-Xylene	ND	15	4.5	ug/kg	
95-47-6	o-Xylene	ND	7.5	3.0	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	108%		80-121%
2037-26-5	Toluene-D8	102%		71-130%
460-00-4	4-Bromofluorobenzene	126%		59-148%
17060-07-0	1,2-Dichloroethane-D4	112%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J031542.D

Form I COA

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031542.D	1	07/31/07	JG	n/a	n/a	VJ2191
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		87-116%
17060-07-0	1,2-Dichloroethane-D4	104%		76-127%
2037-26-5	Toluene-D8	94%		86-112%
460-00-4	4-Bromofluorobenzene	98%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044675.D

Form I VOA

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044675.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	3.46 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND UJ	83	42	ug/kg	
71-43-2	Benzene	ND	8.3	3.3	ug/kg	
75-27-4	Bromodichloromethane	ND	8.3	3.3	ug/kg	
75-25-2	Bromoform	ND	8.3	3.3	ug/kg	
108-90-7	Chlorobenzene	ND	8.3	3.3	ug/kg	
75-00-3	Chloroethane	ND	8.3	5.0	ug/kg	
67-66-3	Chloroform	ND	8.3	3.3	ug/kg	
75-15-0	Carbon disulfide	ND	8.3	3.3	ug/kg	
56-23-5	Carbon tetrachloride	ND	8.3	3.3	ug/kg	
75-34-3	1,1-Dichloroethane	ND	8.3	3.3	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	8.3	3.3	ug/kg	
107-06-2	1,2-Dichloroethane	ND	8.3	3.3	ug/kg	
78-87-5	1,2-Dichloropropane	ND	8.3	3.3	ug/kg	
124-48-1	Dibromochloromethane	ND	8.3	3.3	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	8.3	3.3	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	8.3	3.3	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	8.3	3.3	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	8.3	3.3	ug/kg	
100-41-4	Ethylbenzene	ND	8.3	3.3	ug/kg	
591-78-6	2-Hexanone	ND	42	17	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	42	17	ug/kg	
74-83-9	Methyl bromide	ND	8.3	3.3	ug/kg	
74-87-3	Methyl chloride	ND UL	8.3	3.3	ug/kg	
75-09-2	Methylene chloride	ND	17	8.3	ug/kg	
78-93-3	Methyl ethyl ketone	ND	42	17	ug/kg	
100-42-5	Styrene	ND	8.3	3.3	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	8.3	3.3	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	8.3	3.3	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	8.3	3.3	ug/kg	
127-18-4	Tetrachloroethylene	ND	8.3	3.3	ug/kg	
108-88-3	Toluene	ND	8.3	3.3	ug/kg	
79-01-6	Trichloroethylene	ND	8.3	3.3	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	8.3	3.3	ug/kg	
	m,p-Xylene	ND	17	5.0	ug/kg	
95-47-6	o-Xylene	ND	8.3	3.3	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	109%		80-121%
2037-26-5	Toluene-D8	100%		71-130%
460-00-4	4-Bromofluorobenzene	118%		59-148%
17060-07-0	1,2-Dichloroethane-D4	116%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044676.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044676.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	5.17 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND VJ	56	28	ug/kg	
71-43-2	Benzene	ND	5.6	2.2	ug/kg	
75-27-4	Bromodichloromethane	ND	5.6	2.2	ug/kg	
75-25-2	Bromoform	ND	5.6	2.2	ug/kg	
108-90-7	Chlorobenzene	ND	5.6	2.2	ug/kg	
75-00-3	Chloroethane	ND	5.6	3.3	ug/kg	
67-66-3	Chloroform	ND	5.6	2.2	ug/kg	
75-15-0	Carbon disulfide	ND	5.6	2.2	ug/kg	
56-23-5	Carbon tetrachloride	ND	5.6	2.2	ug/kg	
75-34-3	1,1-Dichloroethane	ND	5.6	2.2	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	5.6	2.2	ug/kg	
107-06-2	1,2-Dichloroethane	ND	5.6	2.2	ug/kg	
78-87-5	1,2-Dichloropropane	ND	5.6	2.2	ug/kg	
124-48-1	Dibromochloromethane	ND	5.6	2.2	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	5.6	2.2	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	5.6	2.2	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	5.6	2.2	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	5.6	2.2	ug/kg	
100-41-4	Ethylbenzene	ND	5.6	2.2	ug/kg	
591-78-6	2-Hexanone	ND	28	11	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	28	11	ug/kg	
74-83-9	Methyl bromide	ND	5.6	2.2	ug/kg	
74-87-3	Methyl chloride	ND VL	5.6	2.2	ug/kg	
75-09-2	Methylene chloride	ND	11	5.6	ug/kg	
78-93-3	Methyl ethyl ketone	ND	28	11	ug/kg	
100-42-5	Styrene	ND	5.6	2.2	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	5.6	2.2	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	5.6	2.2	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	5.6	2.2	ug/kg	
127-18-4	Tetrachloroethylene	ND	5.6	2.2	ug/kg	
108-88-3	Toluene	ND	5.6	2.2	ug/kg	
79-01-6	Trichloroethylene	ND	5.6	2.2	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OA

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	5.6	2.2	ug/kg	
	m,p-Xylene	ND	11	3.3	ug/kg	
95-47-6	o-Xylene	ND	5.6	2.2	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	109%		80-121%
2037-26-5	Toluene-D8	106%		71-130%
460-00-4	4-Bromofluorobenzene	135%		59-148%
17060-07-0	1,2-Dichloroethane-D4	115%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044677.D H044691.D

Form I OA

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044677.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2 [a]	H044691.D	1	07/27/07	SH	n/a	n/a	VH1663

	Initial Weight
Run #1	3.74 g
Run #2	2.36 g

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [b]	70.7 J	75	37	ug/kg	J
71-43-2	Benzene	ND	7.5	3.0	ug/kg	
75-27-4	Bromodichloromethane	ND	7.5	3.0	ug/kg	
75-25-2	Bromoform	ND	7.5	3.0	ug/kg	
108-90-7	Chlorobenzene	ND	7.5	3.0	ug/kg	
75-00-3	Chloroethane	ND	7.5	4.5	ug/kg	
67-66-3	Chloroform	ND	7.5	3.0	ug/kg	
75-15-0	Carbon disulfide	ND	7.5	3.0	ug/kg	
56-23-5	Carbon tetrachloride	ND	7.5	3.0	ug/kg	
75-34-3	1,1-Dichloroethane	ND	7.5	3.0	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	7.5	3.0	ug/kg	
107-06-2	1,2-Dichloroethane	ND	7.5	3.0	ug/kg	
78-87-5	1,2-Dichloropropane	ND	7.5	3.0	ug/kg	
124-48-1	Dibromochloromethane	ND	7.5	3.0	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	7.5	3.0	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	7.5	3.0	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	7.5	3.0	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	7.5	3.0	ug/kg	
100-41-4	Ethylbenzene	ND	7.5	3.0	ug/kg	
591-78-6	2-Hexanone	ND	37	15	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	37	15	ug/kg	
74-83-9	Methyl bromide	ND	7.5	3.0	ug/kg	
74-87-3	Methyl chloride	ND VL	7.5	3.0	ug/kg	
75-09-2	Methylene chloride	ND	15	7.5	ug/kg	
78-93-3	Methyl ethyl ketone	ND	37	15	ug/kg	
100-42-5	Styrene	ND	7.5	3.0	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	7.5	3.0	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	7.5	3.0	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	7.5	3.0	ug/kg	
127-18-4	Tetrachloroethylene	ND	7.5	3.0	ug/kg	
108-88-3	Toluene	ND	7.5	3.0	ug/kg	
79-01-6	Trichloroethylene	ND	7.5	3.0	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OA

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	7.5	3.0	ug/kg	
	m,p-Xylene	ND	15	4.5	ug/kg	
95-47-6	o-Xylene	ND	7.5	3.0	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	110%	108%	80-121%
2037-26-5	Toluene-D8	105%	107%	71-130%
460-00-4	4-Bromofluorobenzene	134%	146%	59-148%
17060-07-0	1,2-Dichloroethane-D4	119%	112%	77-123%

(a) Confirmation run.
(b) CCV outside of control limits; results may be biased high.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044678.D H044692.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044678.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2 [a]	H044692.D	1	07/27/07	SH	n/a	n/a	VH1663

	Initial Weight
Run #1	2.95 g
Run #2	3.02 g

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND VJ	92	46	ug/kg	
71-43-2	Benzene	ND	9.2	3.7	ug/kg	
75-27-4	Bromodichloromethane	ND	9.2	3.7	ug/kg	
75-25-2	Bromoform	ND	9.2	3.7	ug/kg	
108-90-7	Chlorobenzene	ND	9.2	3.7	ug/kg	
75-00-3	Chloroethane	ND	9.2	5.5	ug/kg	
67-66-3	Chloroform	ND	9.2	3.7	ug/kg	
75-15-0	Carbon disulfide	ND	9.2	3.7	ug/kg	
56-23-5	Carbon tetrachloride	ND	9.2	3.7	ug/kg	
75-34-3	1,1-Dichloroethane	ND	9.2	3.7	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	9.2	3.7	ug/kg	
107-06-2	1,2-Dichloroethane	ND	9.2	3.7	ug/kg	
78-87-5	1,2-Dichloropropane	ND	9.2	3.7	ug/kg	
124-48-1	Dibromochloromethane	ND	9.2	3.7	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	9.2	3.7	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	9.2	3.7	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	9.2	3.7	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	9.2	3.7	ug/kg	
100-41-4	Ethylbenzene	ND	9.2	3.7	ug/kg	
591-78-6	2-Hexanone	ND	46	18	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	46	18	ug/kg	
74-83-9	Methyl bromide	ND	9.2	3.7	ug/kg	
74-87-3	Methyl chloride	ND VL	9.2	3.7	ug/kg	
75-09-2	Methylene chloride	ND	18	9.2	ug/kg	
78-93-3	Methyl ethyl ketone	ND	46	18	ug/kg	
100-42-5	Styrene	ND	9.2	3.7	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	9.2	3.7	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	9.2	3.7	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	9.2	3.7	ug/kg	
127-18-4	Tetrachloroethylene	ND	9.2	3.7	ug/kg	
108-88-3	Toluene	ND	9.2	3.7	ug/kg	
79-01-6	Trichloroethylene	ND	9.2	3.7	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OA7

Accutest Laboratories

Report of Analysis

3.2.4

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	9.2	3.7	ug/kg	
	m,p-Xylene	ND	18	5.5	ug/kg	
95-47-6	o-Xylene	ND	9.2	3.7	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	109%	110%	80-121%
2037-26-5	Toluene-D8	108%	110%	71-130%
460-00-4	4-Bromofluorobenzene	133%	162%	59-148%
17060-07-0	1,2-Dichloroethane-D4	116%	117%	77-123%

(a) Confirmation run.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044680.D

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Report of Analysis

3-25

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044680.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	4.08 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND VJ	70	35	ug/kg	
71-43-2	Benzene	ND	7.0	2.8	ug/kg	
75-27-4	Bromodichloromethane	ND	7.0	2.8	ug/kg	
75-25-2	Bromoform	ND	7.0	2.8	ug/kg	
108-90-7	Chlorobenzene	ND	7.0	2.8	ug/kg	
75-00-3	Chloroethane	ND	7.0	4.2	ug/kg	
67-66-3	Chloroform	ND	7.0	2.8	ug/kg	
75-15-0	Carbon disulfide	ND	7.0	2.8	ug/kg	
56-23-5	Carbon tetrachloride	ND	7.0	2.8	ug/kg	
75-34-3	1,1-Dichloroethane	ND	7.0	2.8	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	7.0	2.8	ug/kg	
107-06-2	1,2-Dichloroethane	ND	7.0	2.8	ug/kg	
78-87-5	1,2-Dichloropropane	ND	7.0	2.8	ug/kg	
124-48-1	Dibromochloromethane	ND	7.0	2.8	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	7.0	2.8	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	7.0	2.8	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	7.0	2.8	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	7.0	2.8	ug/kg	
100-41-4	Ethylbenzene	ND	7.0	2.8	ug/kg	
591-78-6	2-Hexanone	ND	35	14	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	35	14	ug/kg	
74-83-9	Methyl bromide	ND	7.0	2.8	ug/kg	
74-87-3	Methyl chloride	ND VL	7.0	2.8	ug/kg	
75-09-2	Methylene chloride	ND	14	7.0	ug/kg	
78-93-3	Methyl ethyl ketone	ND	35	14	ug/kg	
100-42-5	Styrene	ND	7.0	2.8	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	7.0	2.8	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	7.0	2.8	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	7.0	2.8	ug/kg	
127-18-4	Tetrachloroethylene	ND	7.0	2.8	ug/kg	
108-88-3	Toluene	ND	7.0	2.8	ug/kg	
79-01-6	Trichloroethylene	ND	7.0	2.8	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OA

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	7.0	2.8	ug/kg	
	m,p-Xylene	ND	14	4.2	ug/kg	
95-47-6	o-Xylene	ND	7.0	2.8	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	111%		80-121%
2037-26-5	Toluene-D8	102%		71-130%
460-00-4	4-Bromofluorobenzene	125%		59-148%
17060-07-0	1,2-Dichloroethane-D4	117%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044681.D H044693.D

Form I OM

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044681.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2 [a]	H044693.D	1	07/27/07	SH	n/a	n/a	VH1663

	Initial Weight
Run #1	3.67 g
Run #2	2.93 g

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND VJ	79	40	ug/kg	
71-43-2	Benzene	ND	7.9	3.2	ug/kg	
75-27-4	Bromodichloromethane	ND	7.9	3.2	ug/kg	
75-25-2	Bromoform	ND	7.9	3.2	ug/kg	
108-90-7	Chlorobenzene	ND	7.9	3.2	ug/kg	
75-00-3	Chloroethane	ND	7.9	4.8	ug/kg	
67-66-3	Chloroform	ND	7.9	3.2	ug/kg	
75-15-0	Carbon disulfide	ND	7.9	3.2	ug/kg	
56-23-5	Carbon tetrachloride	ND	7.9	3.2	ug/kg	
75-34-3	1,1-Dichloroethane	ND	7.9	3.2	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	7.9	3.2	ug/kg	
107-06-2	1,2-Dichloroethane	ND	7.9	3.2	ug/kg	
78-87-5	1,2-Dichloropropane	ND	7.9	3.2	ug/kg	
124-48-1	Dibromochloromethane	ND	7.9	3.2	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	7.9	3.2	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	7.9	3.2	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	7.9	3.2	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	7.9	3.2	ug/kg	
100-41-4	Ethylbenzene	ND	7.9	3.2	ug/kg	
591-78-6	2-Hexanone	ND	40	16	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	40	16	ug/kg	
74-83-9	Methyl bromide	ND	7.9	3.2	ug/kg	
74-87-3	Methyl chloride	ND VL	7.9	3.2	ug/kg	
75-09-2	Methylene chloride	ND	16	7.9	ug/kg	
78-93-3	Methyl ethyl ketone	ND	40	16	ug/kg	
100-42-5	Styrene	ND	7.9	3.2	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	7.9	3.2	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	7.9	3.2	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	7.9	3.2	ug/kg	
127-18-4	Tetrachloroethylene	ND	7.9	3.2	ug/kg	
108-88-3	Toluene	ND	7.9	3.2	ug/kg	
79-01-6	Trichloroethylene	ND	7.9	3.2	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Corg

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	7.9	3.2	ug/kg	
	m,p-Xylene	ND	16	4.8	ug/kg	
95-47-6	o-Xylene	ND	7.9	3.2	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	110%	107%	80-121%
2037-26-5	Toluene-D8	107%	113%	71-130%
460-00-4	4-Bromofluorobenzene	138%	130%	59-148%
17060-07-0	1,2-Dichloroethane-D4	115%	115%	77-123%

(a) Confirmation run.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: F022458.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	F022458.D	1	07/27/07	WJ	n/a	n/a	VF413
Run #2							

	Initial Weight
Run #1	4.45 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND VT	61	31	ug/kg	
71-43-2	Benzene	ND	6.1	2.4	ug/kg	
75-27-4	Bromodichloromethane	ND	6.1	2.4	ug/kg	
75-25-2	Bromoform	ND	6.1	2.4	ug/kg	
108-90-7	Chlorobenzene	ND	6.1	2.4	ug/kg	
75-00-3	Chloroethane	ND	6.1	3.7	ug/kg	
67-66-3	Chloroform	ND	6.1	2.4	ug/kg	
75-15-0	Carbon disulfide	ND	6.1	2.4	ug/kg	
56-23-5	Carbon tetrachloride	ND	6.1	2.4	ug/kg	
75-34-3	1,1-Dichloroethane	ND	6.1	2.4	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	6.1	2.4	ug/kg	
107-06-2	1,2-Dichloroethane	ND	6.1	2.4	ug/kg	
78-87-5	1,2-Dichloropropane	ND	6.1	2.4	ug/kg	
124-48-1	Dibromochloromethane	ND	6.1	2.4	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	6.1	2.4	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	6.1	2.4	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	6.1	2.4	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	6.1	2.4	ug/kg	
100-41-4	Ethylbenzene	ND	6.1	2.4	ug/kg	
591-78-6	2-Hexanone	ND	31	12	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	31	12	ug/kg	
74-83-9	Methyl bromide	ND	6.1	2.4	ug/kg	
74-87-3	Methyl chloride	ND	6.1	2.4	ug/kg	
75-09-2	Methylene chloride	ND	12	6.1	ug/kg	
78-93-3	Methyl ethyl ketone	ND	31	12	ug/kg	
100-42-5	Styrene	ND	6.1	2.4	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	6.1	2.4	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	6.1	2.4	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	6.1	2.4	ug/kg	
127-18-4	Tetrachloroethylene	ND	6.1	2.4	ug/kg	
108-88-3	Toluene	ND	6.1	2.4	ug/kg	
79-01-6	Trichloroethylene	ND	6.1	2.4	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OA

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Report of Analysis

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	6.1	2.4	ug/kg	
	m,p-Xylene	ND	12	3.7	ug/kg	
95-47-6	o-Xylene	ND	6.1	2.4	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	108%		80-121%
2037-26-5	Toluene-D8	100%		71-130%
460-00-4	4-Bromofluorobenzene	106%		59-148%
17060-07-0	1,2-Dichloroethane-D4	110%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: F022459.D

Form I COA

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Report of Analysis

3.2.8

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	F022459.D	1	07/27/07	WJ	n/a	n/a	VF413
Run #2							

	Initial Weight
Run #1	4.16 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND VT	66	33	ug/kg	
71-43-2	Benzene	ND	6.6	2.6	ug/kg	
75-27-4	Bromodichloromethane	ND	6.6	2.6	ug/kg	
75-25-2	Bromoform	ND	6.6	2.6	ug/kg	
108-90-7	Chlorobenzene	ND	6.6	2.6	ug/kg	
75-00-3	Chloroethane	ND	6.6	3.9	ug/kg	
67-66-3	Chloroform	ND	6.6	2.6	ug/kg	
75-15-0	Carbon disulfide	ND	6.6	2.6	ug/kg	
56-23-5	Carbon tetrachloride	ND	6.6	2.6	ug/kg	
75-34-3	1,1-Dichloroethane	ND	6.6	2.6	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	6.6	2.6	ug/kg	
107-06-2	1,2-Dichloroethane	ND	6.6	2.6	ug/kg	
78-87-5	1,2-Dichloropropane	ND	6.6	2.6	ug/kg	
124-48-1	Dibromochloromethane	ND	6.6	2.6	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	6.6	2.6	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	6.6	2.6	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	6.6	2.6	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	6.6	2.6	ug/kg	
100-41-4	Ethylbenzene	ND	6.6	2.6	ug/kg	
591-78-6	2-Hexanone	ND	33	13	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	33	13	ug/kg	
74-83-9	Methyl bromide	ND	6.6	2.6	ug/kg	
74-87-3	Methyl chloride	ND	6.6	2.6	ug/kg	
75-09-2	Methylene chloride	ND	13	6.6	ug/kg	
78-93-3	Methyl ethyl ketone	ND	33	13	ug/kg	
100-42-5	Styrene	ND	6.6	2.6	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	6.6	2.6	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	6.6	2.6	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	6.6	2.6	ug/kg	
127-18-4	Tetrachloroethylene	ND	6.6	2.6	ug/kg	
108-88-3	Toluene	ND	6.6	2.6	ug/kg	
79-01-6	Trichloroethylene	ND	6.6	2.6	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	6.6	2.6	ug/kg	
	m,p-Xylene	ND	13	3.9	ug/kg	
95-47-6	o-Xylene	ND	6.6	2.6	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	108%		80-121%
2037-26-5	Toluene-D8	103%		71-130%
460-00-4	4-Bromofluorobenzene	116%		59-148%
17060-07-0	1,2-Dichloroethane-D4	110%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: F022460.D

Form I Cog

Accutest Laboratories

Report of Analysis

3129

3

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	F022460.D	1	07/27/07	WJ	n/a	n/a	VF413
Run #2							

	Initial Weight
Run #1	2.74 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND VJ	100	51	ug/kg	
71-43-2	Benzene	ND	10	4.1	ug/kg	
75-27-4	Bromodichloromethane	ND	10	4.1	ug/kg	
75-25-2	Bromoform	ND	10	4.1	ug/kg	
108-90-7	Chlorobenzene	ND	10	4.1	ug/kg	
75-00-3	Chloroethane	ND	10	6.2	ug/kg	
67-66-3	Chloroform	ND	10	4.1	ug/kg	
75-15-0	Carbon disulfide	ND	10	4.1	ug/kg	
56-23-5	Carbon tetrachloride	ND	10	4.1	ug/kg	
75-34-3	1,1-Dichloroethane	ND	10	4.1	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	10	4.1	ug/kg	
107-06-2	1,2-Dichloroethane	ND	10	4.1	ug/kg	
78-87-5	1,2-Dichloropropane	ND	10	4.1	ug/kg	
124-48-1	Dibromochloromethane	ND	10	4.1	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	10	4.1	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	10	4.1	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	10	4.1	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	10	4.1	ug/kg	
100-41-4	Ethylbenzene	ND	10	4.1	ug/kg	
591-78-6	2-Hexanone	ND	51	21	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	51	21	ug/kg	
74-83-9	Methyl bromide	ND	10	4.1	ug/kg	
74-87-3	Methyl chloride	ND	10	4.1	ug/kg	
75-09-2	Methylene chloride	ND	21	10	ug/kg	
78-93-3	Methyl ethyl ketone	ND	51	21	ug/kg	
100-42-5	Styrene	ND	10	4.1	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	10	4.1	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	10	4.1	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	10	4.1	ug/kg	
127-18-4	Tetrachloroethylene	ND	10	4.1	ug/kg	
108-88-3	Toluene	ND	10	4.1	ug/kg	
79-01-6	Trichloroethylene	ND	10	4.1	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OP

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	10	4.1	ug/kg	
	m,p-Xylene	ND	21	6.2	ug/kg	
95-47-6	o-Xylene	ND	10	4.1	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	109%		80-121%
2037-26-5	Toluene-D8	101%		71-130%
460-00-4	4-Bromofluorobenzene	114%		59-148%
17060-07-0	1,2-Dichloroethane-D4	110%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: F022461.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	F022461.D	1	07/27/07	WJ	n/a	n/a	VF413
Run #2							

	Initial Weight
Run #1	2.18 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND UJ	120	60	ug/kg	
71-43-2	Benzene	ND	12	4.8	ug/kg	
75-27-4	Bromodichloromethane	ND	12	4.8	ug/kg	
75-25-2	Bromoform	ND	12	4.8	ug/kg	
108-90-7	Chlorobenzene	ND	12	4.8	ug/kg	
75-00-3	Chloroethane	ND	12	7.2	ug/kg	
67-66-3	Chloroform	ND	12	4.8	ug/kg	
75-15-0	Carbon disulfide	ND	12	4.8	ug/kg	
56-23-5	Carbon tetrachloride	ND	12	4.8	ug/kg	
75-34-3	1,1-Dichloroethane	ND	12	4.8	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	12	4.8	ug/kg	
107-06-2	1,2-Dichloroethane	ND	12	4.8	ug/kg	
78-87-5	1,2-Dichloropropane	ND	12	4.8	ug/kg	
124-48-1	Dibromochloromethane	ND	12	4.8	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	12	4.8	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	12	4.8	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	12	4.8	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	12	4.8	ug/kg	
100-41-4	Ethylbenzene	ND	12	4.8	ug/kg	
591-78-6	2-Hexanone	ND	60	24	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	60	24	ug/kg	
74-83-9	Methyl bromide	ND	12	4.8	ug/kg	
74-87-3	Methyl chloride	ND	12	4.8	ug/kg	
75-09-2	Methylene chloride	ND	24	12	ug/kg	
78-93-3	Methyl ethyl ketone	ND	60	24	ug/kg	
100-42-5	Styrene	ND	12	4.8	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	12	4.8	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	12	4.8	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	12	4.8	ug/kg	
127-18-4	Tetrachloroethylene	ND	12	4.8	ug/kg	
108-88-3	Toluene	ND	12	4.8	ug/kg	
79-01-6	Trichloroethylene	ND	12	4.8	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OA

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	12	4.8	ug/kg	
	m,p-Xylene	ND	24	7.2	ug/kg	
95-47-6	o-Xylene	ND	12	4.8	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	114%		80-121%
2037-26-5	Toluene-D8	108%		71-130%
460-00-4	4-Bromofluorobenzene	122%		59-148%
17060-07-0	1,2-Dichloroethane-D4	116%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: F022462.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	F022462.D	1	07/27/07	WJ	n/a	n/a	VF413
Run #2							

	Initial Weight
Run #1	2.06 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	65.8 J	130	63	ug/kg	J
71-43-2	Benzene	ND	13	5.1	ug/kg	
75-27-4	Bromodichloromethane	ND	13	5.1	ug/kg	
75-25-2	Bromoform	ND	13	5.1	ug/kg	
108-90-7	Chlorobenzene	ND	13	5.1	ug/kg	
75-00-3	Chloroethane	ND	13	7.6	ug/kg	
67-66-3	Chloroform	ND	13	5.1	ug/kg	
75-15-0	Carbon disulfide	ND	13	5.1	ug/kg	
56-23-5	Carbon tetrachloride	ND	13	5.1	ug/kg	
75-34-3	1,1-Dichloroethane	ND	13	5.1	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	13	5.1	ug/kg	
107-06-2	1,2-Dichloroethane	ND	13	5.1	ug/kg	
78-87-5	1,2-Dichloropropane	ND	13	5.1	ug/kg	
124-48-1	Dibromochloromethane	ND	13	5.1	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	13	5.1	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	13	5.1	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	13	5.1	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	13	5.1	ug/kg	
100-41-4	Ethylbenzene	ND	13	5.1	ug/kg	
591-78-6	2-Hexanone	ND	63	25	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	63	25	ug/kg	
74-83-9	Methyl bromide	ND	13	5.1	ug/kg	
74-87-3	Methyl chloride	ND	13	5.1	ug/kg	
75-09-2	Methylene chloride	ND	25	13	ug/kg	
78-93-3	Methyl ethyl ketone	ND	63	25	ug/kg	
100-42-5	Styrene	ND	13	5.1	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	13	5.1	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	13	5.1	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	13	5.1	ug/kg	
127-18-4	Tetrachloroethylene	ND	13	5.1	ug/kg	
108-88-3	Toluene	ND	13	5.1	ug/kg	
79-01-6	Trichloroethylene	ND	13	5.1	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	13	5.1	ug/kg	
	m,p-Xylene	ND	25	7.6	ug/kg	
95-47-6	o-Xylene	ND	13	5.1	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	112%		80-121%
2037-26-5	Toluene-D8	105%		71-130%
460-00-4	4-Bromofluorobenzene	118%		59-148%
17060-07-0	1,2-Dichloroethane-D4	116%		77-123%

(a) CCV outside of control limits; results may be biased high.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: F022479.D

Form I OM

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	F022479.D	1	07/28/07	WJ	n/a	n/a	VF414
Run #2							

	Initial Weight
Run #1	3.53 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	78.2 J	82	41	ug/kg	J
71-43-2	Benzene	ND	8.2	3.3	ug/kg	
75-27-4	Bromodichloromethane	ND	8.2	3.3	ug/kg	
75-25-2	Bromoform	ND	8.2	3.3	ug/kg	
108-90-7	Chlorobenzene	ND	8.2	3.3	ug/kg	
75-00-3	Chloroethane	ND	8.2	4.9	ug/kg	
67-66-3	Chloroform	ND	8.2	3.3	ug/kg	
75-15-0	Carbon disulfide	ND	8.2	3.3	ug/kg	
56-23-5	Carbon tetrachloride	ND	8.2	3.3	ug/kg	
75-34-3	1,1-Dichloroethane	ND	8.2	3.3	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	8.2	3.3	ug/kg	
107-06-2	1,2-Dichloroethane	ND	8.2	3.3	ug/kg	
78-87-5	1,2-Dichloropropane	ND	8.2	3.3	ug/kg	
124-48-1	Dibromochloromethane	ND	8.2	3.3	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	8.2	3.3	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	8.2	3.3	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	8.2	3.3	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	8.2	3.3	ug/kg	
100-41-4	Ethylbenzene	ND	8.2	3.3	ug/kg	
591-78-6	2-Hexanone	ND	41	16	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	41	16	ug/kg	
74-83-9	Methyl bromide	ND	8.2	3.3	ug/kg	
74-87-3	Methyl chloride	ND	8.2	3.3	ug/kg	
75-09-2	Methylene chloride	ND	16	8.2	ug/kg	
78-93-3	Methyl ethyl ketone	ND	41	16	ug/kg	
100-42-5	Styrene	ND	8.2	3.3	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	8.2	3.3	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	8.2	3.3	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	8.2	3.3	ug/kg	
127-18-4	Tetrachloroethylene	ND	8.2	3.3	ug/kg	
108-88-3	Toluene	ND	8.2	3.3	ug/kg	
79-01-6	Trichloroethylene	ND	8.2	3.3	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSS05		
Lab Sample ID:	F51154-32	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	86.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	8.2	3.3	ug/kg	
	m,p-Xylene	ND	16	4.9	ug/kg	
95-47-6	o-Xylene	ND	8.2	3.3	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	109%		80-121%
2037-26-5	Toluene-D8	106%		71-130%
460-00-4	4-Bromofluorobenzene	121%		59-148%
17060-07-0	1,2-Dichloroethane-D4	108%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J031457.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031457.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	2.7 J	5.0	1.0	ug/l	J
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	94%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	108%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J031458.D

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Report of Analysis

Client Sample ID:	071807TW		
Lab Sample ID:	F51154-13	Date Sampled:	07/18/07
Matrix:	AQ - Trip Blank Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031458.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I rev

Accutest Laboratories

Report of Analysis

Client Sample ID:	071807TW		
Lab Sample ID:	F51154-13	Date Sampled:	07/18/07
Matrix:	AQ - Trip Blank Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	93%		76-127%
2037-26-5	Toluene-D8	99%		86-112%
460-00-4	4-Bromofluorobenzene	109%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044658.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	071807TS		
Lab Sample ID:	F51154-14	Date Sampled:	07/18/07
Matrix:	SO - Trip Blank Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044658.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	5.00 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	50	25	ug/kg	
71-43-2	Benzene	ND	5.0	2.0	ug/kg	
75-27-4	Bromodichloromethane	ND	5.0	2.0	ug/kg	
75-25-2	Bromoform	ND	5.0	2.0	ug/kg	
108-90-7	Chlorobenzene	ND	5.0	2.0	ug/kg	
75-00-3	Chloroethane	ND	5.0	3.0	ug/kg	
67-66-3	Chloroform	ND	5.0	2.0	ug/kg	
75-15-0	Carbon disulfide	ND	5.0	2.0	ug/kg	
56-23-5	Carbon tetrachloride	ND	5.0	2.0	ug/kg	
75-34-3	1,1-Dichloroethane	ND	5.0	2.0	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	5.0	2.0	ug/kg	
107-06-2	1,2-Dichloroethane	ND	5.0	2.0	ug/kg	
78-87-5	1,2-Dichloropropane	ND	5.0	2.0	ug/kg	
124-48-1	Dibromochloromethane	ND	5.0	2.0	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	5.0	2.0	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	5.0	2.0	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	5.0	2.0	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	5.0	2.0	ug/kg	
100-41-4	Ethylbenzene	ND	5.0	2.0	ug/kg	
591-78-6	2-Hexanone	ND	25	10	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	25	10	ug/kg	
74-83-9	Methyl bromide	ND	5.0	2.0	ug/kg	
74-87-3	Methyl chloride	ND	5.0	2.0	ug/kg	
75-09-2	Methylene chloride	ND	10	5.0	ug/kg	
78-93-3	Methyl ethyl ketone	ND	25	10	ug/kg	
100-42-5	Styrene	ND	5.0	2.0	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	5.0	2.0	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	5.0	2.0	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	5.0	2.0	ug/kg	
127-18-4	Tetrachloroethylene	ND	5.0	2.0	ug/kg	
108-88-3	Toluene	ND	5.0	2.0	ug/kg	
79-01-6	Trichloroethylene	ND	5.0	2.0	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Final Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	071807TS		
Lab Sample ID:	F51154-14	Date Sampled:	07/18/07
Matrix:	SO - Trip Blank Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	5.0	2.0	ug/kg	
	m,p-Xylene	ND	10	3.0	ug/kg	
95-47-6	o-Xylene	ND	5.0	2.0	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	97%		80-121%
2037-26-5	Toluene-D8	98%		71-130%
460-00-4	4-Bromofluorobenzene	113%		59-148%
17060-07-0	1,2-Dichloroethane-D4	102%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: H044659.D

Form I OV7

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB071907S		
Lab Sample ID:	F51154-19	Date Sampled:	07/19/07
Matrix:	SO - Trip Blank Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044659.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	5.00 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	50	25	ug/kg	
71-43-2	Benzene	ND	5.0	2.0	ug/kg	
75-27-4	Bromodichloromethane	ND	5.0	2.0	ug/kg	
75-25-2	Bromoform	ND	5.0	2.0	ug/kg	
108-90-7	Chlorobenzene	ND	5.0	2.0	ug/kg	
75-00-3	Chloroethane	ND	5.0	3.0	ug/kg	
67-66-3	Chloroform	ND	5.0	2.0	ug/kg	
75-15-0	Carbon disulfide	ND	5.0	2.0	ug/kg	
56-23-5	Carbon tetrachloride	ND	5.0	2.0	ug/kg	
75-34-3	1,1-Dichloroethane	ND	5.0	2.0	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	5.0	2.0	ug/kg	
107-06-2	1,2-Dichloroethane	ND	5.0	2.0	ug/kg	
78-87-5	1,2-Dichloropropane	ND	5.0	2.0	ug/kg	
124-48-1	Dibromochloromethane	ND	5.0	2.0	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	5.0	2.0	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	5.0	2.0	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	5.0	2.0	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	5.0	2.0	ug/kg	
100-41-4	Ethylbenzene	ND	5.0	2.0	ug/kg	
591-78-6	2-Hexanone	ND	25	10	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	25	10	ug/kg	
74-83-9	Methyl bromide	ND	5.0	2.0	ug/kg	
74-87-3	Methyl chloride	ND	5.0	2.0	ug/kg	
75-09-2	Methylene chloride	ND	10	5.0	ug/kg	
78-93-3	Methyl ethyl ketone	ND	25	10	ug/kg	
100-42-5	Styrene	ND	5.0	2.0	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	5.0	2.0	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	5.0	2.0	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	5.0	2.0	ug/kg	
127-18-4	Tetrachloroethylene	ND	5.0	2.0	ug/kg	
108-88-3	Toluene	ND	5.0	2.0	ug/kg	
79-01-6	Trichloroethylene	ND	5.0	2.0	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I OA

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB071907S		
Lab Sample ID:	F51154-19	Date Sampled:	07/19/07
Matrix:	SO - Trip Blank Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	5.0	2.0	ug/kg	
	m,p-Xylene	ND	10	3.0	ug/kg	
95-47-6	o-Xylene	ND	5.0	2.0	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		80-121%
2037-26-5	Toluene-D8	97%		71-130%
460-00-4	4-Bromofluorobenzene	113%		59-148%
17060-07-0	1,2-Dichloroethane-D4	101%		77-123%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J031459.D

Form I GC

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB071907W		
Lab Sample ID:	F51154-21	Date Sampled:	07/19/07
Matrix:	AQ - Trip Blank Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031459.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result		RL	MDL	Units	Q
67-64-1	Acetone	ND		25	5.0	ug/l	
71-43-2	Benzene	ND		1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND		1.0	0.50	ug/l	
75-25-2	Bromoform	ND		1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND		1.0	0.50	ug/l	
75-00-3	Chloroethane	ND		2.0	1.0	ug/l	
67-66-3	Chloroform	1.3	J	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND		2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND		1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND		1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND		1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND		1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND		1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND		1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND		1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND		1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND		1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND		1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND		1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND		5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND		5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND		2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND		2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND		5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND		5.0	2.5	ug/l	
100-42-5	Styrene	ND		1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND		1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND		1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND		1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND		1.0	0.50	ug/l	
108-88-3	Toluene	ND		1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND		1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I - OA

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB071907W		
Lab Sample ID:	F51154-21	Date Sampled:	07/19/07
Matrix:	AQ - Trip Blank Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	93%		76-127%
2037-26-5	Toluene-D8	99%		86-112%
460-00-4	4-Bromofluorobenzene	110%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Dioxin Furans
SGS Paradigm Analytical Laboratories, Inc. SDGs G383-596
(Accutest SDG F52026)

DATE: December 12, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 22, 2007. The sample was analyzed for Dioxin Furan compounds using USEPA SW-846 Method 8290 High Resolution Gas Chromatography/High Resolution Mass Spectroscopy (HRGC/HRMS). A total of one aqueous sample was validated. The sample Id is:

Field Sample ID	Lab Sample ID
41GW03	F52026-1

Data were reviewed and validated using a combination of project QAPP, *DOD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *USEPA Region III Dioxin/Furan Data Validation Guidance* (March, 1999). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Blank Analysis
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Internal Standards (IS) Recovery Standard Solutions
	X	Cleanup Standards
	X	Laboratory Control Standard or Ongoing Precision Result (OPR)
	X	Matrix Spike and Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

12/12/07
Date

RFAAP VALIDATION REPORT
DIOXIN FURAN REVIEW
SDGs G383-596
(Accutest SDG F52026)

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, dioxin and furans are shipped cooled (@4°C ± 2°C) with a maximum holding time of 30 days from sample collection to preparative extraction and 45 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/22/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 2.6°C and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 5.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: For the aqueous samples collected 08/22/07, the dioxins and furans were extracted on 08/27/07 and analyzed on 08/30/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Blank Analysis

The purpose of laboratory (or field) blank analyses is to determine the existence and magnitude of contamination problems resulting from field and laboratory activities. No contamination should be found in any of the blanks >EDL (estimated detection limit). The DoD QSM criteria specifies all concentrations should be less than ½ MRL (<MRL for common laboratory contaminants OCDD and OCDF) and <2*EDL for the calibration blanks. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants OCDD or OCDF, or 5 times (5X) the maximum amount for other target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. ng/L	Action Level ng/L	B qualified samples
09/01/07	LMB14448	OCDD	0.0137J	0.0685	None
09/01/07	LMB14448	2,3,7,8-TCDF	0.00254J	0.0127	None
09/01/07	LMB14448	1,2,3,7,8-PeCDF	0.00158J	0.0079	None
09/01/07	LMB14448	2,3,4,7,8-PeCDF	0.00178J	0.0089	None
09/01/07	LMB14448	1,2,3,4,7,8-HxCDF	0.00452J	0.0226	None
09/01/07	LMB14448	1,2,3,6,7,8-HxCDF	0.00250J	0.0125	None
09/01/07	LMB14448	2,3,4,6,7,8-HxCDF	0.00160J	0.0080	None
09/01/07	LMB14448	1,2,3,7,8,9-HxCDF	0.00150J, EMPC	0.0075	None
09/01/07	LMB14448	1,2,3,4,6,7,8-HpCDF	0.0328J	0.164	None
09/01/07	LMB14448	OCDF	0.0624J	0.312	None
09/01/07	LMB14448	Total TCDFs	0.00510	0.0255	None
09/01/07	LMB14448	Total PeCDFs	0.00336	0.0168	None
09/01/07	LMB14448	Total HxCDFs	0.0131	0.0655	None
09/01/07	LMB14448	Total HpCDFs	0.0328	0.164	None
09/09/07	RB083007	All congeners <EDL	NA	NA	None

EDL = Estimated detection limit
J = Estimated value <MRL and >EDL.
EMPC = Estimated Maximum Possible Concentration.
NA = Not Applicable.

III-Instrument Performance Check

Instrument must be tuned with perfluorokerosene (PFK) to achieve a static resolving power of at least 10,000 (10% valley) and lock-mass ion between lowest and highest masses for each descriptor and level of reference compound ≤10%. Documentation of the mass spectrometer resolving power is accomplished by recording the peak profile of the high-mass reference signal (typically m/z 330.9792) obtained during a peak examination by using the low-mass PFK ion at m/z 292.9825 or lower in mass as reference. At the beginning of the each 12-hour period, the chromatographic resolution is verified in the same fashion as in the initial calibration through the analysis of HRCC solution on the DB-5 (or equivalent) column or through the analysis of the column performance solution on the SP-2331 or SP-225 (or equivalent) column. A 25% valley must be achieved between the close eluters.

- All PFK forms were verified and found to be in compliance with method specification. No qualifiers were applied.

IV-Initial Calibration

Once the window defining mix has been analyzed and the descriptor switching times have been verified, the five point calibration solutions can be analyzed prior to sample analysis. Per method and DoD QSM, the initial calibration criteria are as follows:

  - The percent relative standard deviations for the mean response factors RRF(n) from the 17 unlabeled standards must not exceed ±20%, and those for the labeled reference compounds must not exceed ±30%;
  - The signal to noise ratio ≥10% for all target ions;
  - Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For initial calibration performed on 07/10/07 for all target compounds on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this initial calibration.

- For TCDF initial calibration performed on 04/18/07 for all target compounds on instrument HRMS3, all criteria were met. No qualifiers were applied. TCDF confirmation for sample 41GW03 (F52026-1) applies to this initial calibration.

V-Continuing Calibration
The continuing calibration consists of two parts: evaluation of the mass resolution and retention time check. Per method and DoD QSM, the following stipulates the continuing calibration criteria.

- The signal signal-to-noise ratio (S/N) must be at least 10:1 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard for each analyte.
- The relative response factor of each analyte for the unlabeled standard must be within ±20% of the average RF obtained from the initial calibration, and the RRF of each labeled standard must be within ±30% of the average RRF established during initial calibration. This is expressed in term of percent difference %D.
- Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For continuing calibration performed on 09/01/07 @12:26 on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this continuing calibration.

- For continuing calibration performed on 09/01/07 @23:42 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/02/07 @11:03 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/02/07 @22:24 on instrument HRMS1, 1,2,3,4,7,8-HxCDD (20.1%) was above criteria. For all other congeners, all criteria were met. No samples reported apply to this continuing calibration. No qualifiers were applied.

- For continuing calibration performed on 09/05/07 @11:06 on instrument HRMS3, all criteria were met. No qualifiers were applied. TCDF confirmation for sample 41GW03 (F52026-1) applies to this continuing calibration.

- For continuing calibration performed on 09/05/07 @15:52 on instrument HRMS3, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

VI-Internal Standards (IS) Recovery Standard Solutions
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: Recoveries of the isotopically-labeled recovery standards to fall within the 40 to 135 percent range for the tetra- through octachlorinated congeners, or as stated in the data package (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VII-Cleanup Standards
Cleanup standards are added to every sample, blank, quality control sample, and calibration solution. This compound is added to the samples after extraction but prior to cleanup and is used to verify the percent recovery obtained using the isotope dilution technique. The control limits are 40 to 135 percent (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Standard (LCS) or Ongoing Precision Result (OPR)
LCSs are used to monitor laboratory accuracy and precision by calculating the percent recoveries of the spiked compounds. Per DOD QSM and method criteria, acceptable performance is determined by:

1. Recoveries of the isotopically-labeled extraction standards to fall within 40-135% control limits for the tetra- through octachlorinated congeners, or as stated in the data package;

2. Recoveries (accuracy) of the unlabeled compounds should be within ±35% when spiked at the method quantitation limit and within ±30% when spiked above 20 times the method quantitation limit, or as stated in the data package;

3. When duplicate OPR are required, the relative percent difference (RPD) of the unlabeled analytes concentrations should be within 30% when spiked at the method quantitation limit and within ±20% when spiked above 20 times the method quantitation limit.

- Sample OPR14448 was used as LCS and LCSD on 09/01/07 analytical run. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. Per DoD QSM, MS/MSD recoveries must be within in-house laboratory limits (75-125%) and RPD ≤20%.

- No project specific aqueous matrix MS/MSD was performed in this SDG; therefore, it was not evaluated.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

XI-Quantitation Verification
The accuracy of analytical results was verified through the calculation of at least one the several parameters such as the %D, %RSD, % recovery, and/or compound concentration. Values were found to be within 10%. Any value reported by the laboratory as estimated "A" based on an analyte to internal standard ratio below the calibration curve was qualified as estimated "J". The signal signal-to-noise ratio (S/N) must be greater than 2.5 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard. Any detected value with ether interference (I-lab flag) was qualified as estimated "J". For where the ion ratio failed the 25% criteria (*-lab flag), the estimated maximum possible concentration (EMPC) was reported and flagged estimated "J". For where presence of quantitation interference (Q-lab flag), the date was flagged estimated "J" for detects and "UJ" for non-detects.

- 1,2,3,4,6,7,8-HpCDF exceeded upper calibration limit for sample 41GW03 (F52026-1). 1,2,3,4,6,7,8-HpCDF was qualified estimated "J" for all associated samples based upon this outlier.

Sample: 41GW03 (F52026-1), OCDD

A(x) = sum of the integrated ion abundances of the quantitation ions for the unlabeled ions;

A(is) = sum of the integrated ion abundances of the quantitation ions for the labeled ions;
Q(is) = quantity, in ng/ul, of the internal standard added to the sample before extraction;
W = weight, in g, of the sample (solid or organic liquid) as dry weight, or volume in mL of an aqueous sample; and
Avg. RRF(n) = calculated mean relative response factor for the unlabeled analyte.

$$\text{Conc. (ng/L)} = \frac{(A(x)) * Q(is) * 1000}{A(is) * W * \text{Avg. RRF}} = \frac{(12900000+14600000) * 4.0 * 1000}{(24400000+27100000) * 782 * 1.0783} = 2.53 \text{ ng/L}$$

Reported Value = 2.53 ng/L
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ EDL and <MRL or <3*EDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥EDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ EDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I Copy

SGS Environmental Services

Method 8290
F52026-1
Accutest

Analytical Data Summary Sheet

Analyte	Amount ng/L	EDL ng/L	EMPC ng/L	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00317				
1,2,3,7,8-PeCDD	ND	0.00639				
1,2,3,4,7,8-HxCDD	ND	0.00639				
1,2,3,6,7,8-HxCDD	0.0109 J			37:06	1.33	A
1,2,3,7,8,9-HxCDD	0.0130 J			37:22	1.18	A
1,2,3,4,6,7,8-HpCDD	0.0726			40:34	0.96	
OCDD	2.53			45:04	0.89	
2,3,7,8-TCDF	0.0132			30:58	0.78	
1,2,3,7,8-PeCDF	0.232			33:34	1.57	
2,3,4,7,8-PeCDF	0.479			34:10	1.56	
1,2,3,4,7,8-HxCDF	10.7			36:18	1.23	
1,2,3,6,7,8-HxCDF	2.43			36:24	1.25	
2,3,4,6,7,8-HxCDF	0.632			36:54	1.21	
1,2,3,7,8,9-HxCDF	0.107			37:42	1.21	
1,2,3,4,6,7,8-HpCDF	38.2 J			39:16	1.04	E
1,2,3,4,7,8,9-HpCDF	1.01			41:15	1.05	
OCDF	34.0			45:21	0.88	
Total TCDDs	ND	~~0.00317~~	0.0224 J			
Total PeCDDs	0.0409		0.116 J			
Total HxCDDs	0.0813		0.119 J			
Total HpCDDs	0.151					
Total TCDFs	0.416		0.429 J			
Total PeCDFs	3.70					
Total HxCDFs	21.3		21.3 J			
Total HpCDFs	42.9					
WHO-2005 TEQ (ND=0)	1.95		1.95			
WHO-2005 TEQ (ND=½)	1.95		1.95			

Client Information			**Sample Information**	
Project Name:	F52026		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F52026-1		Weight / Volume:	782 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14448
Project ID:	G383-596		Instrument:	HRMS1
Sample ID:	G383-596-2C		Filename:	a01sep07a-6
Collection Date/Time:	08/22/07	7:00	Retchk:	a01sep07a-1
Receipt Date/Time:	08/28/07	10:30	Begin ConCal:	a01sep07a-1
Extraction Date:	08/29/07		End ConCal:	a01sep07a-15
Analysis Date/Time:	09/01/07	16:27	Initial Cal:	m8290-071007a

Form I Copy

SGS Environmental Services

Method 8290
F52026-1
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.34	67.2	31:33	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.29	64.5	34:21	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.52	76.0	37:06	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.29	64.6	40:33	1.07	
13C12-OCDD	4.0	2.07	51.6	45:03	0.90	
13C12-2,3,7,8-TCDF	2.0	1.60	80.2	30:58	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.31	65.5	33:33	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.54	77.1	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.53	76.3	39:15	0.46	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.333	83.2	31:34	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.294	73.5	34:10	1.61	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.288	72.0	37:00	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.348	87.1	36:16	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.244	61.1	41:13	0.46	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:06	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:22	1.25	

Client Information			**Sample Information**		
Project Name:	F52026		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F52026-1		Weight / Volume:	782 mL	
			Solids / Lipids:	NA	%
			Original pH :	8	
Laboratory Information			Batch ID:	WG14448	
Project ID:	G383-596		Instrument:	HRMS1	
Sample ID:	G383-596-2C		Filename:	a01sep07a-6	
Collection Date/Time:	08/22/07	7:00	Retchk:	a01sep07a-1	
Receipt Date/Time:	08/28/07	10:30	Begin ConCal:	a01sep07a-1	
Extraction Date:	08/29/07		End ConCal:	a01sep07a-15	
Analysis Date/Time:	09/01/07	16:27	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.16]Report

Analyzed by: JWP
Date: 09-05-07

Reviewed by: [signature]
Date: 9/5/07

Form I Copy

TCDF Confirmation - Method 8290
F52026-1
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	0.0132	0.00285		20.81	0.73	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.80	0.78	

Client Information			**Sample Information**		
Project Name:	F52026		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F52026-1		Weight / Volume:	782	mL
			Solids / Lipids:	NA	
			Original pH :	8	
Laboratory Information			Batch ID:	WG14448	
Project ID:	G383-596		Instrument:	hrms3	
Sample ID:	G383-596-2C		Filename:	c05sep07b-12	
Collection Date/Time:	08/22/07	7:00	Retchk:	c05sep07b-2	
Receipt Date:	08/28/07	10:30	Begin ConCal:	c05sep07b-1	
Extraction Date:	08/29/07		End ConCal:	c05sep07b-13	
Analysis Date/Time:	09/05/07	15:28	Initial Cal:	mcf-c041807a	

Analyzed by: _____
Date: 090607

Reviewed by: _____
Date: 9/6/07

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MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Explosives, PETN, & Nitroglycerin
Accutest Laboratories, Inc., SDG F52026

DATE: December 20, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 22, 2007. Aqueous samples were analyzed for explosives, nitroglycerin, and PETN using USEPA SW-846 3535A/8330A. A total of one aqueous sample was validated. The sample Id is:

Field Sample ID	Lab Sample ID
41GW03	F52026-1

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Blank Analysis
	X	Initial Calibration
	X	Continuing Calibration
	X	System Monitoring Compounds
X		Laboratory Control Sample
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualification.

Eric Malarek, Chemist

12/20/07
Date

RFAAP VALIDATION REPORT
EXPLOSIVES REVIEW
SDG F52026

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, explosive compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/22/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 2.6°C and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 5.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: For the aqueous samples collected 08/22/07, the explosives were extracted on 08/29/07 and analyzed on 08/30/07. All criteria were met. No qualifiers were applied.

II-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5x) the maximum amount for explosive target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
08/30/07	OP22102-MB	All target explosives <½MRL	NA	NA	None
08/31/07	OP22102-MB	All target explosives <½MRL	NA	NA	None
08/31/07	OP22102-MB	All target explosives <½MRL	NA	NA	None
08/30/07	OP22102-MB	PETN & NG <½MRL	NA	NA	None
09/11/07	RB083007	All target explosives <½MRL	NA	NA	None
09/07/07	RB083007	PETN & NG <½MRL	NA	NA	None

MRL = Method Reporting Limit
NA = Not Applicable

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The DoD QSM specifies that the correlation coefficient must be ≥0.995 and/or the percent relative standard deviation (%RSD) must be ≤20%. All detects were qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects were qualified as estimated "UJ" for where there were grossly exceeding recoveries. Grossly exceeding is defined as twice the established criteria limits.

- For the explosives initial calibration performed on 10/20/06 on instrument G1315B, all criteria were met for target explosives compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. No samples reported apply to this initial calibration.

- For the explosives initial calibration performed on 08/21/07 on instrument G1315B, all criteria were met for target explosives compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this initial calibration.

- For the PETN and nitroglycerin initial calibration performed on 03/15/07 on instrument G1315B, all criteria were met for target compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this initial calibration.

IV-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. Continuing calibration standards are analyzed after every 10 injections, and at the end of the analysis sequence. The DoD QSM specifies that the percent difference (%D) from initial calibration should be no greater than ±20%. All detects were qualified as estimated "J" for where there were exceeding %Ds, and all non-detects were qualified as estimated "UJ" for where there were grossly exceeding recoveries. Grossly exceeding is defined as twice the established criteria limits.

- For explosives initial calibration verification performed on 10/20/06 @14:03 on instrument G1315B, nitrobenzene (20.5% signal #2) was outside criteria. All samples were non-detect for this compound. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives initial calibration verification performed on 10/20/06 @15:10 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives initial calibration verification performed on 10/21/06 @20:17 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives continuing calibration performed on 08/30/07 @10:44 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 08/30/07 @15:47 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this continuing calibration.

- For explosives continuing calibration performed on 08/30/07 @21:24 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 08/31/07 @10:04 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 08/31/07 @13:45 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 08/31/07 @16:01 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Confirmation for sample 41GW03 (F52026-1) applies to this continuing calibration.

- For explosives continuing calibration performed on 08/31/07 @19:36 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PETN and nitroglycerin initial calibration verification performed on 03/15/07 @12:35 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PETN and nitroglycerin continuing calibration performed on 08/30/07 @11:26 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PETN and nitroglycerin continuing calibration performed on 08/30/07 @13:09 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this continuing calibration.

- For PETN and nitroglycerin continuing calibration performed on 08/30/07 @13:35 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

V-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the laboratory control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria: 3,4-dinitrotoluene (70-136%)

- All criteria were met. No qualifiers were applied.

VI-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor long-term accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the laboratory control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-12 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22102-BS was used as aqueous LCS for explosives analyzed on 08/30/07. All criteria were met. No qualifiers were applied. No samples reported apply to this LCS.

- Sample OP22102-BS was used as aqueous LCS for explosives analyzed on 08/31/07. 2-Amino-4,6-dinitrotoluene (118%) was above laboratory criteria; however, within DoD QSM criteria. 2-Amino-4,6-dinitrotoluene was qualified bias high "K" based upon the high recovery. Sample 41GW03 (F52026-1) applies to this LCS.

- Sample OP22102-BS2 was used as aqueous LCS for PETN and nitroglycerin analyzed on 08/30/07. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the laboratory control limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-12 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample J69871-1 was used as the aqueous MS/MSD for the explosive analysis on 08/30/07. Since the spiked sample was not a site sample, it was not evaluated. Sample 41GW03 (F52026-1) applies to this MS/MSD.

- Sample 43MW5 (F52025-5) was used as the aqueous MS/MSD for the PETN and nitroglycerin analysis on 08/30/07. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this MS/MSD.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

IX-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The calculation was based calibration factors. The absolute percent difference (%D) between the calculated and the reported value must be within 10% difference. All values >MDL and <MRL or <3*MDL (whichever was greater) were qualified as estimated "J". All positive values must have less than or equal to 40% %D between the primary and secondary columns.

- For sample 41GW03 (F52026-1), 1,3,5-trinitrobenzene (64.2%) was outside criteria. All other target compounds, the %Ds between the primary and secondary columns were within criteria. 1,3,5-Trinitrobenzene was qualified estimated "J" based upon the high %D.

Sample: 41GW03 (F52026-1), 2-amino-4,6-dinitrotoluene

Conc. µg/L = (Ax * Vt * DF) / (CF * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area of characteristic ion for compound being measured.
Vt = Volume of total extract (mL).
CF = Average relative calibration factor for compound being measured (from ICAL)
Vs = Volume of sample extracted (mL).
DF = Dilution factor

Conc. µg/L = (317687 * 10 * 1) / (7292 * 900) = 0.48 µg/L (Signal #1)

Reported Value = 0.48 µg/L
% Difference = 0.0%
Values were within 10% difference

Sample: OP22102-BS2, nitroglycerin

Conc. µg/L = (Ax * Vt * DF) / (CF * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area of characteristic ion for compound being measured.
Vt = Volume of total extract (mL).
CF = Average relative calibration factor for compound being measured (from ICAL)
Vs = Volume of sample extracted (mL).
DF = Dilution factor

Conc. µg/L = (3137463 * 10 * 1) / (1228 * 1000) = 25.6 µg/L (Signal #1)

Reported Value = 25.6 µg/L
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW03		
Lab Sample ID:	F52026-1	Date Sampled:	08/22/07
Matrix:	AQ - Ground Water	Date Received:	08/23/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG023870.D	1	08/30/07	NAF	08/29/07	OP22102	GGG1013
Run #2	PP022675.D	1	08/30/07	NAF	08/29/07	OP22102	GPP789
Run #3 [b]	GG023899.D	1	08/31/07	NAF	08/29/07	OP22102	GGG1015

	Initial Volume	Final Volume
Run #1	900 ml	10.0 ml
Run #2	900 ml	10.0 ml
Run #3	900 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.22	0.057	ug/l	
121-82-4	RDX	ND	0.22	0.067	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.22	0.062	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.22	0.079	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.22	0.11	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	0.48	0.22	0.072	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	2.2	0.22	0.062	ug/l	
98-95-3	Nitrobenzene	ND	0.22	0.081	ug/l	
88-72-2	o-Nitrotoluene	ND	0.22	0.13	ug/l	
99-08-1	m-Nitrotoluene	ND	0.22	0.087	ug/l	
99-99-0	p-Nitrotoluene	ND	0.22	0.11	ug/l	
479-45-8	Tetryl	ND	0.22	0.076	ug/l	
99-35-4	1,3,5-Trinitrobenzene	0.57 J	0.22	0.072	ug/l	
118-96-7	2,4,6-Trinitrotoluene	0.17 J	0.22	0.056	ug/l	J
55-63-0	Nitroglycerine	ND	2.2	0.56	ug/l	
78-11-5	PETN	ND	2.2	0.56	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Run# 3	Limits
610-39-9	3,4-Dinitrotoluene	112%	109%	113%	70-136%

(a) All hits confirmed by reanalysis on a dissimilar column.
(b) Confirmation run.
(c) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – Herbicides
Accutest Laboratories, Inc., SDG F52026

DATE: December 14, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 22, 2007. Aqueous sample was analyzed for chlorinated herbicides using USEPA SW846 Method 3510C/8151A. A total of one aqueous sample was validated. The sample Id is:

Field Sample ID	Lab Sample ID
41GW03	F52026-1

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
X		Initial Calibration
X		Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
	X	Laboratory Control Sample
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

12/14/07
Date

RFAAP VALIDATION REPORT
CHLORINATED HERBICIDES REVIEW
SDG F52026

I-Holding Times

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, chlorinated herbicides compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/22/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 2.6°C and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 5.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: For aqueous samples collected 08/22/07, the herbicides were extracted on 08/29/07 and analyzed on 09/01/07. All criteria were met. No qualifiers were applied.

II-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The DoD QSM specifies that the percent relative standard deviation (%RSD) for a 5-point standard calibration should be ≤20% for each target compound.

- No initial calibration was provided for MCPP and MCPA on instrument GC-DD. During discussions with the laboratory, they indicated that they perform a daily single point calibration rather than a five point calibration. All samples were non-detect and qualified estimated "UJ" based upon this outlier. Sample 41GW03 (F52026-1) applies to this single point calibration.

- For initial calibration performed on 08/31/07 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this initial calibration.

III-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration establishes the response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The DoD QSM specifies that the percent difference (%D) between the initial calibration CF and the continuing calibration CF must be ≤20%.

- A single point calibration was provided for MCPP and MCPA on instrument GC-DD for 08/31/07 run. The calibration standard indicated adequate response for MCPP and MCPA. However, since a five point calibration was not performed, %D calculation could not be verified. All samples were non-detect and qualified estimated "UJ" based upon this outlier. Sample 41GW03 (F52026-1) applies to this single point calibration.

- For continuing calibration performed on 08/31/07 @23:51 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/01/07 @04:49 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this continuing calibration.

- For continuing calibration performed on 09/01/07 @09:48 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/05/07 @21:41 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/05/07 @22:56 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

IV-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field or laboratory activities. No contaminants should be detected in any of the associated blanks. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are qualified "B" if the concentration of the analyte is ≤ five times (5x) the absolute maximum blank concentration. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/01/07	OP7963-MB	All target compounds <½MRL	NA	NA	None
09/10/07	RB083007	All target compounds <½MRL	NA	NA	None

MRL = Method reporting limit.

NA = Not Applicable.

V-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. Spike recoveries must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Control Limit: 2,4-DCAA (34-179%)

- All criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Data for laboratory control samples (LCS) are generated to determine long-term precision and accuracy of the analytical method. Percent recoveries must be within the specified control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-8 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP7963-BS was used as the aqueous LCS for the 09/01/07 run. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-8 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample 43MW1 (F52025-1) was used for the aqueous MS/MSD analysis on 09/01/07. Dinoseb (RPD=67%) was above DoD QSM criteria and laboratory criteria. All samples were non-detect for dinoseb; therefore, no qualifiers were applied based upon this outlier. All other herbicides were within criteria. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this MS/MSD.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

IX-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. Percent difference (%D) between the calculated value and the reported value must be within 10%. All positive values must have less than or equal to 40% %D between the primary and secondary columns. Any sample value >MDL and <MRL is qualified as estimated, "J." All criteria were met. No qualifiers were applied.

- All chlorinated herbicides were non-detect. No confirmations were required.

Sample: 43MW1MS (F52025-1MS), 2,4-DB

Conc. µg/L = (Amt * DF * Vt) / (CF * Vo)

where: Amt = the response on column (ng/mL) of the sample
CF = Calibration Factor (from initial calibration)
Vt = volume of final extract (mL)
DF = dilution factor
Vo = volume of the sample extracted (mL)

Conc. µg/L = (5780425 ng/mL * 1 * 10 mL) / (7872* 1000 mL)
= 7.3 ng/mL = 7.3 µg/L

Reported Conc. = 7.3 µg/L
%D = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: DD67084.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW03		
Lab Sample ID:	F52026-1	**Date Sampled:**	08/22/07
Matrix:	AQ - Ground Water	**Date Received:**	08/23/07
Method:	SW846 8151 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD67084.D	1	09/01/07	ATX	08/29/07	T:OP7963	T:GDD1307
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND	50		ug/l	
94-74-6	MCPA	ND	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	102%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
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Edgewood, Maryland
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Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – TAL Metals (Total and Dissolved)
Accutest Laboratories, Inc., SDG F52026

DATE: December 21, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 22, 2007. The aqueous sample was analyzed for total and dissolved target analyte list (TAL) metals using USEPA SW-846 3010A/6010B for ICP metals and SW-846 7470A for mercury. The dissolved fractions have an "A" suffix for the laboratory ID. A total of two aqueous samples (1 set of total and dissolved samples) were validated. The sample Id is:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41GW03	F52026-1	41GW03	F52026-1A

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
X		Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
	X	Laboratory Sample Duplicate
	X	Matrix Spike and Spike Duplicate
X		ICP Serial Dilution
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

12/21/07
Date

RFAAP VALIDATION REPORT
METALS REVIEW
SDG F52026

I-Holding Times

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. Holding time criteria: For aqueous matrices, the samples are shipped cool @4°C±2°C and preserved to pH<2 with HNO_3 with a maximum holding time is 180 days for ICP metals and 28 days for mercury.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/22/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 2.6°C and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 5.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: For aqueous samples collected 08/22/07, they were digested on 09/05/07 and analyzed on 09/06/07 (second run for calcium, magnesium, and manganese) for total and dissolved ICP metals. For aqueous samples collected 08/22/07, they were digested and analyzed on 08/30/07 for total mercury and digested and analyzed on 09/05/07 for dissolved mercury. All criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (DoD QSM <½ MRL) 3 – standards (r≥0.995) ICV/CCV (90-110%) (DoD QSM 90-110%) MRL (70-130%) (DoD QSM 80-120%) High Std. (95-105%)	Hg:	1 – blank (DoD QSM <½ MRL) 5 – standards (r≥0.995) ICV/CCV (80-120%)(DoD QSM ICV 90-110% & CCV 80-120%) MRL (80-120%) (DoD QSM 80-120%) High Std. (95-105%)

- The aqueous samples were analyzed for total and dissolved ICP metals on 09/06/07 (second run for calcium, magnesium, and manganese). Total mercury was analyzed for the aqueous samples on 08/30/07 with a correlation coefficient of 0.9998. Dissolved mercury was analyzed for the aqueous samples on 09/05/07 with a correlation coefficient of 0.9999. All ICV/CCV/High Standard criteria were met for all metals and runs. **Table 2** summarizes the MRL standard analysis. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
09/06/07	ICP-Sb	12	121%	None	K
09/06/07	ICP-Se	10	124%	None	K
09/06/07	Ca, Mg, & Mn	Various	All within criteria	None	None
08/30/07	Hg (Tot)	1.0	60.0%	41GW03 (Tot)	L
09/05/07	Hg (Dis)	1.0	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. DoD QSM limits are <½MRL for the method blank and <2*MDL for the calibration blanks. Samples are qualified "B" when they are less than 5x the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. Only total metals were analyzed for the rinse blank sample.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/06/07	Antimony	ICB/CCBs	17.9	89.5	None
09/06/07	Beryllium	ICB/CCBs	2.4J	12.0	41GW03 (Tot & Dis)
09/06/07	Iron	ICB/CCBs	37.0J	185	None
09/06/07	Potassium	ICB/CCBs	1730J	8650	None
09/06/07	Sodium	ICB/CCBs	1960J	9800	None
09/06/07	Ca, Mg, Mn	ICB/CCBs	<2*MDL	NA	None
08/30/07	Mercury	ICB/CCBs	<2*MDL	NA	None
09/05/07	Mercury	ICB/CCBs	<2*MDL	NA	None
08/30/07	Mercury	MP12843-MB	<2*MDL	NA	None
09/05/07	Mercury	MP12873-MB	<2*MDL	NA	None
09/06/07	Potassium	MP12878-MB	1740J	8700	None
09/06/07	Sodium	MP12878-MB	2020J	10100	None
09/06/07	Potassium	MP12878-MB	1740J	8700	None
09/06/07	Sodium	MP12878-MB	2200J	11000	None
09/17/07	Potassium	RB083007	1740J	8700	None
09/17/07	Sodium	RB083007	1860J	9300	None
09/05/07	Mercury	RB083007	<2*MDL	NA	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".

IV-ICP Interference Check Sample (ICS)

The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (DoD QSM limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)

The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All aqueous LCS results must fall within the control limits. The DoD QSM aqueous LCS recovery limits are specified in Table D-18 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample MP12878-BS was used as aqueous LCS for ICP metals analysis on 09/06/07. All criteria were met. No qualifiers were applied. Samples 41GW03 (F52026-1) and 41GW03 (F52026-1A) apply to this LCS.

- Sample MP12843-BS was used as aqueous LCS for mercury analysis performed on 08/30/07. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this LCS.

- Sample MP12873-BS was used as aqueous LCS for mercury analysis performed on 09/05/07. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1A) applies to this LCS.

VI-Laboratory Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analyses are also performed to generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. DoD QSM limits for metals are 20% RPD for ICP metals and mercury.

- Sample 43MW1 (F52025-1) was used as aqueous laboratory duplicate for ICP metals analysis on 09/06/07. Beryllium (40.0%) was above criteria. Beryllium was outside due to low sample concentrations (i.e. <MRL); therefore, no qualifiers were applied based upon this outlier. All other metals were within criteria. No qualifiers were applied. Samples 41GW03 (F52026-1) and 41GW03 (F52026-1A) apply to this laboratory duplicate.

- Sample F52017-1 was used as laboratory aqueous laboratory duplicate for mercury analysis on 08/30/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Sample 41GW03 (F52026-1) applies to this laboratory duplicate.

- Sample 48MW3 (F52170-5) was used as aqueous laboratory duplicate for mercury analysis on 09/05/07. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1A) applies to this laboratory duplicate.

VII-Matrix Spike/Spike Duplicate
MS/MSD are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS and MSD per 20 samples of similar matrix. MS and MSD recoveries and relative percent differences between MS and MSD recoveries should be within the specified limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-18 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used. Post digestion spikes limits are 75-125% for ICP metals and mercury.

- Sample 43MW1 (F52025-1) was used as laboratory aqueous MS/MSD for ICP metals analysis on 09/06/07. All criteria were met. No qualifiers were applied. Samples 41GW03 (F52026-1) and 41GW03 (F52026-1A) apply to this MS/MSD.

- Sample F52017-1 was used as laboratory aqueous MS/MSD for mercury analysis on 08/30/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Sample 41GW03 (F52026-1) applies to this MS/MSD.

- Sample 48MW3 (F52170-5) was used as laboratory aqueous MS/MSD for mercury analysis on 09/05/07. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1A) applies to this MS/MSD.

VIII-ICP Serial Dilution
An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for ICP metals was analyzed on 09/06/07 using aqueous sample 43MW1 (F52025-1). Aluminum (100%), barium (13.7%), beryllium (604%), cobalt (100%), iron (25.4%), magnesium (12.2%), manganese (12.4%), nickel (100%), potassium (289%), sodium (75.5%), and vanadium (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for aluminum, barium, beryllium, cobalt, iron, manganese, nickel, potassium, sodium, and vanadium; therefore, no qualifiers were applied based upon these outliers. For magnesium, all detects were qualified estimated "J" and non-detects no qualifier based upon this outlier. Samples 41GW03 (F52026-1) and 41GW03 (F52026-1A) apply to this serial dilution.

- The serial dilution for mercury was analyzed using aqueous sample F52017-1 on 08/30/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Sample 41GW03 (F52026-1) applies to this serial dilution.

- The serial dilution for mercury was analyzed using aqueous sample 48MW3 (F52170-5) on 09/05/07. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1A) applies to this serial dilution.

IX-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 35% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

X-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." The following calculations were performed for verification.

- The total and dissolved fractions were compared. The total metals should be greater than the dissolved fractions. All detected compounds found in the sample and its dissolved pair are noted in **Table 4** with the associated %D. Compounds that were non-detect "U" for either the total and dissolved samples were excluded from the total/dissolved concentration assessment. If the concentration that is greater than the MRL and the dissolved concentration are greater than its total concentration by 10%, then both results have been flagged with a "J." If the %D>50%, then both samples were rejected "R". All criteria were met. No qualifiers were applied.

Table 4 Total/Dissolved Hits Summary

Sample ID	Compound	MRL (µg/L)	Total Fraction (µg/L)	Dissolved Fraction (µg/L)	%D	Qualifier
41GW03	Aluminum	200	105000	79U	NA	None
41GW03	Iron	300	145000	600U	NA	None
41GW03	Lead	5.0	1200	2.1U	NA	None
41GW03	Magnesium	50000	1070000	61200	NA	None
41GW03	Manganese	150	6900	1090	NA	None
41GW03	Nickel	40	121	7.9J	NA	None
41GW03	Potassium	10000	43700	11900	NA	None
41GW03	Silver	10	0.86J	0.77U	NA	None
41GW03	Sodium	10000	61100	53100	NA	None
41GW03	Arsenic	10	25.5	3.7U	NA	None
41GW03	Barium	200	931	215	NA	None
41GW03	Beryllium	4.0	6.6	1.2J	NA	None
41GW03	Cadmium	5.0	3.3J	1.0U	NA	None
41GW03	Chromium	10	117	0.92U	NA	None
41GW03	Cobalt	50	67.4	2.5J	NA	None
41GW03	Copper	25	137	1.2U	NA	None
41GW03	Vanadium	50	148	1.1U	NA	None
41GW03	Zinc	20	2730	52.8	NA	None
41GW03	Calcium	10000	1980000	408000	NA	None
41GW03	Mercury	1.0	0.80J	0.11U	NA	None

J = Estimated value <MRL and >MDL.
U = Value Non-detect as <MDL.
NA = Not Applicable.

ICP Sample: 41GW03 (F52026-1A), Barium

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (214.8 µg/L)*(50 mL)*(1) / (50 mL) = 215 µg/L

Reported concentration = 215 µg/L
%D = 0.0%
Values were within 10% difference.

CVAA Sample: 41GW03 (F52026-1), Mercury

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (0.800 µg/L)*(50 mL)*(1) / (50 mL) = 0.80 µg/L

Reported concentration = 0.80 µg/L
%D = 0.0%.
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

D = Indicates sample was analyzed at a dilution.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

N (Metals) = Laboratory spike sample recovery not within control limits.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW03		
Lab Sample ID:	F52026-1	**Date Sampled:**	08/22/07
Matrix:	AQ - Ground Water	**Date Received:**	08/23/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	105000	200	79	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Antimony [a]	6.6 U	12	6.6	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Arsenic	25.5	10	3.7	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Barium	931	200	5.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Beryllium	6.6 B	4.0	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cadmium	3.3 J	5.0	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Calcium	1980000	10000	1000	ug/l	10	09/05/07	09/06/07	RS	SW846 6010B [3]	SW846 3010A [5]
Chromium	117	10	0.92	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cobalt	67.4	50	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Copper	137	25	1.2	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Iron	145000	300	15	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Lead	1200	5.0	2.1	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Magnesium	1070000 J	50000	1000	ug/l	10	09/05/07	09/06/07	RS	SW846 6010B [3]	SW846 3010A [5]
Manganese	6900	150	10	ug/l	10	09/05/07	09/06/07	RS	SW846 6010B [3]	SW846 3010A [5]
Mercury	0.80 J	1.0	0.11	ug/l	1	08/30/07	08/30/07	LM	SW846 7470A [1]	SW846 7470A [4]
Nickel	121	40	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Potassium	43700	10000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Selenium [b]	160 U	200	160	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Silver	0.86 J	10	0.77	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Sodium	61100	10000	500	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Thallium	6.5 U	10	6.5	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Vanadium	148	50	1.1	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]
Zinc	2780	20	5.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [5]

(1) Instrument QC Batch: MA5945
(2) Instrument QC Batch: MA5956
(3) Instrument QC Batch: MA5957
(4) Prep QC Batch: MP12843
(5) Prep QC Batch: MP12878

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.
(b) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW03		
Lab Sample ID:	F52026-1A	**Date Sampled:**	08/22/07
Matrix:	AQ - Groundwater Filtered	**Date Received:**	08/23/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	79 U	200	79	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Antimony [a]	6.6 U	12	6.6	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Arsenic	3.7 U	10	3.7	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Barium	215	200	5.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.2 J B	4.0	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Calcium	408000	1000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Chromium	0.92 U	10	0.92	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Cobalt	2.5 J J	50	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Copper	1.2 U	25	1.2	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Iron [b]	600 U	1200	600	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Lead	2.1 U	5.0	2.1	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Magnesium	61200 J	5000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Manganese	1090	15	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.11 U	1.0	0.11	ug/l	1	09/05/07	09/05/07	RS	SW846 7470A [1]	SW846 7470A [3]
Nickel	7.9 J J	40	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Potassium	11900	10000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Selenium [b]	80 U	100	80	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Silver	0.77 U	10	0.77	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Sodium	53100	10000	500	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Thallium	6.5 U	10	6.5	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.1 U	50	1.1	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Zinc	52.8	20	5.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5953
(2) Instrument QC Batch: MA5956
(3) Prep QC Batch: MP12873
(4) Prep QC Batch: MP12878

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.
(b) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Perchlorate
Datachem Laboratories, Inc. SDG 07E-0767-01
(Accutest Laboratories, Inc., SDG F52026)

DATE: December 12, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 22, 2007. The aqueous sample was analyzed for perchlorate analysis using liquid chromatography mass spectroscopy (LC/MS) SW-846 method 6850 in selective ion monitoring (SIM) mode. A total of one aqueous sample was validated. The sample Id is:

Field Sample ID	Lab Sample ID
41GW03	F52026-1

Data were reviewed and validated using a combination of project QAPP, *DOD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006), *DoD Perchlorate Handbook August, Rev1, Change 1, 2007* (DoD, 2007), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial and Continuing Calibration
	X	Blank Analysis
	X	Internal Standards
	X	Laboratory Control Sample (LCS)
X		Matrix Spike (MS) and Spike Duplicate (MSD)
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

12/12/07
Date

RFAAP VALIDATION REPORT
PERCHLORATE REVIEW
SDG 07E-0767-01 (F52026)

I-Holding Times and Preservation
The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. For perchlorate analysis, aqueous samples are received and stored at cool @4°C±2°C with a maximum holding time of 28 days from collection (DoD Perchlorate Handbook criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/22/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 2.6°C and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 5.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The aqueous sample was collected on 08/22/07. The aqueous perchlorate sample was prepped on 09/04/07 and analyzed on 09/04/07. All holding time criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, $^{35}Cl^{16}O_3$, met the mass calibration criteria. No qualification was applied.

III-Initial and Continuing Calibration
Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

Perchlorate:
1- blank (<1/2MRL DoD Perchlorate Handbook)
5 – standards ($r \geq 0.995$ DoD Perchlorate Handbook)
ICV (±10%D DoD Perchlorate Handbook)
CCV/ICS (±30%D DoD Perchlorate Handbook)
LODV (±30%D DoD Perchlorate Handbook)

- The perchlorate sample was analyzed on 09/04/07. Perchlorate was calibrated second order for on 09/04/07 with a coefficient of 0.9999. All ICV/CCV/ICS/LODV standards were within criteria. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this calibration.

IV-Blanks

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be detected in any of the associated blanks >MDL. The DoD Perchlorate Handbook criterion specifies all concentrations should be less than ½ MRL for method blanks. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/04/07	Perchlorate	BL-259634-1	<½MRL	NA	None
09/18/07	Perchlorate	RB083007	<½MRL	NA	None

MRL = Method Reporting Limit.
NA = Not Applicable.

V-Internal Standards

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The DoD Handbook specifies retention times (RT) 1.0 ± 2% of last calibration standard and the ratio of RT of sample to standard should be 3.06 and fall between 2.3 and 3.8. The laboratory 83:85 mass ratio limit range is 2.15 to 4.00. The internal standard peak area responses should fall between 50% to 150% recoveries.

- All criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples (LCS)

The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. DoD Perchlorate Handbook and laboratory aqueous limits are 85-115%.

- Sample QC-259634-1 was used as aqueous LCS for perchlorate analysis dated 09/04/07. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this LCS.

VII-Matrix Spike (MS) and Spike Duplicate (MSD)

MS and MSD are generated to determine long-term accuracy and precision of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike samples at a frequency of one MS/MSD per 20 samples of similar matrix. MS/MSD recoveries and relative percent differences between MS recoveries should be within the specified limits. DoD Perchlorate Handbook aqueous limits are 75-125%; RPD≤20%. The laboratory limits are 80-120%; RPD≤15%.

- Sample 43MW1 (F52025-1) was used for the MS/MSD analysis for the 09/04/07 perchlorate analysis. Perchlorate (122%) was above lab criteria and within DoD QSM criteria. The LCS recovery was within criteria (See Section VI) for perchlorate. The spiked sample was qualified estimated bias high "K" based upon the high recovery. Sample 41GW03 (F52026-1) applies to this MS/MSD.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

IX-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever was greater) was qualified as estimated, "J." The following calculations were performed for verification.

Sample: 41GW03 (F52026-1), Perchlorate

y (area ratio) = (Sample Area/Area EIC89) = (6121.9/72236.3) = 0.08474825 = ax^2 + bx + c

Setting y = 0,
x = [-b ± SQRT(b^2-4ac)] / (2a)

where: x is the amount ratio

a = 0.0350178 b = 1.23841 (set to zero = c-y) c = - 0.00090073 - 0.08474825 = -0.08564898

amount ratio ={-1.23841± [SQRT{(1.23841^2) – (4*0.0350178*-0.08564898)}] / (2*0.0350178)
= (-1.23841±1.24324) / (0.0700356)
= 0.0690257

Conc. µg/L = (Amount ratio * Is * DF)

where: Conc. = Sample concentration in ug/L
I_s = Amount of internal standard (µg/L).
DF = Dilution factor

Conc. µg/L = (Amount ratio * Is * DF)
= (0.0690257 * 5 µg/L * 1) = 0.345 µg/L

Reported concentration = 0.345 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I Copy

DATA CHEM LABORATORIES
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FORM A (TYPE I)
SINGLE METHOD ANALYSES

SAMPLE ANALYSIS DATA SHEET

Form RLIMS63A-V1.4
09110714300339

S077W023

Date Printed.....: 11-SEP-07 14:30

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F52026
Release Number.....: Not Provided

Date Received.....: 28-AUG-07 00:00

Client Sample Name: F52026-1
DCL Sample Name...: 07E04422
DCL Report Group..: 07E-0767-01

Matrix.....: WATER
Date Sampled.....: 22-AUG-07 07:00
Reporting Units...: ug/L
Report Basis.....: ☒ As Received ☐ Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 04-SEP-07 00:00
Preparation Method...: 6850
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G078300C
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
☒ Primary
☐ Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	CRDL
Perchlorate	04-SEP-07 18:52	0.112	0.345			1	0.200

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MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Pesticides and PCBs
Accutest Laboratories, Inc., SDG F52026

DATE: December 20, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 22, 2007. Aqueous samples were analyzed for pesticides and PCBs using USEPA Method 3510C/8081A and 3510C/8082, respectively. A total of one aqueous sample was validated. The sample Id is:

Field Sample ID	Lab Sample ID
41GW03	F52026-1

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
X		Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

12/20/07
Date

RFAAP VALIDATION REPORT
PESTICIDE/PCB REVIEW
SDG F52026

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, pesticide and PCB compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/22/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 2.6°C and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 5.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: For aqueous samples collected 08/22/07, the pesticides were extracted on 08/28/07 and analyzed on 09/06/07. The PCBs were extracted 08/28/07 and analyzed 09/07/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check (Degradation Standard)
Performance checks on the gas chromatograph with electron capture detector (GC/ECD) system are performed to ensure adequate resolution and instrument sensitivity. The performance evaluation mixture (PEM) must be analyzed at the beginning of the analytical sequence. The breakdown of Endrin and 4,4'-DDT must be ≤15% on both signals.

- For analysis performed on 08/31/07 @13:31, endrin and 4,4'-DDT percent breakdowns were 12.4% and 8.8% on signal #1 and 12.3% and 7.6% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 09/06/07 @09:36, endrin and 4,4'-DDT percent breakdowns were 14.4% and 7.4% on signal #1 and 14.9% and 7.0% on signal #2, respectively. All criteria were met. No qualifiers were applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5 point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. Calibration factors are generated for each compound. The DoD QSM specifies that the percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016, 1242, 1254, and 1260 must be <20% or the mean %RSD for all analytes in the standard must be ≤20%. If linear regression is used, the correlation coefficient must be ≥0.995. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits.

- For the pesticide initial calibration performed on 08/31/07 on instrument ECD5, all criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) was analyzed using this initial calibration.

- For the PCB initial calibration performed on 09/06/07 on instrument ECD3, all criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) was analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for pesticide/PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The DoD QSM specifies that the percent difference (%D) or the average %Ds for all analytes in the standard from the initial calibration should be no greater than ±20%.

- For pesticide initial calibration verification performed on 08/31/07 @16:57 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 09/06/07 @09:55 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For pesticide chlordane continuing calibration performed on 09/06/07 @10:18 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For pesticide toxaphene continuing calibration performed on 09/06/07 @10:33 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 09/06/07 @13:36 on instrument ECD5, all criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) was analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 09/06/07 @16:47 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 09/06/07 @15:58 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 09/07/07 @00:13 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 09/07/07 @02:33 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 09/07/07 @06:03 on instrument ECD3, all criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) was analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 09/07/07 @07:30 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 09/08/07 @06:04 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1248 continuing calibration performed on 09/08/07 @06:22 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1242 continuing calibration performed on 09/08/07 @06:39 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1232/1268 continuing calibration performed on 09/08/07 @06:57 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1221/1254 continuing calibration performed on 09/08/07 @07:14 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 09/08/07 @10:17 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

V-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for pesticide and PCB target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
Pesticides	09/06/07	OP22089-MB	All target <½MRL	NA	NA	None
Pesticides	09/24/07	RB083007	All target <½MRL	NA	NA	None
PCBs	09/07/07	OP22088-MB	All target <½MRL	NA	NA	None
PCBs	09/08/07	OP22088-MB	All target <½MRL	NA	NA	None
PCBs	09/14/07	RB083007	All target <½MRL	NA	NA	None

NA = Not Applicable
MRL = Method Reporting Limit

VI-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:	Tetrachloro-m-xylene:	Pesticides: 42-127% (DoD QSM 25-140%)
	Decachlorobiphenyl:	Pesticides: 27-127% (DoD QSM 30-135%)
Aqueous Criteria:	Tetrachloro-m-xylene:	PCBs: 38-127% (DoD QSM Not Listed)
	Decachlorobiphenyl:	PCBs: 25-137% (DoD QSM 40-135%)

- For PCBs sample 41GW03 (F52026-1), decachlorobiphenyl (30.0%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For pesticides, all criteria were met.

VII-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22089-BS was used as the aqueous LCS for the pesticide analysis on 09/06/07. Compound endrin aldehyde (24%) was outside DoD QSM criteria, however within laboratory criteria. Compound endrin aldehyde was non-detect for all associated samples and was qualified estimated bias "UL" for non-detects based upon the low recovery. Sample 41GW03 (F52026-1) applies to this LCS.

- Sample OP22088-BS was used as the aqueous LCS for the PCB analysis on 09/07/07. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this LCS.

- Sample OP22088-BS was used as the aqueous LCS for the PCB analysis on 09/08/07. All criteria were met. No qualifiers were applied. No samples reported apply to this LCS.

VIII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample F51982-1 was used as the MS/MSD for the pesticide analysis on 09/06/07. Since the spiked sample is not a RFAAP site sample; it was not evaluated. Sample 41GW03 (F52026-1) applies to this MS/MSD.

- Sample F51982-2 was used as the MS/MSD for the PCB analysis on 09/07/07. Since the spiked sample is not a RFAAP site sample; it was not evaluated. Sample 41GW03 (F52026-1) applies to this MS/MSD.

IX-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

X-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All positive values must have less than or equal to 40% %D between the primary and secondary columns. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." All criteria were met.

- All chlorinated pesticides and PCBs were non-detect for this SDG. No confirmations were required.

Sample: OP22089-BS, alpha-chlordane

Conc. µg/L = (Amt * DF * Vt) / (CF * Vo)

where: Amt is the response on column (ng/mL) of the sample
CF = Calibration Factor (from initial calibration)
Vt is the volume of final extract (mL)
DF is the dilution factor
Vo is the volume of the sample extracted (mL)

Conc. µg/L = (10300617 ng/mL * 1 * 10 mL) / (196400 * 1000 mL)
= 0.52 ng/mL = 0.52 µg/L

Reported Conc. = 0.52 µg/L
%D = 0.0%
Values were within 10% difference

Sample: **OP22088-BS, Aroclor 1260**

Conc. µg/L = (Ax * Vt * DF) / (CF * Vi * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 µL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (µL).
Vs = Volume of sample extracted (L).
DF = Dilution factor

Signal #1
Conc1 µg/L = (3674549 * 10000* 1) / (9650 *(1000000) * 1 * 1.00) = 3.81 µg/L
Conc2 µg/L = (4562712 * 10000* 1) / (12000 *(1000000) * 1 * 1.00) = 3.80 µg/L
Conc3 µg/L = (4865504 * 10000* 1) / (12520 *(1000000) * 1 * 1.00) = 3.89 µg/L
Conc4 µg/L = (3266697 * 10000* 1) / (8730 *(1000000) * 1 * 1.00) = 3.74 µg/L
Conc5 µg/L = (8017278 * 10000* 1) / (21240 *(1000000) * 1 * 1.00) = 3.77 µg/L
Conc6 µg/L = (4539316 * 10000* 1) / (12350 *(1000000) * 1 * 1.00) = 3.68 µg/L
Average concentration = 3.8 µg/L

Signal #2
Conc1 µg/L = (506488 * 10000* 1) / (1290 *(1000000) * 1 * 1.00) = 3.93 µg/L
Conc2 µg/L = (614045 * 10000* 1) / (1592 *(1000000) * 1 * 1.00) = 3.86 µg/L
Conc3 µg/L = (580785 * 10000* 1) / (1476 *(1000000) * 1 * 1.00) = 3.93 µg/L
Conc4 µg/L = (423219 * 10000* 1) / (1143 *(1000000) * 1 * 1.00) = 3.70 µg/L
Conc5 µg/L = (1085223 * 10000* 1) / (2836 *(1000000) * 1 * 1.00) = 3.83 µg/L
Conc6 µg/L = (412343 * 10000* 1) / (1099 *(1000000) * 1 * 1.00) = 3.75 µg/L
Average concentration = 3.8 µg/L

Reported Value = 3.8 µg/L (from signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

N (Metals) = Laboratory spike sample recovery not within control limits.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW03		
Lab Sample ID:	F52026-1	**Date Sampled:**	08/22/07
Matrix:	AQ - Ground Water	**Date Received:**	08/23/07
Method:	SW846 8081A SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK21410.D	1	09/06/07	FS	08/28/07	OP22089	GKK780
Run #2							

	Initial Volume	Final Volume
Run #1	990 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.051	0.010	ug/l	
319-84-6	alpha-BHC	ND	0.051	0.010	ug/l	
319-85-7	beta-BHC	ND	0.051	0.011	ug/l	
319-86-8	delta-BHC	ND	0.051	0.010	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.051	0.010	ug/l	
5103-71-9	alpha-Chlordane	ND	0.051	0.010	ug/l	
5103-74-2	gamma-Chlordane	ND	0.051	0.010	ug/l	
60-57-1	Dieldrin	ND	0.051	0.010	ug/l	
72-54-8	4,4'-DDD	ND	0.10	0.020	ug/l	
72-55-9	4,4'-DDE	ND	0.10	0.020	ug/l	
50-29-3	4,4'-DDT	ND	0.10	0.020	ug/l	
72-20-8	Endrin	ND	0.10	0.020	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	0.020	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	0.030	ug/l	
53494-70-5	Endrin ketone	ND	0.10	0.020	ug/l	
959-98-8	Endosulfan-I	ND	0.051	0.010	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	0.010	ug/l	
76-44-8	Heptachlor	ND	0.051	0.010	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.051	0.010	ug/l	
72-43-5	Methoxychlor	ND	0.10	0.020	ug/l	
8001-35-2	Toxaphene	ND	2.5	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	77%		42-127%
2051-24-3	Decachlorobiphenyl	30%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: ST66091.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW03		
Lab Sample ID:	F52026-1	**Date Sampled:**	08/22/07
Matrix:	AQ - Ground Water	**Date Received:**	08/23/07
Method:	SW846 8082 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	ST66091.D	1	09/07/07	JB	08/28/07	OP22088	GST1724
Run #2							

	Initial Volume	Final Volume
Run #1	990 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.51	0.25	ug/l	
11104-28-2	Aroclor 1221	ND	0.51	0.40	ug/l	
11141-16-5	Aroclor 1232	ND	0.51	0.40	ug/l	
53469-21-9	Aroclor 1242	ND	0.51	0.25	ug/l	
12672-29-6	Aroclor 1248	ND	0.51	0.25	ug/l	
11097-69-1	Aroclor 1254	ND	0.51	0.25	ug/l	
11096-82-5	Aroclor 1260	ND	0.51	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	79%		38-127%
2051-24-3	Decachlorobiphenyl	30%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
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Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Semi-Volatiles & Polynuclear Aromatic Hydrocarbons Accutest Laboratories, Inc., SDG F52026

DATE: December 20, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 22, 2007. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW846 Methods 3510C/8270C for aqueous matrices. The polynuclear aromatic hydrocarbons (PAHs) were analyzed using selective ion monitoring (SIM) techniques. A total of one aqueous sample was validated. The sample Id is:

Field Sample ID	Lab Sample ID
41GW03	F52026-1

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
	X	Laboratory Control Sample
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

12/20/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F52026

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For semivolatile (SVOC) and polynuclear aromatic hydrocarbons (PAH) compounds , the samples are cooled @4°C ± 2°C for aqueous samples with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/22/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 2.6°C and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 5.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: For the aqueous samples collected 08/22/07, the SVOCs were extracted on 08/28/07 and analyzed on 09/08/07. For the aqueous samples collected 08/28/07, the PAHs by SIM were extracted on 08/28/07 and analyzed on 09/13/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check

GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for compounds on the semivolatile target compound list (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. The minimum relative response factor (RRF) criteria must be ≥0.05. The DoD QSM specifies that the initial calibration percent relative standard deviation (%RSD) must be ≤15% on the average for all compounds (<30% for CCCs). All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- Initial calibration for the SVOCs was performed on 08/16/07 on instrument MSBNA03. Target compounds 2,4-dinitrophenol (25.1%) and 4,6-dinitro-2-methylphenol (18.1%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 2,4-dinitrophenol (r=0.9992) and 4,6-dinitro-2-methylphenol (r=0.9992) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. No samples reported were analyzed using this initial calibration.

- Initial calibration for the SVOCs was performed on 09/06/07 on instrument MSBNA03. Target compounds 2,4-dinitrophenol (38.8%; grossly exceeding) and 4,6-dinitro-2-methylphenol (16.1%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 2,4-dinitrophenol (r=0.9964) and 4,6-dinitro-2-methylphenol (r=0.9998) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Sample 41GW03 (F52026-1) was analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/05/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. Sample 41GW03 (F52026-1) was analyzed using this initial calibration.

- Initial calibration for the PCP by SIM was performed on 09/06/07 on instrument MSBNA01, PCP (22.5%) was above criteria (%RSD≤15%; RRF≥0.05). PCP (r=0.9993) was quantified using linear regression with correlation coefficient >0.995, therefore, no qualifiers were applied based upon the high %RSD. No samples reported were analyzed using this initial calibration.

IV-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥0.05. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ±20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For SVOC initial calibration verification performed on 08/16/07 @12:53 on instrument MSBNA03, 4-chloroaniline (35.2%) and 3-nitroaniline (36.1%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 4-chloroaniline and 3-nitroaniline. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC initial calibration verification performed on 08/16/07 @13:24 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 09/05/07 @11:53 on instrument MSBNA03, 2,4-dinitrophenol (44.4% drift) was outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 2,4-dinitrophenol. No samples reported apply to this continuing calibration.

- For SVOC initial calibration verification performed on 09/06/07 @14:46 on instrument MSBNA03, bis(2-chloroethoxy) methane (23.6%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for bis(2-chloroethoxy) methane. No samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 09/06/07 @15:14 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 09/08/07 @10:18 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/06/07 @13:48 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PCP by SIM initial calibration verification performed on 09/06/07 @14:30 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/12/07 @09:59 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PAH by SIM continuing calibration performed on 09/13/07 @12:16 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/05/07	OP22083-MB	All SVOC target <½MRL	NA	NA	None
09/08/07	OP22083-MB	All SVOC target <½MRL	NA	NA	None
09/06/07	OP22084-MB	All PAH SIM target <½MRL	NA	NA	None
09/12/07	OP22084-MB	All PAH SIM target <½MRL	NA	NA	None
09/13/07	OP22084-MB	All PAH SIM target <½MRL	NA	NA	None
09/15/07	RB083007	All SVOC target <½MRL	NA	NA	None
09/20/07	RB083007	All PAH SIM target <½MRL	NA	NA	None

NA = Not applicable.
MRL = Method reporting limit.

VI-Surrogate Spikes

Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-2 and Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:
2-Fluorophenol (14-62%) – (DoD QSM = 20-110%)
Phenol – d5 (10-40%) – (DoD QSM = 10-115%)
2,4,6-Tribromophenol (33-118%) – (DoD QSM = 40-125%)
Nitrobenzene-d5 (42-108%) – (DoD QSM = 40-110%)
2-Fluorobiphenyl (40-106%) – (DoD QSM = 50-110%)
p-Terphenyl – d14 (39-121%) – (DoD QSM = 50-135%)

- All criteria were met. No qualifiers were applied.

VII-Internal Standards

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD LCS aqueous recovery limits are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006).

- Sample OP22083-BS was used as the aqueous LCS for the SVOC analysis on 09/05/07. All criteria were met. All criteria were met. No qualifiers were applied. No samples reported apply to this LCS.

- Sample OP22083-BS was used as the aqueous LCS for the SVOC analysis on 09/08/07. All criteria were met. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this LCS.

- Sample OP22084-BS was used as the aqueous LCS for the PAH SIM analysis on 09/06/07. All criteria were met. No qualifiers were applied. No samples reported apply to this LCS.

- Sample OP22084-BS was used as the aqueous LCS for the PAH SIM analysis on 09/12/07. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006).

- Sample F51982-2 was used for the MS/MSD for the aqueous SVOC analysis on 09/08/07. The spiked sample was not a RFAAP site sample; therefore, it was not evaluated. Sample 41GW03 (F52026-1) applies to this MS/MSD.

- Sample 17MW02 (F51975-3) was used for the aqueous MS/MSD for PAH SIM analysis on 09/12/07. Acenaphthene (58%), acenaphthylene (59%), anthracene (68%), benzo(g,h,i)perylene (57%), indeno(1,2,3-cd)pyrene (61%), 2-methylnaphthalene (56%; RPD=24%), naphthalene (57%; RPD=27%), and phenanthrene (66%) were outside laboratory criteria and within DoD QSM criteria. For all other target PAHs, all criteria were met. The LCS was within criteria for all target compounds (Section VIII). The spiked sample was non-detect for all target PAHs and was qualified bias low non-detect "UL" for acenaphthene, acenaphthylene, anthracene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, and phenanthrene based upon the low recoveries. Sample 41GW03 (F52026-1) applies to this MS/MSD.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

XI-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: 41GW03 (F52026-1), diethyl phthalate

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (34334 * 40 * 1000 * 1) / (253535 * 1.361 * 900 * 1) = 4.4 ng/mL
= 4.4 µg/L

Reported Value = 4.4 µg/L
% Difference = 0.0%
Values were within 10% difference.

Sample: OP22084-BS, fluorene

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (828757 * 4 * 1000 * 1) / (143573 * 1.285 * 1000 * 1) = 18.0 ng/mL
= 18.0 µg/L

Reported Value = 18.0 µg/L
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: R10432.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW03		
Lab Sample ID:	F52026-1	**Date Sampled:**	08/22/07
Matrix:	AQ - Ground Water	**Date Received:**	08/23/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R10432.D	1	09/08/07	NJ	08/28/07	OP22083	SR487
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	28	11	ug/l	
95-57-8	2-Chlorophenol	ND	5.6	1.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.6	2.2	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.6	1.1	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.6	2.2	ug/l	
51-28-5	2,4-Dinitrophenol	ND	28	11	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	11	2.2	ug/l	
95-48-7	2-Methylphenol	ND	5.6	1.1	ug/l	
	3&4-Methylphenol	ND	5.6	1.4	ug/l	
88-75-5	2-Nitrophenol	ND	5.6	1.1	ug/l	
100-02-7	4-Nitrophenol	ND	28	11	ug/l	
87-86-5	Pentachlorophenol	ND	28	11	ug/l	
108-95-2	Phenol	ND	5.6	2.2	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.6	1.1	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.6	1.1	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.6	1.3	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.6	2.2	ug/l	
100-51-6	Benzyl Alcohol	ND	5.6	1.1	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.6	1.4	ug/l	
106-47-8	4-Chloroaniline	ND	5.6	2.2	ug/l	
86-74-8	Carbazole	ND	5.6	1.1	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.6	1.1	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.6	1.1	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.6	1.1	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.6	1.4	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.6	1.7	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.6	1.8	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.6	1.7	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.6	1.1	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.6	1.1	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	11	2.2	ug/l	
132-64-9	Dibenzofuran	ND	5.6	1.1	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW03		
Lab Sample ID:	F52026-1	**Date Sampled:**	08/22/07
Matrix:	AQ - Ground Water	**Date Received:**	08/23/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.6	2.2	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.6	2.2	ug/l	
84-66-2	Diethyl phthalate	4.4 J	5.6	2.2	ug/l	J
131-11-3	Dimethyl phthalate	ND	5.6	2.2	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.6	2.2	ug/l	
118-74-1	Hexachlorobenzene	ND	5.6	1.3	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.6	1.9	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.6	1.7	ug/l	
67-72-1	Hexachloroethane	ND	5.6	2.1	ug/l	
78-59-1	Isophorone	ND	5.6	1.1	ug/l	
88-74-4	2-Nitroaniline	ND	11	2.2	ug/l	
99-09-2	3-Nitroaniline	ND	11	2.2	ug/l	
100-01-6	4-Nitroaniline	ND	11	2.2	ug/l	
98-95-3	Nitrobenzene	ND	5.6	1.1	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.6	1.1	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.6	1.1	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.6	1.7	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	32%		14-62%
4165-62-2	Phenol-d5	24%		10-40%
118-79-6	2,4,6-Tribromophenol	66%		33-118%
4165-60-0	Nitrobenzene-d5	58%		42-108%
321-60-8	2-Fluorobiphenyl	57%		40-106%
1718-51-0	Terphenyl-d14	67%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W036833.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW03		
Lab Sample ID:	F52026-1	**Date Sampled:**	08/22/07
Matrix:	AQ - Ground Water	**Date Received:**	08/23/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036833.D	1	09/13/07	RB	08/28/07	OP22084	SW1899
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.1	0.56	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.56	ug/l	
120-12-7	Anthracene	ND	1.1	0.56	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.22	0.056	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.22	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.22	0.056	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.22	0.11	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.22	0.11	ug/l	
218-01-9	Chrysene	ND	0.22	0.11	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.22	0.056	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.28	ug/l	
86-73-7	Fluorene	ND	1.1	0.28	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.22	0.056	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-20-3	Naphthalene	ND	1.1	0.28	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.56	ug/l	
129-00-0	Pyrene	ND	1.1	0.28	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation - Volatiles
Accutest Laboratories, Inc., SDG F52026

DATE: December 19, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 22, 2007. The sample was analyzed for target compound list (TCL) volatile organic compounds (VOCs) using USEPA SW846 Method 5030B/8260B for aqueous matrices. A total of one aqueous sample was validated. The sample Id is:

Field Sample ID	Lab Sample ID
41GW03	F52026-1

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Results
	X	Initial Calibration
	X	Continuing Calibration
X		Blank Analysis
	X	Laboratory Control Sample
	X	Matrix Spike / Spike Duplicate Sample
	X	System Monitoring Compounds
	X	Internal Standards
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

12/19/07
Date

RFAAP VALIDATION REPORT
VOLATILES REVIEW
SDG F52026

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of analysis. Holding time criteria: For aqueous samples cooled @ 4°C±2°C; pH<2 HCl, the maximum holding time is 14 days (7 days if no HCl added) from sample collection to analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/22/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 2.6°C and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 5.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: For the aqueous sample collected 08/22/07, the VOCs were prepped and analyzed on 08/31/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, bromofluorobenzene (BFB), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent relative standard deviation (%RSD) must be ≤15% for each target compound and must be ≤30% for each calibration check compound. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration performed on 08/31/07 on instrument MSVOA6, target compounds chloroethane (20.1%), methylene chloride (55.0%; grossly exceeding), 2-butanone (15.4%), dibromomethane (15.6%), trans-1,3-dichloropropene (20.7%), dibromochloromethane (18.9%), 2-hexanone (17.9%), styrene (16.9%), and bromoform (22.6%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds chloroethane (r=0.9965), methylene chloride (r=0.9971), 2-butanone (r=0.9957), dibromomethane (r=0.9960), trans-1,3-dichloropropene (r=0.9973), dibromochloromethane (r=0.9988), 2-hexanone (r=0.9990), and styrene (r=0.9994) were quantified using linear or second order regression with correlation coefficients >0.995; therefore, no qualifiers were applied based upon these outliers. Bromoform was non-detect for all associated samples; therefore, no qualifiers were applied for bromoform based upon this outlier. Sample 41GW03 (F52026-1) was analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Continuing calibration establishes the 12-hour relative response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within 20% for all target compounds. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration verification performed on 08/31/07 @13:48 on instrument MSVOA6, target compounds 2-butanone (20.6%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). 2-Butanone was non-detect for all samples; therefore, no qualifiers were applied based upon the high %Drift. No samples reported apply to this initial calibration verification. No qualifiers were applied based upon this outlier.

- For continuing calibration performed on 08/31/07 @14:58 on instrument MSVOA6, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of BFB. No contaminants should be detected in any of the associated blanks > the MDL. The DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants methylene chloride, acetone, and 2-butanone). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants methylene chloride, acetone, and 2-butanone (MEK), or 5 times (5X) the maximum amount for other volatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. There was no trip blank associated with the samples collected 08/22/07.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
08/31/07	VJ2219-MB	Chloroform	0.43J	2.15	41GW03
08/31/07	VJ2219-MB	Methylene Chloride	1.9J	19.0	None
09/13/07	RB083007	All target <½MRL	NA	NA	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
NA = Not Applicable
MRL = Method Reporting Limit

VI-Laboratory Control Sample

Data for laboratory control samples (LCS) are evaluated to determine long-term accuracy of the analytical method on various matrices. Percent recoveries (%Rs) should be within the specified control limits. The DoD aqueous LCS recovery limits are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample VJ2219-BS was used as the aqueous LCS for the VOC analysis on 08/31/07. All criteria were met. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate

Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. The DoD MS/MSD aqueous recovery limits follow the LCS criteria and are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample F52073-1 was used for the aqueous MS/MSD analysis for analysis on 08/31/07. Since this sample is not a RFAAP site sample, it was not evaluated. No qualifiers were applied. Sample 41GW03 (F52026-1) applies to this MS/MSD.

VIII-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Recoveries for system monitoring compounds in volatile samples and blanks must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria: Dibromofluoromethane (87-116%) (DoD QSM = 85-115%)
1,2-Dichloroethane-d4 (76-127%) (DoD QSM = 70-120%)
Toluene-d8 (86-112%) (DoD QSM = 85-120%)
4-Bromofluorobenzene (84-120%) (DoD QSM = 75-120%)

- All criteria were met. No qualifiers were applied.

IX-Internal Standards (IS)
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

XI-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: 41GW03 (F52026-1), chloroform

Conc. (µg/L) = (Ax)*(Is) *(DF)/(Ais)*(RRF)

where: Ax is the compound area
Ais is the corresponding internal standard area
Is is the corresponding internal standard concentration (µg/L)
DF is the dilution factor
RRF is the relative response factor.

Conc. µg/L = (12242 * 50 µg/L * 1) / (1660592 * 0.440) = 0.84 µg/L

Reported Conc. = 0.84 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW03		
Lab Sample ID:	F52026-1	**Date Sampled:**	08/22/07
Matrix:	AQ - Ground Water	**Date Received:**	08/23/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J032258.D	1	08/31/07	KW	n/a	n/a	VJ2219
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	0.84	1.0	0.21	ug/l	JB
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Conv

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW03		
Lab Sample ID:	F52026-1	**Date Sampled:**	08/22/07
Matrix:	AQ - Ground Water	**Date Received:**	08/23/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		87-116%
17060-07-0	1,2-Dichloroethane-D4	103%		76-127%
2037-26-5	Toluene-D8	96%		86-112%
460-00-4	4-Bromofluorobenzene	100%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
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Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Dioxin Furans
SGS Paradigm Analytical Laboratories, Inc. SDGs G383-598
(Accutest SDG F52110)

DATE: November 19, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 27, 2007. The samples were analyzed for Dioxin Furan compounds using USEPA SW-846 Method 8290 High Resolution Gas Chromatography/High Resolution Mass Spectroscopy (HRGC/HRMS). A total of three aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41MW1	F52110-4	41MW3	F52110-6
41MW2	F52110-5		

Data were reviewed and validated using a combination of project QAPP, *DOD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *USEPA Region III Dioxin/Furan Data Validation Guidance* (March, 1999). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Blank Analysis
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Internal Standards (IS) Recovery Standard Solutions
	X	Cleanup Standards
	X	Laboratory Control Standard or Ongoing Precision Result (OPR)
	X	Matrix Spike and Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

Eric Malarek, Chemist

11/19/07

Date

RFAAP VALIDATION REPORT
DIOXIN FURAN REVIEW
SDGs G383-598
(Accutest SDG F52110)

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, dioxin and furans are shipped cooled (@4°C ± 2°C) with a maximum holding time of 30 days from sample collection to preparative extraction and 45 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/27/07, the coolers were received by the primary laboratory (Accutest) on 08/28/07 at 0.6°C, 1.2°C, 0.8°C, 0.2°C, 0.4°C, 1.0°C, 0.6°C, 0.6°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 3.0°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 3.6°C. Some of the receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/27/07, the dioxins and furans were extracted on 09/11/07 and analyzed on 09/13/07 and 09/14/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Blank Analysis

The purpose of laboratory (or field) blank analyses is to determine the existence and magnitude of contamination problems resulting from field and laboratory activities. No contamination should be found in any of the blanks >EDL (estimated detection limit). The DoD QSM criteria specifies all concentrations should be less than ½ MRL (<MRL for common laboratory contaminants OCDD and OCDF) and <2*EDL for the calibration blanks. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants OCDD or OCDF, or 5 times (5X) the maximum amount for other target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. ng/L	Action Level ng/L	B qualified samples
09/13/07	LMB14463	All congeners <EDL	NA	NA	None
09/09/07	RB083007	All congeners <EDL	NA	NA	None

EDL = Estimated detection limit

III-Instrument Performance Check

Instrument must be tuned with perfluorokerosene (PFK) to achieve a static resolving power of at least 10,000 (10% valley) and lock-mass ion between lowest and highest masses for each descriptor and level of reference compound ≤10%. Documentation of the mass spectrometer resolving power is accomplished by recording the peak profile of the high-mass reference signal (typically m/z 330.9792) obtained during a peak examination by using the low-mass PFK ion at m/z 292.9825 or lower in mass as reference. At the beginning of the each 12-hour period, the chromatographic resolution is verified in the same fashion as in the initial calibration through the analysis of HRCC solution on the DB-5 (or equivalent) column or through the analysis of the column performance solution on the SP-2331 or SP-225 (or equivalent) column. A 25% valley must be achieved between the close eluters.

- All PFK forms were verified and found to be in compliance with method specification. No qualifiers were applied.

IV-Initial Calibration

Once the window defining mix has been analyzed and the descriptor switching times have been verified, the five point calibration solutions can be analyzed prior to sample analysis. Per method and DoD QSM, the initial calibration criteria are as follows:

  - The percent relative standard deviations for the mean response factors RRF(n) from the 17 unlabeled standards must not exceed ±20%, and those for the labeled reference compounds must not exceed ±30%;
  - The signal to noise ratio ≥10% for all target ions;
  - Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For initial calibration performed on 07/10/07 for all target compounds on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this initial calibration.

V-Continuing Calibration

The continuing calibration consists of two parts: evaluation of the mass resolution and retention time check. Per method and DoD QSM, the following stipulates the continuing calibration criteria.

  - The signal signal-to-noise ratio (S/N) must be at least 10:1 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard for each analyte.
  - The relative response factor of each analyte for the unlabeled standard must be within ±20% of the average RF obtained from the initial calibration, and the RRF of each labeled standard must be within ±30% of the average RRF established during initial calibration. This is expressed in term of percent difference %D.
  - Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For continuing calibration performed on 09/12/07 @20:12 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/13/07 @07:35 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/13/07 @18:57 on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this continuing calibration.

- For continuing calibration performed on 09/14/07 @06:18 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/14/07 @17:39 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/15/07 @05:00 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

VI-Internal Standards (IS) Recovery Standard Solutions
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: Recoveries of the isotopically-labeled recovery standards to fall within the 40 to 135 percent range for the tetra- through octachlorinated congeners, or as stated in the data package (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VII-Cleanup Standards
Cleanup standards are added to every sample, blank, quality control sample, and calibration solution. This compound is added to the samples after extraction but prior to cleanup and is used to verify the percent recovery obtained using the isotope dilution technique. The control limits are 40 to 135 percent (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Standard (LCS) or Ongoing Precision Result (OPR)
LCSs are used to monitor laboratory accuracy and precision by calculating the percent recoveries of the spiked compounds. Per DOD QSM and method criteria, acceptable performance is determined by:

1. Recoveries of the isotopically-labeled extraction standards to fall within 40-135% control limits for the tetra- through octachlorinated congeners, or as stated in the data package;

2. Recoveries (accuracy) of the unlabeled compounds should be within $\pm$35% when spiked at the method quantitation limit and within $\pm$30% when spiked above 20 times the method quantitation limit, or as stated in the data package;

3. When duplicate OPR are required, the relative percent difference (RPD) of the unlabeled analytes concentrations should be within 30% when spiked at the method quantitation limit and within $\pm$20% when spiked above 20 times the method quantitation limit.

- Sample OPR14463 was used as LCS and LCSD on 09/13/07 analytical run. All criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. Per DoD QSM, MS/MSD recoveries must be within in-house laboratory limits (75-125%) and RPD ≤20%.

- No project specific aqueous matrix MS/MSD was performed in this SDG; therefore, it was not evaluated.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

XI-Quantitation Verification
The accuracy of analytical results was verified through the calculation of at least one the several parameters such as the %D, %RSD, % recovery, and/or compound concentration. Values were found to be within 10%. Any value reported by the laboratory as estimated "A" based on an analyte to internal standard ratio below the calibration curve was qualified as estimated "J". The signal signal-to-noise ratio (S/N) must be greater than 2.5 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard. Any detected value with ether interference (I-lab flag) was qualified as estimated "J". For where the ion ratio failed the 25% criteria (*-lab flag), the estimated maximum possible concentration (EMPC) was reported and flagged estimated "J". For where presence of quantitation interference (Q-lab flag), the date was flagged estimated "J" for detects and "UJ" for non-detects.

Sample: OPR14463, OCDD

A(x) = sum of the integrated ion abundances of the quantitation ions for the unlabeled ions;
A(is) = sum of the integrated ion abundances of the quantitation ions for the labeled ions;
Q(is) = quantity, in ng/ul, of the internal standard added to the sample before extraction;
W = weight, in g, of the sample (solid or organic liquid) as dry weight, or volume in mL of an aqueous sample; and
Avg. RRF(n) = calculated mean relative response factor for the unlabeled analyte.

$$\text{Conc. (ng/L)} = \frac{(A(x))\ *Q(is)*1000}{A(is)\ *\ W\ *\ \text{Avg. RRF}} = \frac{(12100000+13500000)*\ 4.0\ *\ 1000}{(23800000+26800000)\ *\ 20\ *\ 1.0783}$$

= 93.8 pg/µL

Reported Value = 94.0 pg/µL
% Difference = 0.2%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ EDL and <MRL or <3*EDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥EDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ EDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I Copy

SGS Environmental Services

Method 8290
F52110-4
Accutest

Analytical Data Summary Sheet

Analyte	Amount ng/L	EDL ng/L	EMPC ng/L	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00486				
1,2,3,7,8-PeCDD	ND	0.00479				
1,2,3,4,7,8-HxCDD	ND	0.00479				
1,2,3,6,7,8-HxCDD	ND	0.00479				
1,2,3,7,8,9-HxCDD	ND	0.00479				
1,2,3,4,6,7,8-HpCDD	ND	0.00479				
OCDD	ND	0.00959				
2,3,7,8-TCDF	ND	0.00424				
1,2,3,7,8-PeCDF	ND	0.00479				
2,3,4,7,8-PeCDF	ND	0.00479				
1,2,3,4,7,8-HxCDF	ND	0.00479				
1,2,3,6,7,8-HxCDF	ND	0.00479				
2,3,4,6,7,8-HxCDF	ND	0.00479				
1,2,3,7,8,9-HxCDF	ND	0.00479				
1,2,3,4,6,7,8-HpCDF	ND	0.00479				
1,2,3,4,7,8,9-HpCDF	ND	0.00479				
OCDF	ND	0.00959				
Total TCDDs	ND	0.00486				
Total PeCDDs	ND	0.00479				
Total HxCDDs	ND	0.00479				
Total HpCDDs	ND	0.00479				
Total TCDFs	ND	0.00424				
Total PeCDFs	ND	0.00479				
Total HxCDFs	ND	0.00479				
Total HpCDFs	ND	0.00479				
WHO-2005 TEQ (ND=0)	ND		ND			
WHO-2005 TEQ (ND=½)	0.00758		0.00758			

Client Information			**Sample Information**	
Project Name:	F52110		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F52110-4		Weight / Volume:	1043 mL
			Solids / Lipids:	NA %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14463
Project ID:	G383-598		Instrument:	HRMS1
Sample ID:	G383-598-1D		Filename:	a12sep07a_4-5
Collection Date/Time:	08/27/07	13:40	Retchk:	a12sep07a_3-14
Receipt Date/Time:	08/29/07	10:30	Begin ConCal:	a12sep07a_3-14
Extraction Date:	09/11/07		End ConCal:	a12sep07a_4-14
Analysis Date/Time:	09/13/07	23:03	Initial Cal:	m8290-071007a

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Method 8290
F52110-4
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.38	68.8	31:18	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.29	64.6	34:09	1.57	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.50	75.1	36:51	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.50	74.8	40:12	1.05	
13C12-OCDD	4.0	2.98	74.4	44:34	0.89	
13C12-2,3,7,8-TCDF	2.0	1.52	76.0	30:37	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.25	62.7	33:22	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.43	71.6	36:09	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.47	73.4	38:57	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.358	89.5	31:19	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.293	73.2	33:58	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.353	88.3	36:45	1.25	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.339	84.7	36:03	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.288	71.9	40:52	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	30:46	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:06	1.24	

Client Information			**Sample Information**	
Project Name:	F52110		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F52110-4		Weight / Volume:	1043 mL
			Solids / Lipids:	NA %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14463
Project ID:	G383-598		Instrument:	HRMS1
Sample ID:	G383-598-1D		Filename:	a12sep07a_4-5
Collection Date/Time:	08/27/07	13:40	Retchk:	a12sep07a_3-14
Receipt Date/Time:	08/29/07	10:30	Begin ConCal:	a12sep07a_3-14
Extraction Date:	09/11/07		End ConCal:	a12sep07a_4-14
Analysis Date/Time:	09/13/07	23:03	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.16]Report

Analyzed by: JWO
Date: 09-18-07

Reviewed by: CP
Date: 9/18/07

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SGS Environmental Services

Method 8290
F52110-5
Accutest

Analytical Data Summary Sheet

Analyte	Amount ng/L	EDL ng/L	EMPC ng/L	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00281				
1,2,3,7,8-PeCDD	ND	0.00508				
1,2,3,4,7,8-HxCDD	ND	0.00508				
1,2,3,6,7,8-HxCDD	ND	0.00508				
1,2,3,7,8,9-HxCDD	ND	0.00508				
1,2,3,4,6,7,8-HpCDD	ND	0.00508				
OCDD	ND	0.0102				
2,3,7,8-TCDF	ND	0.00247				
1,2,3,7,8-PeCDF	ND	0.00508				
2,3,4,7,8-PeCDF	ND	0.00508				
1,2,3,4,7,8-HxCDF	ND	0.00508				
1,2,3,6,7,8-HxCDF	ND	0.00508				
2,3,4,6,7,8-HxCDF	ND	0.00508				
1,2,3,7,8,9-HxCDF	ND	0.00508				
1,2,3,4,6,7,8-HpCDF	ND	0.00508				
1,2,3,4,7,8,9-HpCDF	ND	0.00508				
OCDF	ND	0.0102				
Total TCDDs	ND	0.00281				
Total PeCDDs	ND	0.00508				
Total HxCDDs	ND	0.00508				
Total HpCDDs	ND	0.00508				
Total TCDFs	ND	0.00247				
Total PeCDFs	ND	0.00508				
Total HxCDFs	ND	0.00508				
Total HpCDFs	ND	0.00508				
WHO-2005 TEQ (ND=0)	ND		ND			
WHO-2005 TEQ (ND=½)	0.00676		0.00676			

Client Information			**Sample Information**	
Project Name:	F52110		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F52110-5		Weight / Volume:	984 mL
			Solids / Lipids:	NA %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14463
Project ID:	G383-598		Instrument:	HRMS1
Sample ID:	G383-598-2D		Filename:	a12sep07a_4-6
Collection Date/Time:	08/27/07	13:30	Retchk:	a12sep07a_3-14
Receipt Date/Time:	08/29/07	10:30	Begin ConCal:	a12sep07a_3-14
Extraction Date:	09/11/07		End ConCal:	a12sep07a_4-14
Analysis Date/Time:	09/13/07	23:52	Initial Cal:	m8290-071007a

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Method 8290
F52110-5
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.52	76.2	31:18	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.49	74.4	34:09	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.73	86.5	36:49	1.23	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.72	85.8	40:12	1.06	
13C12-OCDD	4.0	3.49	87.2	44:34	0.90	
13C12-2,3,7,8-TCDF	2.0	1.69	84.5	30:37	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.42	71.2	33:21	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.61	80.6	36:09	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.66	82.8	38:57	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.389	97.3	31:19	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.333	83.3	33:58	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.397	99.3	36:45	1.36	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.389	97.2	36:03	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.333	83.3	40:52	0.44	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	30:46	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:06	1.24	

Client Information			**Sample Information**	
Project Name:	F52110		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F52110-5		Weight / Volume:	984 mL
			Solids / Lipids:	NA %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14463
Project ID:	G383-598		Instrument:	HRMS1
Sample ID:	G383-598-2D		Filename:	a12sep07a_4-6
Collection Date/Time:	08/27/07	13:30	Retchk:	a12sep07a_3-14
Receipt Date/Time:	08/29/07	10:30	Begin ConCal:	a12sep07a_3-14
Extraction Date:	09/11/07		End ConCal:	a12sep07a_4-14
Analysis Date/Time:	09/13/07	23:52	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.16]Report

Analyzed by: _____
Date: 9-18-07

Reviewed by: _____
Date: 9/14/07

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SGS Environmental Services

Method 8290
F52110-6
Accutest

Analytical Data Summary Sheet

Analyte	Amount ng/L	EDL ng/L	EMPC ng/L	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00383				
1,2,3,7,8-PeCDD	ND	0.00510				
1,2,3,4,7,8-HxCDD	ND	0.00510				
1,2,3,6,7,8-HxCDD	ND	0.00510				
1,2,3,7,8,9-HxCDD	ND	0.00510				
1,2,3,4,6,7,8-HpCDD	ND	0.00640				
OCDD	ND	0.0102				
2,3,7,8-TCDF	ND	0.00296				
1,2,3,7,8-PeCDF	ND	0.00510				
2,3,4,7,8-PeCDF	ND	0.00510				
1,2,3,4,7,8-HxCDF	ND	0.00510				
1,2,3,6,7,8-HxCDF	ND	0.00510				
2,3,4,6,7,8-HxCDF	ND	0.00510				
1,2,3,7,8,9-HxCDF	ND	0.00510				
1,2,3,4,6,7,8-HpCDF	ND	0.00510				
1,2,3,4,7,8,9-HpCDF	ND	0.00510				
OCDF	ND	0.0102				
Total TCDDs	ND	0.00383				
Total PeCDDs	ND	0.00510				
Total HxCDDs	ND	0.00510				
Total HpCDDs	ND	0.00640				
Total TCDFs	ND	0.00296				
Total PeCDFs	ND	0.00510				
Total HxCDFs	ND	0.00510				
Total HpCDFs	ND	0.00510				
WHO-2005 TEQ (ND=0)	ND		ND			
WHO-2005 TEQ (ND=½)	0.00732		0.00732			

Client Information			**Sample Information**	
Project Name:	F52110		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F52110-6		Weight / Volume:	981 mL
			Solids / Lipids:	NA %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14463
Project ID:	G383-598		Instrument:	HRMS1
Sample ID:	G383-598-3D		Filename:	a12sep07a_4-7
Collection Date/Time:	08/27/07	14:45	Retchk:	a12sep07a_3-14
Receipt Date/Time:	08/29/07	10:30	Begin ConCal:	a12sep07a_3-14
Extraction Date:	09/11/07		End ConCal:	a12sep07a_4-14
Analysis Date/Time:	09/14/07	0:40	Initial Cal:	m8290-071007a

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SGS Environmental Services

Method 8290
F52110-6
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.38	69.1	31:18	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.35	67.7	34:09	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.52	75.8	36:51	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.48	73.9	40:12	1.06	
13C12-OCDD	4.0	3.08	77.1	44:34	0.89	
13C12-2,3,7,8-TCDF	2.0	1.51	75.6	30:37	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.28	64.0	33:22	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.45	72.4	36:09	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.44	72.0	38:57	0.46	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.369	92.2	31:19	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.308	77.0	33:58	1.57	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.360	89.9	36:45	1.25	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.345	86.1	36:03	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.301	75.3	40:52	0.45	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	30:46	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:06	1.24	

Client Information			**Sample Information**	
Project Name:	F52110		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F52110-6		Weight / Volume:	981 mL
			Solids / Lipids:	NA %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14463
Project ID:	G383-598		Instrument:	HRMS1
Sample ID:	G383-598-3D		Filename:	a12sep07a_4-7
Collection Date/Time:	08/27/07	14:45	Retchk:	a12sep07a_3-14
Receipt Date/Time:	08/29/07	10:30	Begin ConCal:	a12sep07a_3-14
Extraction Date:	09/11/07		End ConCal:	a12sep07a_4-14
Analysis Date/Time:	09/14/07	0:40	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.16]Report

Analyzed by: JVO
Date: 9-18-07

Reviewed by: [signature]
Date: 9/14/07

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Explosives, PETN, & Nitroglycerin
Accutest Laboratories, Inc., SDG F52110

DATE: November 16, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 27, 2007. Aqueous samples were analyzed for explosives, nitroglycerin, and PETN using USEPA SW-846 3535A/8330A. A total of three aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41MW1	F52110-4	41MW3	F52110-6
41MW2	F52110-5		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Blank Analysis
	X	Initial Calibration
	X	Continuing Calibration
	X	System Monitoring Compounds
	X	Laboratory Control Sample
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

Eric Malarek, Chemist

11/16/07
Date

RFAAP VALIDATION REPORT
EXPLOSIVES REVIEW
SDG F52110

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, explosive compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/27/07, the coolers were received by the primary laboratory (Accutest) on 08/28/07 at 0.6°C, 1.2°C, 0.8°C, 0.2°C, 0.4°C, 1.0°C, 0.6°C, 0.6°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 3.0°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 3.6°C. Some of the receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/27/07, the explosives were extracted on 08/31/07 and analyzed on 09/04/07 and 09/05/07. All criteria were met. No qualifiers were applied.

II-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5x) the maximum amount for explosive target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/05/07	OP22151-MB	All target explosives <½MRL	NA	NA	None
09/04/07	OP22151-MB	PETN & NG <½MRL	NA	NA	None
09/11/07	RB083007	All target explosives <½MRL	NA	NA	None
09/07/07	RB083007	PETN & NG <½MRL	NA	NA	None

MRL = Method Reporting Limit
NA = Not Applicable

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The DoD QSM specifies that the correlation coefficient must be ≥0.995 and/or the percent relative standard deviation (%RSD) must be ≤20%. All detects were qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects were qualified as estimated "UJ" for where there were grossly exceeding recoveries. Grossly exceeding is defined as twice the established criteria limits.

- For the explosives initial calibration performed on 08/21/07 on instrument G1315B, all criteria were met for target explosives compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this initial calibration.

- For the PETN and nitroglycerin initial calibration performed on 03/15/07 on instrument G1315B, all criteria were met for target compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this initial calibration.

IV-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. Continuing calibration standards are analyzed after every 10 injections, and at the end of the analysis sequence. The DoD QSM specifies that the percent difference (%D) from initial calibration should be no greater than ±20%. All detects were qualified as estimated "J" for where there were exceeding %Ds, and all non-detects were qualified as estimated "UJ" for where there were grossly exceeding recoveries. Grossly exceeding is defined as twice the established criteria limits.

- For explosives initial calibration verification performed on 08/21/07 @17:16 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives continuing calibration performed on 09/05/07 @16:14 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Sample 41MW1 (F52110-4) applies to this continuing calibration.

- For explosives continuing calibration performed on 09/05/07 @21:28 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples 41MW2 (F52110-5) and 41MW3 (F52110-6) apply to this continuing calibration.

- For explosives continuing calibration performed on 09/06/07 @02:42 on instrument G1315B, tetryl (24.5%) was outside criteria for signal #1. Signal #2 was within criteria. All samples were non-detect for tetryl; therefore, no qualifiers were applied based upon this outlier. No samples reported apply to this continuing calibration.

- For PETN and nitroglycerin initial calibration verification performed on 03/15/07 @12:35 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PETN and nitroglycerin continuing calibration performed on 09/04/07 @12:17 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this continuing calibration.

- For PETN and nitroglycerin continuing calibration performed on 09/04/07 @13:34 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

V-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the laboratory control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria: 3,4-dinitrotoluene (70-136%)

- All criteria were met. No qualifiers were applied.

VI-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor long-term accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the laboratory control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-12 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22151-BS was used as aqueous LCS for explosives analyzed on 09/05/07. All criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

- Sample OP22151-BS2 was used as aqueous LCS for PETN and nitroglycerin analyzed on 09/04/07. All criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the laboratory control limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-12 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample 41MW1 (F52110-4) was used as the aqueous MS/MSD for the explosive analysis on 09/05/07. HMX (131%) was outside DoD QSM criteria and within laboratory criteria. Tetryl (RPD=35%) was outside DoD QSM and laboratory criteria. All samples were non-detect for HMX and tetryl; therefore, no qualifiers were applied based upon these outliers. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this MS/MSD.

- Sample 41MW3 (F52110-6) was used as the aqueous MS/MSD for the PETN and nitroglycerin analysis on 09/04/07. All criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this MS/MSD.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

IX-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The calculation was based calibration factors. The absolute percent difference (%D) between the calculated and the reported value must be within 10% difference. All values >MDL and <MRL or <3*MDL (whichever was greater) were qualified as estimated "J". All positive values must have less than or equal to 40% %D between the primary and secondary columns.

- All explosives, PETN, and nitroglycerin were non-detect. No confirmations were required.

Sample: 41MW1MS (F52110-4MS), 2-amino-4,6-dinitrotoluene

Conc. µg/L = (Ax * Vt * DF) / (CF * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area of characteristic ion for compound being measured.
Vt = Volume of total extract (mL).
CF = Average relative calibration factor for compound being measured (from ICAL)
Vs = Volume of sample extracted (mL).
DF = Dilution factor

Conc. µg/L = (4063826 * 10 * 1) / (7699 * 520) = 10.2 µg/L (Signal #1)

Reported Value = 10.2 µg/L
% Difference = 0.0%
Values were within 10% difference

Sample: 41MW3MS (F52110-6MS), nitroglycerin

Conc. µg/L = (Ax * Vt * DF) / (CF * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area of characteristic ion for compound being measured.
Vt = Volume of total extract (mL).
CF = Average relative calibration factor for compound being measured (from ICAL)
Vs = Volume of sample extracted (mL).
DF = Dilution factor

Conc. µg/L = (3140590 * 10 * 1) / (1228 * 470) = 54.4 µg/L (Signal #1)

Reported Value = 54.4 µg/L
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: PP022750.D PP022722.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8330A SW846 3535A	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	PP022750.D	1	09/05/07	MRE	08/31/07	OP22151	GPP792
Run #2	PP022722.D	1	09/04/07	MRE	08/31/07	OP22151	GPP791

	Initial Volume	Final Volume
Run #1	1010 ml	10.0 ml
Run #2	1010 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.20	0.050	ug/l	
121-82-4	RDX	ND	0.20	0.059	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.20	0.055	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.20	0.070	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.20	0.096	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.20	0.064	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.20	0.055	ug/l	
98-95-3	Nitrobenzene	ND	0.20	0.072	ug/l	
88-72-2	o-Nitrotoluene	ND	0.20	0.11	ug/l	
99-08-1	m-Nitrotoluene	ND	0.20	0.077	ug/l	
99-99-0	p-Nitrotoluene	ND	0.20	0.10	ug/l	
479-45-8	Tetryl	ND	0.20	0.067	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.20	0.064	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.20	0.050	ug/l	
55-63-0	Nitroglycerine	ND[a]	2.0	0.50	ug/l	
78-11-5	PETN	ND[a]	2.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	106%	92%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: PP022755.D PP022723.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8330A SW846 3535A	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	PP022755.D	1	09/05/07	MRE	08/31/07	OP22151	GPP792
Run #2	PP022723.D	1	09/04/07	MRE	08/31/07	OP22151	GPP791

	Initial Volume	Final Volume
Run #1	1030 ml	10.0 ml
Run #2	1030 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.19	0.050	ug/l	
121-82-4	RDX	ND	0.19	0.058	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.19	0.054	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.19	0.069	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.19	0.094	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.19	0.063	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.19	0.054	ug/l	
98-95-3	Nitrobenzene	ND	0.19	0.071	ug/l	
88-72-2	o-Nitrotoluene	ND	0.19	0.11	ug/l	
99-08-1	m-Nitrotoluene	ND	0.19	0.076	ug/l	
99-99-0	p-Nitrotoluene	ND	0.19	0.098	ug/l	
479-45-8	Tetryl	ND	0.19	0.066	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.19	0.063	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.19	0.049	ug/l	
55-63-0	Nitroglycerine	ND [a]	1.9	0.49	ug/l	
78-11-5	PETN	ND [a]	1.9	0.49	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	114%	125%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: PP022756.D PP022724.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8330A SW846 3535A	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	PP022756.D	1	09/05/07	MRE	08/31/07	OP22151	GPP792
Run #2	PP022724.D	1	09/04/07	MRE	08/31/07	OP22151	GPP791

	Initial Volume	Final Volume
Run #1	1040 ml	10.0 ml
Run #2	1040 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.19	0.049	ug/l	
121-82-4	RDX	ND	0.19	0.058	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.19	0.054	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.19	0.068	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.19	0.093	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.19	0.062	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.19	0.054	ug/l	
98-95-3	Nitrobenzene	ND	0.19	0.070	ug/l	
88-72-2	o-Nitrotoluene	ND	0.19	0.11	ug/l	
99-08-1	m-Nitrotoluene	ND	0.19	0.075	ug/l	
99-99-0	p-Nitrotoluene	ND	0.19	0.097	ug/l	
479-45-8	Tetryl	ND	0.19	0.065	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.19	0.062	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.19	0.048	ug/l	
55-63-0	Nitroglycerine	ND	1.9	0.48	ug/l	
78-11-5	PETN	ND	1.9	0.48	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	106%	122%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
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Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – Herbicides
Accutest Laboratories, Inc., SDG F52110

DATE: November 16, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 27, 2007. Aqueous samples were analyzed for chlorinated herbicides using USEPA SW846 Method 3510C/8151A. A total of three aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41MW1	F52110-4	41MW3	F52110-6
41MW2	F52110-5		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
X		Initial Calibration
X		Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
	X	Laboratory Control Sample
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/16/07
Date

RFAAP VALIDATION REPORT
CHLORINATED HERBICIDES REVIEW
SDG F52110

I-Holding Times

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, chlorinated herbicides compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/27/07, the coolers were received by the primary laboratory (Accutest) on 08/28/07 at 0.6°C, 1.2°C, 0.8°C, 0.2°C, 0.4°C, 1.0°C, 0.6°C, 0.6°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 3.0°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 3.6°C. Some of the receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For aqueous samples collected 08/27/07, the herbicides were extracted on 08/29/07 and analyzed on 09/01/07. All criteria were met. No qualifiers were applied.

II-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The DoD QSM specifies that the percent relative standard deviation (%RSD) for a 5-point standard calibration should be ≤20% for each target compound.

- No initial calibration was provided for MCPP and MCPA on instrument GC-DD. During discussions with the laboratory, they indicated that they perform a daily single point calibration rather than a five point calibration. All samples were non-detect and qualified estimated "UJ" based upon this outlier. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this single point calibration.

- For initial calibration performed on 08/31/07 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration establishes the response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The DoD QSM specifies that the percent difference (%D) between the initial calibration CF and the continuing calibration CF must be ≤20%.

- A single point calibration was provided for MCPP and MCPA on instrument GC-DD for 08/31/07 run. The calibration standard indicated adequate response for MCPP and MCPA. However, since a five point calibration was not performed, %D calculation could not be verified. All samples were non-detect and qualified estimated "UJ" based upon this outlier. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this single point calibration.

- For continuing calibration performed on 08/31/07 @23:51 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/01/07 @04:49 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this continuing calibration.

- For continuing calibration performed on 09/01/07 @09:48 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/05/07 @09:41 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/05/07 @10:56 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

IV-Blank Analysis
The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field or laboratory activities. No contaminants should be detected in any of the associated blanks. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are qualified "B" if the concentration of the analyte is ≤ five times (5x) the absolute maximum blank concentration. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/01/07	OP7963-MB	All target compounds <½MRL	NA	NA	None
09/10/07	RB083007	All target compounds <½MRL	NA	NA	None

V-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. Spike recoveries must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Control Limit: 2,4-DCAA (34-179%)

- All criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Data for laboratory control samples (LCS) are generated to determine long-term precision and accuracy of the analytical method. Percent recoveries must be within the specified control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-8 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP7963-BS was used as the aqueous LCS for the 09/01/07 run. All herbicides were within criteria. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-8 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample 43MW1 (F52025-1) was used for the aqueous MS/MSD analysis on 09/01/07. Dinoseb (RPD=67%) was above DoD QSM criteria and laboratory criteria. All samples were non-detect for dinoseb; therefore, no qualifiers were applied based upon this outlier. All other herbicides were within criteria. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this MS/MSD.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

IX-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. Percent difference (%D) between the calculated value and the reported value must be within 10%. All positive values must have less than or equal to 40% %D between the primary and secondary columns. Any sample value >MDL and <MRL is qualified as estimated, "J." All criteria were met. No qualifiers were applied.

- All chlorinated herbicides were non-detect. No confirmations were required.

Sample: 43MW1MS (F52025-1MS), 2,4-DB

Conc. µg/L = (Amt * DF * Vt) / (CF * Vo)

where: Amt = the response on column (ng/mL) of the sample
CF = Calibration Factor (from initial calibration)
Vt = volume of final extract (mL)
DF = dilution factor
Vo = volume of the sample extracted (mL)

Conc. µg/L = (5780425 ng/mL * 1 * 10 mL) / (7872* 1000 mL)
= 7.3 ng/mL = 7.3 µg/L

Reported Conc. = 7.3 µg/L
%D = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8151 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD67085.D	1	09/01/07	ATX	08/29/07	T:OP7963	T:GDD1307
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND	50		ug/l	
94-74-6	MCPA	ND	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	51%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8151 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD67086.D	1	09/01/07	ATX	08/29/07	T:OP7963	T:GDD1307
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND VT	50		ug/l	
94-74-6	MCPA	ND VT	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	102%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Corr

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8151 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD67087.D	1	09/01/07	ATX	08/29/07	T:OP7963	T:GDD1307
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND	50		ug/l	
94-74-6	MCPA	ND	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	79%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – TAL Metals
Accutest Laboratories, Inc., SDG F52110

DATE: November 19, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 27, 2007. Aqueous samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3010A/6010B for ICP metals and SW-846 7470A for mercury. A total of three aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41MW1	F52110-4	41MW3	F52110-6
41MW2	F52110-5		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
X		Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
	X	Laboratory Sample Duplicate
X		Matrix Spike and Spike Duplicate
	X	ICP Serial Dilution
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/19/07
Date

RFAAP VALIDATION REPORT
METALS REVIEW
SDG F52110

I-Holding Times

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. Holding time criteria: For aqueous matrices, the samples are shipped cool @4°C±2°C and preserved to pH<2 with HNO_3 with a maximum holding time is 180 days for ICP metals and 28 days for mercury.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/27/07, the coolers were received by the primary laboratory (Accutest) on 08/28/07 at 0.6°C, 1.2°C, 0.8°C, 0.2°C, 0.4°C, 1.0°C, 0.6°C, 0.6°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 3.0°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 3.6°C. Some of the receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For aqueous samples collected 08/27/07, they were digested on 09/05/07 and analyzed on 09/13/07 for ICP-sodium and 09/11/07 for the other ICP metals. The samples were digested on 08/31/07 and analyzed on 08/31/07 for mercury. All criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (DoD QSM <½ MRL) 3 – standards (r≥0.995) ICV/CCV (90-110%) (DoD QSM 90-110%) MRL (70-130%) (DoD QSM 80-120%) High Std. (95-105%)	Hg:	1 – blank (DoD QSM <½ MRL) 5 – standards (r≥0.995) ICV/CCV (80-120%)(DoD QSM ICV 90-110% & CCV 80-120%) MRL (80-120%) (DoD QSM 80-120%) High Std. (95-105%)

- The aqueous samples were analyzed for ICP-sodium on 09/13/07 and for the other ICP metals on 09/11/07. Mercury was analyzed for the aqueous samples on 08/31/07 with a correlation coefficient of 0.9998. All ICV/CCV/High Standard criteria were met for all metals and runs. **Table 2** summarizes the MRL standard analysis. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
08/31/07	Hg	1.0	60%	41MW1, 41MW2, 41MW3	L, UL
09/11/07	ICP-Sb	6.0	78%	41MW1, 41MW2, 41MW3	L, UL
09/11/07	ICP-Pb	5.0	130%; 126%	41MW1, 41MW2, 41MW3	K
09/11/07	ICP-Tl	10	77%	41MW1, 41MW2, 41MW3	L, UL
09/13/07	ICP-Na	10000	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. DoD QSM limits are <½MRL for the method blank and <2*MDL for the calibration blanks. Samples are qualified "B" when they are less than 5x the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) in this SDG.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/11/07	Lead	ICB/CCBs	4.5J	22.5	41MW1, 41MW2, 41MW3
09/11/07	Sodium	ICB/CCBs	2060J	10300	None
09/11/07	Potassium	ICB/CCBs	1730J	8650	41MW1, 41MW2
09/13/07	Sodium	ICB/CCBs	<2*MDL	NA	None
08/31/07	Mercury	ICB/CCBs	<2*MDL	NA	None
09/11/07	Aluminum	MP12900-MB	300	1500	None
09/11/07	Copper	MP12900-MB	3.1J	15.5	None
09/11/07	Potassium	MP12900-MB	1720J	8600	41MW1, 41MW2
09/11/07	Sodium	MP12900-MB	1870J	9350	None
08/31/07	Mercury	MP12844-MB	<2*MDL	NA	None
09/17/07	Potassium	RB083007	1740J	8700	41MW1, 41MW2
09/17/07	Sodium	RB083007	1860J	9300	None
09/05/07	Mercury	RB083007	<2*MDL	NA	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".

IV-ICP Interference Check Sample (ICS)

The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (DoD QSM limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)

The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All aqueous LCS results must fall within the control limits. The DoD QSM aqueous LCS recovery limits are specified in Table D-18 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample MP12900-BS was used as aqueous LCS for ICP metals analysis on 09/11/07. All criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

- Sample MP12844-BS was used as aqueous LCS for mercury analysis performed on 08/31/07. All criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

VI-Laboratory Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analyses are also performed to generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. DoD QSM limits for metals are 20% RPD for ICP metals and mercury.

- Sample 41MW1 (F52110-4) was used as aqueous laboratory duplicate for ICP metals analysis on 09/11/07. Arsenic (200%), lead (30.1%), and zinc (35.6%) were above criteria. Arsenic, lead, and zinc were outside due to low sample concentrations (i.e. <MRL); therefore, no qualifiers were applied based upon these outliers. All other metals were within criteria. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this laboratory duplicate.

- Sample F52107-1 was used as laboratory aqueous laboratory duplicate for mercury analysis on 08/31/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this laboratory duplicate.

VII-Matrix Spike/Spike Duplicate
MS/MSD are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS and MSD per 20 samples of similar matrix. MS and MSD recoveries and relative percent differences between MS and MSD recoveries should be within the specified limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-18 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used. Post digestion spikes limits are 75-125% for ICP metals and mercury.

- Sample 41MW1 (F52110-4) was used as laboratory aqueous MS/MSD for ICP metals analysis on 09/11/07. Potassium (196%, 196%) and sodium (168%; 76%) were outside criteria. The sample concentration was >4 times the spike added for sodium; therefore, no qualifiers were applied based upon this outlier. Potassium was qualified bias high "K" for detects and no qualifier for non-detects based upon the high recoveries. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this MS/MSD.

- Sample F52107-1 was used as laboratory aqueous MS/MSD for mercury analysis on 08/31/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this MS/MSD.

VIII-ICP Serial Dilution
An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for total ICP metals was analyzed using aqueous sample 41MW1 (F52110-4) on 09/11/07. Arsenic (100%), copper (100%), lead (283%), potassium (152%), vanadium (100%), and zinc (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for arsenic, copper, lead, potassium, vanadium, and zinc; therefore, no qualifiers were applied based upon these outliers. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this serial dilution.

- The serial dilution for mercury was analyzed using aqueous sample F52107-1 on 08/31/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this serial dilution.

IX-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 35% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

X-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." The following calculations were performed for verification.

ICP Sample: 41MW1 (F52110-4), Barium

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (29.5 µg/L)*(50 mL)*(1) / (50 mL) = 29.5 µg/L

Reported concentration = 29.5 µg/L
%D = 0.0%
Values were within 10% difference.

CVAA Sample: MP12844-BS, Mercury

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (3.02 µg/L)*(50 mL)*(1) / (50 mL) = 3.0 µg/L

Reported concentration = 3.0 µg/L
%D = 0.0%.
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

D = Indicates sample was analyzed at a dilution.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

N (Metals) = Laboratory spike sample recovery not within control limits.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I Corp

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	79 U	200	79	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Antimony	3.3 U	6.0	3.3	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Arsenic	5.0 J	10	3.7	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Barium	29.5 J	200	5.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Beryllium	1.0 U	4.0	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cadmium	1.0 U	5.0	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Calcium	69700	1000	100	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Chromium	10.8	10	0.92	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cobalt	1.0 U	50	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Copper	7.1 J	25	1.2	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Iron [a]	380 U	600	380	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Lead	4.2 J	5.0	2.1	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Magnesium	76600	5000	100	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Manganese	47.1	15	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Mercury	0.11 U	1.0	0.11	ug/l	1	08/30/07	08/30/07	LM	SW846 7470A [1]	SW846 7470A [4]
Nickel	6.2 J	40	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Potassium	3900 J	10000	100	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Selenium	4.0 U	10	4.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Silver	0.77 U	10	0.77	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Sodium	751000	500000	25000	ug/l	50	09/10/07	09/13/07	DM	SW846 6010B [3]	SW846 3010A [5]
Thallium	6.5 U	10	6.5	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Vanadium	1.3 J	50	1.1	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Zinc	12.9 J	20	5.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]

(1) Instrument QC Batch: MA5945
(2) Instrument QC Batch: MA5966
(3) Instrument QC Batch: MA5974
(4) Prep QC Batch: MP12844
(5) Prep QC Batch: MP12900

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	79 U	200	79	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Antimony	3.3 U UL	6.0	3.3	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Arsenic	7.9 J J	10	3.7	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Barium	40 J J	200	5.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Beryllium	1.0 U	4.0	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cadmium	1.0 U	5.0	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Calcium	121000	1000	100	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Chromium	6.1 J J	10	0.92	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cobalt	7.0 J J	50	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Copper	9.9 J J	25	1.2	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Iron [a]	600 U	1200	600	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Lead	3.1 J B	5.0	2.1	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Magnesium	115000	5000	100	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Manganese	42.3	15	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Mercury	0.11 U UL	1.0	0.11	ug/l	1	08/30/07	08/30/07	LM	SW846 7470A [1]	SW846 7470A [4]
Nickel	6.0 J J	40	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Potassium	8570 J B	10000	100	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Selenium [a]	20 U	40	20	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Silver	0.77 U	10	0.77	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Sodium	3030000	500000	25000	ug/l	50	09/10/07	09/13/07	DM	SW846 6010B [3]	SW846 3010A [5]
Thallium	6.5 U UL	10	6.5	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Vanadium	2.0 J J	50	1.1	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Zinc	9.5 J J	20	5.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]

(1) Instrument QC Batch: MA5945
(2) Instrument QC Batch: MA5966
(3) Instrument QC Batch: MA5974
(4) Prep QC Batch: MP12844
(5) Prep QC Batch: MP12900

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	79 U	200	79	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Antimony	3.3 U UL	6.0	3.3	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Arsenic	3.7 U	10	3.7	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Barium	24.8 J J	200	5.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Beryllium	1.0 U	4.0	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cadmium	1.0 U	5.0	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Calcium	98200	1000	100	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Chromium	2.9 J J	10	0.92	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cobalt	1.0 U	50	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Copper	1.2 U	25	1.2	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Iron [a]	380 U	600	380	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Lead	4.5 J B	5.0	2.1	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Magnesium	61500	5000	100	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Manganese	42.3 J	15	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Mercury	0.11 U UL	1.0	0.11	ug/l	1	08/30/07	08/30/07	LM	SW846 7470A [1]	SW846 7470A [4]
Nickel	2.5 J J	40	1.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Potassium	10600 K	10000	100	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Selenium [a]	20 U	40	20	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Silver	0.77 U	10	0.77	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Sodium	110000	20000	1000	ug/l	2	09/10/07	09/13/07	DM	SW846 6010B [3]	SW846 3010A [5]
Thallium	6.5 U UL	10	6.5	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Vanadium	1.1 U	50	1.1	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]
Zinc	14.5 J J	20	5.0	ug/l	1	09/10/07	09/11/07	DM	SW846 6010B [2]	SW846 3010A [5]

(1) Instrument QC Batch: MA5945
(2) Instrument QC Batch: MA5966
(3) Instrument QC Batch: MA5974
(4) Prep QC Batch: MP12844
(5) Prep QC Batch: MP12900

(a) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Perchlorate
Datachem Laboratories, Inc. SDG 07E-0774-01
(Accutest Laboratories, Inc., SDG F52110)

DATE: November 19, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 27, 2007. The aqueous samples were analyzed for perchlorate analysis using liquid chromatography mass spectroscopy (LC/MS) SW-846 method 6850 in selective ion monitoring (SIM) mode. A total of three aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41MW1	F52110-4	41MW3	F52110-6
41MW2	F52110-5		

Data were reviewed and validated using a combination of project QAPP, *DOD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006), *DoD Perchlorate Handbook August, Rev1, Change 1, 2007* (DoD, 2007), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial and Continuing Calibration
	X	Blank Analysis
X		Internal Standards
	X	Laboratory Control Sample (LCS)
X		Matrix Spike (MS) and Spike Duplicate (MSD)
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/19/07
Date

RFAAP VALIDATION REPORT
PERCHLORATE REVIEW
SDG 07E-0774-01 (F52110)

I-Holding Times and Preservation
The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. For perchlorate analysis, aqueous samples are received and stored at cool @4°C±2°C with a maximum holding time of 28 days from collection (DoD Perchlorate Handbook criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/27/07, the coolers were received by the primary laboratory (Accutest) on 08/28/07 at 0.6°C, 1.2°C, 0.8°C, 0.2°C, 0.4°C, 1.0°C, 0.6°C, 0.6°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 3.0°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 3.6°C. Some of the receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: The aqueous samples were collected on 08/27/07. The aqueous perchlorate samples were prepped on 09/04/07 and analyzed on 09/04/07. All holding time criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, $^{35}Cl^{16}O_3$, met the mass calibration criteria. No qualification was applied.

III-Initial and Continuing Calibration
Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

Perchlorate:	1- blank (<1/2MRL DoD Perchlorate Handbook)
	5 – standards (r≥0.995 DoD Perchlorate Handbook)
	ICV (±10%D DoD Perchlorate Handbook)
	CCV/ICS (±30%D DoD Perchlorate Handbook)
	LODV (±30%D DoD Perchlorate Handbook)

- The perchlorate samples were analyzed on 09/04/07 for the aqueous samples. Perchlorate was calibrated second order for on 09/04/07 with a coefficient of 0.9999. All ICV/CCV/ICS/LODV standards were within criteria. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this calibration.

IV-Blanks

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be detected in any of the associated blanks >MDL. The DoD Perchlorate Handbook criterion specifies all concentrations should be less than ½ MRL for method blanks. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/04/07	Perchlorate	BL-259634-1	<½MRL	NA	None
09/18/07	Perchlorate	RB083007	<½MRL	NA	None

MRL = Method Reporting Limit.
NA = Not Applicable.

V-Internal Standards

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The DoD Handbook specifies retention times (RT) 1.0 ± 2% of last calibration standard and the ratio of RT of sample to standard should be 3.06 and fall between 2.3 and 3.8. The laboratory 83:85 mass ratio limit range is 2.15 to 4.00. The internal standard peak area responses should fall between 50% to 150% recoveries.

- For sample 41MW1 (F52110-4), the 83:85 mass ratio range (1.77) was below criteria. The internal standard peak area response was within criteria. Perchlorate was detected in the associated sample and was qualified estimated "J" based upon this outlier.

- For sample 41MW2 (F52110-5), the 83:85 mass ratio range (1.88) was below criteria. The internal standard peak area response was within criteria. Perchlorate was detected in the associated sample and was qualified estimated "J" based upon this outlier.

- For all other samples, all criteria were met.

VI-Laboratory Control Samples (LCS)

The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. DoD Perchlorate Handbook and laboratory aqueous limits are 85-115%.

- Sample QC-259634-1 was used as aqueous LCS for perchlorate analysis dated 09/04/07. All criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS sample.

VII-Matrix Spike (MS) and Spike Duplicate (MSD)
MS and MSD are generated to determine long-term accuracy and precision of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike samples at a frequency of one MS/MSD per 20 samples of similar matrix. MS/MSD recoveries and relative percent differences between MS recoveries should be within the specified limits. DoD Perchlorate Handbook aqueous limits are 75-125%; RPD≤20%. The laboratory limits are 80-120%; RPD≤15%.

- Sample 43MW1 (F52025-1) was used for the MS/MSD analysis for the 09/04/07 perchlorate analysis. Perchlorate (122%) was above lab criteria and within DoD QSM criteria. The LCS recovery was within criteria (See Section VI) for perchlorate. The spiked sample was qualified estimated bias high "K" based upon the high recovery. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this MS/MSD sample.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

IX-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever was greater) was qualified as estimated, "J." The following calculations were performed for verification.

Sample: 41MW2 (F52110-5), Perchlorate

y (area ratio) = (Sample Area/Area EIC89) = (33480.3/53499.1) = 0.62581 = ax^2 + bx + c

Setting y = 0,
x = [-b ± SQRT(b^2-4ac)] / (2a)

where: x is the amount ratio

a = 0.0350178 b = 1.23841 (set to zero = c-y) c = - 0.00090073 - 0.62581 = -0.62671126

amount ratio ={-1.23841± [SQRT{(1.23841^2) – (4*0.0350178*-0.62671126)}] / (2*0.0350178)
= (-1.23841±1.273359) / (0.0700356)
= 0.49902
Conc. µg/L = (Amount ratio * Is * DF)

where: Conc. = Sample concentration in ug/L
I_s = Amount of internal standard (µg/L).
DF = Dilution factor

Conc. µg/L = (Amount ratio * Is * DF)
= (0.49902* 5 µg/L * 1) = 2.50 µg/L

Reported concentration = 2.50 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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DATA CHEM LABORATORIES
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FORM A (TYPE I)
SINGLE METHOD ANALYSES

SAMPLE ANALYSIS DATA SHEET

Form RLIMS63A-V1.4
09060709155635

S077X02B

Date Printed.....: 06-SEP-07 09:15

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F52110
Release Number.....: Not Provided

Date Received.....: 29-AUG-07 00:00

Client Sample Name: **F52110-4**
DCL Sample Name...: **07E04441**
DCL Report Group..: **07E-0774-01**

Matrix.....: WATER
Date Sampled.....: 27-AUG-07 13:40
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 04-SEP-07 00:00
Preparation Method...: 6850
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G078300C
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	04-SEP-07 21:10	0.112	0.294	J		1	0.200

960 West LeVoy Drive / Salt Lake City, Utah 84123-2547
Phone (801) 266-7700
FAX (801) 268-9992
Web Page: www.datachem.com
E-mail: lab@datachem.com

Form I Copy

DATA CHEM LABORATORIES
A Sorenson Company

FORM A (TYPE I)
SINGLE METHOD ANALYSES

Form RLIMS63A-V1.4
09060709155635

S077X02C

SAMPLE ANALYSIS DATA SHEET

Date Printed.....: 06-SEP-07 09:15

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F52110
Release Number.....: Not Provided

Date Received.....: 29-AUG-07 00:00

Client Sample Name: **F52110-5**
DCL Sample Name...: **07E04442**
DCL Report Group..: **07E-0774-01**

Matrix.....: WATER
Date Sampled.....: 27-AUG-07 13:30
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 04-SEP-07 00:00
Preparation Method...: 6850
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G078300C
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	04-SEP-07 21:29	0.112	2.50	J		1	0.200

960 West LeVoy Drive / Salt Lake City, Utah 84123-2547
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FAX (801) 268-9992 E-mail: lab@datachem.com

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DATA CHEM LABORATORIES
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FORM A (TYPE I)
SINGLE METHOD ANALYSES

Form RLIMS63A-V1.4
09060709155635

S077X02D

SAMPLE ANALYSIS DATA SHEET

Date Printed.....: 06-SEP-07 09:15

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F52110
Release Number.....: Not Provided

Date Received.....: 29-AUG-07 00:00

Client Sample Name: **F52110-6**
DCL Sample Name...: **07E04443**
DCL Report Group..: **07E-0774-01**

Matrix.....: WATER
Date Sampled.....: 27-AUG-07 14:45
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 04-SEP-07 00:00
Preparation Method...: 6850
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G078300C
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	04-SEP-07 21:49	0.112	0.978			1	0.200

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Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Pesticides and PCBs
Accutest Laboratories, Inc., SDG F52110

DATE: November 16, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 27, 2007. Aqueous samples were analyzed for pesticides and PCBs using USEPA Method 3510C/8081A and 3510C/8082, respectively. A total of three aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41MW1	F52110-4	41MW3	F52110-6
41MW2	F52110-5		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
X		Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/16/07
Date

RFAAP VALIDATION REPORT
PESTICIDE/PCB REVIEW
SDG F52110

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, pesticide and PCB compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/27/07, the coolers were received by the primary laboratory (Accutest) on 08/28/07 at 0.6°C, 1.2°C, 0.8°C, 0.2°C, 0.4°C, 1.0°C, 0.6°C, 0.6°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 3.0°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 3.6°C. Some of the receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For aqueous samples collected 08/27/07, the pesticides were extracted on 08/31/07 and analyzed on 09/17/07. The PCBs were extracted 08/31/07 and analyzed 09/10/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check (Degradation Standard)
Performance checks on the gas chromatograph with electron capture detector (GC/ECD) system are performed to ensure adequate resolution and instrument sensitivity. The performance evaluation mixture (PEM) must be analyzed at the beginning of the analytical sequence. The breakdown of Endrin and 4,4'-DDT must be ≤15% on both signals.

- For analysis performed on 09/13/07 @11:24, endrin and 4,4'-DDT percent breakdowns were 7.5% and 3.3% on signal #1 and 6.8% and 2.7% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 09/17/07 @15:41, endrin and 4,4'-DDT percent breakdowns were 8.6% and 11.3% on signal #1 and 8.2% and 9.8% on signal #2, respectively. All criteria were met. No qualifiers were applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5 point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. Calibration factors are generated for each compound. The DoD QSM specifies that the percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016, 1242, 1254, and 1260 must be <20% or the mean %RSD for all analytes in the standard must be ≤20%. If linear regression is used, the correlation coefficient must be ≥0.995. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits.

- For the pesticide initial calibration performed on 09/13/07 on instrument ECD6, all criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) were analyzed using this initial calibration.

- For the PCB initial calibration performed on 09/08/07 on instrument ECD7, all criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) were analyzed using this initial calibration.

- For the PCB initial calibration performed on 09/11/07 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for pesticide/PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The DoD QSM specifies that the percent difference (%D) or the average %Ds for all analytes in the standard from the initial calibration should be no greater than ±20%.

- For pesticide initial calibration verification performed on 09/13/07 @13:46 on instrument ECD6, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 09/17/07 @18:02 on instrument ECD6, endrin ketone (22.1%) was outside criteria for the signal #2. Endrin ketone was within criteria for signal #1. Endrin ketone was non-detect for all associated samples; therefore, no qualifiers were applied based upon this outlier. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 09/17/07 @20:40 on instrument ECD6, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 09/08/07 @14:16 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 09/10/07 @19:28 on instrument ECD7, all criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 09/10/07 @22:35 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For pesticide initial calibration verification performed on 09/11/07 @13:32 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 09/11/07 @16:48 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

V-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for pesticide and PCB target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) in this SDG.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
Pesticides	09/17/07	OP22157-MB	All target <½MRL	NA	NA	None
Pesticides	09/24/07	RB083007	All target <½MRL	NA	NA	None
PCBs	09/10/07	OP22156-MB	All target <½MRL	NA	NA	None
PCBs	09/11/07	OP22156-MB	All target <½MRL	NA	NA	None
PCBs	09/14/07	RB083007	All target <½MRL	NA	NA	None

NA = Not Applicable
MRL = Method Reporting Limit

VI-System Monitoring Compound (Surrogates)

Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:	Tetrachloro-m-xylene:	Pesticides: 42-127% (DoD QSM 25-140%)
	Decachlorobiphenyl:	Pesticides: 27-127% (DoD QSM 30-135%)
Aqueous Criteria:	Tetrachloro-m-xylene:	PCBs: 38-127% (DoD QSM Not Listed)
	Decachlorobiphenyl:	PCBs: 25-137% (DoD QSM 40-135%)

- All criteria were met. No qualifiers were applied.

VII-Laboratory Control Samples

Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22157-BS was used as the aqueous LCS for the pesticide analysis on 09/17/07. Compound endrin aldehyde (19%) was outside DoD QSM criteria, however within laboratory criteria. Compound endrin aldehyde was non-detect for all associated samples and was qualified estimated bias "UL" for non-detects based upon the low recovery. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

- Sample OP22156-BS was used as the aqueous LCS for the PCB analysis on 09/10/07. All criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

VIII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample 41MW3 (F52110-6) was used as the aqueous MS/MSD for the pesticide on 09/17/07. Dieldrin (RPD=17%) was outside laboratory criteria and within DoD QSM criteria. All samples were non-detect for dieldrin; therefore, no qualifiers were applied based upon this outlier. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this MS/MSD.

- Sample 41MW1 (F52110-4) was used as the aqueous MS/MSD for the PCB analysis on 09/10/07. All criteria were met. No qualifiers were applied. Samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this MS/MSD.

IX-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

X-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All positive values must have less than or equal to 40% %D between the primary and secondary columns. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." All criteria were met.

- All chlorinated pesticides and PCBs were non-detect for this SDG. No confirmations were required.

Sample: 41MW3MS (F52110-6MS), alpha-chlordane

Conc. µg/L = (Amt * DF * Vt) / (CF * Vo)

where: Amt is the response on column (ng/mL) of the sample
CF = Calibration Factor (from initial calibration)
Vt is the volume of final extract (mL)
DF is the dilution factor
Vo is the volume of the sample extracted (mL)

Conc. µg/L = (2724613 ng/mL * 1 * 10 mL) / (49480 * 450 mL)
= 1.2 ng/mL = 1.2 µg/L

Reported Conc. = 1.2 µg/L
%D = 0.0%
Values were within 10% difference

Sample: 41MW1MS (F52110-4MS), Aroclor 1260

Conc. µg/L = (Ax * Vt * DF) / (CF * Vi * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 µL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (µL).
Vs = Volume of sample extracted (L).
DF = Dilution factor

Signal #1
Conc1 µg/L = (1755745 * 10000* 1) / (4195 *(1000000) * 1 * 0.50) = 8.37 µg/L
Conc2 µg/L = (2098383 * 10000* 1) / (4983 *(1000000) * 1 * 0.50) = 8.42 µg/L
Conc3 µg/L = (1861753 * 10000* 1) / (4369 *(1000000) * 1 * 0.50) = 8.52 µg/L
Conc4 µg/L = (1437223 * 10000* 1) / (3557 *(1000000) * 1 * 0.50) = 8.08 µg/L
Conc5 µg/L = (3258382 * 10000* 1) / (7658 *(1000000) * 1 * 0.50) = 8.51 µg/L
Conc6 µg/L = (1231288 * 10000* 1) / (2877 *(1000000) * 1 * 0.50) = 8.56 µg/L
Average concentration = 8.4 µg/L

Signal #2
Conc1 µg/L = (1157206 * 10000* 1) / (2851 *(1000000) * 1 * 0.50) = 8.12 µg/L
Conc2 µg/L = (1427610 * 10000* 1) / (3454 *(1000000) * 1 * 0.50) = 8.27 µg/L
Conc3 µg/L = (1415853 * 10000* 1) / (3307 *(1000000) * 1 * 0.50) = 8.56 µg/L
Conc4 µg/L = (991005 * 10000* 1) / (2465 *(1000000) * 1 * 0.50) = 8.04 µg/L
Conc5 µg/L = (2309497 * 10000* 1) / (5541 *(1000000) * 1 * 0.50) = 8.34 µg/L
Conc6 µg/L = (924284 * 10000* 1) / (2209 *(1000000) * 1 * 0.50) = 8.37 µg/L
Average concentration = 8.3 µg/L

Reported Value = 8.4 µg/L (from signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

N (Metals) = Laboratory spike sample recovery not within control limits.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: TT09130.D

Run I only

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8081A SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT09130.D	1	09/17/07	FS	08/31/07	OP22157	GTT302
Run #2							

	Initial Volume	Final Volume
Run #1	1030 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.049	0.0097	ug/l	
319-84-6	alpha-BHC	ND	0.049	0.0097	ug/l	
319-85-7	beta-BHC	ND	0.049	0.011	ug/l	
319-86-8	delta-BHC	ND	0.049	0.0097	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.049	0.0097	ug/l	
5103-71-9	alpha-Chlordane	ND	0.049	0.0097	ug/l	
5103-74-2	gamma-Chlordane	ND	0.049	0.0097	ug/l	
60-57-1	Dieldrin	ND	0.049	0.0097	ug/l	
72-54-8	4,4'-DDD	ND	0.097	0.019	ug/l	
72-55-9	4,4'-DDE	ND	0.097	0.019	ug/l	
50-29-3	4,4'-DDT	ND	0.097	0.019	ug/l	
72-20-8	Endrin	ND	0.097	0.019	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.097	0.019	ug/l	
7421-93-4	Endrin aldehyde	ND *UL*	0.097	0.029	ug/l	
53494-70-5	Endrin ketone	ND	0.097	0.019	ug/l	
959-98-8	Endosulfan-I	ND	0.049	0.0097	ug/l	
33213-65-9	Endosulfan-II	ND	0.097	0.0097	ug/l	
76-44-8	Heptachlor	ND	0.049	0.0097	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.049	0.0097	ug/l	
72-43-5	Methoxychlor	ND	0.097	0.019	ug/l	
8001-35-2	Toxaphene	ND	2.4	1.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	72%		42-127%
2051-24-3	Decachlorobiphenyl	69%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX024468.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8082 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX024468.D	1	09/10/07	AC	08/31/07	OP22156	GXX217
Run #2							

	Initial Volume	Final Volume
Run #1	1030 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.49	0.24	ug/l	
11104-28-2	Aroclor 1221	ND	0.49	0.39	ug/l	
11141-16-5	Aroclor 1232	ND	0.49	0.39	ug/l	
53469-21-9	Aroclor 1242	ND	0.49	0.24	ug/l	
12672-29-6	Aroclor 1248	ND	0.49	0.24	ug/l	
11097-69-1	Aroclor 1254	ND	0.49	0.24	ug/l	
11096-82-5	Aroclor 1260	ND	0.49	0.24	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	77%		38-127%
2051-24-3	Decachlorobiphenyl	81%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT09131.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8081A SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT09131.D	1	09/17/07	FS	08/31/07	OP22157	GTT302
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.056	0.011	ug/l	
319-84-6	alpha-BHC	ND	0.056	0.011	ug/l	
319-85-7	beta-BHC	ND	0.056	0.012	ug/l	
319-86-8	delta-BHC	ND	0.056	0.011	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.056	0.011	ug/l	
5103-71-9	alpha-Chlordane	ND	0.056	0.011	ug/l	
5103-74-2	gamma-Chlordane	ND	0.056	0.011	ug/l	
60-57-1	Dieldrin	ND	0.056	0.011	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.022	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.022	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.022	ug/l	
72-20-8	Endrin	ND	0.11	0.022	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.022	ug/l	
7421-93-4	Endrin aldehyde	ND	0.11	0.033	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.022	ug/l	
959-98-8	Endosulfan-I	ND	0.056	0.011	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.011	ug/l	
76-44-8	Heptachlor	ND	0.056	0.011	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.056	0.011	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.022	ug/l	
8001-35-2	Toxaphene	ND	2.8	1.4	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	73%		42-127%
2051-24-3	Decachlorobiphenyl	72%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX024471.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8082 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX024471.D	1	09/10/07	AC	08/31/07	OP22156	GXX217
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.56	0.28	ug/l	
11104-28-2	Aroclor 1221	ND	0.56	0.44	ug/l	
11141-16-5	Aroclor 1232	ND	0.56	0.44	ug/l	
53469-21-9	Aroclor 1242	ND	0.56	0.28	ug/l	
12672-29-6	Aroclor 1248	ND	0.56	0.28	ug/l	
11097-69-1	Aroclor 1254	ND	0.56	0.28	ug/l	
11096-82-5	Aroclor 1260	ND	0.56	0.28	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	79%		38-127%
2051-24-3	Decachlorobiphenyl	81%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: TT09132.D

Form I COM

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8081A SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT09132.D	1	09/17/07	FS	08/31/07	OP22157	GTT302
Run #2							

	Initial Volume	Final Volume
Run #1	800 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.063	0.013	ug/l	
319-84-6	alpha-BHC	ND	0.063	0.013	ug/l	
319-85-7	beta-BHC	ND	0.063	0.014	ug/l	
319-86-8	delta-BHC	ND	0.063	0.013	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.063	0.013	ug/l	
5103-71-9	alpha-Chlordane	ND	0.063	0.013	ug/l	
5103-74-2	gamma-Chlordane	ND	0.063	0.013	ug/l	
60-57-1	Dieldrin	ND	0.063	0.013	ug/l	
72-54-8	4,4'-DDD	ND	0.13	0.025	ug/l	
72-55-9	4,4'-DDE	ND	0.13	0.025	ug/l	
50-29-3	4,4'-DDT	ND	0.13	0.025	ug/l	
72-20-8	Endrin	ND	0.13	0.025	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.13	0.025	ug/l	
7421-93-4	Endrin aldehyde	ND	0.13	0.038	ug/l	
53494-70-5	Endrin ketone	ND	0.13	0.025	ug/l	
959-98-8	Endosulfan-I	ND	0.063	0.013	ug/l	
33213-65-9	Endosulfan-II	ND	0.13	0.013	ug/l	
76-44-8	Heptachlor	ND	0.063	0.013	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.063	0.013	ug/l	
72-43-5	Methoxychlor	ND	0.13	0.025	ug/l	
8001-35-2	Toxaphene	ND	3.1	1.6	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	71%		42-127%
2051-24-3	Decachlorobiphenyl	54%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX024472.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8082 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX024472.D	1	09/10/07	AC	08/31/07	OP22156	GXX217
Run #2							

	Initial Volume	Final Volume
Run #1	800 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.63	0.31	ug/l	
11104-28-2	Aroclor 1221	ND	0.63	0.50	ug/l	
11141-16-5	Aroclor 1232	ND	0.63	0.50	ug/l	
53469-21-9	Aroclor 1242	ND	0.63	0.31	ug/l	
12672-29-6	Aroclor 1248	ND	0.63	0.31	ug/l	
11097-69-1	Aroclor 1254	ND	0.63	0.31	ug/l	
11096-82-5	Aroclor 1260	ND	0.63	0.31	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	77%		38-127%
2051-24-3	Decachlorobiphenyl	62%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Semi-Volatiles & Polynuclear Aromatic Hydrocarbons Accutest Laboratories, Inc., SDG F52110

DATE: November 15, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 27, 2007. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW846 Methods 3510C/8270C for aqueous matrices. The polynuclear aromatic hydrocarbons (PAHs) were analyzed using selective ion monitoring (SIM) techniques. A total of six aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
P-4	F52110-1	41MW1	F52110-4
S4W-1	F52110-2	41MW2	F52110-5
8B	F52110-3	41MW3	F52110-6

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
X		Laboratory Control Sample
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/15/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F52110

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For semivolatile (SVOC) and polynuclear aromatic hydrocarbons (PAH) compounds , the samples are cooled @4°C ± 2°C for aqueous samples with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/27/07, the coolers were received by the primary laboratory (Accutest) on 08/28/07 at 0.6°C, 1.2°C, 0.8°C, 0.2°C, 0.4°C, 1.0°C, 0.6°C, 0.6°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 3.0°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 3.6°C. Some of the receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the groundwater samples collected 08/27/07, the SVOCs were extracted on 08/31/07 and analyzed on 09/14/07. For the PAHs by SIM, they were extracted on 08/31/07 and analyzed on 09/20/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for compounds on the semivolatile target compound list (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. The minimum relative response factor (RRF) criteria must be ≥0.05. The DoD QSM specifies that the initial calibration percent relative standard deviation (%RSD) must be ≤15% on the average for all compounds (<30% for CCCs). All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- Initial calibration for the SVOCs was performed on 08/21/07 on instrument MSBNA02. Target compounds hexachlorocyclopentadiene (29.2%) and 4,6-dinitro-2-methylphenol (16.5%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds hexachlorocyclopentadiene (r=0.9990) and 4,6-dinitro-2-methylphenol (r=0.9984) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/19/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. No samples reported were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/20/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥0.05. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ±20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For SVOC initial calibration verification performed on 08/21/07 @15:20 on instrument MSBNA02, 4-chloroaniline (45.7%; grossly exceeding) and 3-nitroaniline (30.2%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 3-nitroaniline and 4-chloroaniline. No qualification applies for 3-nitroaniline. 4-Chloroaniline would be qualified bias low "UL"; however no samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 08/21/07 @15:48 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 09/13/07 @16:15 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/19/07 @22:41 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/19/07 @23:23 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/20/07 @16:43 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/20/07 @18:11 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank 082307R (F52035-5) (low-flow pump) applies to groundwater samples P-4 (F52110-1), S4W-1 (F52110-2), and 8B (F52110-3) in this SDG. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/13/07	OP22139-MB	All SVOC target <½MRL	NA	NA	None
09/20/07	OP22140-MB	All PAH SIM target <½MRL	NA	NA	None
09/20/07	OP22140-MB	All PAH SIM target <½MRL	NA	NA	None
09/15/07	RB083007	All SVOC target <½MRL	NA	NA	None
09/20/07	RB083007	All PAH SIM target <½MRL	NA	NA	None
09/12/07	082307R	All SVOC target <½MRL	NA	NA	None
09/14/07	082307R	All PAH SIM target <½MRL	NA	NA	None

NA = Not applicable.
MRL = Method reporting limit.

VI-Surrogate Spikes
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-2 and Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:
2-Fluorophenol (14-62%) – (DoD QSM = 20-110%)
Phenol – d5 (10-40%) – (DoD QSM = 10-115%)
2,4,6-Tribromophenol (33-118%) – (DoD QSM = 40-125%)
Nitrobenzene-d5 (42-108%) – (DoD QSM = 40-110%)
2-Fluorobiphenyl (40-106%) – (DoD QSM = 50-110%)
p-Terphenyl – d14 (39-121%) – (DoD QSM = 50-135%)

- All criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD LCS aqueous recovery limits are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22139-BS was used as the aqueous LCS for the SVOC analysis on 09/13/07. Compounds 1,3-dichlorobenzene (35%), 1,4-dichlorobenzene (37%), hexachlorobutadiene (36%), and hexachloroethane (27%) were below the laboratory and/or the DoD QSM criteria. Compounds 1,3-dichlorobenzene, 1,4-dichlorobenzene, hexachlorobutadiene, and hexachloroethane were non-detect for all associated samples and were qualified bias low "UL" based upon the low recoveries. All other compounds were within criteria. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

- Sample OP22140-BS was used as the aqueous LCS for the PAH SIM analysis on 09/20/07. All criteria were met. No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

- Sample OP22140-BS was used as the aqueous LCS for the PAH SIM analysis on 09/20/07. All criteria were met. No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OMW2 (F52070-1) was used for the aqueous MS/MSD for SVOC analysis on 09/13/07. 4-Nitrophenol (68%, 64%) was above the laboratory and within the DoD QSM criteria. 4-Nitrophenol was within control limits for the associated LCS (Section VIII). 4-Nitrophenol was non-detect for the spiked sample; therefore, no qualifiers were applied based upon this outlier. All other compounds were within criteria. Samples OMW2 (F52070-1), OMW1 (F52070-2), and TMMW1 (F52070-3) apply to this MS/MSD.

- Sample OMW2 (F52070-1) was used for the aqueous MS/MSD for PAH SIM analysis on 09/20/07. Acenaphthene (56%), acenaphthylene (58%), anthracene (67%), benzo(a)pyrene (72%), benzo(g,h,i)perylene (58%), dibenzo(a,h)anthracene (62%), flouranthene (68%), indeno(1,2,3-cd)pyrene (60%), 1-methylnaphthalene (56%), 2-methylnaphthalene (53%), naphthalene (53%), phenanthene (64%), and pyrene (65%) were below laboratory; however, within DoD QSM accuracy criteria. All other target compounds were within criteria. The associated aqueous LCS was within criteria (Section VIII). Acenaphthene, acenaphthylene, anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, dibenzo(a,h)anthracene, flouranthene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthene, and pyrene were non-detect for the spiked sample and qualified "UL" based upon the low recoveries. Samples P -4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this MS/MSD.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No field sample duplicate pair was analyzed with this SDG.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: S4W-1 (F52110-2), bis(2-ethylhexyl)phthalate

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (205491 * 40 * 1000 * 1) / (366872 * 0.958 * 1010 * 1) = 23.1 ng/mL
= 23.1 µg/L

Reported Value = 23.1 µg/L
% Difference = 0.0%
Values were within 10% difference.

Sample: S4W-1 (F52110-2), fluorene

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (223439 * 4 * 1000 * 1) / (237282 * 1.299 * 1010 * 1) = 2.9 ng/mL
= 2.9 µg/L

Reported Value = 2.9 µg/L
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: L038368.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-4		
Lab Sample ID:	F52110-1	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038368.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	9.8	ug/l	
95-57-8	2-Chlorophenol	ND	4.9	0.98	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.9	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.9	0.98	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.9	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	9.8	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.8	2.0	ug/l	
95-48-7	2-Methylphenol	ND	4.9	0.98	ug/l	
	3&4-Methylphenol	ND	4.9	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	4.9	0.98	ug/l	
100-02-7	4-Nitrophenol	ND	25	9.8	ug/l	
87-86-5	Pentachlorophenol	ND	25	9.8	ug/l	
108-95-2	Phenol	ND	4.9	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.9	0.98	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.9	0.98	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.9	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.9	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	4.9	0.98	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.9	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	4.9	2.0	ug/l	
86-74-8	Carbazole	ND	4.9	0.98	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.9	0.98	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.9	0.98	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.9	0.98	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.9	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.9	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	4.9	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	4.9	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.9	0.98	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.9	0.98	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.8	2.0	ug/l	
132-64-9	Dibenzofuran	ND	4.9	0.98	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	P-4		
Lab Sample ID:	F52110-1	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	4.9	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	4.9	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	4.9	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	4.9	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	4.9	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	4.9	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	4.9	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.9	1.5	ug/l	
67-72-1	Hexachloroethane	ND	4.9	1.9	ug/l	
78-59-1	Isophorone	ND	4.9	0.98	ug/l	
88-74-4	2-Nitroaniline	ND	9.8	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	9.8	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	9.8	2.0	ug/l	
98-95-3	Nitrobenzene	ND	4.9	0.98	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.9	0.98	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.9	0.98	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	4.9	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	30%		14-62%
4165-62-2	Phenol-d5	20%		10-40%
118-79-6	2,4,6-Tribromophenol	65%		33-118%
4165-60-0	Nitrobenzene-d5	58%		42-108%
321-60-8	2-Fluorobiphenyl	54%		40-106%
1718-51-0	Terphenyl-d14	74%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	P-4		
Lab Sample ID:	F52110-1	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036992.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.98	0.49	ug/l	
208-96-8	Acenaphthylene	ND	0.98	0.49	ug/l	
120-12-7	Anthracene	ND	0.98	0.49	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.049	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.098	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.049	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.098	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.098	ug/l	
218-01-9	Chrysene	ND	0.20	0.098	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.049	ug/l	
206-44-0	Fluoranthene	ND	0.98	0.25	ug/l	
86-73-7	Fluorene	ND	0.98	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.049	ug/l	
90-12-0	1-Methylnaphthalene	ND	0.98	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	0.98	0.25	ug/l	
91-20-3	Naphthalene	ND	0.98	0.25	ug/l	
85-01-8	Phenanthrene	ND	0.98	0.49	ug/l	
129-00-0	Pyrene	ND	0.98	0.25	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L038369.D

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Report of Analysis

Client Sample ID:	S4W-1		
Lab Sample ID:	F52110-2	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038369.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1010 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	9.9	ug/l	
95-57-8	2-Chlorophenol	ND	5.0	0.99	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	0.99	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.0	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	9.9	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.9	2.0	ug/l	
95-48-7	2-Methylphenol	ND	5.0	0.99	ug/l	
	3&4-Methylphenol	ND	5.0	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	0.99	ug/l	
100-02-7	4-Nitrophenol	ND	25	9.9	ug/l	
87-86-5	Pentachlorophenol	ND	25	9.9	ug/l	
108-95-2	Phenol	ND	5.0	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	0.99	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	0.99	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.0	0.99	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	2.0	ug/l	
86-74-8	Carbazole	ND	5.0	0.99	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	0.99	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	0.99	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	0.99	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.0	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND VL	5.0	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND VL	5.0	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	0.99	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	0.99	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.9	2.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	0.99	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	S4W-1		
Lab Sample ID:	F52110-2	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.0	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	23.1	5.0	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND VL	5.0	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	1.5	ug/l	
67-72-1	Hexachloroethane	ND VL	5.0	1.9	ug/l	
78-59-1	Isophorone	ND	5.0	0.99	ug/l	
88-74-4	2-Nitroaniline	ND	9.9	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	9.9	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	9.9	2.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	0.99	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	0.99	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	0.99	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.0	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	33%		14-62%
4165-62-2	Phenol-d5	23%		10-40%
118-79-6	2,4,6-Tribromophenol	72%		33-118%
4165-60-0	Nitrobenzene-d5	64%		42-108%
321-60-8	2-Fluorobiphenyl	59%		40-106%
1718-51-0	Terphenyl-d14	70%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W036993.D

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Report of Analysis

Client Sample ID:	S4W-1		
Lab Sample ID:	F52110-2	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036993.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	1010 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	1.5	0.99	0.50	ug/l	
208-96-8	Acenaphthylene	ND	0.99	0.50	ug/l	
120-12-7	Anthracene	ND	0.99	0.50	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.050	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.099	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.050	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.099	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.099	ug/l	
218-01-9	Chrysene	ND	0.20	0.099	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.050	ug/l	
206-44-0	Fluoranthene	ND	0.99	0.25	ug/l	
86-73-7	Fluorene	2.9	0.99	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.050	ug/l	
90-12-0	1-Methylnaphthalene	7.6	0.99	0.25	ug/l	
91-57-6	2-Methylnaphthalene	2.0	0.99	0.25	ug/l	
91-20-3	Naphthalene	1.0	0.99	0.25	ug/l	
85-01-8	Phenanthrene	1.5	0.99	0.50	ug/l	
129-00-0	Pyrene	ND	0.99	0.25	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L038370.D

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Report of Analysis

Client Sample ID:	8B		
Lab Sample ID:	F52110-3	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038370.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	28	11	ug/l	
95-57-8	2-Chlorophenol	ND	5.6	1.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.6	2.2	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.6	1.1	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.6	2.2	ug/l	
51-28-5	2,4-Dinitrophenol	ND	28	11	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	11	2.2	ug/l	
95-48-7	2-Methylphenol	ND	5.6	1.1	ug/l	
	3&4-Methylphenol	ND	5.6	1.4	ug/l	
88-75-5	2-Nitrophenol	ND	5.6	1.1	ug/l	
100-02-7	4-Nitrophenol	ND	28	11	ug/l	
87-86-5	Pentachlorophenol	ND	28	11	ug/l	
108-95-2	Phenol	ND	5.6	2.2	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.6	1.1	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.6	1.1	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.6	1.3	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.6	2.2	ug/l	
100-51-6	Benzyl Alcohol	ND	5.6	1.1	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.6	1.4	ug/l	
106-47-8	4-Chloroaniline	ND	5.6	2.2	ug/l	
86-74-8	Carbazole	ND	5.6	1.1	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.6	1.1	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.6	1.1	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.6	1.1	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.6	1.4	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.6	1.7	ug/l	
541-73-1	1,3-Dichlorobenzene	ND UL	5.6	1.8	ug/l	
106-46-7	1,4-Dichlorobenzene	ND UL	5.6	1.7	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.6	1.1	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.6	1.1	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	11	2.2	ug/l	
132-64-9	Dibenzofuran	ND	5.6	1.1	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	8B		
Lab Sample ID:	F52110-3	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.6	2.2	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.6	2.2	ug/l	
84-66-2	Diethyl phthalate	ND	5.6	2.2	ug/l	
131-11-3	Dimethyl phthalate	ND	5.6	2.2	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.6	2.2	ug/l	
118-74-1	Hexachlorobenzene	ND	5.6	1.3	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.6	1.9	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.6	1.7	ug/l	
67-72-1	Hexachloroethane	ND	5.6	2.1	ug/l	
78-59-1	Isophorone	ND	5.6	1.1	ug/l	
88-74-4	2-Nitroaniline	ND	11	2.2	ug/l	
99-09-2	3-Nitroaniline	ND	11	2.2	ug/l	
100-01-6	4-Nitroaniline	ND	11	2.2	ug/l	
98-95-3	Nitrobenzene	ND	5.6	1.1	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.6	1.1	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.6	1.1	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.6	1.7	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	33%		14-62%
4165-62-2	Phenol-d5	24%		10-40%
118-79-6	2,4,6-Tribromophenol	70%		33-118%
4165-60-0	Nitrobenzene-d5	59%		42-108%
321-60-8	2-Fluorobiphenyl	52%		40-106%
1718-51-0	Terphenyl-d14	80%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W036994.D

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Report of Analysis

Client Sample ID:	8B		
Lab Sample ID:	F52110-3	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036994.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.1	0.56	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.56	ug/l	
120-12-7	Anthracene	ND	1.1	0.56	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.22	0.056	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.22	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.22	0.056	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.22	0.11	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.22	0.11	ug/l	
218-01-9	Chrysene	ND	0.22	0.11	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.22	0.056	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.28	ug/l	
86-73-7	Fluorene	ND	1.1	0.28	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.22	0.056	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-20-3	Naphthalene	ND	1.1	0.28	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.56	ug/l	
129-00-0	Pyrene	ND	1.1	0.28	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L038371.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038371.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1040 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	24	9.6	ug/l	
95-57-8	2-Chlorophenol	ND	4.8	0.96	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.8	1.9	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.8	0.96	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.8	1.9	ug/l	
51-28-5	2,4-Dinitrophenol	ND	24	9.6	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.6	1.9	ug/l	
95-48-7	2-Methylphenol	ND	4.8	0.96	ug/l	
	3&4-Methylphenol	ND	4.8	1.2	ug/l	
88-75-5	2-Nitrophenol	ND	4.8	0.96	ug/l	
100-02-7	4-Nitrophenol	ND	24	9.6	ug/l	
87-86-5	Pentachlorophenol	ND	24	9.6	ug/l	
108-95-2	Phenol	ND	4.8	1.9	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.8	0.96	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.8	0.96	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.8	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.8	1.9	ug/l	
100-51-6	Benzyl Alcohol	ND	4.8	0.96	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.8	1.2	ug/l	
106-47-8	4-Chloroaniline	ND	4.8	1.9	ug/l	
86-74-8	Carbazole	ND	4.8	0.96	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.8	0.96	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.8	0.96	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.8	0.96	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.8	1.2	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.8	1.4	ug/l	
541-73-1	1,3-Dichlorobenzene	ND VL	4.8	1.5	ug/l	
106-46-7	1,4-Dichlorobenzene	ND VL	4.8	1.4	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.8	0.96	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.8	0.96	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.6	1.9	ug/l	
132-64-9	Dibenzofuran	ND	4.8	0.96	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	4.8	1.9	ug/l	
117-84-0	Di-n-octyl phthalate	ND	4.8	1.9	ug/l	
84-66-2	Diethyl phthalate	ND	4.8	1.9	ug/l	
131-11-3	Dimethyl phthalate	ND	4.8	1.9	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	4.8	1.9	ug/l	
118-74-1	Hexachlorobenzene	ND	4.8	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	4.8	1.6	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.8	1.4	ug/l	
67-72-1	Hexachloroethane	ND	4.8	1.8	ug/l	
78-59-1	Isophorone	ND	4.8	0.96	ug/l	
88-74-4	2-Nitroaniline	ND	9.6	1.9	ug/l	
99-09-2	3-Nitroaniline	ND	9.6	1.9	ug/l	
100-01-6	4-Nitroaniline	ND	9.6	1.9	ug/l	
98-95-3	Nitrobenzene	ND	4.8	0.96	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.8	0.96	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.8	0.96	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	4.8	1.4	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	33%		14-62%
4165-62-2	Phenol-d5	22%		10-40%
118-79-6	2,4,6-Tribromophenol	72%		33-118%
4165-60-0	Nitrobenzene-d5	66%		42-108%
321-60-8	2-Fluorobiphenyl	57%		40-106%
1718-51-0	Terphenyl-d14	75%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W036995.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036995.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	1040 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.96	0.48	ug/l	
208-96-8	Acenaphthylene	ND	0.96	0.48	ug/l	
120-12-7	Anthracene	ND	0.96	0.48	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.19	0.048	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.19	0.096	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.19	0.048	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.19	0.096	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.19	0.096	ug/l	
218-01-9	Chrysene	ND	0.19	0.096	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.19	0.048	ug/l	
206-44-0	Fluoranthene	ND	0.96	0.24	ug/l	
86-73-7	Fluorene	ND	0.96	0.24	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.19	0.048	ug/l	
90-12-0	1-Methylnaphthalene	ND	0.96	0.24	ug/l	
91-57-6	2-Methylnaphthalene	ND	0.96	0.24	ug/l	
91-20-3	Naphthalene	ND	0.96	0.24	ug/l	
85-01-8	Phenanthrene	ND	0.96	0.48	ug/l	
129-00-0	Pyrene	ND	0.96	0.24	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L038372.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038372.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	9.8	ug/l	
95-57-8	2-Chlorophenol	ND	4.9	0.98	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.9	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.9	0.98	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.9	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	9.8	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.8	2.0	ug/l	
95-48-7	2-Methylphenol	ND	4.9	0.98	ug/l	
	3&4-Methylphenol	ND	4.9	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	4.9	0.98	ug/l	
100-02-7	4-Nitrophenol	ND	25	9.8	ug/l	
87-86-5	Pentachlorophenol	ND	25	9.8	ug/l	
108-95-2	Phenol	ND	4.9	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.9	0.98	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.9	0.98	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.9	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.9	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	4.9	0.98	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.9	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	4.9	2.0	ug/l	
86-74-8	Carbazole	ND	4.9	0.98	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.9	0.98	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.9	0.98	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.9	0.98	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.9	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.9	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND VL	4.9	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND VL	4.9	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.9	0.98	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.9	0.98	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.8	2.0	ug/l	
132-64-9	Dibenzofuran	ND	4.9	0.98	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Corp

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	4.9	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	4.9	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	4.9	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	4.9	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	4.9	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	4.9	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	4.9	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.9	1.5	ug/l	
67-72-1	Hexachloroethane	ND	4.9	1.9	ug/l	
78-59-1	Isophorone	ND	4.9	0.98	ug/l	
88-74-4	2-Nitroaniline	ND	9.8	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	9.8	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	9.8	2.0	ug/l	
98-95-3	Nitrobenzene	ND	4.9	0.98	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.9	0.98	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.9	0.98	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	4.9	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	29%		14-62%
4165-62-2	Phenol-d5	22%		10-40%
118-79-6	2,4,6-Tribromophenol	61%		33-118%
4165-60-0	Nitrobenzene-d5	52%		42-108%
321-60-8	2-Fluorobiphenyl	46%		40-106%
1718-51-0	Terphenyl-d14	68%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W036996.D

Form I GC

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036996.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.98	0.49	ug/l	
208-96-8	Acenaphthylene	ND	0.98	0.49	ug/l	
120-12-7	Anthracene	ND	0.98	0.49	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.049	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.098	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.049	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.098	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.098	ug/l	
218-01-9	Chrysene	ND	0.20	0.098	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.049	ug/l	
206-44-0	Fluoranthene	ND	0.98	0.25	ug/l	
86-73-7	Fluorene	ND	0.98	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.049	ug/l	
90-12-0	1-Methylnaphthalene	ND	0.98	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	0.98	0.25	ug/l	
91-20-3	Naphthalene	ND	0.98	0.25	ug/l	
85-01-8	Phenanthrene	ND	0.98	0.49	ug/l	
129-00-0	Pyrene	ND	0.98	0.25	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L038373.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038373.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	26	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.1	1.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.1	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.1	1.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.1	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	26	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	2.0	ug/l	
95-48-7	2-Methylphenol	ND	5.1	1.0	ug/l	
	3&4-Methylphenol	ND	5.1	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	5.1	1.0	ug/l	
100-02-7	4-Nitrophenol	ND	26	10	ug/l	
87-86-5	Pentachlorophenol	ND	26	10	ug/l	
108-95-2	Phenol	ND	5.1	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.1	1.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.1	1.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.1	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.1	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.1	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.1	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	5.1	2.0	ug/l	
86-74-8	Carbazole	ND	5.1	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.1	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.1	1.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.1	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.1	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.1	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND VL	5.1	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND VL	5.1	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.1	1.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.1	1.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	2.0	ug/l	
132-64-9	Dibenzofuran	ND	5.1	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.1	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.1	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.1	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.1	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.1	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.1	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND VL	5.1	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.1	1.5	ug/l	
67-72-1	Hexachloroethane	ND VL	5.1	1.9	ug/l	
78-59-1	Isophorone	ND	5.1	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	10	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	10	2.0	ug/l	
98-95-3	Nitrobenzene	ND	5.1	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.1	1.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.1	1.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.1	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	31%		14-62%
4165-62-2	Phenol-d5	21%		10-40%
118-79-6	2,4,6-Tribromophenol	60%		33-118%
4165-60-0	Nitrobenzene-d5	56%		42-108%
321-60-8	2-Fluorobiphenyl	51%		40-106%
1718-51-0	Terphenyl-d14	67%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W036997.D

Run 1 Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036997.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.51	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.51	ug/l	
120-12-7	Anthracene	ND	1.0	0.51	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.051	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.051	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.051	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.26	ug/l	
86-73-7	Fluorene	ND	1.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.051	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-20-3	Naphthalene	ND	1.0	0.26	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.51	ug/l	
129-00-0	Pyrene	ND	1.0	0.26	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation - Volatiles
Accutest Laboratories, Inc., SDG F52110

DATE: November 15, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 27, 2007. The samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) using USEPA SW846 Method 5030B/8260B for aqueous matrices. A total of six aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
P-4	F52110-1	41MW1	F52110-4
S4W-1	F52110-2	41MW2	F52110-5
8B	F52110-3	41MW3	F52110-6

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
X		Holding Times and Preservation
	X	Instrument Performance Results
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Laboratory Control Sample
	X	Matrix Spike / Spike Duplicate Sample
	X	System Monitoring Compounds
	X	Internal Standards
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

10/15/07
Date

RFAAP VALIDATION REPORT
VOLATILES REVIEW
SDG F52110

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of analysis. Holding time criteria: For aqueous samples cooled @ 4°C±2°C; pH<2 HCl, the maximum holding time is 14 days (7 days if no HCl added) from sample collection to analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/27/07, the coolers were received by the primary laboratory (Accutest) on 08/28/07 at 0.6°C, 1.2°C, 0.8°C, 0.2°C, 0.4°C, 1.0°C, 0.6°C, 0.6°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 3.0°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 3.6°C. Some of the receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/27/07, the VOCs were prepped and analyzed on 09/06/07 and 09/10/07. Samples 41MW1 (F52110-4) and 41MW2 (F52110-5) were received pH>2 and analyzed on 09/06/07 and 09/10/07 (respectively) beyond the 7 day holding time. Samples 41MW1 (F52110-4) and 41MW2 (F52110-5) were qualified "L" for detects and "UL" for non-detects based upon this outlier for all aromatic VOCs (benzene, chlorobenzene, ethylbenzene, toluene, styrene, o-xylene, and m,p-xylenes). For all other samples, all criteria were met.

II-Instrument Performance Check
The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, bromofluorobenzene (BFB), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent relative standard deviation (%RSD) must be ≤15% for each target compound and must be ≤30% for each calibration check compound. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration performed on 09/06/07 on instrument MSVOA7, target compounds vinyl chloride (19.3%), bromomethane (20.6%), chloroethane (16.4%), 1,1-dichloroethene (20.5%), carbon disulfide (17.2%), methylene chloride (83.5%; grossly exceeding), 1,1,1-trichloroethane (18.9%), carbon tetrachloride (24.8%), trichloroethene (16.2%), tetrachloroethene (16.3%), ethylbenzene (15.5%), m,p-xylenes (15.7%), o-xylene (16.4%), styrene (19.0%), and bromoform (19.0%) were outside %RSD/RRF criteria. All RSDs/RRFs (RRF≥0.05) were within criteria for all other target compounds. Compounds vinyl chloride (r=0.9995), bromomethane (r=0.9989), chloroethane (r=0.9989), 1,1-dichloroethene (r=0.9971), carbon disulfide (r=0.9994), methylene chloride (r=0.9987), 1,1,1-trichloroethane (r=0.9996), carbon tetrachloride (r=0.9981), trichloroethene (r=0.9996), tetrachloroethene (r=0.9994), ethylbenzene (r=0.9997), m,p-xylenes (r=0.9995), o-xylene (r=0.9996), and styrene (r=0.9996) were quantified using linear or higher order with correlations >0.995; therefore, no qualifiers were applied based upon these outliers. Bromoform was non-detect for all associated samples; therefore, no qualifiers were applied based upon this outlier. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), and 41MW1 (F52110-4) were analyzed using this initial calibration.

- For initial calibration performed on 09/07/07 on instrument MSVOA7, target compounds bromomethane (21.5%), 1,1-dichloroethene (15.9%), carbon disulfide (15.5%), methylene chloride (41.5%; grossly exceeding), chloroform (19.2%), 1,1,1-trichloroethane (16.1%), carbon tetrachloride (18.6%), styrene (16.9%), and bromoform (17.1%) were outside %RSD/RRF criteria. All RSDs/RRFs (RRF≥0.05) were within criteria for all other target compounds. Compounds 1,1-dichloroethene (r=0.9988), carbon disulfide (r=0.9983), methylene chloride (r=0.9998), chloroform (r=0.9998), 1,1,1-trichloroethane (r=0.9992), carbon tetrachloride (r=0.9983), and styrene (r=0.9997) were quantified using linear or higher order with correlations >0.995; therefore, no qualifiers were applied based upon these outliers. Bromomethane and bromoform were non-detect for all associated samples; therefore, no qualifiers were applied based upon this outlier. Samples 41MW2 (F52110-5) and 41MW3 (F52110-6) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Continuing calibration establishes the 12-hour relative response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within 20% for all target compounds. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration verification performed on 09/06/07 @15:19 on instrument MSVOA7, chloroethane (23.6%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Chloroethane was non-detect for all samples; therefore, no qualifiers were applied based upon the high %Ds/%Drifts. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), and 41MW1 (F52110-4) apply to this initial calibration verification.

- For initial calibration verification performed on 09/07/07 @16:58 on instrument MSVOA7, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For continuing calibration performed on 09/10/07 @10:26 on instrument MSVOA7, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No qualifiers were applied. Samples 41MW2 (F52110-5) and 41MW3 (F52110-6) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of BFB. No contaminants should be detected in any of the associated blanks > the MDL. The DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants methylene chloride, acetone, and 2-butanone). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants methylene chloride, acetone, and 2-butanone (MEK), or 5 times (5X) the maximum amount for other volatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank 082307R (F52035-5) (low-flow pump) applies to groundwater samples P-4 (F52110-1), S4W-1 (F52110-2), and 8B (F52110-3) in this SDG. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) in this SDG. The trip blank TB082707 (F52110-7) applies to the aqueous samples collected 08/27/07 in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/06/07	VM905-MB	Chloroform	0.53J	2.65	None
09/06/07	VM905-MB	Methylene Chloride	1.2J	12.0	None
09/10/07	VM907-MB	Chloroform	0.53J	2.65	None
09/10/07	VM907-MB	Methylene Chloride	1.6J	16.0	None
09/05/07	082307R	All target <½MRL	NA	NA	None
09/13/07	083007R	All target <½MRL	NA	NA	None
09/10/07	TB082707	Methylene Chloride	1.1JB	5.50	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
B = Analyte was found in associated method blank.
NA = Not Applicable
MRL = Method Reporting Limit

VI-Laboratory Control Sample

Data for laboratory control samples (LCS) are evaluated to determine long-term accuracy of the analytical method on various matrices. Percent recoveries (%Rs) should be within the specified control limits. The DoD aqueous LCS recovery limits are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample VM905-BS was used as the aqueous LCS for the VOC analysis on 09/06/07. Chloromethane (128%) was above DoD QSM criteria and within laboratory control limits. All samples were non-detect for chloromethane; therefore, no qualifiers were applied based upon this outlier. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), and 41MW1 (F52110-4) apply to this LCS.

- Sample VM907-BS was used as the aqueous LCS for the VOC analysis on 09/10/07. All criteria were met. No qualifiers were applied. Samples 41MW2 (F52110-5) and 41MW3 (F52110-6) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. The DoD MS/MSD aqueous recovery limits follow the LCS criteria and are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample F52139-4 was used for the aqueous MS/MSD analysis for analysis on 09/06/07. Since this sample is not a RFAAP site sample, it was not evaluated. No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), and 41MW1 (F52110-4) apply to this MS/MSD.

- Sample 41MW2 (F52110-5) was used for the aqueous MS/MSD analysis on 09/10/07. 2-Hexanone (129%, 130%), 4-methyl-2-pentanone (129%, 126%), and chloromethane (134%, 129%) were above DoD QSM criteria and/or laboratory control limits. All samples were non-detect for 2-hexanone, 4-methyl-2-pentanone, and chloromethane; therefore, no qualifiers were applied based upon these outliers. All other percent recoveries were within criteria for all target compounds. Samples 41MW2 (F52110-5) and 41MW3 (F52110-6) apply to this MS/MSD.

VIII-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Recoveries for system monitoring compounds in volatile samples and blanks must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria: Dibromofluoromethane (87-116%) (DoD QSM = 85-115%)
1,2-Dichloroethane-d4 (76-127%) (DoD QSM = 70-120%)
Toluene-d8 (86-112%) (DoD QSM = 85-120%)
4-Bromofluorobenzene (84-120%) (DoD QSM = 75-120%)

- All criteria were met. No qualifiers were applied.

IX-Internal Standards (IS)
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No field sample duplicate pair was analyzed with this SDG.

XI-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: 41MW2 (F52110-5), tetrachloroethylene

Conc. (µg/L) = (Ax)*(Is) *(DF)/(Ais)*(RRF)

where: Ax is the compound area
Ais is the corresponding internal standard area
Is is the corresponding internal standard concentration (µg/L)
DF is the dilution factor
RRF is the relative response factor.

Conc. µg/L = (17459 * 50 µg/L * 1) / (1731790 * 0.297) = 1.7 µg/L

Reported Conc. = 1.7 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: M0022076.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-4		
Lab Sample ID:	F52110-1	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M0022076.D	1	09/06/07	MM	n/a	n/a	VM905
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Ken I Carey

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-4		
Lab Sample ID:	F52110-1	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	97%		87-116%
17060-07-0	1,2-Dichloroethane-D4	99%		76-127%
2037-26-5	Toluene-D8	98%		86-112%
460-00-4	4-Bromofluorobenzene	99%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	S4W-1		
Lab Sample ID:	F52110-2	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M0022077.D	1	09/06/07	MM	n/a	n/a	VM905
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	S4W-1		
Lab Sample ID:	F52110-2	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	100%		76-127%
2037-26-5	Toluene-D8	99%		86-112%
460-00-4	4-Bromofluorobenzene	96%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: M0022078.D

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Report of Analysis

Client Sample ID:	8B		
Lab Sample ID:	F52110-3	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M0022078.D	1	09/06/07	MM	n/a	n/a	VM905
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.61	1.0	0.25	ug/l	J
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	8B		
Lab Sample ID:	F52110-3	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	100%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: M0022079.D

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Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	M0022079.D	1	09/06/07	MM	n/a	n/a	VM905
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND VL	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND VL	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND VL	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND VL	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.35 J	1.0	0.25	ug/l	J
108-88-3	Toluene	ND VL	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		87-116%
17060-07-0	1,2-Dichloroethane-D4	100%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	98%		84-120%

(a) Sample was not preserved to a pH < 2; reported results are considered minimum values.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: M0022096.D

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Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	M0022096.D	1	09/10/07	MM	n/a	n/a	VM907
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	17	1.0	0.25	ug/l	
108-88-3	Toluene	0.30	1.0	0.27	ug/l	J
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	103%		84-120%

(a) Sample was not preserved to a pH < 2; reported results are considered minimum values.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M0022097.D	1	09/10/07	MM	n/a	n/a	VM907
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.80 J	1.0	0.25	ug/l	J
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		87-116%
17060-07-0	1,2-Dichloroethane-D4	101%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	104%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: M0022098.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB082707		
Lab Sample ID:	F52110-7	**Date Sampled:**	08/27/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M0022098.D	1	09/10/07	MM	n/a	n/a	VM907
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	1.1 J	5.0	1.0	ug/l	JB
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB082707		
Lab Sample ID:	F52110-7	**Date Sampled:**	08/27/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
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CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	103%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Dioxin Furans
SGS Paradigm Analytical Laboratories, Inc. SDGs G383-599
(Accutest SDG F52137)

DATE: November 26, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 28, 2007. The samples were analyzed for Dioxin Furan compounds using USEPA SW-846 Method 8290 High Resolution Gas Chromatography/High Resolution Mass Spectroscopy (HRGC/HRMS). A total of two aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41GW01	F52137-1	41GW02	F52137-2

Data were reviewed and validated using a combination of project QAPP, *DOD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *USEPA Region III Dioxin/Furan Data Validation Guidance* (March, 1999). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
X		Blank Analysis
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Internal Standards (IS) Recovery Standard Solutions
	X	Cleanup Standards
	X	Laboratory Control Standard or Ongoing Precision Result (OPR)
	X	Matrix Spike and Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/26/07

Date

RFAAP VALIDATION REPORT
DIOXIN FURAN REVIEW
SDGs G383-599
(Accutest SDG F52137)

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, dioxin and furans are shipped cooled (@4°C ± 2°C) with a maximum holding time of 30 days from sample collection to preparative extraction and 45 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/28/07, the coolers were received by the primary laboratory (Accutest) on 08/29/07 at 2.4°C, 2.0°C, and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.4°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.6°C. All criteria were met. No qualifiers were applied. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/28/07, the dioxins and furans were extracted on 09/05/07 and 09/06/07 and analyzed on 09/07/07 and 09/09/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Blank Analysis

The purpose of laboratory (or field) blank analyses is to determine the existence and magnitude of contamination problems resulting from field and laboratory activities. No contamination should be found in any of the blanks >EDL (estimated detection limit). The DoD QSM criteria specifies all concentrations should be less than ½ MRL (<MRL for common laboratory contaminants OCDD and OCDF) and <2*EDL for the calibration blanks. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants OCDD or OCDF, or 5 times (5X) the maximum amount for other target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were sampled with disposable bailers; therefore, no rinse blank applies to these samples.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. ng/L	Action Level ng/L	B qualified samples
09/08/07	LMB14457	All congeners <EDL	NA	NA	None
09/09/07	LMB14456	1,2,3,7,8-PeCDD	0.00102J	0.00510	None
09/09/07	LMB14456	1,2,3,7,8-PeCDF	0.00136J	0.00680	41GW02
09/09/07	LMB14456	2,3,4,7,8-PeCDF	0.000980J	0.00490	None
09/09/07	LMB14456	1,2,3,4,7,8-HxCDF	0.000780J	0.00390	None
09/09/07	LMB14456	1,2,3,6,7,8-HxCDF	0.000740J	0.00370	41GW02
09/09/07	LMB14456	1,2,3,4,6,7,8-HpCDF	0.00102J	0.00510	None
09/09/07	LMB14456	Total PeCDDs	0.00102	0.00510	None
09/09/07	LMB14456	Total PeCDFs	0.00234	0.0117	None
09/09/07	LMB14456	Total HxCDFs	0.00152	0.00760	None
09/09/07	LMB14456	Total HpCDFs	0.00102	0.00510	None

J = Estimated value >EDL and <MRL.
EDL = Estimated detection limit

III-Instrument Performance Check

Instrument must be tuned with perfluorokerosene (PFK) to achieve a static resolving power of at least 10,000 (10% valley) and lock-mass ion between lowest and highest masses for each descriptor and level of reference compound ≤10%. Documentation of the mass spectrometer resolving power is accomplished by recording the peak profile of the high-mass reference signal (typically m/z 330.9792) obtained during a peak examination by using the low-mass PFK ion at m/z 292.9825 or lower in mass as reference. At the beginning of the each 12-hour period, the chromatographic resolution is verified in the same fashion as in the initial calibration through the analysis of HRCC solution on the DB-5 (or equivalent) column or through the analysis of the column performance solution on the SP-2331 or SP-225 (or equivalent) column. A 25% valley must be achieved between the close eluters.

- All PFK forms were verified and found to be in compliance with method specification. No qualifiers were applied.

IV-Initial Calibration

Once the window defining mix has been analyzed and the descriptor switching times have been verified, the five point calibration solutions can be analyzed prior to sample analysis. Per method and DoD QSM, the initial calibration criteria are as follows:

  - The percent relative standard deviations for the mean response factors RRF(n) from the 17 unlabeled standards must not exceed ±20%, and those for the labeled reference compounds must not exceed ±30%;
  - The signal to noise ratio ≥10% for all target ions;
  - Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For initial calibration performed on 07/10/07 for all target compounds on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this initial calibration.

V-Continuing Calibration
The continuing calibration consists of two parts: evaluation of the mass resolution and retention time check. Per method and DoD QSM, the following stipulates the continuing calibration criteria.

- The signal signal-to-noise ratio (S/N) must be at least 10:1 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard for each analyte.
- The relative response factor of each analyte for the unlabeled standard must be within ±20% of the average RF obtained from the initial calibration, and the RRF of each labeled standard must be within ±30% of the average RRF established during initial calibration. This is expressed in term of percent difference %D.
- Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For continuing calibration performed on 09/07/07 @08:32 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/07/07 @12:33 on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample 41GW01 (F52137-1) applies to this continuing calibration.

- For continuing calibration performed on 09/07/07 @23:54 on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample applies to this continuing calibration.

- For continuing calibration performed on 09/08/07 @11:15 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/08/07 @22:36 on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample 41GW02 (F52137-2) applies to this continuing calibration.

- For continuing calibration performed on 09/09/07 @09:58 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

VI-Internal Standards (IS) Recovery Standard Solutions
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: Recoveries of the isotopically-labeled recovery standards to fall within the 40 to 135 percent range for the tetra- through octachlorinated congeners, or as stated in the data package (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VII-Cleanup Standards
Cleanup standards are added to every sample, blank, quality control sample, and calibration solution. This compound is added to the samples after extraction but prior to cleanup and is used to verify the percent recovery obtained using the isotope dilution technique. The control limits are 40 to 135 percent (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Standard (LCS) or Ongoing Precision Result (OPR)
LCSs are used to monitor laboratory accuracy and precision by calculating the percent recoveries of the spiked compounds. Per DOD QSM and method criteria, acceptable performance is determined by:

1. Recoveries of the isotopically-labeled extraction standards to fall within 40-135% control limits for the tetra- through octachlorinated congeners, or as stated in the data package;

2. Recoveries (accuracy) of the unlabeled compounds should be within ±35% when spiked at the method quantitation limit and within ±30% when spiked above 20 times the method quantitation limit, or as stated in the data package;

3. When duplicate OPR are required, the relative percent difference (RPD) of the unlabeled analytes concentrations should be within 30% when spiked at the method quantitation limit and within ±20% when spiked above 20 times the method quantitation limit.

- Sample OPR14456 was used as LCS and LCSD on 09/09/07 analytical run. All criteria were met. No qualifiers were applied. Sample 41GW02 (F52137-2) applies to this LCS.

- Sample OPR14457 was used as LCS and LCSD on 09/08/07 analytical run. All criteria were met. No qualifiers were applied. Sample 41GW01 (F52137-1) applies to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. Per DoD QSM, MS/MSD recoveries must be within in-house laboratory limits (75-125%) and RPD ≤20%.

- No project specific aqueous matrix MS/MSD was performed in this SDG; therefore, it was not evaluated.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of at least one the several parameters such as the %D, %RSD, % recovery, and/or compound concentration. Values were found to be within 10%. Any value reported by the laboratory as estimated "A" based on an analyte to internal standard ratio below the calibration curve was qualified as estimated "J". The signal signal-to-noise ratio (S/N) must be greater than 2.5 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard. Any detected value with ether interference (I-lab flag) was qualified as estimated "J". For where the ion ratio failed the 25% criteria (*-lab flag), the estimated maximum possible concentration (EMPC) was reported and flagged estimated "J". For where presence of quantitation interference (Q-lab flag), the date was flagged estimated "J" for detects and "UJ" for non-detects.

- For sample 41GW01 (F52137-1), 1,2,3,4,7,8,9-HpCDF, 1,2,3,7,8-PeCDF, Total HpCDFs, and Total PeCDFs were qualified estimated non-detect "UJ" based upon the presence of quantitation interference.

Sample: 41GW02 (F52137-2), OCDD

A(x) = sum of the integrated ion abundances of the quantitation ions for the unlabeled ions;
A(is) = sum of the integrated ion abundances of the quantitation ions for the labeled ions;
Q(is) = quantity, in ng/ul, of the internal standard added to the sample before extraction;
W = weight, in g, of the sample (solid or organic liquid) as dry weight, or volume in mL of an aqueous sample; and
Avg. RRF(n) = calculated mean relative response factor for the unlabeled analyte.

$$\text{Conc. (ng/L)} = \frac{(A(x))\ *Q(is)*1000}{A(is)\ *\ W\ *\ \text{Avg. RRF}} = \frac{(48000000+53400000)*4.0*1000}{(28200000+31400000)\ *\ 775\ *\ 1.0783} = 8.14\ \text{ng/L}$$

Reported Value = 8.14 ng/L
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ EDL and <MRL or <3*EDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥EDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ EDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I Copy

SGS Environmental Services

Method 8290
F52137-1
Accutest

Analytical Data Summary Sheet

Analyte	Amount ng/L	EDL ng/L	EMPC ng/L	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00210				
1,2,3,7,8-PeCDD	ND	0.00551				
1,2,3,4,7,8-HxCDD	ND	0.00551				
1,2,3,6,7,8-HxCDD	ND	0.00551				
1,2,3,7,8,9-HxCDD	ND	0.00551				
1,2,3,4,6,7,8-HpCDD	ND	0.00551				
OCDD	0.0963 J			45:01	0.86	A
2,3,7,8-TCDF	ND	0.00168				
1,2,3,7,8-PeCDF	ND UJ	0.00551				Q
2,3,4,7,8-PeCDF	ND	0.00551				
1,2,3,4,7,8-HxCDF	ND	0.00551				
1,2,3,6,7,8-HxCDF	ND	0.00551				
2,3,4,6,7,8-HxCDF	ND	0.00551				
1,2,3,7,8,9-HxCDF	ND	0.00551				
1,2,3,4,6,7,8-HpCDF	ND	0.00551				
1,2,3,4,7,8,9-HpCDF	ND UJ	0.00551				Q
OCDF	ND	0.0110				
Total TCDDs	ND	0.00210				
Total PeCDDs	ND	0.00551				
Total HxCDDs	ND	0.00551				
Total HpCDDs	ND	0.00551				
Total TCDFs	ND	~~0.00168~~	0.00231 J			
Total PeCDFs	ND UJ	0.00551				Q
Total HxCDFs	ND	0.00551				
Total HpCDFs	ND UJ	0.00551				Q
WHO-2005 TEQ (ND=0)	0.0000289		0.0000289			
WHO-2005 TEQ (ND=½)	0.00684		0.00684			

Client Information			**Sample Information**	
Project Name:	F52137		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F52137-1		Weight / Volume:	908 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14456
Project ID:	G383-599		Instrument:	HRMS1
Sample ID:	G383-599-1B		Filename:	a07sep07a_2-13
Collection Date/Time:	08/28/07	8:30	Retchk:	a07sep07a-6
Receipt Date/Time:	08/31/07	10:25	Begin ConCal:	a07sep07a-6
Extraction Date:	09/05/07		End ConCal:	a07sep07a_2-14
Analysis Date/Time:	09/07/07	23:05	Initial Cal:	m8290cc-090707a_2

Form I Copy

SGS Environmental Services

Method 8290
F52137-1
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.59	79.7	31:31	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.75	87.7	34:19	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.71	85.7	37:04	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.81	90.3	40:31	1.06	
13C12-OCDD	4.0	3.54	88.6	45:01	0.90	
13C12-2,3,7,8-TCDF	2.0	1.81	90.4	30:55	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.30	65.1	33:31	1.59	Q
13C12-1,2,3,6,7,8-HxCDF	2.0	1.75	87.6	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.63	81.5	39:13	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.385	96.2	31:31	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.389	97.3	34:09	1.58	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.359	89.7	36:58	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.371	92.7	36:16	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.296	74.1	41:12	0.44	Q
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:03	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:19	1.25	

Client Information			**Sample Information**	
Project Name:	F52137		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F52137-1		Weight / Volume:	908 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14456
Project ID:	G383-599		Instrument:	HRMS1
Sample ID:	G383-599-1B		Filename:	a07sep07a_2-13
Collection Date/Time:	08/28/07	8:30	Retchk:	a07sep07a-6
Receipt Date/Time:	08/31/07	10:25	Begin ConCal:	a07sep07a-6
Extraction Date:	09/05/07		End ConCal:	a07sep07a_2-14
Analysis Date/Time:	09/07/07	23:05	Initial Cal:	m8290cc-090707a_2

Form Version:[8290_DB_2.16]Report

Analyzed by: _____
Date: 09-12-07

Reviewed by: _____
Date: 9/12/07

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SGS Environmental Services

Method 8290
F52137-2
Accutest

Analytical Data Summary Sheet

Analyte	Amount ng/L	EDL ng/L	EMPC ng/L	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00249				
1,2,3,7,8-PeCDD	EMPC	~~0.00645~~	0.00529 J	34:19	1.31 *	A
1,2,3,4,7,8-HxCDD	0.00320 J			36:58	1.38	A
1,2,3,6,7,8-HxCDD	0.00671 J			37:04	1.29	A
1,2,3,7,8,9-HxCDD	0.0557 J			37:19	1.27	A
1,2,3,4,6,7,8-HpCDD	0.172			40:31	1.03	
OCDD	8.14			45:01	0.90	
2,3,7,8-TCDF	0.00557 J			30:57	0.84	A
1,2,3,7,8-PeCDF	0.00359 B			33:31	1.48	A
2,3,4,7,8-PeCDF	0.00550 J			34:09	1.75	A
1,2,3,4,7,8-HxCDF	0.00529 J			36:16	1.23	A
1,2,3,6,7,8-HxCDF	0.00335 B			36:22	1.23	A
2,3,4,6,7,8-HxCDF	0.00222 J			36:52	1.15	A
1,2,3,7,8,9-HxCDF	0.00792 J			37:40	1.35	A
1,2,3,4,6,7,8-HpCDF	0.0290 J			39:13	1.11	A
1,2,3,4,7,8,9-HpCDF	ND	0.00645				
OCDF	0.0549 J			45:18	0.87	A
Total TCDDs	0.00333					
Total PeCDDs	~~0.0260~~		0.0313 J			
Total HxCDDs	0.158					
Total HpCDDs	0.395					
Total TCDFs	~~0.0383~~		0.0431 J			
Total PeCDFs	~~0.0194~~		0.0218 J			
Total HxCDFs	0.0285					
Total HpCDFs	0.0420					
WHO-2005 TEQ (ND=0)	0.0152		0.0205			
WHO-2005 TEQ (ND=½)	0.0197		0.0218			

Client Information			**Sample Information**	
Project Name:	F52137		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F52137-2		Weight / Volume:	775 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14457
Project ID:	G383-599		Instrument:	HRMS1
Sample ID:	G383-599-2C		Filename:	a07sep07a_5-10
Collection Date/Time:	08/28/07	9:20	Retchk:	a07sep07a_4-14
Receipt Date/Time:	08/31/07	10:25	Begin ConCal:	a07sep07a_4-14
Extraction Date:	09/06/07		End ConCal:	a07sep07a_5-14
Analysis Date/Time:	09/09/07	6:44	Initial Cal:	m8290-071007a

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SGS Environmental Services

Method 8290
F52137-2
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.42	71.2	31:31	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.33	66.4	34:19	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.59	79.3	37:04	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.51	75.3	40:31	1.06	
13C12-OCDD	4.0	2.66	66.4	45:00	0.90	
13C12-2,3,7,8-TCDF	2.0	1.70	85.1	30:55	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.32	66.1	33:31	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.53	76.3	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.47	73.5	39:13	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.349	87.3	31:31	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.289	72.3	34:09	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.272	68.1	36:58	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.310	77.4	36:16	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.281	70.3	41:12	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:03	0.80	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:19	1.25	

Client Information			**Sample Information**	
Project Name:	F52137		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F52137-2		Weight / Volume:	775 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14457
Project ID:	G383-599		Instrument:	HRMS1
Sample ID:	G383-599-2C		Filename:	a07sep07a_5-10
Collection Date/Time:	08/28/07	9:20	Retchk:	a07sep07a_4-14
Receipt Date/Time:	08/31/07	10:25	Begin ConCal:	a07sep07a_4-14
Extraction Date:	09/06/07		End ConCal:	a07sep07a_5-14
Analysis Date/Time:	09/09/07	6:44	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.16]Report

Analyzed by: _____
Date: 9/12/07

Reviewed by: _____
Date: 9/12/07

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Explosives
Accutest Laboratories, Inc., SDG F52137

DATE: November 26, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 28, 2007. Aqueous samples were analyzed for explosives using USEPA SW-846 3535A/8330A. PETN and nitroglycerin were not analyzed due to laboratory error; therefore, they were not reported/validated. A total of two aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41GW01	F52137-1	41GW02	F52137-2

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Blank Analysis
	X	Initial Calibration
	X	Continuing Calibration
	X	System Monitoring Compounds
X		Laboratory Control Sample
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualification.

Eric Malarek, Chemist

11/26/07
Date

RFAAP VALIDATION REPORT
EXPLOSIVES REVIEW
SDG F52137

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, explosive compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/28/07, the coolers were received by the primary laboratory (Accutest) on 08/29/07 at 2.4°C, 2.0°C, and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.4°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.6°C. All criteria were met. No qualifiers were applied. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/28/07, the explosives were extracted on 09/04/07 and analyzed on 09/06/07. All criteria were met. No qualifiers were applied.

II-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5x) the maximum amount for explosive target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were sampled with disposable bailers; therefore, no rinse blank applies to these samples.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/06/07	OP22176-MB	All target explosives <½MRL	NA	NA	None
09/06/07	OP22176-MB	All target explosives <½MRL	NA	NA	None

MRL = Method Reporting Limit
NA = Not Applicable

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The DoD QSM specifies that the correlation coefficient must be ≥0.995 and/or the percent relative standard deviation (%RSD) must be ≤20%. All detects were qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects were qualified as estimated "UJ" for where there were grossly exceeding recoveries. Grossly exceeding is defined as twice the established criteria limits.

- For the explosives initial calibration performed on 01/19/07 on instrument G1315B, all criteria were met for target explosives compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. No samples reported apply to this initial calibration.

- For the explosives initial calibration performed on 08/21/07 on instrument G1315B, all criteria were met for target explosives compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) as well as their confirmations apply to this initial calibration.

IV-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. Continuing calibration standards are analyzed after every 10 injections, and at the end of the analysis sequence. The DoD QSM specifies that the percent difference (%D) from initial calibration should be no greater than ±20%. All detects were qualified as estimated "J" for where there were exceeding %Ds, and all non-detects were qualified as estimated "UJ" for where there were grossly exceeding recoveries. Grossly exceeding is defined as twice the established criteria limits.

- For explosives initial calibration verification performed on 01/19/07 @14:58 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives initial calibration verification performed on 08/21/07 @17:16 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives continuing calibration performed on 09/06/07 @02:42 on instrument G1315B, tetryl (24.5%) was outside criteria for signal #1. Signal #2 was within criteria. All samples were non-detect for tetryl; therefore, no qualifiers were applied based upon this outlier. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this continuing calibration.

- For explosives continuing calibration performed on 09/06/07 @08:24 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Sample applies to this continuing calibration.

- For explosives continuing calibration performed on 09/06/07 @14:07 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples apply to this continuing calibration.

- For explosives continuing calibration performed on 09/06/07 @17:34 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Confirmations for samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this continuing calibration.

- For explosives continuing calibration performed on 09/06/07 @18:54 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples apply to this continuing calibration.

- For explosives continuing calibration performed on 09/06/07 @22:35 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples apply to this continuing calibration.

V-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the laboratory control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria: 3,4-dinitrotoluene (70-136%)

- All criteria were met. No qualifiers were applied.

VI-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor long-term accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the laboratory control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-12 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22176-BS was used as aqueous LCS for explosives analyzed on 09/06/07. All criteria were met. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this LCS.

- Sample OP22176-BS was used as aqueous LCS for explosives analyzed on 09/06/07. HMX (128%) was outside DoD QSM criteria and within laboratory criteria. HMX was qualified estimated high "K" for detects and no qualifier for non-detects based upon this outlier. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the laboratory control limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-12 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample 48MW3 (F52170-5) was used as the aqueous MS/MSD for the explosive analysis on 09/06/07. 2,4-Dinitrotoluene (118%) and tetryl (131%, 129%) were outside laboratory criteria and within DoD QSM criteria. All samples were non-detect for 2,4-dinitrotoluene and tetryl; therefore, no qualifiers were applied based upon these outliers. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this MS/MSD.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

IX-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The calculation was based calibration factors. The absolute percent difference (%D) between the calculated and the reported value must be within 10% difference. All values >MDL and <MRL or <3*MDL (whichever was greater) were qualified as estimated "J". All positive values must have less than or equal to 40% %D between the primary and secondary columns.

- For sample 41GW01 (F52137-1), 2,6-dinitrotoluene could not be confirmed (second run) due to an interfering peak. 2,6-Dinitrotoluene was qualified estimated "J" based upon this outlier for sample 41GW01 (F52137-1). All positive values were less than or equal to 40% %D between the primary and secondary columns.

- For sample 41GW02 (F52137-2), all positive values were less than or equal to 40% %D between the primary and secondary columns.

Sample: 41GW02 (F52137-2), HMX

Conc. µg/L = (Ax * Vt * DF) / (CF * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area of characteristic ion for compound being measured.
Vt = Volume of total extract (mL).
CF = Average relative calibration factor for compound being measured (from ICAL)
Vs = Volume of sample extracted (mL).
DF = Dilution factor

Conc. µg/L = (283311 * 10 * 1) / (3262 * 900) = 0.97 µg/L (Signal #1)

Reported Value = 0.97 µg/L
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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Accutest LabLink@71141 12:34 26-Nov-2007

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	Date Sampled:	08/28/07
Matrix:	AQ - Ground Water	Date Received:	08/29/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	PP022772.D	1	09/06/07	MRE	09/04/07	OP22176	GPP792
Run #2 [b]	PP022805.D	1	09/06/07	MRE	09/04/07	OP22176	GPP793

	Initial Volume	Final Volume
Run #1	900 ml	10.0 ml
Run #2	900 ml	10.0 ml

CAS No.	Compound	Result		RL	MDL	Units	Q
2691-41-0	HMX	ND		0.22	0.057	ug/l	
121-82-4	RDX	ND		0.22	0.067	ug/l	
99-65-0	1,3-Dinitrobenzene	ND		0.22	0.062	ug/l	
606-20-2	2,6-Dinitrotoluene [c]	0.66	J	0.22	0.079	ug/l	
121-14-2	2,4-Dinitrotoluene	ND		0.22	0.11	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	0.82		0.22	0.072	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	1.5		0.22	0.062	ug/l	
98-95-3	Nitrobenzene	ND		0.22	0.081	ug/l	
88-72-2	o-Nitrotoluene	ND		0.22	0.13	ug/l	
99-08-1	m-Nitrotoluene	ND		0.22	0.087	ug/l	
99-99-0	p-Nitrotoluene	ND		0.22	0.11	ug/l	
479-45-8	Tetryl	ND		0.22	0.076	ug/l	
99-35-4	1,3,5-Trinitrobenzene	1.2		0.22	0.072	ug/l	
118-96-7	2,4,6-Trinitrotoluene	0.96		0.22	0.056	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	108%	110%	70-136%

(a) All hits confirmed by reanalysis on a dissimilar column.
(b) Confirmation run.
(c) Analyte could not be confirmed due to an interfering peak.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest LabLink@71141 12:34 26-Nov-2007

Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	Date Sampled:	08/28/07
Matrix:	AQ - Ground Water	Date Received:	08/29/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	PP022773.D	1	09/06/07	MRE	09/04/07	OP22176	GPP792
Run #2 [b]	PP022806.D	1	09/06/07	MRE	09/04/07	OP22176	GPP793

	Initial Volume	Final Volume
Run #1	900 ml	10.0 ml
Run #2	900 ml	10.0 ml

CAS No.	Compound	Result		RL	MDL	Units	Q
2691-41-0	HMX	0.97	K	0.22	0.057	ug/l	
121-82-4	RDX	0.21	J	0.22	0.067	ug/l	J
99-65-0	1,3-Dinitrobenzene	ND		0.22	0.062	ug/l	
606-20-2	2,6-Dinitrotoluene	ND		0.22	0.079	ug/l	
121-14-2	2,4-Dinitrotoluene	ND		0.22	0.11	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND		0.22	0.072	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND		0.22	0.062	ug/l	
98-95-3	Nitrobenzene	ND		0.22	0.081	ug/l	
88-72-2	o-Nitrotoluene	ND		0.22	0.13	ug/l	
99-08-1	m-Nitrotoluene	ND		0.22	0.087	ug/l	
99-99-0	p-Nitrotoluene	ND		0.22	0.11	ug/l	
479-45-8	Tetryl	ND		0.22	0.076	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND		0.22	0.072	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND		0.22	0.056	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	108%	104%	70-136%

(a) All hits confirmed by reanalysis on a dissimilar column.
(b) Confirmation run.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – Herbicides
Accutest Laboratories, Inc., SDG F52137

DATE: November 21, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 28, 2007. Aqueous samples were analyzed for chlorinated herbicides using USEPA SW846 Method 3510C/8151A. A total of two aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41GW01	F52137-1	41GW02	F52137-2

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
X		Initial Calibration
X		Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
	X	Laboratory Control Sample
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/21/07
Date

RFAAP VALIDATION REPORT
CHLORINATED HERBICIDES REVIEW
SDG F52137

I-Holding Times

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, chlorinated herbicides compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/28/07, the coolers were received by the primary laboratory (Accutest) on 08/29/07 at 2.4°C, 2.0°C, and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.4°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.6°C. All criteria were met. No qualifiers were applied. No qualifiers were applied based upon these outliers.

- Holding Time Review: For aqueous samples collected 08/28/07, the herbicides were extracted on 09/01/07 and analyzed on 09/10/07. All criteria were met. No qualifiers were applied.

II-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The DoD QSM specifies that the percent relative standard deviation (%RSD) for a 5-point standard calibration should be ≤20% for each target compound.

- No initial calibration was provided for MCPP and MCPA on instrument GC-GG. During discussions with the laboratory, they indicated that they perform a daily single point calibration rather than a five point calibration. All samples were non-detect and qualified estimated "UJ" based upon this outlier. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this single point calibration.

- For initial calibration performed on 09/09/07 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration establishes the response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The DoD QSM specifies that the percent difference (%D) between the initial calibration CF and the continuing calibration CF must be ≤20%.

- A single point calibration was provided for MCPP and MCPA on instrument GC-GG for 09/09/07 run. The calibration standard indicated adequate response for MCPP and MCPA. However, since a five point calibration was not performed, %D calculation could not be verified. All samples were non-detect and qualified estimated "UJ" based upon this outlier. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this single point calibration.

- For continuing calibration performed on 09/10/07 @01:36 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this continuing calibration.

- For continuing calibration performed on 09/10/07 @07:50 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 09/10/07 @14:24 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds, except MCPP and MCPA. No qualifiers were applied. No samples reported apply to this continuing calibration.

IV-Blank Analysis
The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field or laboratory activities. No contaminants should be detected in any of the associated blanks. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are qualified "B" if the concentration of the analyte is ≤ five times (5x) the absolute maximum blank concentration. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were sampled with disposable bailers; therefore, no rinse blank applies to these samples.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/10/07	OP7992-MB	All target compounds <½MRL	NA	NA	None

V-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. Spike recoveries must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Control Limit: 2,4-DCAA (34-179%)

- All criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Data for laboratory control samples (LCS) are generated to determine long-term precision and accuracy of the analytical method. Percent recoveries must be within the specified control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-8 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP7992-BS was used as the aqueous LCS for the 09/10/07 run. Dicamba (115%) and 2,4,5-T (115%) was above DoD QSM and within laboratory criteria. All associated samples were non-detect for dicamba and 2,4,5-T; therefore, no qualifiers were applied based upon these outliers. All other herbicides were within criteria. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-8 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample 48MW3 (F52170-5) was used for the aqueous MS/MSD analysis on 09/10/07. Dinoseb (RPD=38%) and 2,4,5-TP (121%, 118%) were above DoD QSM criteria and/or laboratory criteria. All samples were non-detect for dinoseb and 2,4,5-TP; therefore, no qualifiers were applied based upon these outliers. All other herbicides were within criteria. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this MS/MSD.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

IX-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. Percent difference (%D) between the calculated value and the reported value must be within 10%. All positive values must have less than or equal to 40% %D between the primary and secondary columns. Any sample value >MDL and <MRL is qualified as estimated, "J." All criteria were met. No qualifiers were applied.

- All chlorinated herbicides were non-detect. No confirmations were required.

Sample: 48MW3MS (F52170-5MS), 2,4-DB

Conc. µg/L = (Amt * DF * Vt) / (CF * Vo)

where: Amt = the response on column (ng/mL) of the sample
CF = Calibration Factor (from initial calibration)
Vt = volume of final extract (mL)
DF = dilution factor
Vo = volume of the sample extracted (mL)

Conc. µg/L = (3967383 ng/mL * 1 * 10 mL) / (8610* 500 mL)
= 9.2 ng/mL = 9.2 µg/L

Reported Conc. = 9.2 µg/L
%D = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: GG37475.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8151 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG37475.D	1	09/10/07	ATX	09/01/07	T:OP7992	T:GGG1164
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND UJ	50		ug/l	
94-74-6	MCPA	ND UJ	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	53%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8151 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG37476.D	1	09/10/07	ATX	09/01/07	T:OP7992	T:GGG1164
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	
1918-00-9	Dicamba	ND	0.20	0.080	ug/l	
88-85-7	Dinoseb	ND	0.20	0.090	ug/l	
75-99-0	Dalapon	ND	1.0	1.0	ug/l	
120-36-5	Dichloroprop	ND	1.0	0.51	ug/l	
94-82-6	2,4-DB	ND	2.0	1.9	ug/l	
93-65-2	MCPP	ND U J	50		ug/l	
94-74-6	MCPA	ND U J	50		ug/l	
87-86-5	Pentachlorophenol	ND	0.050	0.040	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	56%		34-179%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – TAL Metals (Total and Dissolved)
Accutest Laboratories, Inc., SDG F52137

DATE: November 20, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 28, 2007. Aqueous samples were analyzed for total and dissolved target analyte list (TAL) metals using USEPA SW-846 3010A/6010B for ICP metals and SW-846 7470A for mercury. The dissolved fractions have an "A" suffix for the laboratory ID. A total of four aqueous samples (2 sets of total and dissolved samples) were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41GW01	F52137-1	41GW02	F52137-2
41GW01	F52137-1A	41GW02	F52137-2A

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
X		Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
	X	Laboratory Sample Duplicate
X		Matrix Spike and Spike Duplicate
X		ICP Serial Dilution
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/20/07
Date

RFAAP VALIDATION REPORT
METALS REVIEW
SDG F52137

I-Holding Times

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. Holding time criteria: For aqueous matrices, the samples are shipped cool @4°C±2°C and preserved to pH<2 with HNO_3 with a maximum holding time is 180 days for ICP metals and 28 days for mercury.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/28/07, the coolers were received by the primary laboratory (Accutest) on 08/29/07 at 2.4°C, 2.0°C, and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.4°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.6°C. All criteria were met. No qualifiers were applied. No qualifiers were applied based upon these outliers.

- Holding Time Review: For aqueous samples collected 08/28/07, they were digested on 09/12/07 and analyzed on 09/13/07 for calcium, manganese, and sodium for select samples and on 09/12/07 and for all other ICP metals. The samples were digested on 08/30/07 and analyzed on 08/30/07 for mercury. All criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:
1- blank (DoD QSM <½ MRL)
3 – standards (r≥0.995)
ICV/CCV (90-110%) (DoD QSM 90-110%)
MRL (70-130%) (DoD QSM 80-120%)
High Std. (95-105%)

Hg:
1 – blank (DoD QSM <½ MRL)
5 – standards (r≥0.995)
ICV/CCV (80-120%)(DoD QSM ICV 90-110% & CCV 80-120%)
MRL (80-120%) (DoD QSM 80-120%)
High Std. (95-105%)

- The aqueous samples were analyzed for ICP metals on 09/13/07 for calcium, manganese, and sodium for select samples and on 09/12/07 and for all other ICP metals. Mercury was analyzed for the aqueous samples on 08/30/07 with a correlation coefficient of 0.9998. Nickel CCV20 (88.0%), CCV21 (89.0%), CCV22 (88.5%), and CCV23 (88.5%) were outside criteria; however, no samples were bracketed by these CCVs for nickel. No qualifiers were applied based upon these outliers. All other ICV/CCV/High Standard criteria were met for all metals and runs. **Table 2** summarizes the MRL standard analysis. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
08/30/07	Hg	1.0	60%	41GW01 (Tot & Dis), 41GW02 (Tot & Dis)	L, UL
09/12/07	ICP-Al	200	78%	41GW01 (Dis), 41GW02 (Dis)	L, UL
09/12/07	ICP-Sb	6.0	124%	None	K
09/12/07	ICP-As	10	122%	None	K
09/12/07	ICP-Pb	5.0	130%; 130%	41GW01 (Dis)	K
09/13/07	ICP-Ca, Mn, Na	Various	All within criteria	None	None
09/18/07	ICP-Ni	40	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. DoD QSM limits are <½MRL for the method blank and <2*MDL for the calibration blanks. Samples are qualified "B" when they are less than 5x the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were sampled with disposable bailers; therefore, no rinse blank applies to these samples.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/12/07	Antimony	ICB/CCBs	11.1	55.5	None
09/12/07	Iron	ICB/CCBs	29.5J	148	None
09/12/07	Lead	ICB/CCBs	5.6J	28.0	41GW01 (Dis)
09/12/07	Potassium	ICB/CCBs	1720J	8600	41GW01 (Dis), 41GW02 (Dis)
09/12/07	Sodium	ICB/CCBs	1800J	9000	None
09/13/07	Ca, Mn, Na	ICB/CCBs	<2*MDL	NA	None
09/13/07	Ca, Mn, Na	ICB/CCBs	<2*MDL	NA	None
09/18/07	Nickel	ICB/CCBs	<2*MDL	NA	None
09/12/07	Copper	MP12917-MB	3.1J	15.5	None
09/12/07	Potassium	MP12917-MB	1700J	8500	41GW01 (Dis), 41GW02 (Dis)
09/12/07	Sodium	MP12917-MB	1770J	8850	None
09/12/07	Potassium	MP12917-MB	1700J	8500	41GW01 (Dis), 41GW02 (Dis)
09/12/07	Sodium	MP12917-MB	1760J	8800	None
08/30/07	Mercury	MP12844-MB	<2*MDL	NA	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".

IV-ICP Interference Check Sample (ICS)

The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (DoD QSM limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)

The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All aqueous LCS results must fall within the control limits. The DoD QSM aqueous LCS recovery limits are specified in Table D-18 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample MP12917-BS was used as aqueous LCS for ICP metals analysis on 09/12/07. All criteria were met. No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW01 (F52137-1A), 41GW02 (F52137-2), and 41GW02 (F52137-2A) apply to this LCS.

- Sample MP12844-BS was used as aqueous LCS for mercury analysis performed on 08/30/07. All criteria were met. No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW01 (F52137-1A), 41GW02 (F52137-2), and 41GW02 (F52137-2A) apply to this LCS.

VIII-ICP Serial Dilution
An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for total ICP metals was analyzed using aqueous sample 41GW01 (F52137-1) on 09/12/07. Arsenic (16.9%), beryllium (100%), cadmium (100%), calcium (21.7%), lead (13.3%), nickel (11.5%), potassium (32.4%), and zinc (13.3%) were outside of criteria limits. Sample concentrations were <50 times MDL for arsenic, beryllium, cadmium; therefore, no qualifiers were applied based upon these outliers. Calcium, lead, nickel, potassium, and zinc were qualified estimated "J" for detects and no qualifier for non-detects based upon the high %D. Samples 41GW01 (F52137-1), 41GW01 (F52137-1A), 41GW02 (F52137-2), and 41GW02 (F52137-2A) apply to this serial dilution.

- The serial dilution for mercury was analyzed using aqueous sample F52107-1 on 08/30/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41GW01 (F52137-1), 41GW01 (F52137-1A), 41GW02 (F52137-2), and 41GW02 (F52137-2A) apply to this serial dilution.

IX-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 35% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

X-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." The following calculations were performed for verification.

- The total and dissolved fractions were compared. The total metals should be greater than the dissolved fractions. All detected compounds found in the sample and its dissolved pair are noted in **Table 4** with the associated %D. Compounds that were non-detect "U" for either the total and dissolved samples were excluded from the total/dissolved concentration assessment. If the concentration that is greater than the MRL and the dissolved concentration is greater than its total concentration by 10%, then both results have been flagged with a "J." If the %D>50%, then both samples were rejected "R". All criteria were met. No qualifiers were applied.

VI-Laboratory Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analyses are also performed to generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. DoD QSM limits for metals are 20% RPD for ICP metals and mercury.

- Sample 41GW01 (F52137-1) was used as aqueous laboratory duplicate for ICP metals analysis on 09/12/07. All metals were within criteria. No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW01 (F52137-1A), 41GW02 (F52137-2), and 41GW02 (F52137-2A) apply to this laboratory duplicate.

- Sample F52107-1 was used as laboratory aqueous laboratory duplicate for mercury analysis on 08/30/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41GW01 (F52137-1), 41GW01 (F52137-1A), 41GW02 (F52137-2), and 41GW02 (F52137-2A) apply to this laboratory duplicate.

VII-Matrix Spike/Spike Duplicate
MS/MSD are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS and MSD per 20 samples of similar matrix. MS and MSD recoveries and relative percent differences between MS and MSD recoveries should be within the specified limits. DoD QSM aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-18 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used. Post digestion spikes limits are 75-125% for ICP metals and mercury.

- Sample 41GW01 (F52137-1) was used as laboratory aqueous MS/MSD for ICP metals analysis on 09/12/07. Antimony (51.6%, 52.4%), calcium (0.0%, -16.0%), iron (55.4%, 66.9%), magnesium (56.0%, 52.0%), manganese (72.0%, 70.0%), potassium (127%, 128%), selenium (77.5%), and zinc (76.8%) were outside criteria. The sample concentration was >4 times the spike added for calcium, magnesium, manganese; therefore, no qualifiers were applied based upon these outliers. Potassium was qualified bias high "K" for detects and no qualifier for non-detects for the spiked sample based upon the high recoveries. Antimony, iron, selenium, and zinc were qualified bias low "L" for detects and "UL" for non-detects for the spiked sample based upon the low recoveries. Samples 41GW01 (F52137-1), 41GW01 (F52137-1A), 41GW02 (F52137-2), and 41GW02 (F52137-2A) apply to this MS/MSD.

- Sample F52107-1 was used as laboratory aqueous MS/MSD for mercury analysis on 08/30/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples 41GW01 (F52137-1), 41GW01 (F52137-1A), 41GW02 (F52137-2), and 41GW02 (F52137-2A) apply to this MS/MSD.

Table 4 Total/Dissolved Hits Summary

Sample ID	Compound	MRL (µg/L)	Total Fraction (µg/L)	Dissolved Fraction (µg/L)	%D	Qualifier
41GW01	Aluminum	200	50700	79U	NA	None
41GW01	Iron	300	85600	15U	NA	None
41GW01	Lead	5.0	273	4.1J	NA	None
41GW01	Magnesium	5000	327000	41300	NA	None
41GW01	Manganese	15	2710	27.6	NA	None
41GW01	Nickel	40	69.9	4.8J	NA	None
41GW01	Potassium	10000	12900	5290J	NA	None
41GW01	Sodium	10000	56900	44100	NA	None
41GW01	Arsenic	10	26.8	3.7U	NA	None
41GW01	Barium	200	678	69.1J	NA	None
41GW01	Beryllium	4.0	2.2J	1.0U	NA	None
41GW01	Cadmium	5.0	1.9J	1.0U	NA	None
41GW01	Chromium	10	67.7	0.92U	NA	None
41GW01	Cobalt	50	36.5J	1.0U	NA	None
41GW01	Copper	25	168	1.2U	NA	None
41GW01	Vanadium	50	92.8	1.1U	NA	None
41GW01	Zinc	20	756	8.6J	NA	None
41GW01	Calcium	10000	842000	80100	NA	None
41GW01	Mercury	1.0	0.17J	0.11U	NA	None
41GW02	Aluminum	200	102000	79U	NA	None
41GW02	Iron	300	183000	15U	NA	None
41GW02	Lead	5.0	784	2.1U	NA	None
41GW02	Magnesium	5000	171000	39200	NA	None
41GW02	Nickel	40	211	4.1J	NA	None
41GW02	Potassium	10000	18700	4910J	NA	None
41GW02	Arsenic	10	24.6	3.7U	NA	None
41GW02	Barium	200	853	42.0J	NA	None
41GW02	Beryllium	4.0	8.6	1.0U	NA	None
41GW02	Cadmium	5.0	2.5J	1.0U	NA	None
41GW02	Chromium	10	121	0.92U	NA	None
41GW02	Cobalt	50	97.7	1.0U	NA	None
41GW02	Copper	25	183	1.2U	NA	None
41GW02	Vanadium	50	155	1.1U	NA	None
41GW02	Zinc	20	1320	5.0U	NA	None
41GW02	Calcium	1000	239000	78500	NA	None
41GW02	Selenium	10	27.6	16U	NA	None
41GW02	Manganese	60	10400	5.5J	NA	None
41GW02	Sodium	40000	92700	78000	NA	None
41GW02	Mercury	1.0	0.47J	0.11U	NA	None

J = Estimated value <MRL and >MDL.
U = Value Non-detect as <MDL.
NA = Not Applicable.

ICP Sample: 41GW02 (F52137-2), Barium

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (852.7 µg/L)*(50 mL)*(1) / (50 mL) = 853 µg/L

Reported concentration = 853 µg/L
%D = 0.0%
Values were within 10% difference.

CVAA Sample: 41GW01 (F52137-1), Mercury

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (0.169 µg/L)*(50 mL)*(1) / (50 mL) = 0.17 µg/L

Reported concentration = 0.17 µg/L
%D = 0.0%.
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

D = Indicates sample was analyzed at a dilution.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

N (Metals) = Laboratory spike sample recovery not within control limits.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	50700	200	79	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Antimony [a]	6.6 U UL	12	6.6	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Arsenic	26.8	10	3.7	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Barium	678	200	5.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Beryllium	2.2 J J	4.0	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cadmium	1.9 J J	5.0	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Calcium	842000 J	10000	1000	ug/l	10	09/12/07	09/13/07	DM	SW846 6010B [3]	SW846 3010A [5]
Chromium	67.7	10	0.92	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cobalt	36.5 J J	50	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Copper	168	25	1.2	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Iron	85600 L	300	15	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Lead	273 J	5.0	2.1	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Magnesium	327000	5000	100	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Manganese	2710	15	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Mercury	0.17 J L	1.0	0.11	ug/l	1	08/30/07	08/30/07	LM	SW846 7470A [1]	SW846 7470A [4]
Nickel	69.9 J	40	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Potassium	12900 J	10000	100	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Selenium [b]	80 U UL	100	80	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Silver	0.77 U	10	0.77	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Sodium	56900	10000	500	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Thallium	6.5 U	10	6.5	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Vanadium	92.8	50	1.1	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Zinc	756 J	20	5.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]

(1) Instrument QC Batch: MA5945
(2) Instrument QC Batch: MA5970
(3) Instrument QC Batch: MA5974
(4) Prep QC Batch: MP12844
(5) Prep QC Batch: MP12917

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1A	**Date Sampled:**	08/28/07
Matrix:	AQ - Groundwater Filtered	**Date Received:**	08/29/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	79 U UL	200	79	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Antimony [a]	6.6 U	12	6.6	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Arsenic	3.7 U	10	3.7	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Barium	69.1 J J	200	5.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Calcium	80100 J	1000	100	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Chromium	0.92 U	10	0.92	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	50	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Copper	1.2 U	25	1.2	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Iron	15 U	300	15	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Lead	4.1 J B	5.0	2.1	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Magnesium	41300	5000	100	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Manganese	27.6	15	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.11 U UL	1.0	0.11	ug/l	1	08/30/07	08/30/07	LM	SW846 7470A [1]	SW846 7470A [3]
Nickel	4.8 J J	40	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Potassium	5290 J B	10000	100	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Selenium [b]	16 U	20	16	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Silver	0.77 U	10	0.77	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Sodium	44100	10000	500	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Thallium	6.5 U	10	6.5	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.1 U	50	1.1	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]
Zinc	8.6 J J	20	5.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5945
(2) Instrument QC Batch: MA5970
(3) Prep QC Batch: MP12844
(4) Prep QC Batch: MP12917

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	102000	200	79	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Antimony [a]	6.6 U	12	6.6	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Arsenic	24.6	10	3.7	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Barium	853	200	5.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Beryllium	8.6	4.0	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cadmium	2.5 J	5.0	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Calcium	239000	1000	100	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Chromium	121	10	0.92	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cobalt	97.7	50	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Copper	183	25	1.2	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Iron	183000	300	15	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Lead	784	5.0	2.1	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Magnesium	171000	5000	100	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Manganese	10400	60	4.0	ug/l	4	09/12/07	09/13/07	DM	SW846 6010B [3]	SW846 3010A [5]
Mercury	0.47 J	1.0	0.11	ug/l	1	08/30/07	08/30/07	LM	SW846 7470A [1]	SW846 7470A [4]
Nickel	211	40	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Potassium	18700	10000	100	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Selenium	27.6	10	4.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Silver	0.77 U	10	0.77	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Sodium	92700	40000	2000	ug/l	4	09/12/07	09/13/07	DM	SW846 6010B [3]	SW846 3010A [5]
Thallium	6.5 U	10	6.5	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Vanadium	155	50	1.1	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Zinc	1320	20	5.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]

(1) Instrument QC Batch: MA5945
(2) Instrument QC Batch: MA5970
(3) Instrument QC Batch: MA5974
(4) Prep QC Batch: MP12844
(5) Prep QC Batch: MP12917

(a) Elevated RL/MDL due to instrument baseline drift.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2A	**Date Sampled:**	08/28/07
Matrix:	AQ - Groundwater Filtered	**Date Received:**	08/29/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	79 U VL	200	79	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Antimony [a]	6.6 U	12	6.6	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Arsenic	3.7 U	10	3.7	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Barium	42.0 J J	200	5.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Beryllium	1.0 U	4.0	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cadmium	1.0 U	5.0	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Calcium	78500 J	1000	100	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Chromium	0.92 U	10	0.92	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Cobalt	1.0 U	50	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Copper	1.2 U	25	1.2	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Iron	15 U	300	15	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Lead	2.1 U	5.0	2.1	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Magnesium	39200	5000	100	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Manganese	5.5 J J	15	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Mercury	0.11 U VL	1.0	0.11	ug/l	1	08/30/07	08/30/07	LM	SW846 7470A [1]	SW846 7470A [4]
Nickel	4.1 J J	40	1.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Potassium	4910 J B	10000	100	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Selenium [b]	16 U	20	16	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Silver	0.77 U	10	0.77	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Sodium	78000	20000	1000	ug/l	2	09/12/07	09/13/07	DM	SW846 6010B [3]	SW846 3010A [5]
Thallium	6.5 U	10	6.5	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Vanadium	1.1 U	50	1.1	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]
Zinc	5.0 U	20	5.0	ug/l	1	09/12/07	09/12/07	DM	SW846 6010B [2]	SW846 3010A [5]

(1) Instrument QC Batch: MA5945
(2) Instrument QC Batch: MA5970
(3) Instrument QC Batch: MA5974
(4) Prep QC Batch: MP12844
(5) Prep QC Batch: MP12917

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Perchlorate
Datachem Laboratories, Inc. SDG 07E-0784-01
(Accutest Laboratories, Inc., SDG F52137)

DATE: November 21, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 28, 2007. The aqueous samples were analyzed for perchlorate analysis using liquid chromatography mass spectroscopy (LC/MS) SW-846 method 6850 in selective ion monitoring (SIM) mode. A total of two aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41GW01	F52137-1	41GW02	F52137-2

Data were reviewed and validated using a combination of project QAPP, *DOD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006), *DoD Perchlorate Handbook August, Rev1, Change 1, 2007* (DoD, 2007), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
X		Initial and Continuing Calibration
	X	Blank Analysis
	X	Internal Standards
	X	Laboratory Control Sample (LCS)
	X	Matrix Spike (MS) and Spike Duplicate (MSD)
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/21/07
Date

RFAAP VALIDATION REPORT
PERCHLORATE REVIEW
SDG 07E-0784-01 (F52137)

I-Holding Times and Preservation
The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. For perchlorate analysis, aqueous samples are received and stored at cool @4°C±2°C with a maximum holding time of 28 days from collection (DoD Perchlorate Handbook criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/28/07, the coolers were received by the primary laboratory (Accutest) on 08/29/07 at 2.4°C, 2.0°C, and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.4°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.6°C. All criteria were met. No qualifiers were applied. No qualifiers were applied based upon these outliers.

- Holding Time Review: The aqueous samples were collected on 08/28/07. The aqueous perchlorate samples were prepped on 09/18/07 and analyzed on 09/18/07. All holding time criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, $^{35}Cl^{16}O_3$, met the mass calibration criteria. No qualification was applied.

III-Initial and Continuing Calibration
Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

Perchlorate:	1- blank (<1/2MRL DoD Perchlorate Handbook)
	5 – standards ($r \geq 0.995$ DoD Perchlorate Handbook)
	ICV (±10%D DoD Perchlorate Handbook)
	CCV/ICS (±30%D DoD Perchlorate Handbook)
	LODV (±30%D DoD Perchlorate Handbook)

- The perchlorate samples were analyzed on 09/18/07 for the aqueous samples. Perchlorate was calibrated second order for on 09/17/07 with a coefficient of 0.9997. LODV2 (74.2%D) was outside criteria limits. All other ICV/CCV/ICS/LODV standards were within criteria. Perchlorate was detected in all associated samples and was qualified estimated "J" based upon the high %D. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this calibration.

IV-Blanks

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be detected in any of the associated blanks >MDL. The DoD Perchlorate Handbook criterion specifies all concentrations should be less than ½ MRL for method blanks. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were sampled with disposable bailers; therefore, no rinse blank applies to these samples.

Table 2 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/18/07	Perchlorate	BL-259711-1	<½MRL	NA	None

MRL = Method Reporting Limit.
NA = Not Applicable.

V-Internal Standards

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The DoD Handbook specifies retention times (RT) 1.0 ± 2% of last calibration standard and the ratio of RT of sample to standard should be 3.06 and fall between 2.3 and 3.8. The laboratory 83:85 mass ratio limit range is 2.15 to 4.00. The internal standard peak area responses should fall between 50% to 150% recoveries.

- All criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples (LCS)

The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. DoD Perchlorate Handbook and laboratory aqueous limits are 85-115%.

- Sample QC-259711-1 was used as aqueous LCS for perchlorate analysis dated 09/18/07. All criteria were met. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this LCS sample.

VII-Matrix Spike (MS) and Spike Duplicate (MSD)
MS and MSD are generated to determine long-term accuracy and precision of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike samples at a frequency of one MS/MSD per 20 samples of similar matrix. MS/MSD recoveries and relative percent differences between MS recoveries should be within the specified limits. DoD Perchlorate Handbook aqueous limits are 75-125%; RPD≤20%. The laboratory limits are 80-120%; RPD≤15%.

- Sample 48MW3 (F52170-5) was used for the MS/MSD analysis for the 09/18/07 perchlorate analysis. All criteria were met. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this MS/MSD sample.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

IX-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever was greater) was qualified as estimated, "J." The following calculations were performed for verification.

Sample: 41GW01 (F52137-1), Perchlorate

y (area ratio) = (Sample Area/Area EIC89) = (4793.3335/59577.2) = 0.08045584 = ax^2 + bx + c

Setting y = 0,
x = [-b ± SQRT(b^2-4ac)] / (2a)

where: x is the amount ratio

a = 0.0225735 b = 1.36878 (set to zero = c-y) c = - 0.0186592 - 0.08045584 = -0.09911504

amount ratio ={-1.36878± [SQRT{(1.36878^2) – (4*0.0225735*-0.09911504)}] / (2*0.0225735)
= (-1.36878±1.372045) / (0.045147)
= 0.07232496
Conc. µg/L = (Amount ratio * Is * DF)

where: Conc. = Sample concentration in ug/L
I_s = Amount of internal standard (µg/L).
DF = Dilution factor

Conc. µg/L = (Amount ratio * Is * DF)
= (0. 07232496 * 5 µg/L * 1) = 0.362 µg/L

Reported concentration = 0.362 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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FORM A (TYPE I)
SINGLE METHOD ANALYSES

SAMPLE ANALYSIS DATA SHEET

S077Z02C

Date Printed.....: 21-SEP-07 10:48

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F52137
Release Number.....: Not Provided

Date Received.....: 31-AUG-07 00:00

Client Sample Name: F52137-1
DCL Sample Name...: 07E04498
DCL Report Group..: 07E-0784-01

Matrix.....: WATER
Date Sampled.....: 28-AUG-07 08:30
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 18-SEP-07 00:00
Preparation Method...: 6850
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G078X00V
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: XP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	18-SEP-07 21:12	0.0663	0.362	J		1	0.200

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DATA CHEM LABORATORIES
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FORM A (TYPE I)
SINGLE METHOD ANALYSES

SAMPLE ANALYSIS DATA SHEET

Date Printed.....: 21-SEP-07 10:48

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F52137
Release Number.....: Not Provided

Date Received.....: 31-AUG-07 00:00

Client Sample Name: F52137-2
DCL Sample Name...: 07M04499
DCL Report Group..: 07M-0784-01

Matrix.....: WATER
Date Sampled.....: 28-AUG-07 09:20
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 18-SEP-07 00:00
Preparation Method...: 6850
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G078K00V
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPFX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	18-SEP-07 21:32	0.0663	0.245	J		1	0.200

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MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Pesticides and PCBs
Accutest Laboratories, Inc., SDG F52137

DATE: November 21, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 28, 2007. Aqueous samples were analyzed for pesticides and PCBs using USEPA Method 3510C/8081A and 3510C/8082, respectively. A total of two aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41GW01	F52137-1	41GW02	F52137-2

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
X		Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/21/07
Date

RFAAP VALIDATION REPORT
PESTICIDE/PCB REVIEW
SDG F52137

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For aqueous samples, pesticide and PCB compounds are shipped cooled (@4°C ± 2°C) with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/28/07, the coolers were received by the primary laboratory (Accutest) on 08/29/07 at 2.4°C, 2.0°C, and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.4°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.6°C. All criteria were met. No qualifiers were applied. No qualifiers were applied based upon these outliers.

- Holding Time Review: For aqueous samples collected 08/28/07, the pesticides were extracted on 08/31/07 and analyzed on 09/17/07. The PCBs were extracted 08/31/07 and analyzed 09/10/07 and 09/11/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check (Degradation Standard)
Performance checks on the gas chromatograph with electron capture detector (GC/ECD) system are performed to ensure adequate resolution and instrument sensitivity. The performance evaluation mixture (PEM) must be analyzed at the beginning of the analytical sequence. The breakdown of Endrin and 4,4'-DDT must be ≤15% on both signals.

- For analysis performed on 09/13/07 @11:24, endrin and 4,4'-DDT percent breakdowns were 7.5% and 3.3% on signal #1 and 6.8% and 2.7% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 09/17/07 @15:41, endrin and 4,4'-DDT percent breakdowns were 8.6% and 11.3% on signal #1 and 8.2% and 9.8% on signal #2, respectively. All criteria were met. No qualifiers were applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5 point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. Calibration factors are generated for each compound. The DoD QSM specifies that the percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016, 1242, 1254, and 1260 must be <20% or the mean %RSD for all analytes in the standard must be ≤20%. If linear regression is used, the correlation coefficient must be ≥0.995. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits.

- For the pesticide initial calibration performed on 09/13/07 on instrument ECD6, all criteria were met. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were analyzed using this initial calibration.

- For the PCB initial calibration performed on 09/08/07 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample 41GW01 (F52137-1) was analyzed using this initial calibration.

- For the PCB initial calibration performed on 09/11/07 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample 41GW02 (F52137-2) was analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for pesticide/PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The DoD QSM specifies that the percent difference (%D) or the average %Ds for all analytes in the standard from the initial calibration should be no greater than ±20%.

- For pesticide initial calibration verification performed on 09/13/07 @13:46 on instrument ECD6, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 09/17/07 @18:02 on instrument ECD6, endrin ketone (22.1%) was outside criteria for the signal #2. Endrin ketone was within criteria for signal #1. Endrin ketone was non-detect for all associated samples; therefore, no qualifiers were applied based upon this outlier. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 09/17/07 @20:40 on instrument ECD6, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 09/08/07 @14:16 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 09/10/07 @19:28 on instrument ECD7, all criteria were met. No qualifiers were applied. Samples were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 09/10/07 @22:35 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample 41GW01 (F52137-1) was analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 09/11/07 @01:58 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For pesticide initial calibration verification performed on 09/11/07 @13:32 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample 41GW02 (F52137-2) was analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 09/11/07 @16:48 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

V-Blank Analysis
The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for pesticide and PCB target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were sampled with disposable bailers; therefore, no rinse blank applies to these samples.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
Pesticides	09/17/07	OP22157-MB	All target <½MRL	NA	NA	None
PCBs	09/10/07	OP22156-MB	All target <½MRL	NA	NA	None
PCBs	09/11/07	OP22156-MB	All target <½MRL	NA	NA	None

NA = Not Applicable
MRL = Method Reporting Limit

VI-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:	Tetrachloro-m-xylene:	Pesticides: 42-127% (DoD QSM 25-140%)
	Decachlorobiphenyl:	Pesticides: 27-127% (DoD QSM 30-135%)
Aqueous Criteria:	Tetrachloro-m-xylene:	PCBs: 38-127% (DoD QSM Not Listed)
	Decachlorobiphenyl:	PCBs: 25-137% (DoD QSM 40-135%)

- For PCBs, surrogate decachlorobiphenyl (28%) was outside DoD QSM; however, within laboratory criteria for sample 41GW02 (F52137-2). Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For all other samples, all criteria were met. No qualifiers were applied.

VII-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD QSM aqueous LCS recovery limits are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22157-BS was used as the aqueous LCS for the pesticide analysis on 09/17/07. Compound endrin aldehyde (19%) was outside DoD QSM criteria, however within laboratory criteria. Compound endrin aldehyde was non-detect for all associated samples and was qualified estimated bias "UL" for non-detects based upon the low recovery. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this LCS.

- Sample OP22156-BS was used as the aqueous LCS for the PCB analysis on 09/10/07. All criteria were met. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this LCS.

VIII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample 41MW3 (F52110-6) was used as the aqueous MS/MSD for the pesticide on 09/17/07. Dieldrin (RPD=17%) was outside laboratory criteria and within DoD QSM criteria. All samples were non-detect for dieldrin; therefore, no qualifiers were applied based upon this outlier. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this MS/MSD.

- Sample 41MW1 (F52110-4) was used as the aqueous MS/MSD for the PCB analysis on 09/10/07. All criteria were met. No qualifiers were applied. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) apply to this MS/MSD.

IX-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific aqueous field duplicate was performed in this SDG; therefore, it was not evaluated.

X-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All positive values must have less than or equal to 40% %D between the primary and secondary columns. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." All criteria were met.

- All chlorinated pesticides and PCBs were non-detect for this SDG. No confirmations were required.

Sample: 41MW3MS (F52110-6MS), alpha-chlordane

Conc. µg/L = (Amt * DF * Vt) / (CF * Vo)

where: Amt is the response on column (ng/mL) of the sample
CF = Calibration Factor (from initial calibration)
Vt is the volume of final extract (mL)
DF is the dilution factor
Vo is the volume of the sample extracted (mL)

Conc. µg/L = (2724613 ng/mL * 1 * 10 mL) / (49480 * 450 mL)
= 1.2 ng/mL = 1.2 µg/L

Reported Conc. = 1.2 µg/L
%D = 0.0%
Values were within 10% difference

Sample: 41MW1MS (F52110-4MS), Aroclor 1260

Conc. µg/L = (Ax * Vt * DF) / (CF * Vi * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 µL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (µL).
Vs = Volume of sample extracted (L).
DF = Dilution factor

Signal #1
Conc1 µg/L = (1755745 * 10000* 1) / (4195 *(1000000) * 1 * 0.50) = 8.37 µg/L
Conc2 µg/L = (2098383 * 10000* 1) / (4983 *(1000000) * 1 * 0.50) = 8.42 µg/L
Conc3 µg/L = (1861753 * 10000* 1) / (4369 *(1000000) * 1 * 0.50) = 8.52 µg/L
Conc4 µg/L = (1437223 * 10000* 1) / (3557 *(1000000) * 1 * 0.50) = 8.08 µg/L
Conc5 µg/L = (3258382 * 10000* 1) / (7658 *(1000000) * 1 * 0.50) = 8.51 µg/L
Conc6 µg/L = (1231288 * 10000* 1) / (2877 *(1000000) * 1 * 0.50) = 8.56 µg/L
Average concentration = 8.4 µg/L

Signal #2
Conc1 µg/L = (1157206 * 10000* 1) / (2851 *(1000000) * 1 * 0.50) = 8.12 µg/L
Conc2 µg/L = (1427610 * 10000* 1) / (3454 *(1000000) * 1 * 0.50) = 8.27 µg/L
Conc3 µg/L = (1415853 * 10000* 1) / (3307 *(1000000) * 1 * 0.50) = 8.56 µg/L
Conc4 µg/L = (991005 * 10000* 1) / (2465 *(1000000) * 1 * 0.50) = 8.04 µg/L
Conc5 µg/L = (2309497 * 10000* 1) / (5541 *(1000000) * 1 * 0.50) = 8.34 µg/L
Conc6 µg/L = (924284 * 10000* 1) / (2209 *(1000000) * 1 * 0.50) = 8.37 µg/L
Average concentration = 8.3 µg/L

Reported Value = 8.4 µg/L (from signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

N (Metals) = Laboratory spike sample recovery not within control limits.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: TT09135.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8081A SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT09135.D	1	09/17/07	FS	08/31/07	OP22157	GTT302
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.056	0.011	ug/l	
319-84-6	alpha-BHC	ND	0.056	0.011	ug/l	
319-85-7	beta-BHC	ND	0.056	0.012	ug/l	
319-86-8	delta-BHC	ND	0.056	0.011	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.056	0.011	ug/l	
5103-71-9	alpha-Chlordane	ND	0.056	0.011	ug/l	
5103-74-2	gamma-Chlordane	ND	0.056	0.011	ug/l	
60-57-1	Dieldrin	ND	0.056	0.011	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.022	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.022	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.022	ug/l	
72-20-8	Endrin	ND	0.11	0.022	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.022	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.11	0.033	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.022	ug/l	
959-98-8	Endosulfan-I	ND	0.056	0.011	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.011	ug/l	
76-44-8	Heptachlor	ND	0.056	0.011	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.056	0.011	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.022	ug/l	
8001-35-2	Toxaphene	ND	2.8	1.4	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	79%		42-127%
2051-24-3	Decachlorobiphenyl	40%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8082 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX024475.D	1	09/10/07	AC	08/31/07	OP22156	GXX217
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.56	0.28	ug/l	
11104-28-2	Aroclor 1221	ND	0.56	0.44	ug/l	
11141-16-5	Aroclor 1232	ND	0.56	0.44	ug/l	
53469-21-9	Aroclor 1242	ND	0.56	0.28	ug/l	
12672-29-6	Aroclor 1248	ND	0.56	0.28	ug/l	
11097-69-1	Aroclor 1254	ND	0.56	0.28	ug/l	
11096-82-5	Aroclor 1260	ND	0.56	0.28	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	105%		38-127%
2051-24-3	Decachlorobiphenyl	45%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8081A SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TT09136.D	1	09/17/07	FS	08/31/07	OP22157	GTT302
Run #2							

	Initial Volume	Final Volume
Run #1	800 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.063	0.013	ug/l	
319-84-6	alpha-BHC	ND	0.063	0.013	ug/l	
319-85-7	beta-BHC	ND	0.063	0.014	ug/l	
319-86-8	delta-BHC	ND	0.063	0.013	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.063	0.013	ug/l	
5103-71-9	alpha-Chlordane	ND	0.063	0.013	ug/l	
5103-74-2	gamma-Chlordane	ND	0.063	0.013	ug/l	
60-57-1	Dieldrin	ND	0.063	0.013	ug/l	
72-54-8	4,4'-DDD	ND	0.13	0.025	ug/l	
72-55-9	4,4'-DDE	ND	0.13	0.025	ug/l	
50-29-3	4,4'-DDT	ND	0.13	0.025	ug/l	
72-20-8	Endrin	ND	0.13	0.025	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.13	0.025	ug/l	
7421-93-4	Endrin aldehyde	ND UL	0.13	0.038	ug/l	
53494-70-5	Endrin ketone	ND	0.13	0.025	ug/l	
959-98-8	Endosulfan-I	ND	0.063	0.013	ug/l	
33213-65-9	Endosulfan-II	ND	0.13	0.013	ug/l	
76-44-8	Heptachlor	ND	0.063	0.013	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.063	0.013	ug/l	
72-43-5	Methoxychlor	ND	0.13	0.025	ug/l	
8001-35-2	Toxaphene	ND	3.1	1.6	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%		42-127%
2051-24-3	Decachlorobiphenyl	30%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8082 SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX024513.D	1	09/11/07	AC	08/31/07	OP22156	GXX218
Run #2							

	Initial Volume	Final Volume
Run #1	800 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.63	0.31	ug/l	
11104-28-2	Aroclor 1221	ND	0.63	0.50	ug/l	
11141-16-5	Aroclor 1232	ND	0.63	0.50	ug/l	
53469-21-9	Aroclor 1242	ND	0.63	0.31	ug/l	
12672-29-6	Aroclor 1248	ND	0.63	0.31	ug/l	
11097-69-1	Aroclor 1254	ND	0.63	0.31	ug/l	
11096-82-5	Aroclor 1260	ND	0.63	0.31	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	106%		38-127%
2051-24-3	Decachlorobiphenyl	28%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Semi-Volatiles & Polynuclear Aromatic Hydrocarbons Accutest Laboratories, Inc., SDG F52137

DATE: November 20, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 28, 2007. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW846 Methods 3510C/8270C for aqueous matrices. The polynuclear aromatic hydrocarbons (PAHs) were analyzed using selective ion monitoring (SIM) techniques. A total of three aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41GW01	F52137-1	WC1-2	F52137-6
41GW02	F52137-2		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
X		Laboratory Control Sample
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/20/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F52137

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For semivolatile (SVOC) and polynuclear aromatic hydrocarbons (PAH) compounds , the samples are cooled @4°C ± 2°C for aqueous samples with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/28/07, the coolers were received by the primary laboratory (Accutest) on 08/29/07 at 2.4°C, 2.0°C, and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.4°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.6°C. All criteria were met. No qualifiers were applied. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the groundwater samples collected 08/28/07, the SVOCs were extracted on 09/04/07 and analyzed on 09/13/07. For the PAHs by SIM, they were extracted on 09/04/07 and analyzed on 09/18/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for compounds on the semivolatile target compound list (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. The minimum relative response factor (RRF) criteria must be ≥0.05. The DoD QSM specifies that the initial calibration percent relative standard deviation (%RSD) must be ≤15% on the average for all compounds (<30% for CCCs). All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- Initial calibration for the SVOCs was performed on 08/21/07 on instrument MSBNA02. Target compounds hexachlorocyclopentadiene (29.2%) and 4,6-dinitro-2-methylphenol (16.5%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds hexachlorocyclopentadiene (r=0.9990) and 4,6-dinitro-2-methylphenol (r=0.9984) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/05/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/19/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. No samples reported were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/20/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. No samples reported were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥0.05. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ±20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For SVOC initial calibration verification performed on 08/21/07 @15:20 on instrument MSBNA02, 4-chloroaniline (45.7%; grossly exceeding) and 3-nitroaniline (30.2%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 3-nitroaniline and 4-chloroaniline. No qualification applies for 3-nitroaniline. 4-Chloroaniline would be qualified bias low "UL"; however no samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 08/21/07 @15:48 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 09/13/07 @16:15 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/05/07 @12:35 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/18/07 @12:23 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/19/07 @22:41 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/19/07 @23:23 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/20/07 @16:43 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/20/07 @18:11 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were sampled with disposable bailers; therefore, no rinse blank applies to these samples. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater sample WC1-2 (F52137-6) in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/13/07	OP22181-MB	All SVOC target <½MRL	NA	NA	None
09/18/07	OP22182-MB	All PAH SIM target <½MRL	NA	NA	None
09/20/07	OP22182-MB	All PAH SIM target <½MRL	NA	NA	None
09/15/07	RB083007	All SVOC target <½MRL	NA	NA	None
09/20/07	RB083007	All PAH SIM target <½MRL	NA	NA	None

NA = Not applicable.
MRL = Method reporting limit.

VI-Surrogate Spikes
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-2 and Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:
2-Fluorophenol (14-62%) – (DoD QSM = 20-110%)
Phenol – d5 (10-40%) – (DoD QSM = 10-115%)
2,4,6-Tribromophenol (33-118%) – (DoD QSM = 40-125%)
Nitrobenzene-d5 (42-108%) – (DoD QSM = 40-110%)
2-Fluorobiphenyl (40-106%) – (DoD QSM = 50-110%)
p-Terphenyl – d14 (39-121%) – (DoD QSM = 50-135%)

- All criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD LCS aqueous recovery limits are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22181-BS was used as the aqueous LCS for the SVOC analysis on 09/13/07. All target compounds were within criteria. No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this LCS.

- Sample OP22182-BS2 was used as the aqueous LCS for the PAH SIM analysis on 09/20/07. Benzo(a)pyrene (68%), benzo(b)flouranthene (68%), benzo(k)flouranthene (68%), chrysene (68%), flouranthene (68%), naphthalene (57%), phenanthene (66%), and pyrene (62%) were below laboratory; however, within DoD QSM accuracy criteria. All other target compounds were within criteria. Benzo(a)pyrene, benzo(b)flouranthene, benzo(k)flouranthene, chrysene, flouranthene, naphthalene, phenanthene, and pyrene were non-detect for all associated samples and were qualified "UL" based upon the low recoveries. All other PAHs were within criteria. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this LCS.

- Sample OP22182-BS2 was used as the aqueous LCS for the PAH SIM analysis on 09/20/07. All target compounds were within criteria. No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample WC1-2 (F52137-6) was used for the aqueous MS/MSD for SVOC analysis on 09/13/07. 4-Nitrophenol (61%, 61%) was above the laboratory criteria and within the DoD QSM criteria. 3,3'-Dichlorobenzidine (55%) was below the laboratory criteria and within the DoD QSM criteria. 4-Nitrophenol and 3,3'-dichlorobenzidine were within control limits for the associated LCS (Section VIII). 4-Nitrophenol was non-detect for the spiked sample; therefore, no qualifiers were applied based upon this outlier. All other compounds were within criteria. 3,3'-Dichlorobenzidine was non-detect for the spiked sample and qualified "UL" based upon the low recovery. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this MS/MSD.

- Sample F52188-3 was used for the MS/MSD for the aqueous PAH SIM analysis on 09/20/07. The spiked sample was not a RFAAP site sample; therefore, it was not evaluated. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this MS/MSD.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No field sample duplicate pair was analyzed with this SDG.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: 41GW01 (F52137-1), diethylphthalate

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (14655 * 40 * 1000 * 1) / (196694 * 1.328 * 900 * 1) = 2.5 ng/mL
= 2.5 µg/L

Reported Value = 2.5 µg/L
% Difference = 0.0%
Values were within 10% difference.

Sample: OP22182-BS2, fluorene

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (1546371 * 4 * 1000 * 1) / (301990 * 1.254 * 1000 * 1) = 16.3 ng/mL
= 16.3 µg/L

Reported Value = 16.3 µg/L
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038354.D	1	09/13/07	RB	09/04/07	OP22181	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	28	11	ug/l	
95-57-8	2-Chlorophenol	ND	5.6	1.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.6	2.2	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.6	1.1	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.6	2.2	ug/l	
51-28-5	2,4-Dinitrophenol	ND	28	11	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	11	2.2	ug/l	
95-48-7	2-Methylphenol	ND	5.6	1.1	ug/l	
	3&4-Methylphenol	ND	5.6	1.4	ug/l	
88-75-5	2-Nitrophenol	ND	5.6	1.1	ug/l	
100-02-7	4-Nitrophenol	ND	28	11	ug/l	
87-86-5	Pentachlorophenol	ND	28	11	ug/l	
108-95-2	Phenol	ND	5.6	2.2	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.6	1.1	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.6	1.1	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.6	1.3	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.6	2.2	ug/l	
100-51-6	Benzyl Alcohol	ND	5.6	1.1	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.6	1.4	ug/l	
106-47-8	4-Chloroaniline	ND	5.6	2.2	ug/l	
86-74-8	Carbazole	ND	5.6	1.1	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.6	1.1	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.6	1.1	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.6	1.1	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.6	1.4	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.6	1.7	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.6	1.8	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.6	1.7	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.6	1.1	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.6	1.1	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	11	2.2	ug/l	
132-64-9	Dibenzofuran	ND	5.6	1.1	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.6	2.2	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.6	2.2	ug/l	
84-66-2	Diethyl phthalate	2.5 J	5.6	2.2	ug/l	J
131-11-3	Dimethyl phthalate	ND	5.6	2.2	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.6	2.2	ug/l	
118-74-1	Hexachlorobenzene	ND	5.6	1.3	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.6	1.9	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.6	1.7	ug/l	
67-72-1	Hexachloroethane	ND	5.6	2.1	ug/l	
78-59-1	Isophorone	ND	5.6	1.1	ug/l	
88-74-4	2-Nitroaniline	ND	11	2.2	ug/l	
99-09-2	3-Nitroaniline	ND	11	2.2	ug/l	
100-01-6	4-Nitroaniline	ND	11	2.2	ug/l	
98-95-3	Nitrobenzene	ND	5.6	1.1	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.6	1.1	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.6	1.1	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.6	1.7	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	31%		14-62%
4165-62-2	Phenol-d5	22%		10-40%
118-79-6	2,4,6-Tribromophenol	75%		33-118%
4165-60-0	Nitrobenzene-d5	61%		42-108%
321-60-8	2-Fluorobiphenyl	60%		40-106%
1718-51-0	Terphenyl-d14	61%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036925.D	1	09/18/07	RB	09/04/07	OP22182	SW1902
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.1	0.56	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.56	ug/l	
120-12-7	Anthracene	ND	1.1	0.56	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.22	0.056	ug/l	
50-32-8	Benzo(a)pyrene	ND VL	0.22	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND VL	0.22	0.056	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.22	0.11	ug/l	
207-08-9	Benzo(k)fluoranthene	ND VL	0.22	0.11	ug/l	
218-01-9	Chrysene	ND VL	0.22	0.11	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.22	0.056	ug/l	
206-44-0	Fluoranthene	ND VL	1.1	0.28	ug/l	
86-73-7	Fluorene	ND	1.1	0.28	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.22	0.056	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-20-3	Naphthalene	ND VL	1.1	0.28	ug/l	
85-01-8	Phenanthrene	ND VL	1.1	0.56	ug/l	
129-00-0	Pyrene	ND VL	1.1	0.28	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L038355.D

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Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038355.D	1	09/13/07	RB	09/04/07	OP22181	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	800 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	31	13	ug/l	
95-57-8	2-Chlorophenol	ND	6.3	1.3	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	6.3	2.5	ug/l	
120-83-2	2,4-Dichlorophenol	ND	6.3	1.3	ug/l	
105-67-9	2,4-Dimethylphenol	ND	6.3	2.5	ug/l	
51-28-5	2,4-Dinitrophenol	ND	31	13	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	13	2.5	ug/l	
95-48-7	2-Methylphenol	ND	6.3	1.3	ug/l	
	3&4-Methylphenol	ND	6.3	1.6	ug/l	
88-75-5	2-Nitrophenol	ND	6.3	1.3	ug/l	
100-02-7	4-Nitrophenol	ND	31	13	ug/l	
87-86-5	Pentachlorophenol	ND	31	13	ug/l	
108-95-2	Phenol	ND	6.3	2.5	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	6.3	1.3	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	6.3	1.3	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	6.3	1.5	ug/l	
85-68-7	Butyl benzyl phthalate	ND	6.3	2.5	ug/l	
100-51-6	Benzyl Alcohol	ND	6.3	1.3	ug/l	
91-58-7	2-Chloronaphthalene	ND	6.3	1.6	ug/l	
106-47-8	4-Chloroaniline	ND	6.3	2.5	ug/l	
86-74-8	Carbazole	ND	6.3	1.3	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	6.3	1.3	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	6.3	1.3	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	6.3	1.3	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	6.3	1.6	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	6.3	1.9	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	6.3	2.0	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	6.3	1.9	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	6.3	1.3	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	6.3	1.3	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	13	2.5	ug/l	
132-64-9	Dibenzofuran	ND	6.3	1.3	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	6.3	2.5	ug/l	
117-84-0	Di-n-octyl phthalate	ND	6.3	2.5	ug/l	
84-66-2	Diethyl phthalate	ND	6.3	2.5	ug/l	
131-11-3	Dimethyl phthalate	ND	6.3	2.5	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	6.3	2.5	ug/l	
118-74-1	Hexachlorobenzene	ND	6.3	1.5	ug/l	
87-68-3	Hexachlorobutadiene	ND	6.3	2.1	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	6.3	1.9	ug/l	
67-72-1	Hexachloroethane	ND	6.3	2.4	ug/l	
78-59-1	Isophorone	ND	6.3	1.3	ug/l	
88-74-4	2-Nitroaniline	ND	13	2.5	ug/l	
99-09-2	3-Nitroaniline	ND	13	2.5	ug/l	
100-01-6	4-Nitroaniline	ND	13	2.5	ug/l	
98-95-3	Nitrobenzene	ND	6.3	1.3	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	6.3	1.3	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	6.3	1.3	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	6.3	1.9	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	38%		14-62%
4165-62-2	Phenol-d5	28%		10-40%
118-79-6	2,4,6-Tribromophenol	68%		33-118%
4165-60-0	Nitrobenzene-d5	72%		42-108%
321-60-8	2-Fluorobiphenyl	68%		40-106%
1718-51-0	Terphenyl-d14	57%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W036926.D

Form I Copy

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Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036926.D	1	09/18/07	RB	09/04/07	OP22182	SW1902
Run #2							

	Initial Volume	Final Volume
Run #1	800 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.3	0.63	ug/l	
208-96-8	Acenaphthylene	ND	1.3	0.63	ug/l	
120-12-7	Anthracene	ND	1.3	0.63	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.25	0.063	ug/l	
50-32-8	Benzo(a)pyrene	ND VL	0.25	0.13	ug/l	
205-99-2	Benzo(b)fluoranthene	ND VL	0.25	0.063	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.25	0.13	ug/l	
207-08-9	Benzo(k)fluoranthene	ND VL	0.25	0.13	ug/l	
218-01-9	Chrysene	ND VL	0.25	0.13	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.25	0.063	ug/l	
206-44-0	Fluoranthene	ND VL	1.3	0.31	ug/l	
86-73-7	Fluorene	ND	1.3	0.31	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.25	0.063	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.3	0.31	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.3	0.31	ug/l	
91-20-3	Naphthalene	ND VL	1.3	0.31	ug/l	
85-01-8	Phenanthrene	ND VL	1.3	0.63	ug/l	
129-00-0	Pyrene	ND VL	1.3	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	WC1-2		
Lab Sample ID:	F52137-6	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038356.D	1	09/13/07	RB	09/04/07	OP22181	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1100 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	23	9.1	ug/l	
95-57-8	2-Chlorophenol	ND	4.5	0.91	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.5	1.8	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.5	0.91	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.5	1.8	ug/l	
51-28-5	2,4-Dinitrophenol	ND	23	9.1	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.1	1.8	ug/l	
95-48-7	2-Methylphenol	ND	4.5	0.91	ug/l	
	3&4-Methylphenol	ND	4.5	1.2	ug/l	
88-75-5	2-Nitrophenol	ND	4.5	0.91	ug/l	
100-02-7	4-Nitrophenol	ND	23	9.1	ug/l	
87-86-5	Pentachlorophenol	ND	23	9.1	ug/l	
108-95-2	Phenol	ND	4.5	1.8	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.5	0.91	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.5	0.91	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.5	1.1	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.5	1.8	ug/l	
100-51-6	Benzyl Alcohol	ND	4.5	0.91	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.5	1.2	ug/l	
106-47-8	4-Chloroaniline	ND	4.5	1.8	ug/l	
86-74-8	Carbazole	ND	4.5	0.91	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.5	0.91	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.5	0.91	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.5	0.91	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.5	1.2	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.5	1.4	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	4.5	1.5	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	4.5	1.4	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.5	0.91	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.5	0.91	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND UL	9.1	1.8	ug/l	
132-64-9	Dibenzofuran	ND	4.5	0.91	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	WC1-2		
Lab Sample ID:	F52137-6	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	4.5	1.8	ug/l	
117-84-0	Di-n-octyl phthalate	ND	4.5	1.8	ug/l	
84-66-2	Diethyl phthalate	ND	4.5	1.8	ug/l	
131-11-3	Dimethyl phthalate	ND	4.5	1.8	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	4.5	1.8	ug/l	
118-74-1	Hexachlorobenzene	ND	4.5	1.1	ug/l	
87-68-3	Hexachlorobutadiene	ND	4.5	1.5	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.5	1.4	ug/l	
67-72-1	Hexachloroethane	ND	4.5	1.7	ug/l	
78-59-1	Isophorone	ND	4.5	0.91	ug/l	
88-74-4	2-Nitroaniline	ND	9.1	1.8	ug/l	
99-09-2	3-Nitroaniline	ND	9.1	1.8	ug/l	
100-01-6	4-Nitroaniline	ND	9.1	1.8	ug/l	
98-95-3	Nitrobenzene	ND	4.5	0.91	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.5	0.91	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.5	0.91	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	4.5	1.4	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	30%		14-62%
4165-62-2	Phenol-d5	20%		10-40%
118-79-6	2,4,6-Tribromophenol	78%		33-118%
4165-60-0	Nitrobenzene-d5	60%		42-108%
321-60-8	2-Fluorobiphenyl	59%		40-106%
1718-51-0	Terphenyl-d14	73%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	WC1-2		
Lab Sample ID:	F52137-6	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036927.D	1	09/18/07	RB	09/04/07	OP22182	SW1902
Run #2							

	Initial Volume	Final Volume
Run #1	1100 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.91	0.45	ug/l	
208-96-8	Acenaphthylene	ND	0.91	0.45	ug/l	
120-12-7	Anthracene	ND	0.91	0.45	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.18	0.045	ug/l	
50-32-8	Benzo(a)pyrene	ND VL	0.18	0.091	ug/l	
205-99-2	Benzo(b)fluoranthene	ND VL	0.18	0.045	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.18	0.091	ug/l	
207-08-9	Benzo(k)fluoranthene	ND VL	0.18	0.091	ug/l	
218-01-9	Chrysene	ND VL	0.18	0.091	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.18	0.045	ug/l	
206-44-0	Fluoranthene	ND VL	0.91	0.23	ug/l	
86-73-7	Fluorene	ND	0.91	0.23	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.18	0.045	ug/l	
90-12-0	1-Methylnaphthalene	ND	0.91	0.23	ug/l	
91-57-6	2-Methylnaphthalene	ND	0.91	0.23	ug/l	
91-20-3	Naphthalene	ND VL	0.91	0.23	ug/l	
85-01-8	Phenanthrene	ND VL	0.91	0.45	ug/l	
129-00-0	Pyrene	ND VL	0.91	0.23	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
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N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation - Volatiles
Accutest Laboratories, Inc., SDG F52137

DATE: November 19, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 28, 2007. The samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) using USEPA SW846 Method 5030B/8260B for aqueous matrices. A total of three aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41GW01	F52137-1	WC1-2	F52137-6
41GW02	F52137-2		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Results
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Laboratory Control Sample
	X	Matrix Spike / Spike Duplicate Sample
	X	System Monitoring Compounds
	X	Internal Standards
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

11/19/07
Date

RFAAP VALIDATION REPORT
VOLATILES REVIEW
SDG F52137

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of analysis. Holding time criteria: For aqueous samples cooled @ 4°C±2°C; pH<2 HCl, the maximum holding time is 14 days (7 days if no HCl added) from sample collection to analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/28/07, the coolers were received by the primary laboratory (Accutest) on 08/29/07 at 2.4°C, 2.0°C, and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.4°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.6°C. All criteria were met. No qualifiers were applied. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/28/07, the VOCs were prepped and analyzed on 09/10/07 and 09/11/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, bromofluorobenzene (BFB), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent relative standard deviation (%RSD) must be ≤15% for each target compound and must be ≤30% for each calibration check compound. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration performed on 09/07/07 on instrument MSVOA4, target compounds bromomethane (22.6%), chloroethane (15.6%), acetone (15.1%), methylene chloride (33.2%; grossly exceeding), 2-butanone (17.3%), 4-methyl-2-pentanone (24.7%), 2-hexanone (20.4%), and styrene (17.2%) were outside %RSD/RRF criteria. All RSDs/RRFs (RRF≥0.05) were within criteria for all other target compounds. Compounds bromomethane (r=0.9989), chloroethane (r=0.9983), acetone (r=0.9975), methylene chloride (r=0.9994), 2-butanone (r=0.9992), 4-methyl-2-pentanone (r=0.9992), 2-hexanone (r=0.9994), and styrene (r=0.9995) were quantified using linear or higher order with correlations >0.995; therefore, no qualifiers were applied based upon these outliers. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Continuing calibration establishes the 12-hour relative response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within 20% for all target compounds. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration verification performed on 09/07/07 @13:07 on instrument MSVOA4, acetone (31.6%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Acetone was non-detect for all samples; therefore, no qualifiers were applied based upon the high %Drift. No samples reported apply to this initial calibration verification.

- For initial calibration verification performed on 09/10/07 @11:58 on instrument MSVOA4, acetone (28.8%) and methylene chloride (33.7%) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Acetone and methylene chloride were non-detect for all samples; therefore, no qualifiers were applied based upon the high %Drifts. Samples 41GW02 (F52137-2) and WC1-2 (F52137-6) apply to this initial calibration verification.

- For continuing calibration performed on 09/11/07 @11:01 on instrument MSVOA4, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No qualifiers were applied. Sample 41GW01 (F52137-1) applies to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of BFB. No contaminants should be detected in any of the associated blanks > the MDL. The DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants methylene chloride, acetone, and 2-butanone). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants methylene chloride, acetone, and 2-butanone (MEK), or 5 times (5X) the maximum amount for other volatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were sampled with disposable bailer; therefore, no rinse blank applies to these samples. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater sample WC1-2 (F52137-6) in this SDG. The trip blank TB082807 (F52137-7) applies to the aqueous samples collected on 08/27/07 in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/10/07	VB2032-MB	All target <½MRL	NA	NA	None
09/11/07	VB2033-MB	All target <½MRL	NA	NA	None
09/13/07	083007R	All target <½MRL	NA	NA	None
09/10/07	TB082807	Methylene Chloride	1.3JB	6.50	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
B = Analyte was found in associated method blank.
NA = Not Applicable
MRL = Method Reporting Limit

VI-Laboratory Control Sample

Data for laboratory control samples (LCS) are evaluated to determine long-term accuracy of the analytical method on various matrices. Percent recoveries (%Rs) should be within the specified control limits. The DoD aqueous LCS recovery limits are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample VB2032-BS was used as the aqueous LCS for the VOC analysis on 09/10/07. All criteria were met. No qualifiers were applied. Samples 41GW02 (F52137-2) and WC1-2 (F52137-6) apply to this LCS.

- Sample VB2033-BS was used as the aqueous LCS for the VOC analysis on 09/11/07. Chloromethane (126%) was above DoD QSM criteria and within laboratory control limits. All samples were non-detect for chloromethane; therefore, no qualifiers were applied based upon this outlier. Sample 41GW01 (F52137-1) applies to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. The DoD MS/MSD aqueous recovery limits follow the LCS criteria and are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample F52274-1 was used for the aqueous MS/MSD analysis for analysis on 09/10/07. Since this sample is not a RFAAP site sample, it was not evaluated. No qualifiers were applied. Samples 41GW02 (F52137-2) and WC1-2 (F52137-6) apply to this MS/MSD.

- Sample F52182-1 was used for the aqueous MS/MSD analysis for analysis on 09/11/07. Since this sample is not a RFAAP site sample, it was not evaluated. No qualifiers were applied. Sample 41GW01 (F52137-1) applies to this MS/MSD.

VIII-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Recoveries for system monitoring compounds in volatile samples and blanks must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:
Dibromofluoromethane (87-116%) (DoD QSM = 85-115%)
1,2-Dichloroethane-d4 (76-127%) (DoD QSM = 70-120%)
Toluene-d8 (86-112%) (DoD QSM = 85-120%)
4-Bromofluorobenzene (84-120%) (DoD QSM = 75-120%)

- All criteria were met. No qualifiers were applied.

IX-Internal Standards (IS)
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No field sample duplicate pair was analyzed with this SDG.

XI-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: WC1-2 (F52137-6), chloroform

Conc. (µg/L) = (Ax)*(Is) *(DF)/(Ais)*(RRF)

where: Ax is the compound area
Ais is the corresponding internal standard area
Is is the corresponding internal standard concentration (µg/L)
DF is the dilution factor
RRF is the relative response factor.

Conc. µg/L = (36773 * 50 µg/L * 1) / (1966202 * 0.561) = 1.7 µg/L

Reported Conc. = 1.7 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B048394.D	1	09/11/07	LD	n/a	n/a	VB2033
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	105%		76-127%
2037-26-5	Toluene-D8	103%		86-112%
460-00-4	4-Bromofluorobenzene	112%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B048356.D	1	09/10/07	LD	n/a	n/a	VB2032
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		87-116%
17060-07-0	1,2-Dichloroethane-D4	106%		76-127%
2037-26-5	Toluene-D8	102%		86-112%
460-00-4	4-Bromofluorobenzene	112%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: B048357.D

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Report of Analysis

Client Sample ID:	WC1-2		
Lab Sample ID:	F52137-6	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B048357.D	1	09/10/07	LD	n/a	n/a	VB2032
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	1.7	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	WC1-2		
Lab Sample ID:	F52137-6	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	106%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	110%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: B048358.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	TB082807		
Lab Sample ID:	F52137-7	**Date Sampled:**	08/28/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B048358.D	1	09/10/07	LD	n/a	n/a	VB2032
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride [a]	1.3 J	5.0	1.0	ug/l	J
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest Laboratories

Report of Analysis

Client Sample ID:	TB082807		
Lab Sample ID:	F52137-7	**Date Sampled:**	08/28/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		87-116%
17060-07-0	1,2-Dichloroethane-D4	106%		76-127%
2037-26-5	Toluene-D8	103%		86-112%
460-00-4	4-Bromofluorobenzene	112%		84-120%

(a) CCV outside of control limits; results may be biased high.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Appendix B

Lithologic Boring Logs and Soil Gas Survey

Appendix B-1

Lithologic Boring Logs

BORING 41MW1

Surface Elevation: 0
Location: Radford AAP, Virginia
Start: 08:15 on 10-8-91
Finish: 10:45 on 10-10-91

Depth (Feet)	Sampling Method	Sample No.	Blows/Foot	Core Run No.	% Recovery	RQD %	Sample Interval	Symbols	Description
0									REDDISH BROWN (5YR 4/4) SILTY CLAY, STIFF, LITTLE YELLOW AND OLIVE MOTTLING, DRY
	SPT	1	19		10				GRADING DARK BROWN (7.5YR 3/3)
5									BECOMING SLIGHTLY PLASTIC, TRACE MEDIUM SAND, SLIGHTLY MOIST
	SPT	2	10		5			CL	SLIGHTLY GRAVELLY
10									GRADING SOFTER
	SPT	3	63		79				GRAVEL SEAM 11.0-12.0 FEET
									BLACK SILT, SOFT, AND LIGHT BROWN SILT WITH REDDISH YELLOW MOTTLING OVERLAYING BEDROCK AT 13.0 FEET
15									LIMESTONE/DOLOSTONE, LIGHT GRAY TO BLUISH BLACK, HARD, WELL CEMENTED, MODERATELY TO HIGHLY FRACTURED, WITH CALCITE INFILLING RUST COLORED STAINING FOUND AT MOST FRACTURES
20	NX			1	100	85			GRADES TO LIGHT GRAY (N/7), HARD
									ZONE OF MORE FRACTURES, THICKER CALCITE VEINS, SOME SAND AND CLAY FILLED PARTINGS
									BECOMES DARK GRAY TO BLUISH BLACK, WITH ABUNDANT CALCITE FILLED CRACKS.
25	NX			2	98	100		LS DLST	RUST COLORED STAINING, LESS FREQUENT TRACE PYRITE AT 24.0 FEET
									LESS FRACTURED, CALCITE VEINS BECOME PITTED AND VUGGY
30	NX			3	100	27			GRAYISH BROWN (2.5Y 5/2) HIGHLY WEATHERED AND FRACTURED ZONE FROM 32.0 TO 35.0 FEET SOME FRACTURES STAINED STRONG BROWN (7.5YR 5/6) GRAY (N/5)
35	NX			4	100	50			CONTINUED GRAY, HARD, WITH HEALED CRACKS AND FRACTURES
	NX			5	82	96			
40									

PLATE
LOG OF BORING

Dames & Moore

FILE

BORING 41MW1 (Cont'd)

Depth (Feet)	Sampling Method	Sample No.	Blows/Foot	Core Run No.	% Recovery	RQD %	Sample Interval	Symbols	Description
40									GRADES TO 10YR 4/3 DARK BROWN WITH VARYING SHADES OF GRAY, WITH ABUNDANT CALCITE CRYSTALS, SLIGHT PITTING
45	NX			6	80	90			BECOMING LESS FRACTURED, WITH FRACTURES OCCURRING ALONG CALCITE VEINS, WHERE MINERAL STAINING IS EVIDENT (YELLOWISH BROWN AND BLACK)
50	NX			7	90	93			
55	NX			8	100	57			SAME LIMESTONE/DOLOSTONE WITH FEW FRACTURES AND YELLOWISH RED STAINING AT FRACTURES
60	NX			9	100	98		LS DLST	SOME LIGHT OLIVE SHADING
65	NX			10	100	83			BECOMES PITTED, CALCITE MORE OBUNDANT, THIN SEAMS OF MORE WEATHERED LIMESTONE INTERBEDDED WITH THE HARDER DOLOSTONE/ LIMESTONE PITTING ENDS 62.9 FEET WHERE BECOMES HARDER
70	NX			11	100	88			BECOMING DARKER, FEW FRACTURES
75	NX			12	96	100			GRADING DARKER TO DARK BLUISH GRAY (5B 4/1), WITH FEW FRACTURES AND CALCITE-HOLED CRACKS HEALED CRACKS SHOW SLIGHT SIGNS OF WEATHERING
80	NX			13	100	90			

PLATE
LOG OF BORING

Dames & Moore

FILE

BORING 41MW1 (Cont'd)

Depth (Feet)	Sampling Method	Sample No.	Blows/Foot	Core Run No.	% Recovery	RQD %	Sample Interval	Symbols	Description
80									WITH SLIGHT ORANGE–YELLOW STAINING
									BORING TERMINATED AT A DEPTH OF 81.5 FEET
85									

PLATE
LOG OF BORING

Dames & Moore

FILE

BORING 41MW2

Surface Elevation: **1,795.4** Feet, MSL
Location: Radford AAP, Virginia
Start: 10:25 on 9-4-91
Finish: 15:30 on 9-6-91

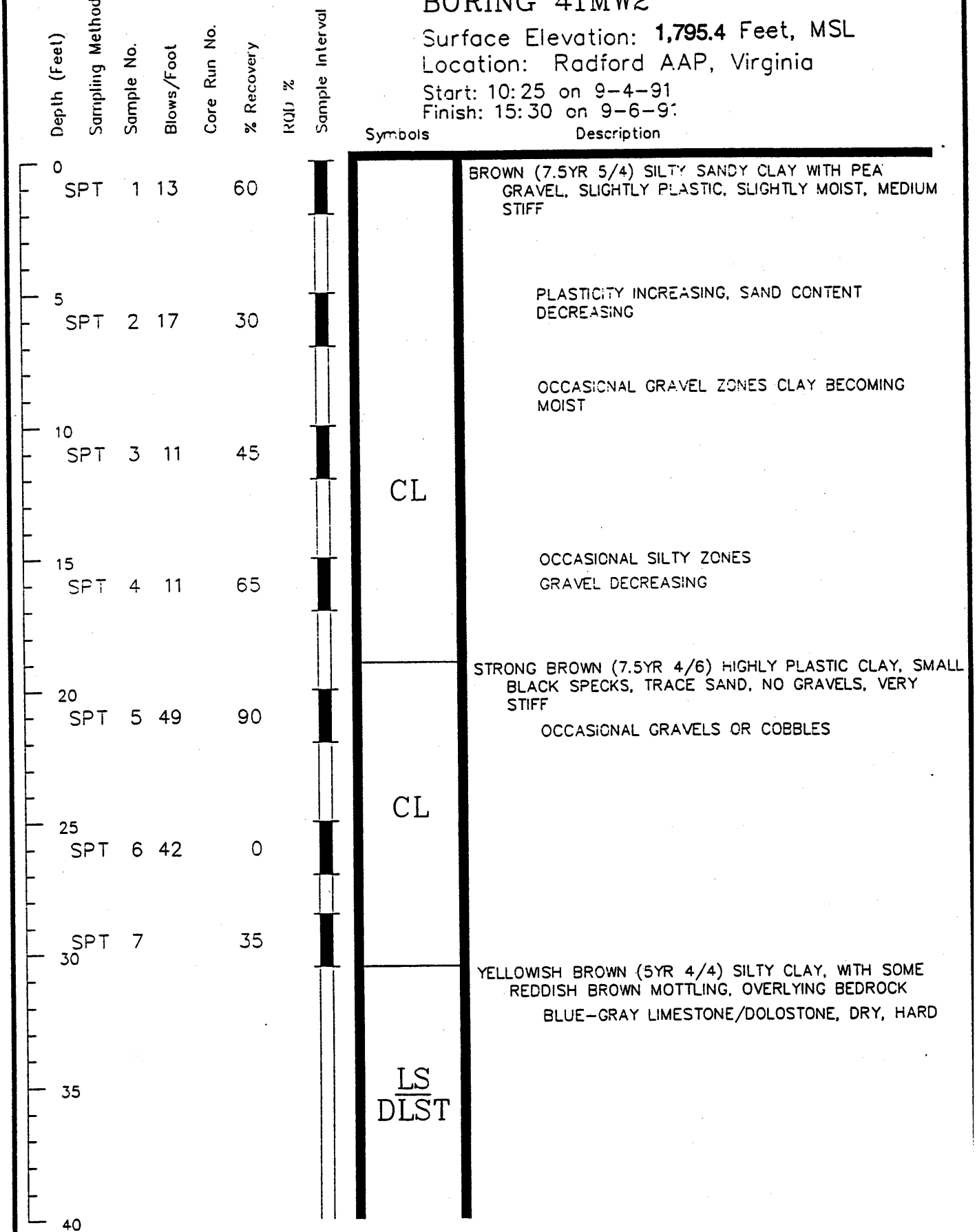


PLATE
LOG OF BORING

Dames & Moore

BORING 41MW2 (Cont'd)

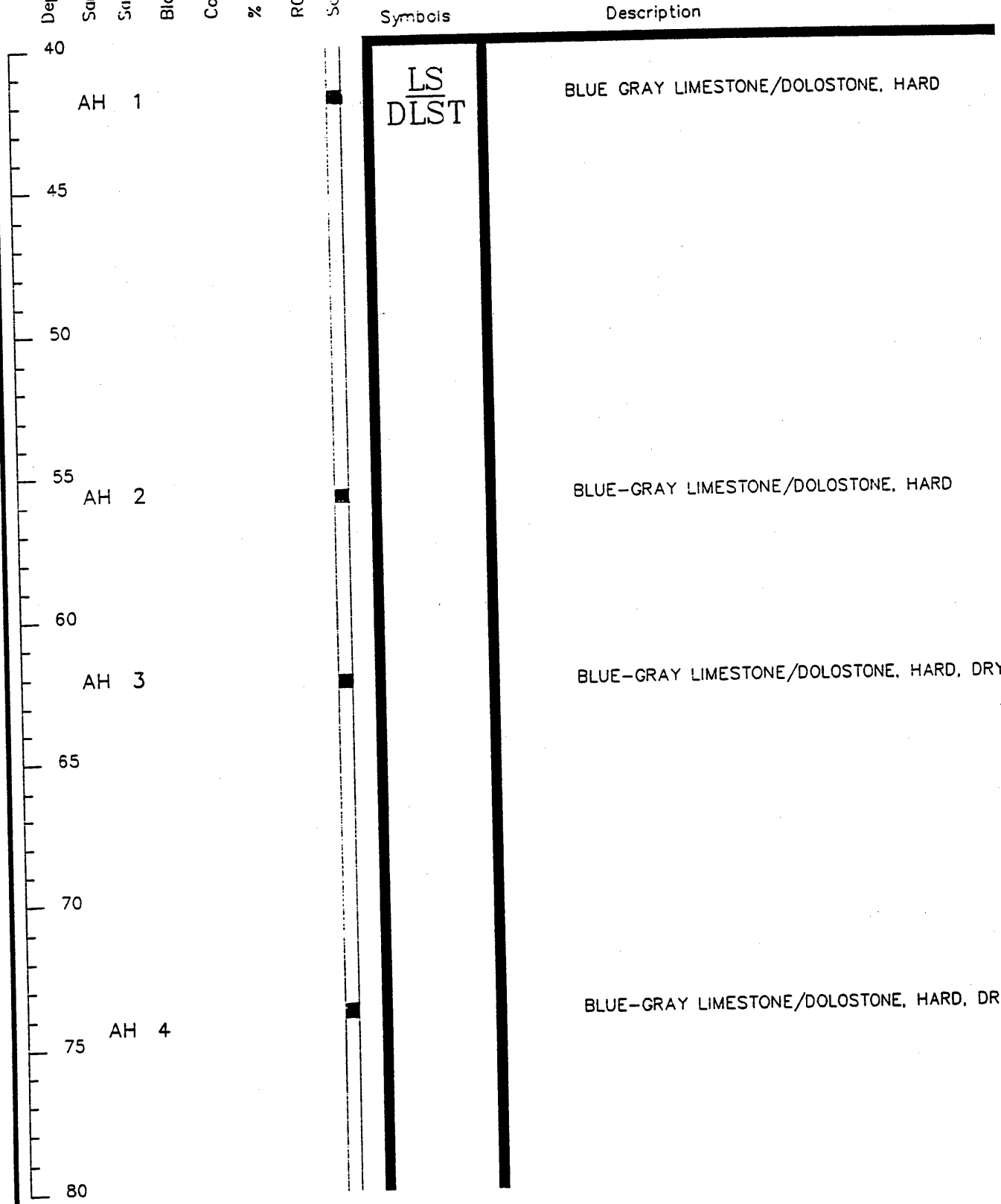


PLATE
LOG OF BORING

Dames & Moore

BORING 41MW2 (Cont'd)

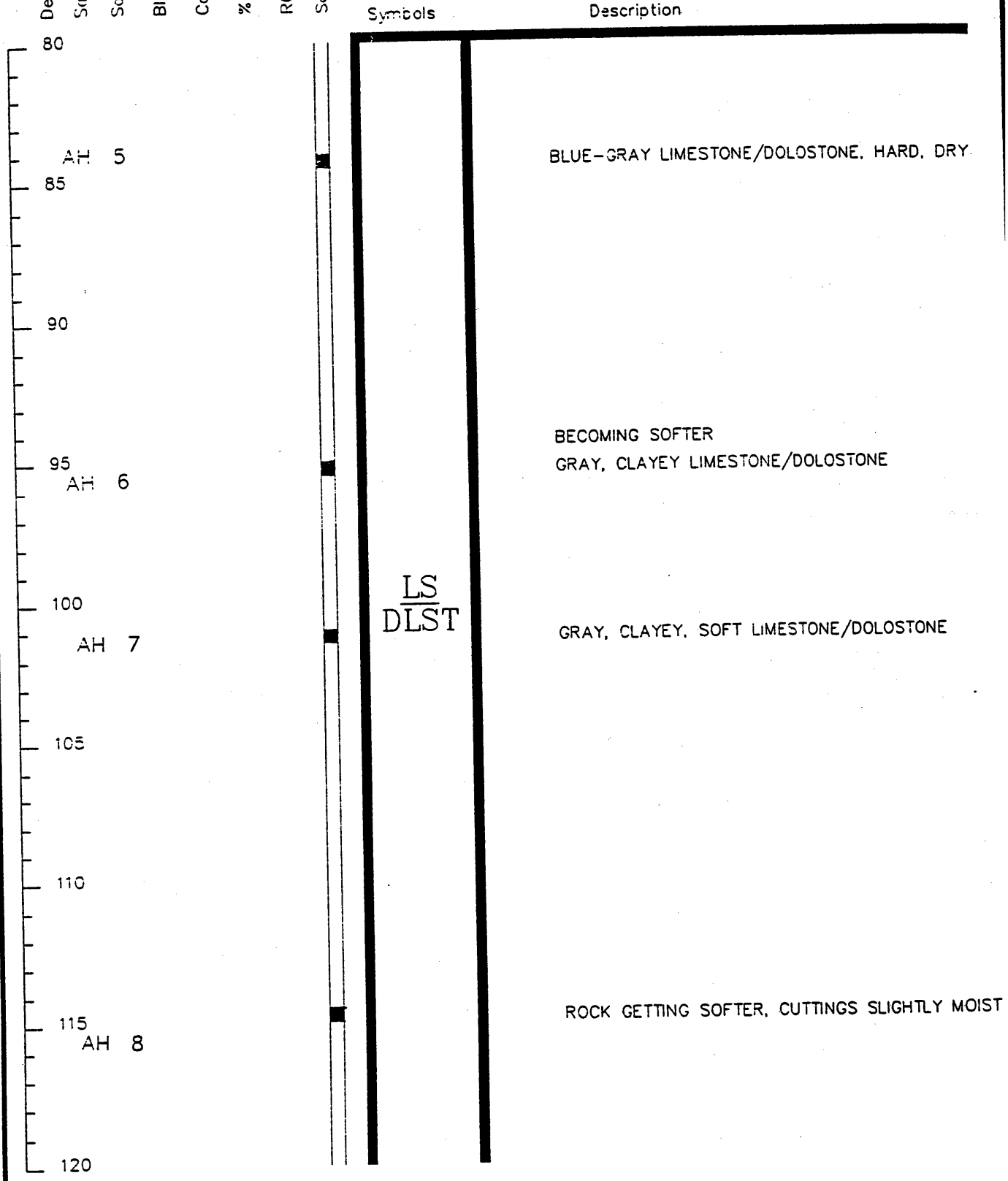


PLATE
LOG OF BORING

Dames & Moor

BORING 41MW2 (Cont'd)

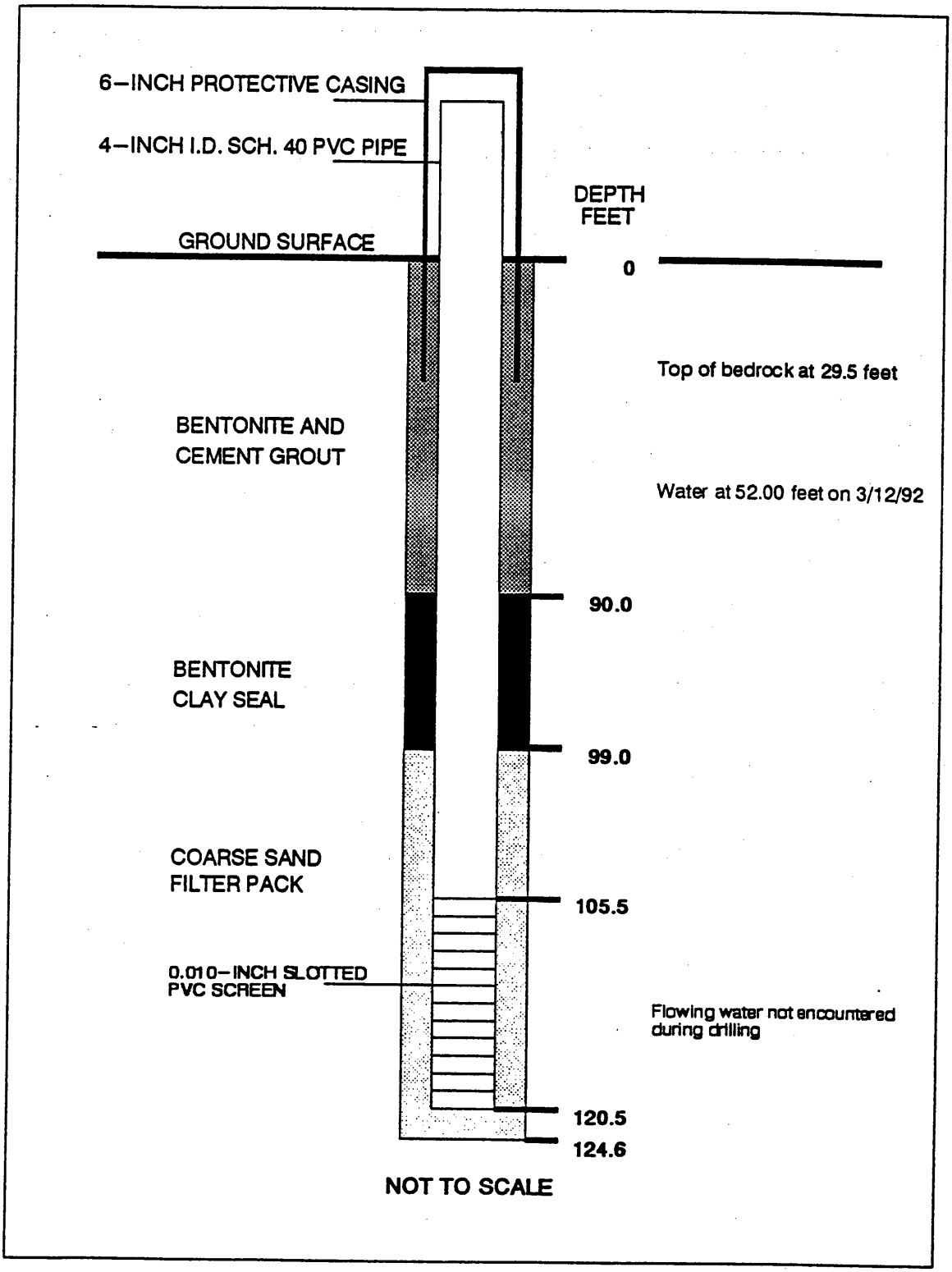
Depth (Feet)	Sampling Method	Sample No.	Blows/Foot	Core Run No.	% Recovery	RQD %	Sample Interval	Symbols	Description
120									
	AH	9						LS DLST	CUTTINGS MOIST, SOFT, LIGHT GRAY CLAYEY LIMESTONE/DOLOSTONE
125									BORING TERMINATED AT A DEPTH OF 125.0 FEET

PLATE
LOG OF BORING

Dames & Moore

WELL INSTALLATION DIAGRAM
FOR VERIFICATION INVESTIGATION
RADFORD AAP, VIRGINIA

Location: 41MW2
Installation Date: 9/6/91
Surface Elevation: 1795.4 Feet
Top of PVC Elevation: 1797.45 Feet



Dames & Moore

BORING 41MW3

Surface Elevation: **1,757.3** Feet, MSL
Location: Radford AAP, Virginia
Start: 07:30 on 10-17-91
Finish: 14:00 on 10-17-91

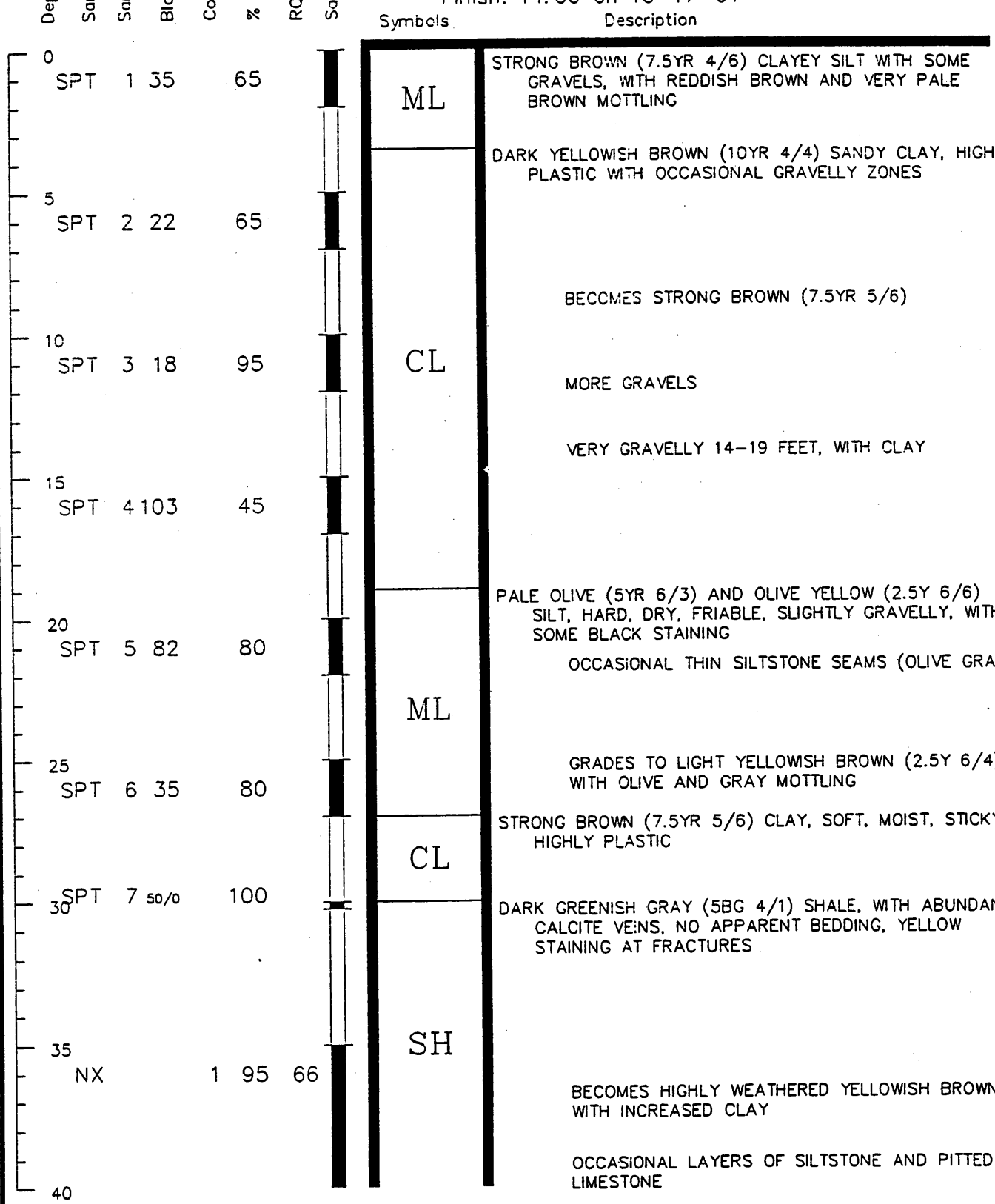


PLATE
LOG OF BORING

Dames & Moore

BORING 41MW3 (Cont'd)

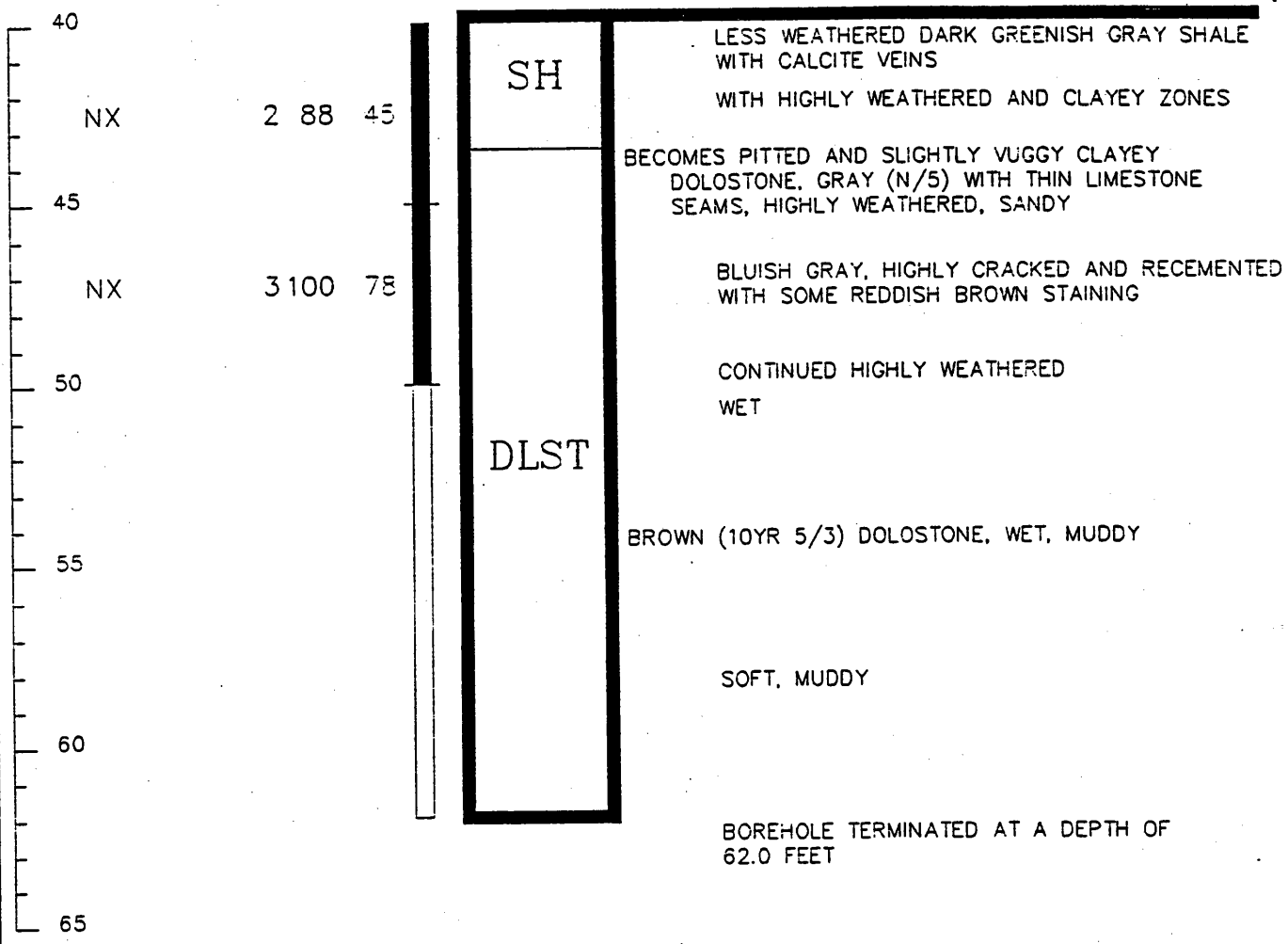
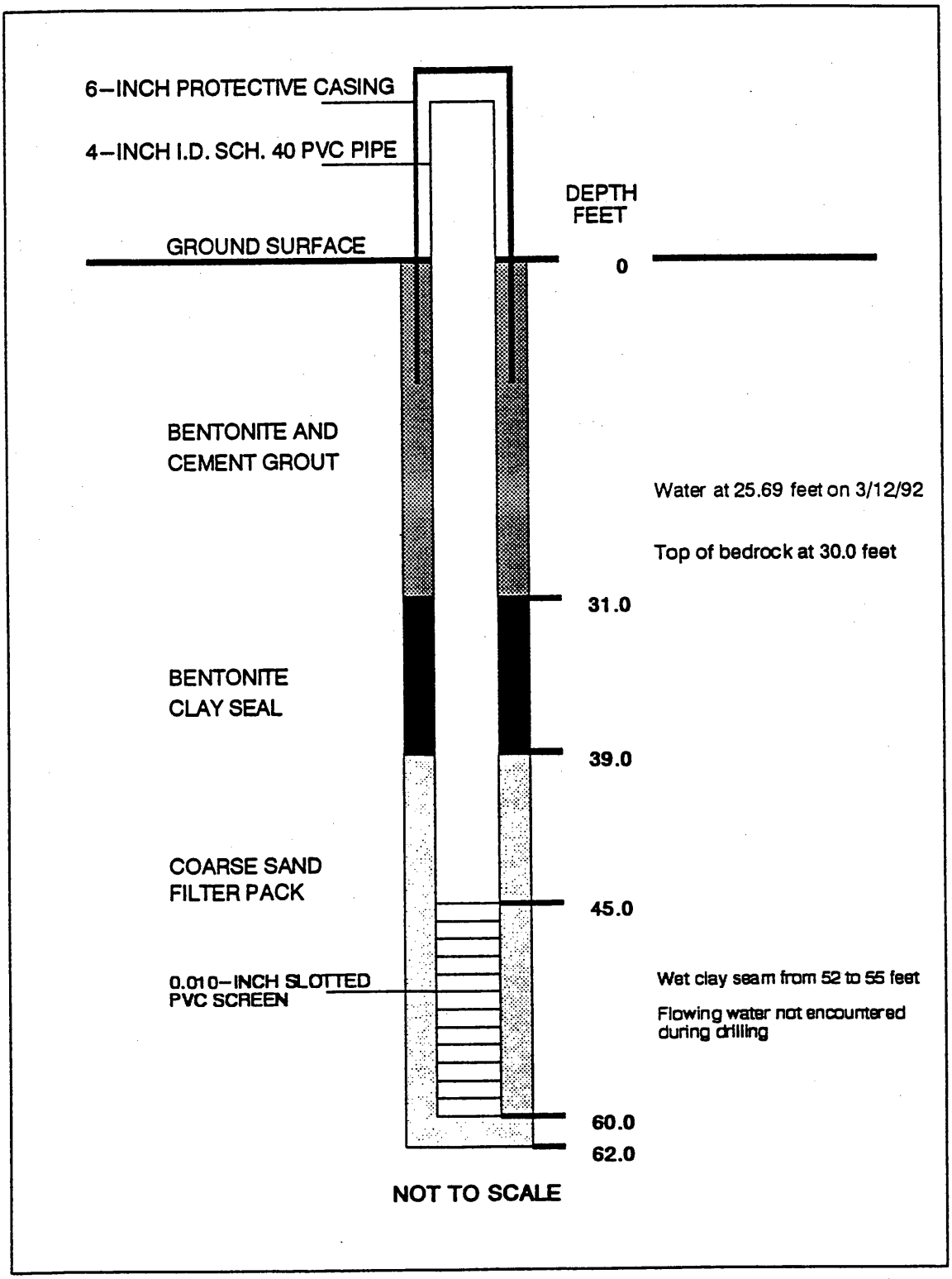


PLATE
LOG OF BORING

Dames & Moore

WELL INSTALLATION DIAGRAM
FOR VERIFICATION INVESTIGATION
RADFORD AAP, VIRGINIA

Location: 41MW3
Installation Date: 10/17/91
Surface Elevation: 1757.3 Feet
Top of PVC Elevation: 1759.35 Feet



Dames & Moore

DRILL HOLE LOG
BORING NO.: 41MW04

PROJECT: Radford AAP SWMU 41
CLIENT: USAEC
LOCATION: SWMU 41
DRILLER: American Environmental
DRILL RIG: Engersol Rand 300A
DEPTH TO WATER> INITIAL ▽ : 45 AT COMPLETION ▼ : 33.1

PROJECT NO.: 123461
DATE: 9/14/2010
ELEVATION: 1734.8
LOGGED BY: J. Hillebrand

ELEVATION/ DEPTH	WELL DETAIL	SOIL SYMBOLS, SAMPLERS AND TEST DATA	USCS	Description	NM	DD	STANDARD PENETRATION TEST DEPTH	N	CURVE 10 30 50
1735 / 0			fill	Reddish brown, moist, Lean CLAY with gravel (Fill)					
			fill	Reddish brown/gray, moist, Lean CLAY (Fill)				28	
1730 / 5			fill	Same					
			fill	Brown, moist, Gravelly Lean CLAY (Fill)				13	
1725 / 10			fill	Brown, moist, Lean CLAY with gravel (Fill)					
			cl	Brown, moist, Lean CLAY				15	
1720 / 15			cl	Same					
			cl	Brown, moist, Lean CLAY with gravel				12	
1715 / 20			cl	Same					
			cl	Brown, moist, gravelly Lean CLAY				13	
1710 / 25			cl	Same					
			cl	Yellowish brown, moist, Gravelly Lean CLAY				14	
1705 / 30			sc	Brown, moist, Clayey SAND with					

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

DRILL HOLE LOG
BORING NO.: 41MW04

PROJECT: Radford AAP SWMU 41 PROJECT NO.: 123461

ELEVATION/ DEPTH	WELL DETAIL	SOIL SYMBOLS, SAMPLERS AND TEST DATA	USCS	Description	NM	DD	STANDARD PENETRATION TEST DEPTH	STANDARD PENETRATION TEST N	STANDARD PENETRATION TEST CURVE (10 30 50)
1700 / 35				rock fragments					
			sc / ROCK	Auger refusal @ 33 ft bgs Air Rotary drilling to 62.5 ft. bgs.				50/1	
1695 / 40									
1690 / 45									
1685 / 50									
1680 / 55									
1675 / 60									
				BOH @ 62.5 ft. bgs.					
1670 / 65									
1665 / 70									
1660 / 75									

Appendix B-2

2007 RFI Well Purge Forms

Well Purging-Field Water Quality Measurements Form

Location (Site / Facility Name) RFAAP
Well Number 41MW1 Date 8-27-07
Field Personnel CJ / BS
Sample Organization Shaw Environmental
Identify MP TOC

Depth to 60 (top) / 80 (bottom) of screen (below MP)
Pump Intake at (ft. below MP)
Purging Device (e.g., Redi Flo2) RFL
PID Reading (ppm) 0

Clock Time 24 HR	Water Depth ft. below MP	Pump Setting[1]	Purge Rate mL/min	Cum. Volume Purged liters	pH	Spec. Cond. mS/cm	Turbidity NTU	DO mg/L	Temp. deg. C	ORP/Eh[2] mv	Comments
	54.85										
1300	54.85	168.7	300		7.28	4.19	224	4.80	14.85	112	
1305	54.85	168.7	300		7.26	4.16	194	4.30	15.10	111	
1310	54.85	168.7	300		7.21	4.19	585	2.99	15.93	73	Turb not reading correctly - water is clear
1315	54.85	169.7	300		7.18	4.08	645	2.76	17.11	62	
1320	54.85	169.7	300		7.17	4.11	662	2.64	17.15	58	
1325	54.85	171.6	300		7.18	4.12	732	2.54	17.28	51	
1330	54.85	172.7	300		7.17	4.10	>751	2.42	17.70	48	

[1] Pump dial setting (e.g., hertz, cycles/min., etc.)
[2] Oxidation reduction potential (stand in for Eh)

Well Purging-Field Water Quality Measurements Form

Location (Site / Facility Name) RFAAP
Well Number 41MW2 Date 8-27-07
Field Personnel CS / BS
Sample Organization Shaw Environmental
Identify MP

Depth to 105.5 (top) / 120.5 (bottom) of screen (below MP)
Pump Intake at (ft. below MP)
Purging Device (e.g., Redi Flo2)
PID Reading (ppm)

Clock Time 24 HR	Water Depth ft. below MP	Pump Setting[1]	Purge Rate mL/min	Cum. Volume Purged liters	pH	Spec. Cond. mS/cm	Turbidity NTU	DO mg/L	Temp. deg. C	ORP/Eh[2] mv	Comments
1245	59.41	[redacted]									
1250	60.39	183.0	350		7.18	19.8	165	5.55	14.11	101	
1255	60.39	183.0	350		7.06	19.6	75	2.09	14.02	97	
1300		185.5	350		7.05	19.7	52	0.48	12.64	60	
13[redacted]05	61.75	185.5	350		7.03	19.2	57	0.21	13.43	-30	
13[redacted]10	62.30	185.5	350		7.05	19.2	60	0	14.32	-43	
13[redacted]15		185.5	350		7.05	19.4	63	0	13.82	-55	
13[redacted]20		185.5	350		7.05	19.4	65	0	13.72	-58	
13[redacted]25	63.55	185.5	350		7.05	19.3	61	0	13.88	-63	
[redacted]		[redacted]	[redacted]	Sample Taken							
1330											

[1] Pump dial setting (e.g., hertz, cycles/min., etc.)
[2] Oxidation reduction potential (stand in for Eh)

Well Purging-Field Water Quality Measurements Form

Location (Site / Facility Name) RFAAP
Well Number 41MW3 **Date** 8-27-07
Field Personnel CJ / BS
Sample Organization Shaw Environmental
Identify MP

Depth to 45 (top) / 60 (bottom) **of screen (below MP)**
Pump Intake at (ft. below MP)
Purging Device (e.g., Redi Flo2)
PID Reading (ppm)

Clock Time 24 HR	Water Depth ft. below MP	Pump Setting[1]	Purge Rate mL/min	Cum. Volume Purged liters	pH	Spec. Cond. mS/cm	Turbidity NTU	DO mg/L	Temp. deg. C	ORP/Eh[2] mv	Comments
1405	36.64										
1420	37.20	146.9	300		7.20	1.77	101	9.59	13.37	92	
1425		146.9	300		6.74	1.73	33	3.63	13.69	48	
1430	38.00	146.9	300		6.71	1.71	34	3.02	13.81	40	
1435		146.9	300		6.71	1.70	34	2.75	14.01	37	
1440					6.72	1.67	34	2.57	14.23	33	
1445	Sample	Taken									

[1] Pump dial setting (e.g., hertz, cycles/min., etc.)
[2] Oxidation reduction potential (stand in for Eh)

Appendix B-3

ANL Geophysical Report

APPENDIX C.4.1: Geophysical Report

1. INTRODUCTION

SWMU 41 is located in the southeast section of the Main Manufacturing Area at Radford Army Ammunition Plant (RFAAP) and consists of two non-contiguous areas, an unlined lagoon (Area A) and a burial area (Area B). The lagoon is approximately 50x70-ft in size and the burial area is approximately 100x150-ft in size. The lagoon received ash material as well as runoff from washing trucks used to haul red water ash. The burial area is described as being lined with a clay soil and was used for the disposal of red water ash from approximately 1967 to 1971.

Argonne National Laboratory (ANL) performed surface geophysical surveys using two-dimensional resistivity profiling, seismic refraction tomography, and EM-31 electrical-conductivity mapping on the burial area of SWMU 41 during August through September 2002. Field inspection of the SWMU 41 lagoon (Area A) indicated that geophysical surveys were not necessary due to the obvious surface expression of this feature. ANL also performed vertical seismic profiles in the three monitoring wells adjacent to SWMU 41 to help guide the seismic interpretations. USACE collected downhole electrical and natural-gamma logs to help constrain the resistivity models.

2. OBJECTIVE

The SWMU 41 surveys were conducted in order to delineate potential burial locations within the burial area (Area A) of SWMU 41. Information obtained by the geophysical surveys was used in developing plans for follow-on focused studies relative to potential constituents in soil.

3. TECHNICAL APPROACH

Site conditions, intrusive sampling and remediation goals are critical in determining what geophysical techniques are appropriate for an investigation. RFAAP is underlain by carbonate rock (limestone and dolomite) that in places is structurally complex (folded and faulted) and contains clastic interbeds and tectonic breccias. Overburden sediments range from 0 to 60+ feet in thickness, and in the burial area, a clay liner may be present as well as an unspecified amount of red water ash.

Geophysical investigations provide subsurface geologic information using non-intrusive techniques, the data from which can often times are interpreted in more than one way. Therefore, the use of two or more geophysical methods, plus the integration of available geotechnical information, allows for a more constrained interpretation of the geophysical data.

Two-dimensional electrical resistivity imaging (2D-ERI), seismic refraction profiling/tomography, and electromagnetic (EM) terrain-conductivity mapping are applicable techniques that can map changes in the electrical (2D-ERI and EM) and acoustic (seismic) characteristics of the underlying soil and rock. These techniques provide complementary information about the subsurface, which can provide a more definitive interpretation of subsurface anomalies over that obtained using the techniques individually. Appendix D.2 describes in more detail the theory and operation of these methods.

In general, the underlying rock should have a higher seismic-velocity than the overburden sediment, and should be readily distinguishable on the resulting tomographic sections. A decrease in seismic velocity will occur where the rock is fractured (weak zones), less competent, or dominated solution cavity development.

The electrical response of the rock is more complex and depends on the type of strata present and the electrical properties of the pore fluid. Higher electrical-resistivity should occur if carbonate rock is present. Alternatively, the presence of an electrically conductive pore-fluid, or a significant clay

fraction, could yield lower-resistivities than expected. Air-filled fractures and voids would likely increase the electrical resistivity.

The disruption of the overburden sediment by activities associated with the burial area is expected to produce a zone of slightly lower seismic-velocity and lower electrical resistivity. In addition, the presence of buried material and degradation products may also lower the electrical response. Metallic debris at the site will also have a significant electromagnetic response during the EM surveys.

Prior to performing the geophysical surveys, a local grid system (geophysical grid) was established which covered the SWMU 41 area. URS Corporation used a Virginia Licensed Surveyor to locate the geophysical grid onto the reference frame established for the "RAAP Project Site Map, dated 8/19/92." GPS measurements were also collected by ANL staff at selected points within the geophysical grid, along the geophysical profiles, and at the 3 monitoring wells adjacent SWMU 41. The GPS used was a Trimble Pro XRS receiver with integrated, real-time differential correction provided by the Omnistar service, and is reported to have sub-meter accuracy. The GPS measured positions were converted into the NAD-83, Virginia State Plane (Zone 4502), US Survey Feet reference frame using Pathfinder Office Pro software (Trimble) and the USACE Corpscon program.

Comparison of the GPS positions with the RAAP Project Map locations indicated that the GPS points needed to be shifted approximately 2756 ft to the east, and around 1362 ft to the south in order to match the base map prepared for SWMU 41. Consistent scaling, such as that used for the SWMU 40/71 site, could not be used to rectify both coordinate frames, nor was it clear what actual reference-frame is being used for the site. Thus to accommodate site reporting and cleanup activities, locations given in this report conform with the horizontal datum established with the 1992 RAAP Project Site Map.

4. Geophysical Surveys

Geophysical surveys collected at the SWMU 41 burial area consisted of an EM-31 survey, two seismic refraction profiles, and 2 two-dimensional resistivity (2D-ERI) profiles (see Figure C.4.1). The EM-31 survey was added to the scope of work to help better guide the location of the 2D-ERI profiles. Vertical seismic profiling was also conducted in the three wells adjacent to SWMU 41 (41MW1, 41MW2, and 41MW3) in order to provide velocity measurements used for the seismic-modeling. Downhole electrical and natural-gamma logging conducted by USACE staff was used to help constrain the geophysical models.

EM-31 Terrain Conductivity Survey

Electromagnetic (EM) surveys were performed in the grid area shown on Figure C.4.1 with the objective of mapping likely disposal sites within the southern part of SWMU 41. It was expected that the activities involved in the construction of and disposal within the trench would alter the subsurface electrical properties. EM-31 measurements were collected along profiles spaced at 8 ft intervals in the approximate northeast-southwest direction and along profiles spaced at 16 ft in the approximate northwest-southeast direction. Quadrature-phase data were collected with the EM-31 for the SWMU 41 survey. EM measurements reflect a weighted average with greater weight given to shallower depths. The EM-31 was operated in the vertical dipole mode and 80% of the measured response correlates with material within the upper 10 ft of the subsurface, with the peak response occurring in the 1.6 to 8.2 ft depth range. The in-phase response of the EM-31, which indicates relative subsurface metal content, malfunctioned during the SWMU 41 survey.

Figure C.4.2 shows the conductivity anomaly map constructed from the EM-31 survey. Red-to-white colors indicate areas of relatively higher electrical conductivity, whereas blue-to-magenta colors areas of lower conductivity. The locations of the seismic and resistivity profiles are also shown in Figure C.4.2, as are the positions of the 3 monitoring wells and the ground-surface topography. Natural or background conditions are not inferred on Figure C.4.2 due to the limited area covered by the survey. A total range in electrical-conductivity of approximately 160 mS/m was measured at SWMU 41.

Two anomalies of relatively higher electrical conductivity are observed in the south central and southeast part of the map. The first anomaly is elongated along a rough NNW-SSE axis, and is approximately 120 ft in length and 20-30 ft in width. The second zone is approximately 30 ft in diameter. Based on the EM-31 conductivity data, this is likely the location of the 1967-1971 disposal area(s). The two anomalous areas may in fact be contiguous, separated by fill material of a different electrical signature. The larger area to the north, represented by the darker blue colors on Figure C.4.2, is not thought to be buried material. The gradational decrease in conductivity toward the edges of the site probably represents changes in the thickness and character of the overburden material, although it is possible that burial material is present at depths greater than that measured by the EM-31 (i.e. greater than ~10ft).

Seismic Surveys

Two seismic refraction profiles, 41-Seis-L1 and 41-Seis-L2, and three vertical seismic profiles were collected at SWMU 41 (see Figure C.4.1). A geophone spacing of 3 ft was used and shot points were spaced at approximately 16 ft intervals. Profile 41-Seis-L1 is approximately 330 ft in length, and 41-Seis-L2 160 ft in length. Profile 41-Seis-L1 is oriented parallel to the long axis of the burial area, and 41-Seis-L2 is roughly perpendicular to this axis. Vertical seismic profiles used a geophone spacing of 5 ft, and surveyed wells 41MW1, 41MW2, and 41MW3.

Figure C.4.3 shows the results for the three vertical seismic profiles collected at SWMU 41, which are used to provide in situ velocity measurements of the underlying soil and rock Data collection and processing steps are outlined in Appendix D.2. Survey results at SWMU 41 indicate that that the

limestone and dolostone units should have seismic velocities of about 8500 ft/s (2600 m/s) or greater. Overburden units are observed to range in velocity from 1500 ft/s (450m/s) to 5500 ft/s (1500m/s).

Figure C.4.4 shows the seismic modeling results for profiles 41-Seis-L1 (top panel) and 41-Seis-L2 (bottom panel). The profiles were processed using both refractor-layer (earth-layer) and tomographic models as described in Appendix D.2. Results are presented as color-contoured cross-sectional models with magenta-to-blue colors representing lower values, and red-to-white colors higher values. The earth-layer interfaces are shown as dark gray trace lines labeled as "SIPT Refractor", and also shown are the vertical seismic profiling results for wells 41MW1 and 41MW2 with their relative positions projected onto Profile 41-Seis-L1. Note that Well 41MW1 is approximately 60 ft distant from the profile, and 41MW2 about 40 ft.

Profile 41-Seis-L1 (top panel, Figure C.4.4) shows the bedrock surface dipping to the NW, dropping to approximately 60 ft below ground surface (bgs) at the NW end. Note that bedrock was observed on the access road to the NW of the profile (~20 ft lower in elevation), which requires the bedrock surface to begin sloping up to NW, beyond the end of the profile. Weathered rock was observed at the surface at the SE end of the profile. Here the model predicts upwards of 5 ft to top-of-competent-rock. The velocities obtained from tomographic modeling are consistent with results from the vertical seismic profiling. Two gentle sags are modeled on the bedrock surface centered at profile coordinates 100X and 235X. A zone of slightly lower bedrock velocity (11,000 ft/s versus 13,000 ft/s) is modeled beneath the sag from about 55X to 115X. Seismic velocities within the overburden do not appear to have discerned anomalous areas associated with disposal activities.

Profile 41-Seis-L2 (bottom panel, Figure C.4.4) models the top-of-rock at a depth consistent with that predicted by Profile 41-Seis-L1. The bedrock surface appears to rise towards the southwest to approximately 20 ft bgs. Bedrock velocities for 41-Seis-L2 are generally lower than observed for 41-Seis-L1, though this may be an artifact due to the short profile length versus bedrock depth, which limits the subsurface coverage. Obvious velocity anomalies are not present within the overburden along the seismic profiles to pinpoint possible disposal activities.

Resistivity Profiling

Two-dimensional resistivity data (2D-ERI) were collected along profiles 41-Resist-L1 and 41-Resist-L2 (see Figure C.4.1). These profiles were oriented to target the high electrical-conductivity feature observed in the EM-31 data (Figure C.4.2). Profile 41-Resist-L1 used 54 electrodes spaced at 6.5 ft intervals, providing a profile length of approximately 347 ft. Space constraints limited Profile 41-Resist-L2 to about 180 ft of lateral coverage, which required the 56 electrodes to be spaced at 3 ft intervals. Both Schlumberger and dipole-dipole arrays were used to collect the resistivity profiles (see Appendix D.2 for further explanation). Use of these array types allows discerning whether observed anomalies are modeling or data collection artifacts, and more credence is given to the results where models constructed from both array types show similar features.

Presented in Figure C.4.5 are the dipole-dipole results, which are shown as color-contoured cross-sectional models with magenta-to-blue colors representing lower values, and red-to-white colors higher values. Also shown are vertical seismic profiling results obtained in Well 41MW1, which is plotted at the approximate position of the perpendicular from each line to the well. Note that Well 41MW-1 is approximately 40 ft from either profile.

Profile 41-Resist-L1 (top panel, Figure C.4.5) maps an approximately 30 ft thick, and laterally continuous, zone of higher resistivity (>500 ohm-m) in the central to southeastern part of the profile (from 100X to 300X). The depth to top of this zone is consistent with where the seismic data indicates competent rock. Note that the bottom of this zone roughly coincides with a zone of lower velocity on the vertical seismic profile.

The high-resistivity zone becomes laterally discontinuous to the northwest suggesting the presence of either a lithologic break or a zone of weaker rock. Comparison with seismic velocities obtained for profile 41-Seis-L2 (bottom panel, Figure C.4.4), which crosses 41-Resist-L1 at approximately 45X,

also indicates the presence of weaker rock. The seismic model, however, predicts a lower bedrock elevation (1760 ft) than does the resistivity model (1770-1775 ft).

An approximately 6-10ft thick zone of low-resistivity (<10 ohm-m) is modeled between coordinates 110X and 290X on Profile 41-Resist-L1. This low-resistivity roughly coincides with the extent of electrically conductive zones (area of low-resistivity) mapped by the EM-31 survey. The 2D-ERI data indicates a maximum burial depth of approximately 10-12 ft bgs if the low-resistivity zone truly represents buried material. This area of low-resistivity may extend to greater depths to the northwest to approximately 50X on the profile.

Profile 41-Resist-L2 (bottom panel, Figure C.4.5) produced a similar model as that shown for 41-Resist-L1. The profile was oriented through the long axis of the EM conductivity anomaly (Figure C.4.2) in order to provide a depth estimate to the base of this feature. The low resistivity zone is about 10 ft in thickness, and extends approximately the same breadth as the EM anomaly (120 ft, from 25X to 155X).

5.0 Summary

Electromagnetic terrain-conductivity surveying, seismic refraction profiling, and two-dimensional electrical-resistivity imaging (2D-ERI) were conducted at SWMU 41 burial area in order to locate potential zones of buried material.

Electromagnetic surveys using the EM-31 instrument mapped a zone of increased electrical-conductivity within the south central and southeastern part of the survey area. These zones are interpreted as the area of the former burial area. The EM data indicates a limited area of disposal (Figure C.4.2), but does not rule out the area to the northwest due to greater depth to rock indicated by the seismic survey (Figure C.4.4).

Seismic refraction mapped the bedrock as a surface sloping towards the North and Northwest, with a slight decrease in velocity in the 50X to 115X on 41-Seis-L1, which is also observed on Profile 41-Seis-L2. This velocity change indicates rather tenuously a lithologic or structural break (consistent with a weaker bedrock zone modeled by 2D-ERI model for Profile 41-Resist-L1). Other significant structural features were not indicated for the bedrock.

2D-ERI profiling modeled a zone of extremely low-resistivity (<10 ohm-m) underlying the upper 10 ft of the ground surface. The spatial extent of these low-resistivity zones is consistent with the conductivity anomalies mapped by the EM-31. The 2D-ERI data suggests a limited depth of burial (<15 ft bgs).

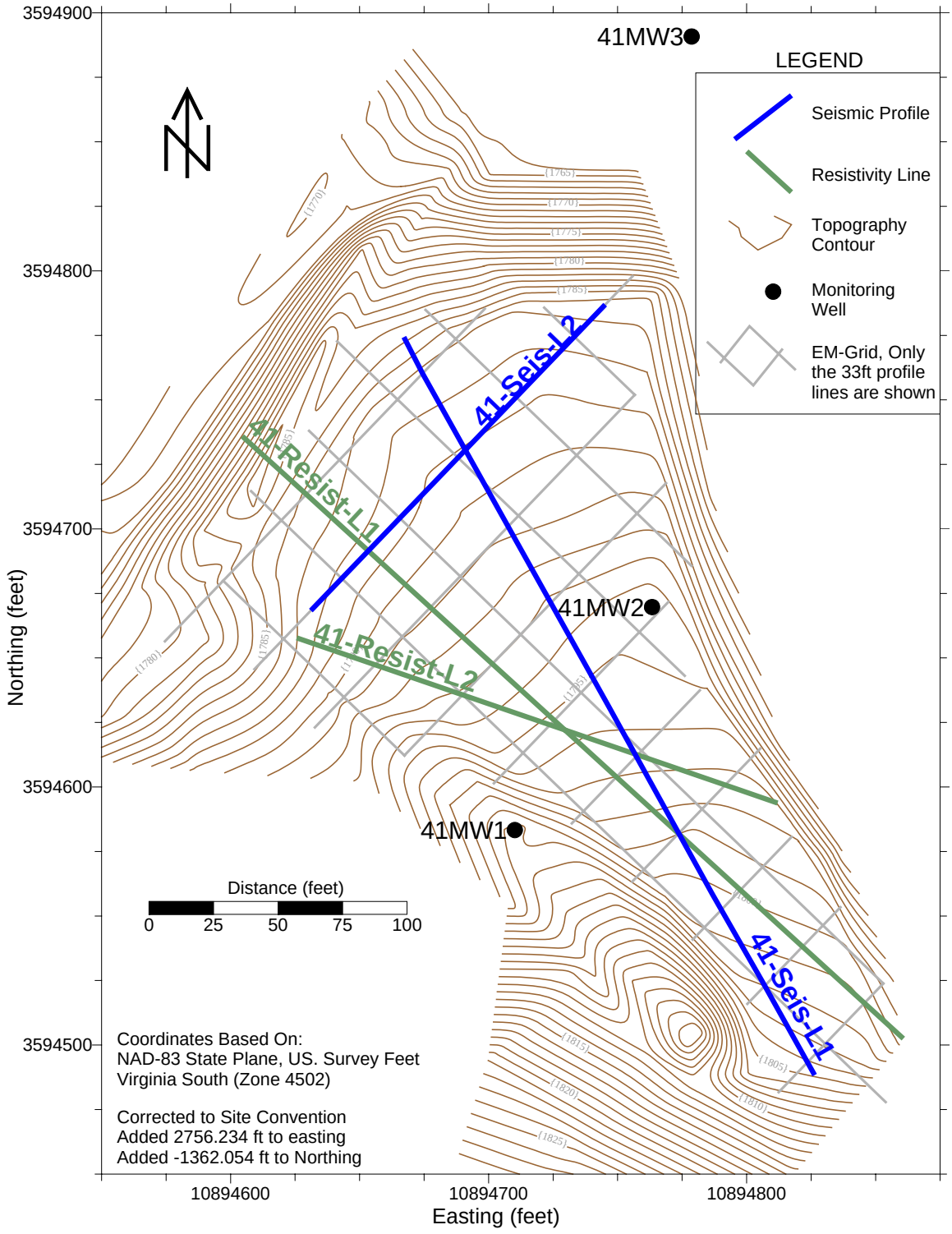


Figure C.4.1 SWMU 41 Base Map (Area A)

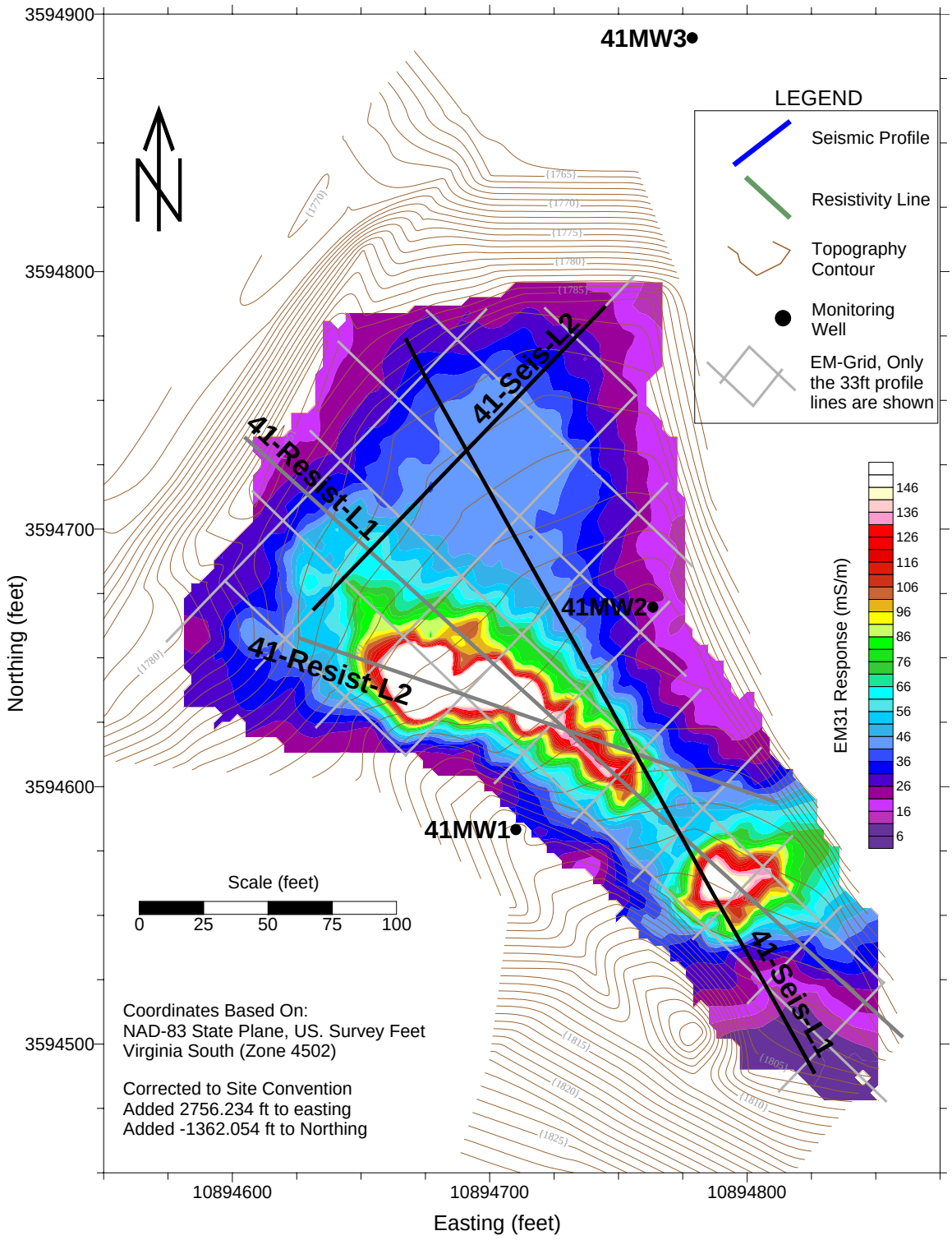


Figure C.4.2 EM-31 Conductivity Anomaly Map

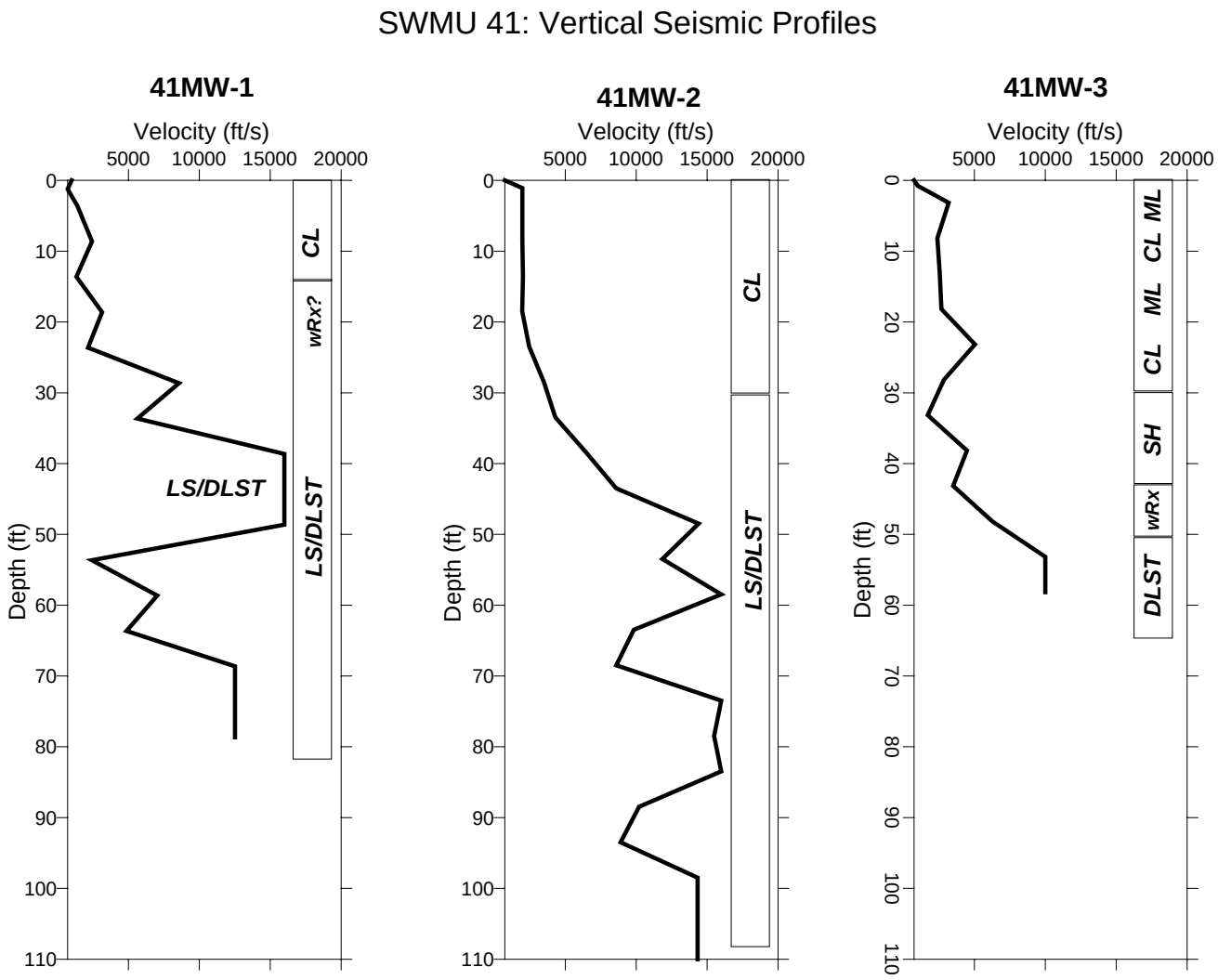


Figure C.4.3 Vertical Seismic Profiling at SWMU 41

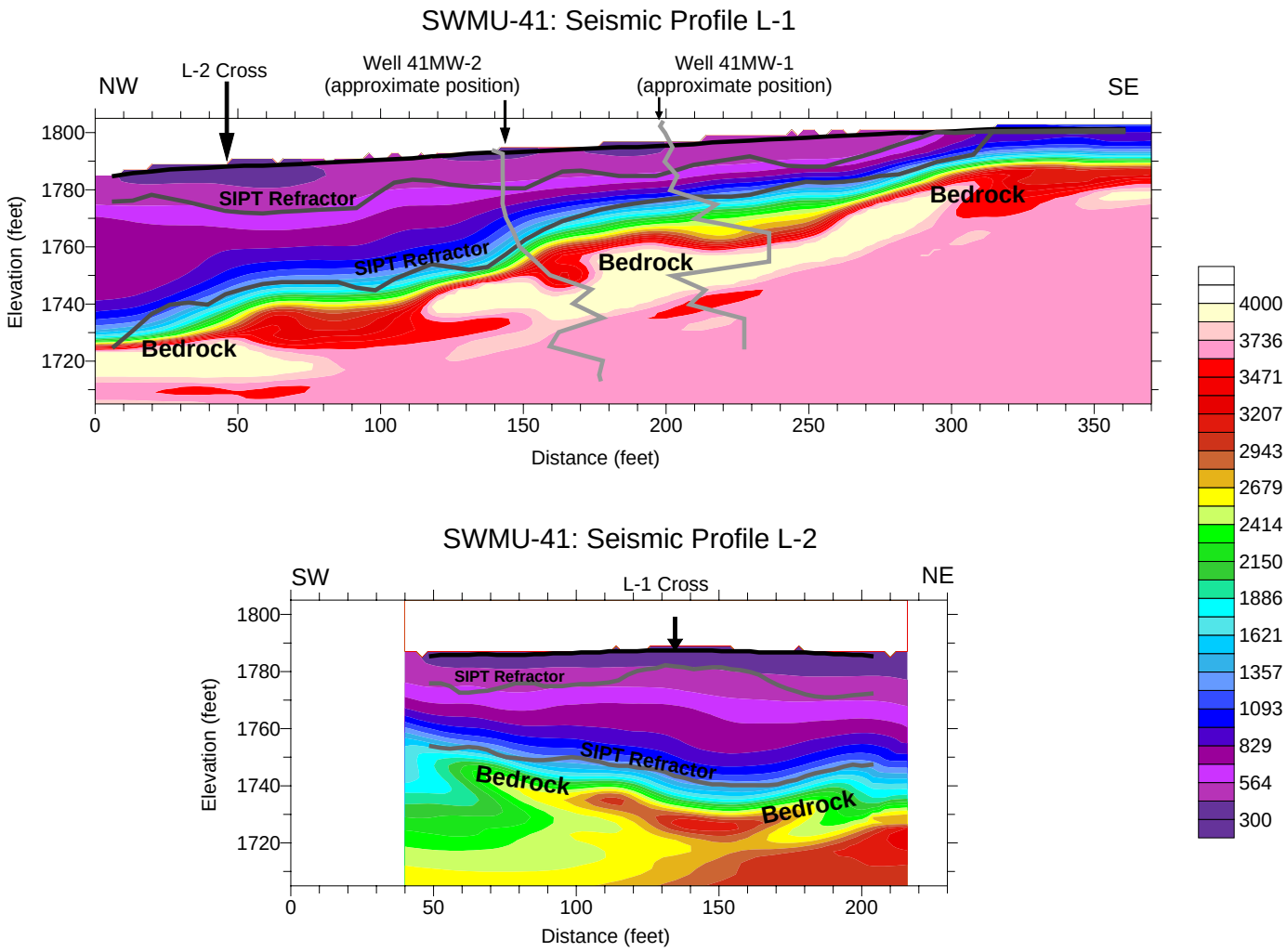


Figure C.4.4 Seismic Refraction Profiling Results

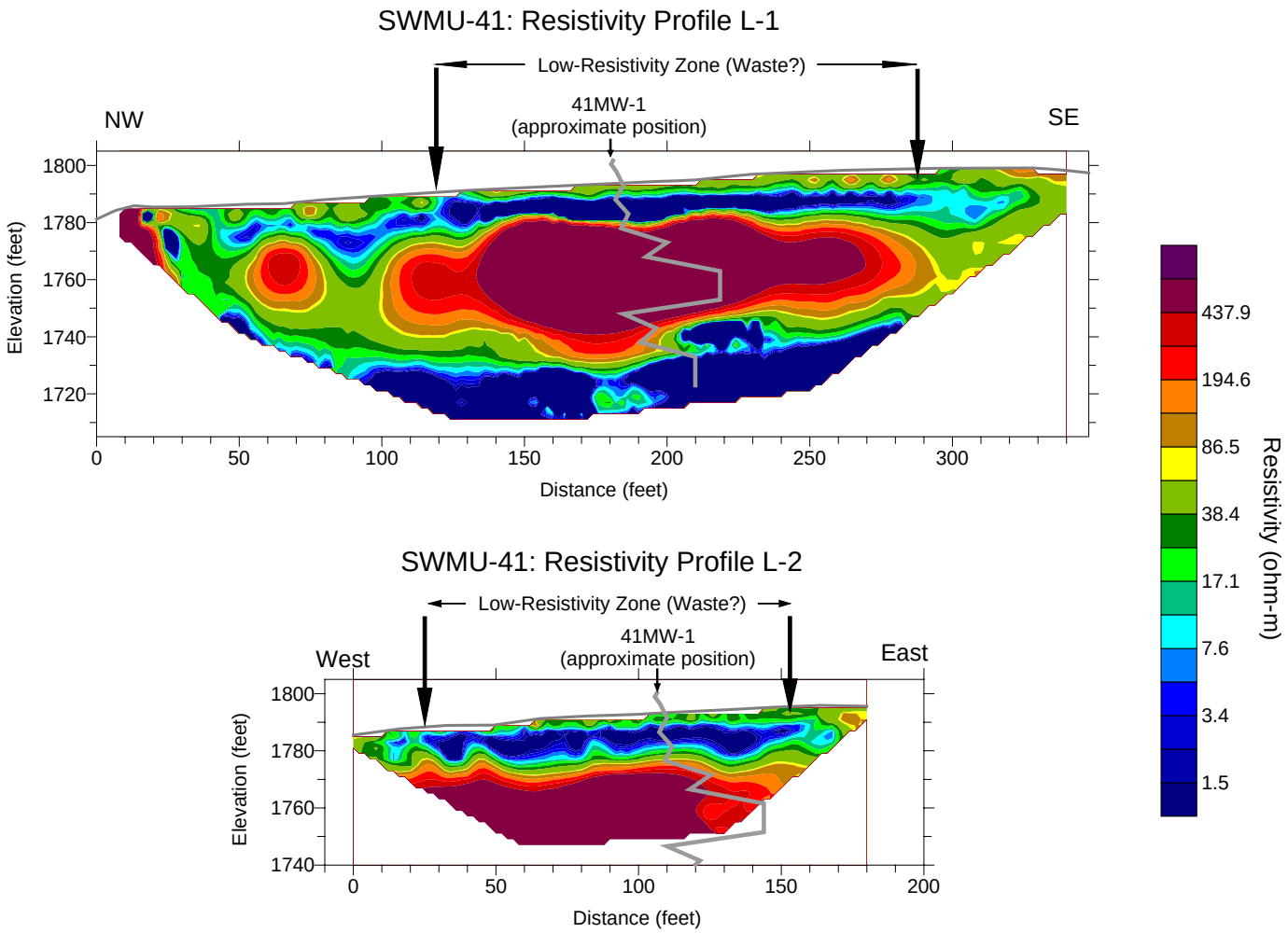


Figure C.4.5. 2D-ERI Model Results for SWMU 41

APPENDIX C.4.2: Geophysical Methods

Geophysical methods used in this investigation consisted of two-dimensional electrical resistivity imaging (2D-ERI), electromagnetic terrain-conductivity surveying (EM surveys), seismic refraction profiling (tomographic and earth-layer solutions), and vertical seismic profiling (check shots). The Radford specific standard operating procedure for geophysical surveys (SOP 20.7) covers EM surveys, and provides guidelines for vertical electrical sounding (VES) and horizontal electrical resistivity profiling, but does not cover the full two-dimensional resistivity and seismic refraction surveys used for this investigation. In order to meet data quality and project objectives, the following guidelines developed through ASTM International were used in the construction and implementation of the geophysical surveys; ASTM-D6431-99 for 2D-ERI profiling, ASTM-D5539-01 for the EM surveys, and ASTM-D5777-00 for the seismic-refraction surveys. Vertical seismic profiling was conducted following specific sections of ASTM-D65777-00 and ASTM-D4428M-00 (cross-hole surveys) that deal with the emplacement of receivers within a borehole, the selection of appropriate energy sources, and the parameters for recording the seismic signal. Appropriate sections of the USACE (1995) manual describing geophysical investigations were also used for the design and implementation of the geophysical surveys performed in this study.

2D Electrical Resistivity Imaging

Two-dimensional electrical resistivity imaging (2D-ERI) measures horizontal and vertical variations in the electrical-resistance of the subsurface. For the Radford Army Ammunition Plant, the underlying carbonate rock was expected to be of higher-electrical resistivity than the overburden sediment. The electrical response of the rock is probably more complex, depending on the type of strata present and the electrical properties of the pore fluid. Higher electrical-resistivity should occur if carbonate rock is present, though the presence of an electrically conductive pore-fluid, or a significant clay fraction, could alternately yield lower-resistivities than expected. In addition, weak or fractured zones within the carbonate rock should display changes in electrical character, from either an increase in resistivity for air-filled regions, to a decrease in resistivity for clayey intervals. Disposal activities within the overburden sediment were expected to produce a zone of lower electrical resistivity. In addition, the presence of buried material and degradation products may also lower the electrical response.

The Advanced Geosciences, Inc. (AGI) Sting/Swift™ system is an automatic multi-electrode system and earth resistivity meter that acquires data by passing an electric current between two electrodes and measuring the potential difference (voltage) between two separate electrodes. The measured voltage is a factor of the resistance of the earth material and the geometry of the electrode array (e.g. dipole-dipole, Schlumberger). Resistivity, an intrinsic property of the earth, is then calculated using the measured voltage, the amperage, and a geometric factor for the electrode array. The calculated resistivity value is actually an “apparent-resistivity” because it includes the resistances of the material that the electrical current passes through. A modeling procedure is then used to convert the measured apparent-resistivity data into earth-layer resistivity sections.

The electrodes used to measure the voltage difference are arranged in various geometries called arrays, and the calculated apparent-resistivity value is interpreted to represent a depth point at the center of an individual array. Depth of measurement is related to width of electrode separation, with greater electrode separation resulting in greater depths of penetration. Classically, two different techniques are used to assess the electrical resistivity of earth materials. In vertical electrical sounding (VES), electrodes are expanded about the center of an array to generate a layered electrical section at a single point (vertical profile). The lateral profiling technique uses an array with a fixed electrode separation, which is marched along a line to image lateral variations at a constant depth.

Two-dimensional electrical-resistivity imaging (2D-ERI) combines VES and lateral profiling into a single survey without the time-consuming process of constantly moving electrodes and reconnecting cables. In 2D-ERI a single cable connects a linear array of electrodes, which are turned on and off

using a preprogrammed sequence via a controller box. The raw apparent-resistivity data are typically displayed as a pseudosection where the lateral position of the measurement point is placed at the center of the corresponding electrode array, and the depth of the measurement increases with increasing electrode spacing. Apparent-resistivity pseudosections are useful for performing quality-control checks and for examining whether manmade objects (e.g. buried utilities) have impacted the data set.

Apparent-resistivity pseudosections are converted, through a process termed inversion, into an electrical-resistivity cross-section showing true subsurface resistivities. RES2DINV (Loke, 1996), a commercially available program, was used to perform the two-dimensional inversion modeling. During the inversion, the subsurface is divided into a number of blocks equal to or less than the number of measurement points. A smoothness-constrained, least-squares inversion routine is used to estimate the resistivity value of each block, and finite-element or finite-difference forward modeling is used to calculate the resulting pseudosection. The model is iteratively corrected until an apparent-resistivity pseudosection calculated from the model converges with the measured apparent-resistivity pseudosection. A root-mean-square (RMS) error calculation of the difference between the two apparent-resistivity pseudosections is used as a measure of the degree of fit for the model. Maximum convergence often occurs within 3 to 5 iterations, after which RMS values do not change significantly and the model may start to become unstable.

Electromagnetic Terrain-Conductivity Surveying

Electromagnetic-induction instruments are used to measure the electrical conductivity of the near surface, and can be used to locate buried metallic objects. A transmitter coil is used to induce an electrical current into the ground, and the receiver coil measures the strength of the secondary magnetic field generated by these currents. Two components of the secondary magnetic field are recorded: 1) the quadrature-phase component which is used to measure the ground conductivity, and 2) the inphase component which is used for metallic detection due to its extreme sensitivity to large metallic objects (Geonics Ltd., 1991). The electrical conductivity of the ground is nearly linearly proportional to strength of the quadrature-phase component and is given in units of milli-siemens per meter (mS/m). The inphase measurement is the ratio of the secondary magnetic field to the primary field, and is expressed in parts per thousands (ppt).

The coils can be oriented in either a vertical dipole or horizontal dipole configuration. For the vertical dipole case, the axes of the coils are oriented perpendicular to the ground surface, and for the horizontal dipole, the axes are parallel to the ground surface. For both cases, the coils are maintained in a coplanar state. The vertical dipole orientation is generally preferred over the horizontal dipole because it provides for a greater investigative depth and is less sensitive to near surface variations.

The separation between the transmitter and receiver coils is the primary component that assesses the depth of penetration. Table C.4-1 lists the depth of investigation for different coil orientations and separations for the Geonics EM-31 and EM-34 instruments. The “Practical Depth” is roughly the depth at which 80% of the instrument response has occurred, and the “Effective Depth Range” is the where the instrument’s overall response is the greatest. Thus, layers within the “Effective Depth Range” contribute most to the measured conductivity. The bolded numbers are for configurations used in this study.

Table C.4-1. Effective penetration depth of the EM-31 and EM-34 Instruments (bold items indicate methods used in this report)

Instrument	Coil Orientation	Practical Depth	Effective Depth Range
EM-31 (3.3 m)	Horizontal Dipole	5.5 ft (1.7 m)	0-5.5 ft (0-1.7 m)
	Vertical Dipole	10 ft (3 m)	1.6-8.2 ft (0.5-2.5 m)
EM-34 (20 m)	Horizontal Dipole	33 ft (10 m)	0-33 ft (0-10 m)
	Vertical Dipole	59 ft (18 m)	10-49 ft (3-15 m)

Conductivity values obtained in EM surveying represent weighted mean values of the layer conductivities from the ground surface to the maximum depth that is sensed by the EM instrument (McNeill, 1980). If the underlying rock or sediment is uniform, the measured conductivity value will be the true conductivity. The amount of contribution to the measured conductivity from a single layer depends on its conductivity, depth, and thickness. In general, deeper layers contribute less to the final value than do near-surface layers, as do layers outside the effective depth range.

Geonics EM-31

The EM-31 transmitter and receiver coils are housed in a 3.5m long sensor boom, and a single person can operate the instrument (Geonics, 1991). A nominal depth of investigation of 18-ft (5.5-m) is realized when measurements are made using the vertical-dipole mode. Measurements are collected at ½ second intervals, and the quadrature and inphase components are collected simultaneously. This allows discrimination between anomalies sourced by buried metallic objects from those that are either lithologically or hydrologically controlled. Additional information consisting of the profile position, starting, and ending points, as well as fiducial mark locations along the profile, were recorded with an OMNI 720 data logger (Polycorder). This information is then downloaded to a personal computer for processing and display.

Seismic Refraction Tomography

Seismic refraction provides acoustic velocity and layer depth information (Redpath, 1973). The refraction method generally depends on an increase in seismic-wave velocity (speed of sound through earth material) with depth, though the newer tomographic codes presently available have the capability of handling a velocity inversion (zones of lower seismic velocity underlying zones of higher velocity). Both a tomographic model and an earth-layer (refractor) cross-section were implemented as processing outputs from the refraction profiling. The commercially available GeoCT-II code was used to construct the tomographic model, and the SIPT software package was used to generate the earth-layer cross-section.

In the refraction method, the seismic energy (or wave) bends (refracts) at interfaces between layers of different velocities. In the special case where the seismic wave has been refracted parallel to the interface, the seismic energy travels along this interface, generating a head wave that returns to the surface. A linear array of acoustic receivers (geophones) was used to record the travel-time of the first returning seismic signal. This information was plotted on a time-distance graph; for the case of plane layer geometry, the time-distance plot showed distinct linear segments for each layer where the inverse of the slope of a segment is equivalent to the apparent seismic velocity for a particular layer.

A multi-channel, engineering seismograph was used to record the seismic refraction information, and either a 500-lb weight drop elastic wave generator (EWG) or a 16-lb. sledgehammer were used as the energy source. Geophones (seismic-receivers) were spaced at a 3 ft interval during surveying. Shot points were acquired at every fifth geophone position, which allows input to the tomographic modeling software.

The processing sequence for the refraction data consisted of:

- Picking first arrival times of return energy for each shot;
- Assigning the array-geometric to the first arrival data;
- Inverting the first-arrival information for velocity and depth using the SIPT algorithm (delay-time method); and
- Constructing a tomographic model of the first-arrival information using the GeoCT-II code from GeoTomo LLC.

The SIPT method took advantage of the reverse-spread geometry and far offset shot points of the survey to compute depths to interfaces below each geophone. The algorithm employed the delay-time method of Pakiser and Black (1957) to calculate depth and position of refraction horizons. The generated refraction model was further refined using a ray-tracing algorithm which overcomes difficulties associated with dipping or undulating horizons.

The GeoCT-II software used a nonlinear, wave front migration technique to generate the velocity-depth cross-section. The shot-receiver geometries, measured first-arrival time information, and a starting velocity model were used in the geophysical inversion. Other a priori constraints such as known velocities from borehole logging and vertical seismic profiling can be used to help guide the inversion. Because a starting model is required by GeoCT-II, the robustness of the solution must be tested using a suite of starting models.

For the RFAAP processing, starting models ranged from simple two-layer cases to vertical velocity gradients, and to the more complex SIPT solution. Different model outputs from GeoCT-II were compared in order to discern where possible modeling artifacts occur. The resulting velocity-depth cross-sections, regardless of the starting model, appeared to converge to the solutions presented in the report (based on the SIPT solution as starting model).

Vertical Seismic Profiling

Vertical seismic profiles (check shots) were used to measure the in-situ velocity of the sediment and rock penetrated by wells at the site. These data provided confirmatory velocity information for the refraction models. The general configuration for recording the downhole seismic data consisted of a three-component geophone, implementing 40Hz receiver elements. The downhole geophone was moved in 5-ft increments within the borehole (5-ft receiver spacing). A sledgehammer was used as the energy source, and is placed at offsets up to 15-ft from the borehole. Three additional geophones were placed on the surface at offsets up to 20-ft from the borehole, and were required to resolve shot-timing variations that occur when using impact sources.

The velocity of the earth material and the type of well construction used governed the placement of the sledgehammer source, vertical spacing of the downhole receiver, and the sampling rate. The objective was to record a seismic signal that has been transmitted through the earth, and not along the borehole wall or borehole casing. This required offsetting the shot point from 5 to 15 ft from the borehole so that the velocity of the near surface material (upper 30 ft) could be measured.

The vertical spacing used was primarily dependent on expected velocities within the subsurface and the recording limitations afforded by the seismic gear. Data recorded at the 0.1 ms interval (10,000 samples per second) used for RFAAP allowed discerning arrival time changes as small as 0.2 ms (twice the sampling interval). Given an expected velocity range of 10,000 to 25,000 ft/s, the 5 ft spacing used yielded theoretical arrival time changes from 0.2 to 0.5 ms.

Data processing consisted of the following:

- Picked first arrival energy for the downhole and reference geophones;
- Sorted the arrival-time data by depth point;

- Computed and applied shot-timing corrections using the arrival time picks obtained from the reference geophones;
- Computed the average velocity to a receiver station using the straight-line distance from the shot to the receiver and the corrected arrival time;
- Converted to vertical travel-time using the depth point for the receiver and the computed average velocities; and
- Computed interval velocities using least squares line-fitting algorithm to estimate the slope (inverse of velocity) between measurement points. The least-squares operator has the advantage of smoothing over small time-picking errors.
- Where available, the data were correlated with the lithologic information and other available borehole geophysical data.

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Appendix C

Sample Location Coordinates and Elevations

Appendix C
2002 RFI/RI Sample Location Coordinates and Elevations

Site ID	Northing	Easting	Elevation
SWMU 41			
41SW08	3596752.08	10892304.22	1722.54
41SW09	3596632.34	10892260.74	1718.22
41SW10	3596528.52	10892343.66	1704.95
41GW01	3596571.37	10892154.08	1733.95
41GW02	3596619.16	10892180.52	1739.21
41GW03	3596566.21	10892210.89	1733.30
41SD11	3595917.87	10892095.70	1788.84
41MW2	3596031.19	10892007.68	unknown
41MW3	3596250.44	10892023.40	unknown
41MW4	3596580.84	10892186.96	1734.80

* Coordinates are in VA State Plane (NAD 1983)

**Elevations are feet above mean sea level (NAVD 88)

Appendix D

Contaminant Fate and Transport

CONTAMINANT FATE AND TRANSPORT

D.1 TRANSFORMATION AND FATE OF CONTAMINANTS

When contaminants are exposed to the environment, the potential for transformations of the chemical exists. The endpoint of the transformation process is referenced as the “fate” of the chemical. The ultimate "fate" refers to the expected final state that an element, compound, or group of compounds will achieve following release to the environment. The fate processes for organic contaminants may include sorption, volatilization, hydrolysis, and abiotic and biotic degradation, while the fate processes for inorganic contaminants may include ion exchange, chemical speciation, and oxidation/reduction. These fate processes dictate how contaminants will be transported in the environment. Contaminants can be transported with little attenuation or retardation due to these fate processes, or they can be delayed or transformed so that little migration occurs. Various fate processes, as well as the properties that may affect the fate of contaminants, are discussed below.

D.1.1 Contaminant Properties Affecting Fate

The physical and chemical properties of contaminants play a large role in determining their fate after release to the environment. The following section provides a discussion of several of these key properties.

D.1.1.1 Specific Gravity

Specific gravity is the ratio of the density of a compound to the density of water. It is a measure of the tendency of a compound to float (specific gravity <1) or sink (specific gravity >1) in water. Contaminants that are immiscible in water can exist as separate phase liquids and are referred to as Light Non-Aqueous Phase Liquids (LNAPLs) if their specific gravity is less than one, or Dense Non-Aqueous Phase Liquids (DNAPLs) if their specific gravity is greater than one.

D.1.1.2 Water Solubility

The solubility of a compound in water is the maximum or saturated concentration of the compound in pure water at a specific temperature. Compounds with high solubility in water tend to remain in the aqueous phase and not partition to soil or sediment, are less likely to volatilize from water, and are generally more likely to biodegrade. Conversely, compounds with low water solubilities tend to partition to soil or sediment, volatilize more readily from water, and are less likely to be biodegradable. The solubility of inorganic chemicals varies widely from insoluble to greater than 100,000 mg/L, depending on temperature, pH, ORP, and the concentrations of dissolved constituents such as humic and fulvic acids.

D.1.1.3 Vapor Pressure

Vapor pressure is a property of a chemical in its pure state, which indicates how readily it will volatilize to the atmosphere. Volatilization from water is dependent upon vapor pressure and Henry’s Law Constant. Vapor pressures for chemicals in their pure states range from 0.001 to 760 mm mercury (mm Hg) for liquids to less than 10^{-10} mm Hg for solids.

D.1.1.4 Henry's Law Constant

The Henry's Law Constant of a compound is essentially the air/water partition coefficient. In dimensional form, the Henry's Law Constant is the ratio of the vapor pressure to the water

solubility (in atm-m^3/mole). The Henry's Law Constant indicates how a chemical will partition between air and water at equilibrium, and can be used to calculate the rate of volatilization of a chemical from water.

D.1.1.5 Organic Carbon/Water Partition Coefficient

The organic carbon/water partition coefficient (K_{oc}) is a measure of the tendency for a chemical to be sorbed to the organic fraction of soil and sediment. Normal K_{oc} values range from 1 to 10^7 L/kg, with higher values indicating greater sorption potential by the soil and lower values indicating high leaching capabilities for the contaminants from the waste source into surface runoff and groundwater.

D.1.1.6 Octanol/Water Partition Coefficient

The octanol/water partition coefficient (K_{ow}) is a measure of the distribution of a compound at equilibrium between n-octanol and water. The octanol/water partition coefficient, K_{ow}, gives an indication of how a compound will preferentially distribute into a solvent or water, and is a measure of how hydrophobic a compound is. A chemical with a high K_{ow} is hydrophobic and may be relatively immobile in an aqueous system (e.g., contaminant sorbs to soil particles), but may be mobilized in the presence of an organic solvent.

D.1.2 Fate of Organic Contaminants

D.1.2.1 Sorption

Sorption and desorption are two major mechanisms affecting the fate of contaminants in the subsurface. Sorption includes both adsorption and absorption. Adsorption is defined as the accumulation occurring at an interface, while absorption is the partitioning between two phases (Knox et al., 1993).

Sorption is the process by which a compound is retained onto a solid particle rather than remaining dissolved in solution. The sorption of contaminants to the soil matrix is an important factor affecting their transport in terrestrial environments. The sorption of contaminants to suspended sediments and bottom sediment is an important factor affecting chemical transport in aquatic environments.

In general, sorption reactions may be classified as either sorbent or solvent-motivated. Sorbent-motivated sorption occurs when an attraction between the sorbent (subsurface material) and the solute (contaminant), and the contaminant accumulates at the surface due to the affinity of the surface for the contaminant. An example of sorbent-motivated sorption would be a highly polar or ionizable contaminant interaction with the cation exchange sites of clay minerals. This type of sorption typically occurs with inorganics and is more commonly referred to as ion exchange. Solvent-motivated sorption occurs when the contaminant is hydrophobic, such as nonpolar organics, which prefer nonpolar phases to the polar water phase. Hydrophobic contaminants will accumulate at an interface or partition into a nonpolar phase (e.g., associate with the organic content of the subsurface medium) rather than partition into the water phase. The sorption of most neutral organic constituents falls into the category of hydrophobic, or solvent-motivated sorption (Knox et al., 1993). The best indicators of the partitioning of a compound between soil and water are the organic carbon/water partition coefficient (K_{oc}), the soil/water distribution coefficient (K_d), the octanol/water partition coefficient (K_{ow}), and the retardation factor (R).

For nonionic organic chemicals and aquifer materials, sorption is largely controlled by the clay and organic carbon content of the soil. The distribution of an organic chemical between water

and a specific soil matrix is characterized by the organic carbon/water partition coefficient, K_{oc}. This coefficient, which is based on the specific organic carbon content of the soil, is typically measured empirically using a linear adsorption isotherm where the partitioning between the two phases is determined by the following equation (Olsen and Davis, 1990):

$$K_d = \frac{C_s}{C_w} \qquad \textit{Equation 1}$$

where:

K_d = Soil/water distribution coefficient (L/kg)
C_s = Mass of the solute on the solid phase per unit mass of the solid phase (mg/kg)
C_w = Mass of the solute per unit volume of solution (mg/L)

The soil/water distribution coefficient, K_d, obtained from the above equation is then normalized to correct for variations in the organic carbon content of differing soil matrices to calculate K_{oc}:

$$K_{oc} = \frac{K_d}{f_{oc}} \qquad \textit{Equation 2}$$

where:

K_{oc} = Organic carbon/water partition coefficient (L/kg)
K_d = Soil/water distribution coefficient (L/kg)
f_{oc} = Fraction of organic carbon in the soil

The normalization of the adsorption coefficient to ascertain K_{oc} correlates well with other adsorption coefficient estimation methods which use other properties of the chemical such as water solubility or octanol/water partitioning (Callahan et al., 1979).

If the empirical K_d or K_{oc} value for the chemical is not available, the most widely accepted method of estimating the organic carbon/water partition coefficient involves the octanol/water partition coefficient, K_{ow}. The octanol/water partition coefficient, K_{ow}, has been correlated to water solubility, the organic carbon/water partition coefficient, and bioconcentration factors for aquatic life and represents the extent of partitioning by a chemical between organic and aqueous phases (Lyman et al., 1990). The relationship between K_{oc} and K_{ow} is expressed as a regression equation:

$$\log K_{oc} = a \log K_{ow} + b \qquad \textit{Equation 3}$$

where a and b are constants derived from specific data sets which represent differing classes of chemicals such as pesticides, aromatic compounds, and chlorinated hydrocarbons. Chemicals with low K_{ow} (i.e., less than 10 L/kg) are considered relatively hydrophilic and tend to have high water solubilities and small K_{oc} values. Conversely, hydrophobic compounds typically have K_{ow} values greater than 10^4 L/kg (Lyman et al., 1990). In general, the more hydrophobic a contaminant is, the more likely the contaminant will be sorbed to soil.

From Equation 1, when C_s is equal to zero, K_d also equals zero. Under this condition, no adsorption or retardation of the chemical occurs. This implies that the contaminant moves at the same velocity as the groundwater and in this case, the contaminant is termed a conservative or nonreactive solute. However, the velocity of the contaminant front can be substantially different for solutes that are adsorbed within the soil matrix. The retardation factor is defined as the ratio of the groundwater flow velocity to the contaminant front velocity:

$$R = 1 + \rho_b \frac{K_d}{n_e} \qquad \textit{Equation 4}$$

where:

R	=	Retardation factor (dimensionless)
θ_b	=	Bulk density of the soil (g/mL)
K_d	=	Distribution coefficient (mL/g)
n_e	=	Effective porosity of the soil (dimensionless)

The retardation factor indicates the extent of retardation of contaminant migration in groundwater due to adsorption. A retardation factor of 1.0 indicates that the contaminant has little tendency to bind to soils and, hence, moves freely in the groundwater. By contrast, the larger the R, the greater the tendency for a contaminant to bind to the soil matrix and the slower it will move in the groundwater. The retardation factor cannot fall below 1.0.

Other factors which affect the adsorption of chemicals to the soil matrix include temperature, pH of the soil and water, particle size distribution, and surface area of solids. The value of the distribution coefficient K_d usually decreases with increasing temperature because adsorption is an exothermic process. Neutral and slightly polarized organic compounds are somewhat affected by pH. Chemicals that tend to ionize are significantly affected by pH (Lyman et al., 1990). When the pH of the groundwater is approximately 1.0 to 1.5 units above the negative log of the acid dissociation constant (pK_a), adsorption becomes significant. A comparison of the pK_a of an organic acid with the pH of the groundwater indicates the potential importance of the dissociation of the organic compound in determining the degree of partitioning. The size of affected soil particles also plays a role in a contaminant's sorption characteristics. Particles of small size, such as particles of fine silt or clay, will have a greater tendency to adsorb chemicals.

D.1.2.2 Volatilization

Volatilization is a process whereby a compound changes state from the aqueous phase to the vapor phase. Compounds that do not adsorb onto soil/sediment or dissolve in water have the greatest tendency to volatilize. The volatility of a compound can be evaluated from its K_{oc} and by assessing its Henry's Law Constant. The value of K_{oc} indicates the degree of sorption of a compound to soil/sediment. A compound with a high K_{oc} value will have a reduced volatility because the compound sorbs extensively to the soil/sediment surface. The Henry's Law Constant can be considered the partition coefficient of the contaminant between the aqueous phase and the gas phase. A Henry's Law Constant of greater than 10^{-3} atm-m^3/mol indicates a high volatility, and a Henry's Law Constant of less than 10^{-5} atm-m^3/mol indicates a low volatility. **Table D-1** provides a rough outline of relative volatility of a solute according to its Henry's Law Constant.

Table D-1
Volatility of Compounds Based on Henry's Law Constants

Volatility	Henry's Law Constant
Volatilization is very slow, at a rate controlled by slow diffusion through air	$< 10^{-5}$ atm-m^3/mol
Volatilization is not rapid but significant	10^{-5} atm-m^3/mol to 10^{-3} atm-m^3/mol
Volatilization is rapid	$> 10^{-3}$ atm-m^3/mol

The Henry's Law Constant is related to other physical properties of the compound, the most important of which are vapor pressure and water solubility. Compounds exhibiting high vapor pressures and low water solubilities tend to have high volatilization rates. In fact, in the absence of literature values, Henry's Law Constants can be estimated from the following equation (Olsen and Davis, 1990):

$$H = \frac{(V_p)(MW)(16.04)}{(WS)(T)} \qquad \textit{Equation 5}$$

where:

V_p = Vapor pressure of the chemical (mm Hg)
MW = Molecular weight of the chemical (g/mol)
WS = Solubility in water (mg/L)
T = Temperature (^oK)
H = Henry's Law Constant ([mg/L]/[mg/L])

From this equation, it is evident that the volatilization of a compound to air will depend on its vapor pressure, water solubility, and temperature. Other important factors affecting volatilization include wind speed, the depth of the aquifer, and the geology of the unsaturated zone.

D.1.2.3 Hydrolysis

Hydrolysis is the reaction of a compound with water. It usually involves the introduction of a hydroxyl (-OH) group into an organic compound, usually at a point of unbalanced charge distribution (Cherry et al., 1983). The hydrolysis reaction can displace halogens, and may be catalyzed by the presence of acids, bases, or metal ions. Therefore, the rate of hydrolysis is pH and metal-ion concentration dependent. Surface effects also may affect the rate of hydrolysis. Halogenated aliphatics are susceptible to hydrolysis, with reactions proceeding most rapidly for monohalogenated compounds, and much more slowly as the number of halogen ions increases (Fetter, 1993).

Hydrolysis applies to a limited number of chemicals. These contain hydrolyzable groups, such as esters, aliphatic halogens, amides, carbamates, and phosphate esters (Howard, 1991). Compounds that are not susceptible include: alkanes, alkenes, aldehydes, amines, and carboxy-containing compounds (Olsen and Davis, 1990).

D.1.2.4 Abiotic Degradation

Abiotic degradation is the chemical degradation of compounds without the assistance of biological activities. In the natural environment, the most common abiotic degradation processes are hydrolysis and hydroxyl radical reactions. Other abiotic degradation processes include direct photolysis, dehydrohalogenation, and oxidation.

Hydrolysis, as mentioned above, is a chemical reaction in which compounds react with water molecules in the environment, resulting in the introduction of a hydroxyl group (-OH) and the loss of a leaving group (-X), typically a halogen.

$$RX + H_2O \rightarrow ROH + HX \ (or\ H^+, X^-) \qquad Equation\ 6$$

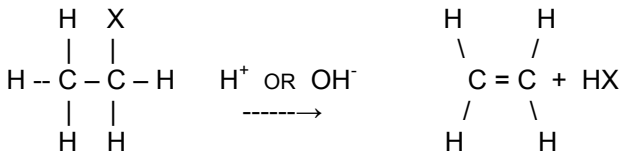
These reactions are catalyzed mainly by hydronium (H_3O^+) and/or hydroxyl ions (OH^-). Therefore, as mentioned above, hydrolysis reactions are pH dependent. Selected metals may also catalyze a hydrolysis reaction (Olsen and Davis, 1990).

Hydroxyl radical reactions are reactions with hydroxyl radicals photochemically generated from sunlight. These reactions may occur mostly in the atmosphere and to a lesser degree in surface water. Once the free radicals are formed, they will react with organic molecules to form an intermediate organic-free radical, which usually reacts further with other compounds. For most chemicals in the atmosphere, reaction with photochemically-generated hydroxyl radicals is the most common degradation process. For many chemicals, experimental reaction rate constants for reactions involving hydroxyl radicals are available in the scientific literature and are used to calculate an estimated half-life by assuming an average hydroxyl radical concentration of $5x10^5$ molecules/cm^3 in non-smog conditions (Howard, 1991).

Occasionally, other reactions besides hydroxyl radical reactions occur in the atmosphere such as ozone oxidation and direct photolysis. Direct photolysis is a photochemical alteration of the compound as a result of the compound absorbing direct sunlight. The possibility of direct photolysis in air or water can be partially assessed by examining the UV spectrum of the chemical. If the chemical does not absorb sunlight at wavelengths greater than 290 nm, the chemical cannot directly photolyze.

Dehydrohalogenation is an elimination reaction in which an alkyl derivative will eliminate HX to form an alkene, where X is commonly a halogen, hydroxyl radical, or ester group:

Equation 7



D.1.2.5 Biotic Degradation

Biodegradation is the process in which the chemical degradation of a compound is assisted by soil microorganisms (e.g., fungi, bacteria). Reactions include oxidation, reduction, hydrolysis, and sometimes rearrangement of the molecule. Though biodegradation may occur very slowly for some compounds, the eventual mineralization of almost every organic compound in the

terrestrial and aquatic environment can be attributed to biodegradation (Alexander, 1978). A typical range of half lives for different degradation rates are summarized in **Table D-2**.

Rates of biotic degradation depend on many factors. Microorganisms require a carbon source (e.g., organic matter), an electron acceptor (e.g., oxygen, nitrate), nutrients (e.g., nitrogen, phosphorus), and various trace elements in order to maintain existing cells and produce new cells. Many environmental factors can also serve to limit the occurrence of microbial metabolism in the subsurface. These factors include pH, temperature, toxics, substrate concentration, and the presence of microbes. Most bacteria find the optimum pH range to be 6.5 to 7.5 and are not able to survive at pH values greater than 9.5 or below 4.0 (Knox et al., 1993). Microbial activity generally increases with increasing temperature. The presence of certain compounds may also be toxic to microorganisms. Heavy metals, acids, bases, or high concentrations of the substrate can serve to limit microbial activity. Finally, for biotic degradation to occur in the subsurface, microbes capable of metabolizing (or cometabolizing) the substrate must be present.

Table D-2
Rate of Biodegradation Based on Half Lives

Biodegradation Rate	Approximate Biodegradation Half-Life
Fast	1 day to 7 days
Moderately Fast	7 days to 4 weeks
Slow	4 weeks to 6 months
Resistant	6 months to 1 year

Complete biotic degradation of organic chemicals by microorganisms, utilizing enzymes to facilitate degradation, ultimately produces microbial cells, water, and carbon dioxide, which eventually lead to mineralization of the compound. Whether or not a chemical is transformed by enzymes depends on the configuration alignment of the enzyme with the organic chemical during the reaction. If an ideal configuration of the enzyme with organic chemicals occurs, the reaction will occur. Persistent chemicals have less favorable alignments, and non-reacting or recalcitrant chemicals fail to bond or produce favorable alignments.

Biotic degradation can be either aerobic or anaerobic. An aerobic reaction occurs in the presence of oxygen. Aerobic reactions occur in oxygen-rich environments such as surface soil (i.e., 0 to 6 inches bgs) and upper layers of sediment. An aerobic reaction is usually an oxidation reaction. An anaerobic reaction occurs in the absence of oxygen. Anaerobic reactions occur in such places as the saturated zone in terrestrial environments and the bottom layer of sediment in aquatic environments. Because of the lack of oxygen in these environments, an anaerobic reaction usually favors dehydrohalogenation reactions or reductive reactions.

D.1.3 Fate of Inorganic Contaminants

D.1.3.1 Ion Exchange

Metals in soil are generally immobile, particularly under neutral or alkaline conditions, and tend to sorb to soil particles. As described in *Section D.1.2.1*, sorption can be considered as either

sorbent- or solvent-motivated. Solvent-motivated sorption (partitioning) typically occurs for nonpolar, hydrophobic organic chemicals in groundwater by accumulation occurring on the organic content of the media. Ion exchange is sorbent-motivated sorption and occurs for inorganic chemicals due to an affinity of the solid surface for the compound. Typically, the sorbent surface contains a charge deficiency and requires the accumulation of ions near the solid/liquid interface to neutralize the surface charge. In subsurface media, the mineral fraction most commonly involved in ion exchange is the clay fraction (Knox et al., 1993). Ion exchange occurs when the sorbent charge deficiency can be neutralized more efficiently by ions in solution than by those ions currently adsorbed. For example, if sodium ions (monovalent) have accumulated and calcium ions (divalent) suddenly appear, the excess surface charge can be more efficiently neutralized by the calcium ions than by sodium. Thus, the sodium ions will desorb, the calcium ions will adsorb, and an exchange of ions occurs. The cation exchange capacity of a given aquifer material indicates the probable type and amount of clay minerals present, and can be used as an indication of the ability of a soil to attenuate cations found in the groundwater (Makeig, 1982).

D.1.3.2 Chemical Speciation

Most inorganic chemicals occur in more than one ionic form, or species, in soils and groundwater. These species, which form as a result of hydrolysis, oxidation/reduction, and complexation reactions, may have different valences and mobilities in groundwater due to different affinities for adsorption and different solubility controls. Simple ionic species often combine with ligands to form ionic or neutral-charge aqueous complexes. The major inorganic ligands in groundwater are generally Cl^-, HCO_3^{-2}, CO_2, and SO_4^{-2}, and in some cases, NH_3, NO_3^- and F^- (Cherry et al., 1983). Environmental conditions which affect speciation of inorganic chemicals include pH, redox potential, and inorganic ligands.

D.1.3.3 Oxidation/Reduction

Oxidation and reduction ("redox") refers to the transfer of electrons and the resultant species change of ions or compounds. Oxidation is the loss of electrons, while reduction is the gain of electrons. Redox processes are important because they can cause changes in the mobility of many inorganic compounds. The ability of a redox reaction to occur is a function of the redox potential. The redox potential is defined in terms of the negative logarithm of the free-electron activity and is referred to as pE. The redox potential can also be expressed in terms of volts (E_h). Low values of pE indicate high electron activity and favor electron-rich species (reduced). High values of pE indicate low electron activity and favor electron-poor species (oxidized).

D.2 TRANSPORT OF CONTAMINANTS

Contaminant transport refers to the mechanisms and rates of migration of contaminants away from the source area. Migration pathways often include air, water, soil, and the interfaces between the phases of the contaminant (i.e., solid, liquid, or gas). Mechanisms controlling the movement of contaminants include advection, dispersion, diffusion, volatilization, and sorption. These mechanisms are dictated by the physical and chemical nature of the environmental media and their interaction with the potential COCs. Water pathways include surface water, storm water runoff, groundwater, infiltration/percolation, and precipitation. The air pathways include uptake into the atmosphere and deposition from it either in a dry or wet form. The soil pathways include sediment and soil transported by erosion or by site activities such as construction and movement through the vadose zone as soil gas. Transport across an interface is primarily due to

partitioning. The degree of partitioning will depend on the volatility, solubility, and sorptive capacity of the phases. The primary transport mechanisms across the water-air and soil-air interfaces are volatilization and sorption, while transport across the soil-water interface is controlled by sorption/desorption and dissolution (solubilization).

D.2.1 Advection

Contaminant transport by advection occurs when the contaminant is moved in and with the bulk flow of either water or the atmosphere. The primary advective transport pathway at Building 4343 is migration into surface water.

D.2.2 Diffusion

Transport by diffusion is the result of a concentration gradient in the contaminant plume or the soil gas within the vadose zone. The rate of diffusion is expressed by the diffusivity coefficient, which is affected by temperature, pressure, density, and soil porosity. Diffusion in soil is strongly dependent on the effective porosity of the soil. Residual clays have high porosity but low effective (interconnected) porosity. Transport due to diffusion in clays is usually minimal.

D.2.3 Volatilization

Volatilization occurs when a liquid changes its phase to a gas. This is primarily a mechanism for organic contaminants migrating from the soil or surface water to the air. Volatilization is a mass transfer process that is limited by a compound's solubility in water, molecular weight, vapor pressure, K_{oc} value, and by the local temperature.

D.2.4 Sorption

As discussed previously, sorption is a general term used in place of the specific terms absorption or adsorption. Adsorption describes the process whereby a contaminant is bound to the surface of a medium, whereas absorption occurs when the contaminant is bound within the medium. The distinction between the two is not always relevant, but the fact that a contaminant has been sorbed indicates that it has been bound to its new medium and will be transported with this new medium. This transport mechanism may be significant when a high concentration of suspended solids is found in water samples.

Desorption is the release (leaching) of a contaminant from the sorbent phase. Sorption/desorption is a primary mechanism of transport for water and soil pathways. In a water-soil environment, soil is the adsorbent and the contaminants are the adsorbates. Sorption/desorption of organic and inorganic compounds within soil-water systems is assessed by several physical and chemical properties of both the compound and the soil or sediment (*Section D.1.2.1*).

Appendix E

HHRA Tables and Statistical Comparison Results

Appendix E-1

RAGS Part D Tables

SWMU 41A

Table E.1-1
Selection of Exposure Pathways - SWMU 41A

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Surface Soil	Surface Soil	SWMU 41A	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact surface soil at SWMU 41A and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact surface soil at SWMU 41A and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	None	There are no workers currently exposed to surface soil at SWMU 41A on a daily basis.
						Dermal	On-site	None	There are no workers currently exposed to surface soil at SWMU 41A on a daily basis.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
		Air	SWMU 41A	Maintenance Worker	Adult	Inhalation	On-site	Quant	Maintenance workers could be exposed to airborne volatiles or particulate matter released from surface soil at SWMU 41A.
				Industrial Worker	Adult	Inhalation	On-site	None	There are no workers currently exposed to airborne volatiles or particulates from surface soil at SWMU 41A on a daily basis.
				Trespasser	Adolescent	Inhalation	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Total Soil (Surface and Subsurface)	Total Soil (Surface and Subsurface)	SWMU 41A	None	None	None	On-site	None	Currently excavation or construction activities are not occurring at SWMU 41A.
	Sediment	Sediment	SWMU 41A	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact sediment at SWMU 41A and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact sediment at SWMU 41A and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	None	There are no workers currently exposed to sediment at SWMU 41A on a daily basis.
						Dermal	On-site	None	There are no workers currently exposed to sediment at SWMU 41A on a daily basis.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Surface Water	Surface Water	SWMU 41A	Maintenance Worker	Adult	Ingestion	On-site	None	Maintenance workers could contact surface water at SWMU 41 while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Maintenance workers could contact surface water at SWMU 41A and be exposed to COPCs via dermal absorption while wading.
				Industrial Worker	Adult	Ingestion	On-site	None	There are no workers currently exposed to surface water at SWMU 41A on a daily basis.
						Dermal	On-site	None	There are no workers currently exposed to surface water at SWMU 41A on a daily basis.

Table E.1-1
Selection of Exposure Pathways - SWMU 41A

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current (cont.)	Surface Water (cont.)	Surface Water	SWMU 41A	Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Groundwater	Groundwater	SWMU 41A	None	None	None	On-site	None	Groundwater is not currently being used at SWMU 41A. Therefore, there is currently no direct exposure to groundwater.
		Air	Volatile groundwater COPCs released to ambient air	Maintenance Worker	Adult	Inhalation	On-site	Quant	Volatiles could be released from groundwater into ambient air. Maintenance workers could be exposed via inhalation.
Future	Surface Soil	Surface Soil	SWMU 41A	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact surface soil at SWMU 41A and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact surface soil at SWMU 41A and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial workers could contact surface soil at SWMU 41A and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Industrial workers could contact surface soil at SWMU 41A and be exposed to COPCs via dermal absorption.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
		Air	SWMU 41A	Maintenance Worker	Adult	Inhalation	On-site	Quant	Maintenance workers could be exposed to airborne volatiles or particulate matter released from surface soil at SWMU 41A.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Industrial workers could be exposed to airborne volatiles or particulate matter released from surface soil at SWMU 41A.
				Trespasser	Adolescent	Inhalation	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Total Soil (Surface and Subsurface)	Total Soil (Surface and Subsurface)	SWMU 41A	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact soil at SWMU 41A and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact soil at SWMU 41A and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial workers could contact soil at SWMU 41A and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Industrial workers could contact soil at SWMU 41A and be exposed to COPCs via dermal absorption.
				Excavation Worker	Adult	Ingestion	On-site	Quant	Excavation workers could contact soil at SWMU 41A and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Excavation workers could contact soil at SWMU 41A and be exposed to COPCs via dermal absorption.

Table E.1-1
Selection of Exposure Pathways - SWMU 41A

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future (cont.)	Total Soil (Surface and Subsurface)	Total Soil (Surface and Subsurface)	SWMU 41A	Resident	Adult	Ingestion	On-site	Quant	If SWMU 41A were to be further developed for residential purposes, residents could be exposed to COPCs in total soil via ingestion. The residential scenario is not considered to be a reasonably anticipated land use; however, it is being included in this evaluation to meet "clean closure" requirements under RCRA.
						Dermal	On-site	Quant	If SWMU 41A were to be further developed for residential purposes, residents could be exposed to COPCs in total soil via dermal absorption.
					Child	Ingestion	On-site	Quant	If SWMU 41A were to be further developed for residential purposes, residents could be exposed to COPCs in total soil via ingestion. The residential scenario is not considered to be a reasonably anticipated land use; however, it is being included in this evaluation to meet "clean closure" requirements under RCRA.
						Dermal	On-site	Quant	If SWMU 41A were to be further developed for residential purposes, residents could be exposed to COPCs in total soil via dermal absorption.
				Trespasser	Adolescent	Ingestion	On-site	None	Given the industrial nature of the site, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Given the industrial nature of the site, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
		Air	SWMU 41A	Maintenance Worker	Adult	Inhalation	On-site	Quant	Maintenance workers could be exposed to airborne volatiles or particulate matter released from soils at SWMU 41A.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Industrial workers could be exposed to airborne volatiles or particulate matter released from soils at SWMU 41A.
				Excavation Worker	Adult	Inhalation	On-site	Quant	Excavation workers could be exposed to airborne volatiles or particulate matter released from soils at SWMU 41A.
				Resident	Adult	Inhalation	On-site	Quant	If SWMU 41A were to be further developed for residential purposes, residents could be exposed to airborne volatiles or particulate matter released from total soil.
					Child	Inhalation	On-site	Quant	If SWMU 41A were to be further developed for residential purposes, residents could be exposed to airborne volatiles or particulate matter released from total soil.
				Trespasser	Adolescent	Inhalation	On-site	None	Given the industrial nature of the site, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Sediment	Sediment	SWMU 41A	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact sediment at SWMU 41A and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact sediment at SWMU 41A and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial workers could contact sediment at SWMU 41A and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Industrial workers could contact sediment at SWMU 41A and be exposed to COPCs via dermal absorption.
				Excavation Worker	Adult	Ingestion	On-site	Quant	Excavation workers could contact sediment at SWMU 41A and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Excavation workers could contact sediment at SWMU 41A and be exposed to COPCs via dermal absorption.
				Resident	Adult	Ingestion	On-site	Quant	Adult residents could contact sediment at SWMU 41A and be exposed to COPCs via incidental ingestion during wading.

Table E.1-1
Selection of Exposure Pathways - SWMU 41A

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
						Dermal	On-site	Quant	Adult residents could contact sediment at SWMU 41A and be exposed to COPCs via dermal absorption during wading.
Future (cont.)	Sediment (cont.)	Sediment	SWMU 41A	Resident	Child	Ingestion	On-site	Quant	Child residents could contact sediment at SWMU 41A and be exposed to COPCs via incidental ingestion during wading.
						Dermal	On-site	Quant	Child residents could contact sediment at SWMU 41A and be exposed to COPCs via dermal absorption during wading.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Surface Water	Surface Water	SWMU 41A	Maintenance Worker	Adult	Ingestion	On-site	None	Maintenance workers could contact surface water at SWMU 41A while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Maintenance workers could contact surface water at SWMU 41A and be exposed to COPCs via dermal absorption while wading.
				Industrial Worker	Adult	Ingestion	On-site	None	Industrial workers could contact surface water at SWMU 41A while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Industrial workers could contact surface water at SWMU 41A and be exposed to COPCs via dermal absorption while wading.
				Excavation Worker	Adult	Ingestion	On-site	None	Excavation workers could contact surface water at SWMU 41A while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Excavation workers could contact surface water at SWMU 41A and be exposed to COPCs via dermal absorption while wading.
				Resident	Adult	Ingestion	On-site	Quant	Residents could contact surface water at SWMU 41A while wading. Surface water ingestion while wading is considered unlikely.
						Dermal	On-site	Quant	Adult residents could contact surface water at SWMU 41A and be exposed to COPCs via dermal absorption while wading.
					Child	Ingestion	On-site	Quant	Residents could contact surface water at SWMU 41A while wading. Surface water ingestion while wading is considered unlikely.
						Dermal	On-site	Quant	Child residents could contact surface water at SWMU 41A and be exposed to COPCs via dermal absorption while wading.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Groundwater	Groundwater	SWMU 41A	Maintenance Worker	Adult	Ingestion	On-site	None	Maintenance workers would not contact groundwater at SWMU 41A.
						Dermal	On-site	None	Maintenance workers would not contact groundwater at SWMU 41A.
				Industrial Worker	Adult	Ingestion	On-site	Quant	If SWMU 41A were to be further developed for industrial purposes and groundwater wells were installed at the site, site workers could be exposed to COPCs in groundwater via ingestion.

Table E.1-1
Selection of Exposure Pathways - SWMU 41A

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
						Dermal	On-site	None	Although site worker dermal exposures to groundwater could occur, the exposed body surface area of a worker (i.e., hands and arms) would be small and exposures would be infrequent.
Future (cont.)	Groundwater (cont.)	Groundwater	SWMU 41A	Excavation Worker	Adult	Ingestion	On-site	None	Based on the depth to groundwater, excavation workers would not contact groundwater at SWMU 41A.
						Dermal	On-site	None	Based on the depth to groundwater, excavation workers would not contact groundwater at SWMU 41A.
				Resident	Adult	Ingestion	On-site	Quant	If SWMU 41A were to be further developed for residential purposes, residents could be exposed to COPCs in groundwater via ingestion. The residential scenario is not considered to be a reasonably anticipated land use; however, it is being included in this evaluation to meet "clean closure" requirements under RCRA.
						Dermal	On-site	Quant	If SWMU 41A were to be further developed for residential purposes, residents could be exposed to COPCs in groundwater via dermal absorption.
					Child	Ingestion	On-site	Quant	If SWMU 41A were to be further developed for residential purposes, residents could be exposed to COPCs in groundwater via ingestion. The residential scenario is not considered to be a reasonably anticipated land use; however, it is being included in this evaluation to meet "clean closure" requirements under RCRA.
						Dermal	On-site	Quant	If SWMU 41A were to be further developed for residential purposes, residents could be exposed to COPCs in groundwater via dermal absorption.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely.
		Homegrown fruits and vegetables	SWMU 41A	Resident	Adult	Ingestion	On-site	Quant	Residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables.
					Child	Ingestion	On-site	Quant	Residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables.
		Air	Volatile groundwater COPCs released to ambient air	Maintenance Worker	Adult	Inhalation	On-site	Quant	Volatiles could be released from groundwater into ambient air. Maintenance workers could be exposed via inhalation.
			Indoor Vapors	Industrial Worker	Adult	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into buildings via vapor intrusion.
			Trench Vapors	Excavation Worker	Adult	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into a construction or utility trench via vapor intrusion.
			Volatiles at Showerhead	Resident	Adult	Inhalation	On-site	Quant	If groundwater wells were installed for residential purposes, adult residents could contact volatiles in groundwater via showering.
					Child	Inhalation	On-site	None	Children are assumed to bathe rather than shower. Therefore, inhalation exposure is assessed using only indoor air.
			Indoor Vapors	Resident	Adult	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into residences via vapor intrusion.
					Child	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into residences via vapor intrusion.

Table E.1-1
Selection of Exposure Pathways - SWMU 41A

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
			Volatile groundwater COPCs released to ambient air	Trespasser	Adolescent	Inhalation	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.

Table E.1-1
Selection of Exposure Pathways - SWMU 41A

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future (cont.)	Groundwater (cont.)	Groundwater	Off-site	Resident	Adult	Ingestion	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate off-site in the future, off-site residents could be exposed to COPCs in groundwater via ingestion.
						Dermal	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate off-site in the future, off-site residents could be exposed to COPCs in groundwater via dermal absorption.
					Child	Ingestion	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate off-site in the future, off-site residents could be exposed to COPCs in groundwater via ingestion.
						Dermal	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate off-site in the future, off-site residents could be exposed to COPCs in groundwater via dermal absorption.
				Trespasser	Adolescent	Ingestion	Off-site	None	The residential scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	Off-site	None	The residential scenario would be protective of the limited exposures that would be experienced by a trespasser.
		Homegrown fruits and vegetables	Off-site	Resident	Adult	Ingestion	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate off-site in the future, off-site residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables.
					Child	Ingestion	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate off-site in the future, off-site residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables.
		Air	Volatile groundwater COPCs released to ambient air	Maintenance Worker	Adult	Inhalation	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate off-site in the future, volatiles could be released from groundwater into ambient air. Off-site maintenance workers could be exposed via inhalation.
			Indoor Vapors	Industrial Worker	Adult	Inhalation	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into off-site buildings via vapor intrusion.
			Trench Vapors	Excavation Worker	Adult	Inhalation	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into an off-site construction or utility trench via vapor intrusion.
			Volatiles at Showerhead	Resident	Adult	Inhalation	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate to off-site wells in the future, adult residents could contact volatiles in groundwater via showering.
					Child	Inhalation	Off-site	None	Children are assumed to bathe rather than shower. Therefore, inhalation exposure is assessed using only indoor air.
			Indoor Vapors	Resident	Adult	Inhalation	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into off-site residences via vapor intrusion.
					Child	Inhalation	Off-site	Quant	If COPCs from SWMU 41A groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into off-site residences via vapor intrusion.
			Volatile groundwater COPCs released to ambient air	Trespasser	Adolescent	Inhalation	Off-site	None	The maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.

Table E.1-2
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant SWMU 41 Area A - Surface Soil

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
Surface Soil	120-82-1	1,2,4-Trichlorobenzene	3.40E-03	3.40E-03	mg/kg	41TP2A	1/5	5.00E-03 - 5.00E-03	3.40E-03	N/A	8.7E+00 N	N/A	N/A	No	BSL
	78-93-3	2-Butanone	4.70E-03	3.80E-02	mg/kg	41TP2A	5/5	N/A	3.80E-02	N/A	2.8E+03 N	N/A	N/A	No	BSL
	50-29-3	4,4-DDT	1.20E-03	1.20E-03	mg/kg	41SB2A	1/2	2.00E-02 - 2.00E-02	1.20E-03	N/A	1.7E+00 C	N/A	N/A	No	BSL
	67-64-1	Acetone	2.40E-02	5.50E-02	mg/kg	41SB3A	5/5	N/A	5.50E-02	N/A	6.1E+03 N	N/A	N/A	No	BSL
	5103-71-9	alpha-Chlordane (5)	1.50E-03	1.50E-03	mg/kg	41SB2A	1/2	2.00E-02 - 2.00E-02	1.50E-03	N/A	1.6E+00 C	N/A	N/A	No	BSL
	11097-69-1	Aroclor 1254	1.50E-01	1.50E-01	mg/kg	41SB2A	1/2	3.30E-02 - 3.30E-02	1.50E-01	N/A	1.1E-01 N	N/A	N/A	Yes	ASL
	71-43-2	Benzene	2.40E-04	5.20E-04	mg/kg	41SB3A	4/5	5.00E-03 - 5.00E-03	5.20E-04	N/A	1.1E+00 C	N/A	N/A	No	BSL
	117-81-7	bis(2-Ethylhexyl) phthalate	1.60E-02	2.00E-01	mg/kg	41SB2A	5/5	N/A	2.00E-01	N/A	3.5E+01 C	N/A	N/A	No	BSL
	75-15-0	Carbon disulfide	1.30E-03	5.00E-03	mg/kg	41TP2A	5/5	N/A	5.00E-03	N/A	6.7E+01 N	N/A	N/A	No	BSL
	156-59-2	cis-1,2-Dichloroethene	1.10E-02	1.10E-02	mg/kg	41TP2A	1/5	5.00E-03 - 5.00E-03	1.10E-02	N/A	7.8E+01 N	N/A	N/A	No	BSL
	60-57-1	Dieldrin	1.40E-03	1.40E-03	mg/kg	41SB2A	1/2	2.00E-02 - 2.00E-02	1.40E-03	N/A	3.0E-02 C	N/A	N/A	No	BSL
	84-74-2	Di-n-butyl phthalate	3.60E-02	2.10E-01	mg/kg	41TP2A	5/5	N/A	2.10E-01	N/A	6.1E+02 N	N/A	N/A	No	BSL
	33213-65-9	Endosulfan II	1.00E-03	1.00E-03	mg/kg	41SB2A	1/2	2.00E-02 - 2.00E-02	1.00E-03	N/A	3.7E+01 N	N/A	N/A	No	BSL
	72-20-8	Endrin	6.40E-03	6.40E-03	mg/kg	41SB2A	1/2	2.00E-02 - 2.00E-02	6.40E-03	N/A	1.8E+00 N	N/A	N/A	No	BSL
	53494-70-5	Endrin ketone (6)	1.70E-03	1.70E-03	mg/kg	41SB2A	1/2	2.00E-02 - 2.00E-02	1.70E-03	N/A	1.8E+00 N	N/A	N/A	No	BSL
	206-44-0	Fluoranthene	6.40E-03	6.40E-03	mg/kg	41SB2A	1/5	2.10E-02 - 2.10E-02	6.40E-03	N/A	2.3E+02 N	N/A	N/A	No	BSL
	5103-74-2	gamma-Chlordane	1.70E-03	1.70E-03	mg/kg	41SB2A	1/2	2.00E-02 - 2.00E-02	1.70E-03	N/A	1.6E+00 C	N/A	N/A	No	BSL
	1024-57-3	Heptachlor epoxide	1.80E-03	1.80E-03	mg/kg	41SB2A	1/2	2.00E-02 - 2.00E-02	1.80E-03	N/A	5.3E-02 C	N/A	N/A	No	BSL
	108-87-2	Methylcyclohexane	2.00E-04	6.60E-04	mg/kg	41SB4A	5/5	N/A	6.60E-04	N/A	N/A	N/A	N/A	Yes	NTX
	75-09-2	Methylene chloride	5.90E-03	5.90E-03	mg/kg	41TP2A	1/5	5.00E-03 - 5.00E-03	5.90E-03	N/A	1.1E+01 C	N/A	N/A	No	BSL
	59-50-7	p-Chloro-m-cresol	8.00E-03	8.00E-03	mg/kg	41SB4A	1/5	1.70E-01 - 1.70E-01	8.00E-03	N/A	N/A	N/A	N/A	Yes	NTX
	129-00-0	Pyrene	3.80E-03	3.80E-03	mg/kg	41SB2A	1/5	2.10E-02 - 2.10E-02	3.80E-03	N/A	1.7E+02 N	N/A	N/A	No	BSL
	127-18-4	Tetrachloroethene	5.10E-03	5.10E-03	mg/kg	41TP2A	1/5	5.00E-03 - 5.00E-03	5.10E-03	N/A	5.7E-01 C	N/A	N/A	No	BSL
	108-88-3	Toluene	1.80E-04	4.90E-04	mg/kg	41SB3A	5/5	N/A	4.90E-04	N/A	5.0E+02 N	N/A	N/A	No	BSL
	79-01-6	Trichloroethene	8.90E-04	8.90E-04	mg/kg	41TP2A	1/5	5.00E-03 - 5.00E-03	8.90E-04	N/A	2.8E+00 C	N/A	N/A	No	BSL
	75-69-4	Trichlorofluoromethane	5.70E-04	5.70E-04	mg/kg	41TP2A	1/5	5.00E-03 - 5.00E-03	5.70E-04	N/A	8.0E+01 N	N/A	N/A	No	BSL
	75-01-4	Vinyl Chloride	1.20E-03	1.20E-03	mg/kg	41TP2A	1/5	5.00E-03 - 5.00E-03	1.20E-03	N/A	6.0E-02 C	N/A	N/A	No	BSL
	1330-20-7	Xylenes (total)	4.10E-04	4.10E-04	mg/kg	41SB3A	1/5	5.00E-03 - 5.00E-03	4.10E-04	N/A	6.0E+01 N	N/A	N/A	No	BSL
	7429-90-5	Aluminum	1.88E+04	3.11E+04	mg/kg	41SB2A	5/5	N/A	3.11E+04	N/A	7.7E+03 N	N/A	N/A	Yes	ASL
	7440-36-0	Antimony	2.10E-01	1.50E+00	mg/kg	41SB2A	5/5	N/A	1.50E+00	N/A	3.1E+00 N	N/A	N/A	No	BSL
	7440-38-2	Arsenic	6.00E+00	1.20E+01	mg/kg	41SB2A	5/5	N/A	1.20E+01	N/A	3.9E-01 C	N/A	N/A	Yes	ASL
	7440-39-3	Barium	1.10E+02	5.53E+02	mg/kg	41SB5A	5/5	N/A	5.53E+02	N/A	1.5E+03 N	N/A	N/A	No	BSL
	7440-41-7	Beryllium	3.40E-01	1.20E+00	mg/kg	41SB4A	5/5	N/A	1.20E+00	N/A	1.6E+01 N	N/A	N/A	No	BSL
	7440-43-9	Cadmium	2.20E+00	2.90E+00	mg/kg	41TP2A	5/5	N/A	2.90E+00	N/A	7.0E+00 N	N/A	N/A	No	BSL
	7440-70-2	Calcium	3.31E+04	1.56E+05	mg/kg	41SB5A	5/5	N/A	1.56E+05	N/A	N/A	1.0E+06	RDA	No	BSL
	7440-47-3	Chromium	1.30E+01	2.50E+01	mg/kg	41TP2A	5/5	N/A	2.50E+01	N/A	2.8E+02 C	N/A	N/A	No	BSL
	7440-48-4	Cobalt	7.80E+00	1.40E+01	mg/kg	41SB4A	5/5	N/A	1.40E+01	N/A	2.3E+00 N	N/A	N/A	Yes	ASL
	7440-50-8	Copper	2.60E+01	6.90E+01	mg/kg	41SB2A	5/5	N/A	6.90E+01	N/A	3.1E+02 N	N/A	N/A	No	BSL
	7439-89-6	Iron	2.43E+04	4.32E+04	mg/kg	41SB2A	5/5	N/A	4.32E+04	N/A	5.5E+03 N	N/A	N/A	Yes	ASL
	7439-92-1	Lead	8.90E+01	1.43E+02	mg/kg	41SB3A	5/5	N/A	1.43E+02	N/A	4.0E+02 N	N/A	N/A	No	BSL
	7439-95-4	Magnesium	2.30E+04	8.28E+04	mg/kg	41SB5A	5/5	N/A	8.28E+04	N/A	N/A	1.0E+06	RDA	No	BSL
	7439-96-5	Manganese	5.17E+02	9.18E+02	mg/kg	41SB5A	5/5	N/A	9.18E+02	N/A	1.8E+02 N	N/A	N/A	Yes	ASL
	7439-97-6	Mercury (Inorganic)	4.70E-02	8.60E-02	mg/kg	41TP2A	5/5	N/A	8.60E-02	N/A	2.3E+00 N	N/A	N/A	No	BSL
	7440-02-0	Nickel	1.70E+01	2.60E+01	mg/kg	41SB4A	5/5	N/A	2.60E+01	N/A	1.5E+02 N	N/A	N/A	No	BSL
	7440-09-7	Potassium	1.89E+03	2.68E+03	mg/kg	41SB4A	5/5	N/A	2.68E+03	N/A	N/A	1.0E+06	RDA	No	BSL

Table E.1-2
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant SWMU 41 Area A - Surface Soil

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	7782-49-2	Selenium	5.20E-01	8.00E-01	mg/kg	41SB3A	5/5	N/A	8.00E-01	N/A	3.9E+01 N	N/A	N/A	No	BSL
	7440-22-4	Silver	8.60E-02	7.70E-01	mg/kg	41SB3A	5/5	N/A	7.70E-01	N/A	3.9E+01 N	N/A	N/A	No	BSL
	7440-23-5	Sodium	5.00E+01	1.73E+03	mg/kg	41SB2A	5/5	N/A	1.73E+03	N/A	N/A	1.0E+06	RDA	No	BSL
	7440-28-0	Thallium	1.50E-01	2.60E-01	mg/kg	41SB4A	5/5	N/A	2.60E-01	N/A	5.1E-01 N	N/A	N/A	No	BSL
	7440-62-2	Vanadium (7)	2.90E+01	5.10E+01	mg/kg	41SB4A	5/5	N/A	5.10E+01	N/A	3.9E+01 N	N/A	N/A	Yes	ASL
	7440-66-6	Zinc	2.42E+02	1.49E+03	mg/kg	41SB2A	5/5	N/A	1.49E+03	N/A	2.3E+03 N	N/A	N/A	No	BSL
	57-12-5	Total Cyanide	5.00E-02	7.00E-02	mg/kg	41SB3A	5/5	N/A	7.00E-02	N/A	1.6E+02 N	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for residential soil from USEPA Regional Screening Level Table (April 2009) and are based on a risk level of 1.0E-06 and a hazard index of 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes
Selection Reason:
Above Screening Levels (ASL)
Deletion Reason:
Infrequent Detection (<= 5%, IFD)
Background Levels (BKG)
No Toxicity Information (NTX)
Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value for alpha-chlordane is based on chlordane.

(6) The screening value for endrin ketone is based on endrin.

(7) The screening value for vanadium is based on vanadium and compounds.

Definitions:
N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Table E.1-3
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	87-61-6	1,2,3-Trichlorobenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	8.70E+00 (N)	No
Surface Soil	95-94-3	1,2,4,5-Tetrachlorobenzene			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+00 (N)	No
	96-12-8	1,2-Dibromo-3-chloropropane			mg/kg		0/5	1.00E-02 - 1.00E-02	1.00E-02	N/A	5.60E-03 (C)	Yes
	106-93-4	1,2-Dibromoethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.40E-02 (C)	No
	99-35-4	1,3,5-Trinitrobenzene			mg/kg		0/5	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.20E+02 (N)	No
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	N/A	6.10E-01 (N)	No
	118-96-7	2,4,6-Trinitrotoluene			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	N/A	3.60E+00 (N)	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	N/A	1.50E+01 (N)	No
	88-72-2	2-Nitrotoluene			mg/kg		0/5	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.90E+00 (C)	No
	99-08-1	3-Nitrotoluene			mg/kg		0/5	1.00E+00 - 1.00E+00	1.00E+00	N/A	1.20E+02 (N)	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	N/A	1.50E+01 (N)	No
	99-99-0	4-Nitrotoluene			mg/kg		0/5	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.40E+01 (N)	No
	1912-24-9	Atrazine			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	2.10E+00 (C)	No
	92-52-4	Biphenyl			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.90E+02 (N)	No
	105-60-2	Caprolactam			mg/kg		0/5	3.30E-01 - 3.30E-01	3.30E-01	N/A	3.10E+03 (N)	No
	74-97-5	Chlorobromomethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	110-82-7	Cyclohexane			mg/kg		0/5	1.00E-02 - 1.00E-02	1.00E-02	N/A	7.20E+02 (N)	No
	121-82-4	Cyclonite			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	N/A	5.50E+00 (C)	No
	75-71-8	Dichlorodifluoromethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.90E+01 (N)	No
	76-13-1	Freon 113			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.30E+03 (N)	No
	2691-41-0	HMX			mg/kg		0/5	1.00E+00 - 1.00E+00	1.00E+00	N/A	3.80E+02 (N)	No
	98-82-8	Isopropylbenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.20E+02 (N)	No
	79-20-9	Methyl Acetate			mg/kg		0/5	1.00E-02 - 1.00E-02	1.00E-02	N/A	7.80E+03 (N)	No
	1634-04-4	Methyl tert-butyl ether			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.90E+01 (C)	No
	55-63-0	Nitroglycerin			mg/kg		0/5	1.00E+01 - 1.00E+01	1.00E+01	N/A	6.10E-01 (N)	Yes
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/5	1.00E+01 - 1.00E+01	1.00E+01	N/A	N/A	NTX
	479-45-8	Tetryl			mg/kg		0/5	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.40E+01 (N)	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E+01 (N)	No
	93-76-5	2,4,5-T			mg/kg		0/2	5.00E-02 - 5.00E-02	5.00E-02	N/A	6.10E+01 (N)	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/2	5.00E-02 - 5.00E-02	5.00E-02	N/A	4.90E+01 (N)	No
	94-75-7	2,4-D			mg/kg		0/2	2.00E-01 - 2.00E-01	2.00E-01	N/A	6.90E+01 (N)	No
	94-82-6	2,4-DB			mg/kg		0/2	2.00E-01 - 2.00E-01	2.00E-01	N/A	4.90E+01 (N)	No
	72-54-8	4,4'-DDD			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	2.00E+00 (C)	No
	72-55-9	4,4'-DDE			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	1.40E+00 (C)	No
	309-00-2	Aldrin			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	2.90E-02 (C)	No
	319-84-6	alpha-BHC			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	7.70E-02 (C)	No
	319-85-7	beta-BHC			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	2.70E-01 (C)	No
	75-99-0	Dalapon			mg/kg		0/2	2.60E-01 - 2.70E-01	2.70E-01	N/A	1.80E+02 (N)	No
	319-86-8	delta-BHC			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	5.20E-01 (C)	No
	1918-00-9	Dicamba			mg/kg		0/2	2.00E-01 - 2.00E-01	2.00E-01	N/A	1.80E+02 (N)	No

Table E.1-3
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future

Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	120-36-5	Dichloroprop			mg/kg		0/2	2.00E-01 - 2.00E-01	2.00E-01	N/A	N/A	NTX
	959-98-8	Endosulfan I			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	3.70E+01 (N)	No
	1031-07-8	Endosulfan sulfate (5)			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	3.70E+01 (N)	No
	7421-93-4	Endrin aldehyde (6)			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	1.80E+00 (N)	No
	58-89-9	gamma-BHC (Lindane)			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	5.20E-01 (C)	No
	76-44-8	Heptachlor			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	1.10E-01 (C)	No
	94-74-6	MCPA			mg/kg		0/4	2.00E+01 - 2.00E+01	2.00E+01	N/A	3.10E+00 (N)	Yes
	93-65-2	MCPP			mg/kg		0/2	2.00E+01 - 2.00E+01	2.00E+01	N/A	6.10E+00 (N)	Yes
	72-43-5	Methoxychlor			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	N/A	3.10E+01 (N)	No
	8001-35-2	Toxaphene			mg/kg		0/2	1.70E-01 - 1.70E-01	1.70E-01	N/A	4.40E-01 (C)	No
	12674-11-2	Aroclor 1016			mg/kg		0/2	6.60E-02 - 6.60E-02	6.60E-02	N/A	3.90E-01 (N)	No
	11104-28-2	Aroclor 1221			mg/kg		0/2	6.60E-02 - 6.60E-02	6.60E-02	N/A	1.70E-01 (C)	No
	11141-16-5	Aroclor 1232			mg/kg		0/2	6.60E-02 - 6.60E-02	6.60E-02	N/A	1.70E-01 (C)	No
	53469-21-9	Aroclor 1242			mg/kg		0/2	3.30E-02 - 3.30E-02	3.30E-02	N/A	2.20E-01 (C)	No
	12672-29-6	Aroclor 1248			mg/kg		0/2	3.30E-02 - 3.30E-02	3.30E-02	N/A	2.20E-01 (C)	No
	11096-82-5	Aroclor 1260			mg/kg		0/2	6.60E-02 - 6.60E-02	6.60E-02	N/A	2.20E-01 (C)	No
	131-11-3	Dimethylphthalate			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	95-50-1	1,2-Dichlorobenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.00E+02 (N)	No
	541-73-1	1,3-Dichlorobenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	106-46-7	1,4-Dichlorobenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.60E+00 (C)	No
	95-95-4	2,4,5-Trichlorophenol			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+02 (N)	No
	88-06-2	2,4,6-Trichlorophenol			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+00 (N)	No
	120-83-2	2,4-Dichlorophenol			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+01 (N)	No
	105-67-9	2,4-Dimethylphenol			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.20E+02 (N)	No
	51-28-5	2,4-Dinitrophenol			mg/kg		0/5	3.30E-01 - 3.30E-01	3.30E-01	N/A	1.20E+01 (N)	No
	121-14-2	2,4-Dinitrotoluene (7)			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	N/A	7.10E-01 (C)	No
	606-20-2	2,6-Dinitrotoluene (7)			mg/kg		0/5	1.00E+00 - 1.00E+00	1.00E+00	N/A	7.10E-01 (C)	Yes
	91-58-7	2-Chloronaphthalene			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.30E+02 (N)	No
	95-57-8	2-Chlorophenol			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.90E+01 (N)	No
	91-57-6	2-Methylnaphthalene			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.10E+01 (N)	No
	88-74-4	2-Nitroaniline			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/kg		0/2	2.00E-01 - 2.00E-01	2.00E-01	N/A	6.10E+00 (N)	No
	91-94-1	3,3'-Dichlorobenzidine			mg/kg		0/5	5.50E-01 - 1.00E+00	1.00E+00	N/A	1.10E+00 (C)	No
	99-09-2	3-Nitroaniline			mg/kg		0/5	1.70E-01 - 2.25E-01	2.25E-01	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/5	2.10E-01 - 2.25E-01	2.25E-01	N/A	6.10E-01 (N)	No
	100-01-6	4-Nitroaniline			mg/kg		0/5	1.70E-01 - 2.25E-01	2.25E-01	N/A	2.40E+01 (C)	No
	100-02-7	4-Nitrophenol			mg/kg		0/5	3.30E-01 - 3.30E-01	3.30E-01	N/A	N/A	NTX
	83-32-9	Acenaphthene			mg/kg		0/5	1.00E-01 - 1.00E-01	1.00E-01	N/A	3.40E+02 (N)	No
	208-96-8	Acenaphthylene (8)			mg/kg		0/5	2.10E-01 - 2.10E-01	2.10E-01	N/A	1.70E+02 (N)	No

Table E.1-3
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future

Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	98-86-2	Acetophenone			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+02 (N)	No
	120-12-7	Anthracene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.70E+03 (N)	No
	100-52-7	Benzaldehyde			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+02 (N)	No
	56-55-3	Benzo(a)anthracene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E-01 (C)	No
	50-32-8	Benzo(a)pyrene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E-02 (C)	Yes
	205-99-2	Benzo(b)fluoranthene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E-01 (C)	No
	191-24-2	Benzo(g,h,i)perylene (8)			mg/kg		0/5	6.00E-02 - 6.00E-02	6.00E-02	N/A	1.70E+02 (N)	No
	207-08-9	Benzo(k)fluoranthene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E+00 (C)	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+01 (N)	No
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.90E-01 (C)	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.50E+00 (C)	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	2.60E+02 (C)	No
	86-74-8	Carbazole			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	218-01-9	Chrysene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E+01 (C)	No
	117-84-0	Di-n-octyl phthalate			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E-02 (C)	Yes
	132-64-9	Dibenzofuran			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	84-66-2	Diethyl phthalate			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	4.90E+03 (N)	No
	86-73-7	Fluorene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	N/A	2.30E+02 (N)	No
	118-74-1	Hexachlorobenzene			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.00E-01 (C)	No
	87-68-3	Hexachlorobutadiene			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+00 (N)	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.70E+01 (N)	No
	67-72-1	Hexachloroethane			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+00 (N)	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E-01 (C)	No
	78-59-1	Isophorone			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	5.10E+02 (C)	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.90E-02 (C)	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	9.90E+01 (C)	No
	91-20-3	Naphthalene			mg/kg		0/5	1.00E-01 - 1.00E-01	1.00E-01	N/A	3.90E+00 (C)	No
	98-95-3	Nitrobenzene			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	N/A	4.40E+00 (C)	No
	95-48-7	o-Cresol			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.10E+02 (N)	No
	106-47-8	p-Chloroaniline			mg/kg		0/5	1.70E-01 - 2.25E-01	2.25E-01	N/A	2.40E+00 (C)	No
	106-44-5	p-Cresol			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.10E+01 (N)	No
	87-86-5	Pentachlorophenol			mg/kg		0/5	3.30E-01 - 3.30E-01	3.30E-01	N/A	3.00E+00 (C)	No
	85-01-8	Phenanthrene (8)			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.70E+02 (N)	No
	108-95-2	Phenol			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+03 (N)	No
	71-55-6	1,1,1-Trichloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	9.00E+02 (N)	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	5.90E-01 (C)	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E+00 (C)	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.40E+00 (C)	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.50E+01 (N)	No

Table E.1-3
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future

Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	107-06-2	1,2-Dichloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.50E-01 (C)	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	9.30E-01 (C)	No
	591-78-6	2-Hexanone			mg/kg		0/5	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/5	1.00E-02 - 1.00E-02	1.00E-02	N/A	5.30E+02 (N)	No
	75-27-4	Bromodichloromethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.80E-01 (C)	No
	74-83-9	Bromomethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	7.90E-01 (N)	No
	56-23-5	Carbon tetrachloride			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.50E-01 (C)	No
	108-90-7	Chlorobenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.10E+01 (N)	No
	75-00-3	Chloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.50E+03 (N)	No
	74-87-3	Chloromethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.20E+01 (N)	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.70E+00 (C)	No
	124-48-1	Dibromochloromethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	7.00E-01 (C)	No
	100-41-4	Ethylbenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	5.70E+00 (C)	No
	100-42-5	Styrene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	6.50E+02 (N)	No
	10061-02-6	trans-1,3-Dichloropropene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.70E+00 (C)	No
	75-25-2	Tribromomethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	6.10E+01 (C)	No
	67-66-3	Trichloromethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.00E-01 (C)	No

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening toxicity values for residential soil from USEPA Regional Screening Level Table (April 2009) and based on a risk level of 1.0E-06 and a hazard index of 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- No Toxicity Information (NTX)

Deletion Reason:
- Infrequent Detection (<= 5%, IFD)
- Background Levels (BKG)
- Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value is based on endosulfan.

(6) The screening value is based on endrin.

(7) The screening value is based on dinitrotoluene mixtures.

(8) The screening value is based on pyrene as a surrogate.

Definitions:
- N/A = Not Applicable or Not Available
- SQL = Sample Quantitation Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
- MCL = Federal Maximum Contaminant Level
- SMCL = Secondary Maximum Contaminant Level
- J = Estimated Value
- C = Carcinogenic
- N = Non-Carcinogenic
- RDA = Recommended Daily Allowance

Table E.1-4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant SWMU 41 Area A - Total Soil

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	N/A	2,3,7,8-TCDD-TE	1.52E-06	8.69E-06	mg/kg	41SB2B	3/3	N/A	8.69E-06	N/A	4.50E-06 C	N/A	N/A	Yes	ASL
Total Soil	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	7.69E-07	2.92E-05	mg/kg	41SB2B	2/3	5.73E-06 - 5.73E-06	2.92E-05	N/A	N/A	N/A	N/A	No	TEQ
	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.12E-05	1.59E-04	mg/kg	41SB2B	3/3	N/A	1.59E-04	N/A	N/A	N/A	N/A	No	TEQ
	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.86E-06	1.86E-06	mg/kg	41SB2B	1/3	5.73E-06 - 6.22E-06	1.86E-06	N/A	N/A	N/A	N/A	No	TEQ
	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	2.07E-06	2.07E-06	mg/kg	41SB2B	1/3	5.73E-06 - 6.22E-06	2.07E-06	N/A	N/A	N/A	N/A	No	TEQ
	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	6.80E-07	2.89E-06	mg/kg	41SB2B	2/3	5.73E-06 - 5.73E-06	2.89E-06	N/A	N/A	N/A	N/A	No	TEQ
	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	1.89E-07	1.38E-06	mg/kg	41SB2B	2/3	5.73E-06 - 5.73E-06	1.38E-06	N/A	N/A	N/A	N/A	No	TEQ
	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	8.86E-07	7.09E-06	mg/kg	41SB2B	2/3	5.73E-06 - 5.73E-06	7.09E-06	N/A	N/A	N/A	N/A	No	TEQ
	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	2.67E-06	1.05E-05	mg/kg	41SB5B	3/3	N/A	1.05E-05	N/A	N/A	N/A	N/A	No	TEQ
	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	1.88E-06	1.88E-06	mg/kg	41SB2B	1/3	5.73E-06 - 6.22E-06	1.88E-06	N/A	N/A	N/A	N/A	No	TEQ
	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	3.71E-07	1.78E-06	mg/kg	41SB2B	2/3	5.73E-06 - 5.73E-06	1.78E-06	N/A	N/A	N/A	N/A	No	TEQ
	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	1.84E-06	1.84E-06	mg/kg	41SB2B	1/3	5.73E-06 - 6.22E-06	1.84E-06	N/A	N/A	N/A	N/A	No	TEQ
	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	3.46E-06	3.46E-06	mg/kg	41SB2B	1/3	5.73E-06 - 6.22E-06	3.46E-06	N/A	N/A	N/A	N/A	No	TEQ
	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.57E-07	3.27E-07	mg/kg	41SB2B	2/3	1.15E-06 - 1.15E-06	3.27E-07	N/A	N/A	N/A	N/A	No	TEQ
	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	1.76E-07	4.65E-06	mg/kg	41SB2B	2/3	1.15E-06 - 1.15E-06	4.65E-06	N/A	N/A	N/A	N/A	No	TEQ
	3268-87-9	Octachlorodibenzodioxin	1.20E-03	6.52E-03	mg/kg	41TP2B	3/3	N/A	6.52E-03	N/A	N/A	N/A	N/A	No	TEQ
	39001-02-0	Octachlorodibenzofuran	2.09E-06	1.43E-04	mg/kg	41SB2B	2/3	1.15E-05 - 1.15E-05	1.43E-04	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 05	Total Heptachlorodibenzofuran	7.69E-07	1.28E-04	mg/kg	41SB2B	2/3	5.73E-06 - 5.73E-06	1.28E-04	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 04	Total Heptachlorodibenzo-p-dioxin	2.54E-05	2.78E-04	mg/kg	41SB2B	3/3	N/A	2.78E-04	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 07	Total Hexachlorodibenzofuran	3.46E-07	4.06E-05	mg/kg	41SB2B	3/3	N/A	4.06E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 06	Total Hexachlorodibenzo-p-dioxin	1.27E-05	4.76E-05	mg/kg	41SB2B	3/3	N/A	4.76E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 09	Total Pentachlorodibenzofuran	4.80E-07	3.18E-05	mg/kg	41SB2B	2/3	5.73E-06 - 5.73E-06	3.18E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 08	Total Pentachlorodibenzo-p-dioxin	6.19E-07	1.62E-05	mg/kg	41SB2B	3/3	N/A	1.62E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 11	Total Tetrachlorodibenzofuran	1.72E-07	7.09E-05	mg/kg	41SB2B	2/3	1.15E-06 - 1.15E-06	7.09E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 10	Total Tetrachlorodibenzo-p-dioxin	1.57E-07	1.25E-05	mg/kg	41SB2B	2/3	1.15E-06 - 1.15E-06	1.25E-05	N/A	N/A	N/A	N/A	No	TEQ
	79-34-5	1,1,2,2-Tetrachloroethane	9.70E-04	9.70E-04	mg/kg	41SB3B	1/11	5.00E-03 - 5.00E-03	9.70E-04	N/A	5.90E-01 C	N/A	N/A	No	BSL
	87-61-6	1,2,3-Trichlorobenzene (5)	3.50E-03	3.50E-03	mg/kg	41SB3B	1/11	5.00E-03 - 5.00E-03	3.50E-03	N/A	8.70E+00 N	N/A	N/A	No	BSL
	120-82-1	1,2,4-Trichlorobenzene	3.40E-03	3.40E-03	mg/kg	41TP2A	1/13	5.00E-03 - 4.00E-02	3.50E-03	N/A	8.70E+00 N	N/A	N/A	No	BSL
	78-93-3	2-Butanone	4.60E-03	3.80E-02	mg/kg	41TP2A	11/11	N/A	3.80E-02	N/A	2.80E+03 N	N/A	N/A	No	BSL
	50-29-3	4,4-DDT	1.20E-03	1.20E-03	mg/kg	41SB2A	1/5	2.00E-02 - 3.10E-01	1.20E-03	N/A	1.70E+00 C	N/A	N/A	No	BSL
	67-64-1	Acetone	2.40E-02	7.40E-02	mg/kg	41SB4C	11/11	N/A	7.40E-02	N/A	6.10E+03 N	N/A	N/A	No	BSL
	5103-71-9	alpha-Chlordane	1.50E-03	1.50E-03	mg/kg	41SB2A	1/5	2.00E-02 - 3.30E-01	1.50E-03	N/A	1.60E+00 C	N/A	N/A	No	BSL
	11097-69-1	Aroclor 1254	1.50E-01	1.50E-01	mg/kg	41SB2A	1/5	3.30E-02 - 2.30E+00	1.50E-01	N/A	1.10E-01 N	N/A	N/A	Yes	ASL
	71-43-2	Benzene	2.00E-04	1.20E-03	mg/kg	41SB2B	9/11	5.00E-03 - 5.00E-03	1.20E-03	N/A	1.10E+00 C	N/A	N/A	No	BSL
	117-81-7	bis(2-Ethylhexyl) phthalate	1.30E-02	2.00E-01	mg/kg	41SB2A	11/13	6.20E-01 - 6.20E-01	2.00E-01	N/A	3.50E+01 C	N/A	N/A	No	BSL
	74-83-9	Bromomethane	2.70E-03	2.70E-03	mg/kg	41SB4C	1/11	5.00E-03 - 5.00E-03	2.70E-03	N/A	7.90E-01 N	N/A	N/A	No	BSL
	75-15-0	Carbon disulfide	1.30E-03	5.70E-03	mg/kg	41TP2B	10/11	5.00E-03 - 5.00E-03	5.70E-03	N/A	6.70E+01 N	N/A	N/A	No	BSL
	156-59-2	cis-1,2-Dichloroethene	1.10E-02	1.10E-02	mg/kg	41TP2A	1/11	5.00E-03 - 5.00E-03	1.10E-02	N/A	7.80E+01 N	N/A	N/A	No	BSL
	110-82-7	Cyclohexane	6.10E-04	6.10E-04	mg/kg	41SB2B	1/11	1.00E-02 - 1.00E-02	8.20E-04	N/A	7.20E+02 N	N/A	N/A	No	BSL
	60-57-1	Dieldrin	1.40E-03	1.40E-03	mg/kg	41SB2A	1/5	2.00E-02 - 3.10E-01	1.40E-03	N/A	3.00E-02 C	N/A	N/A	No	BSL
	84-74-2	Di-n-butyl phthalate	2.40E-02	2.10E-01	mg/kg	41TP2A	11/13	6.10E-02 - 6.10E-02	2.10E-01	N/A	6.10E+02 N	N/A	N/A	No	BSL
	33213-65-9	Endosulfan II	1.00E-03	1.00E-03	mg/kg	41SB2A	1/5	2.00E-02 - 6.20E-01	1.00E-03	N/A	3.70E+01 N	N/A	N/A	No	BSL
	72-20-8	Endrin	6.40E-03	6.40E-03	mg/kg	41SB2A	1/5	2.00E-02 - 4.50E-01	6.40E-03	N/A	1.80E+00 N	N/A	N/A	No	BSL
	53494-70-5	Endrin ketone (6)	1.70E-03	1.70E-03	mg/kg	41SB2A	1/5	2.00E-02 - 5.30E-01	1.70E-03	N/A	1.80E+00 N	N/A	N/A	No	BSL
	206-44-0	Fluoranthene	6.40E-03	6.40E-03	mg/kg	41SB2A	1/13	2.10E-02 - 6.80E-02	6.40E-03	N/A	2.30E+02 N	N/A	N/A	No	BSL
	5103-74-2	gamma-Chlordane (7)	1.70E-03	1.70E-03	mg/kg	41SB2A	1/5	2.00E-02 - 3.30E-01	1.70E-03	N/A	1.60E+00 C	N/A	N/A	No	BSL
	1024-57-3	Heptachlor epoxide	1.80E-03	1.80E-03	mg/kg	41SB2A	1/5	2.00E-02 - 3.30E-01	1.80E-03	N/A	5.30E-02 C	N/A	N/A	No	BSL
	79-20-9	Methyl Acetate	1.40E-03	1.40E-03	mg/kg	41TP2B	1/11	1.00E-02 - 1.00E-02	1.40E-03	N/A	7.80E+03 N	N/A	N/A	No	BSL
	108-87-2	Methylcyclohexane	1.90E-04	1.70E-03	mg/kg	41SB2B	9/11	1.00E-02 - 1.00E-02	1.70E-03	N/A	N/A	N/A	N/A	Yes	NTX
	75-09-2	Methylene chloride	3.60E-03	5.90E-03	mg/kg	41TP2A	2/11	5.00E-03 - 5.00E-03	9.10E-03	N/A	1.10E+01 C	N/A	N/A	No	BSL

Table E.1-4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant SWMU 41 Area A - Total Soil

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	59-50-7	p-Chloro-m-cresol	8.00E-03	8.00E-03	mg/kg	41SB4A	2/13	9.50E-02 - 1.70E-01	8.00E-03	N/A	N/A	N/A	N/A	Yes	NTX
	129-00-0	Pyrene	3.80E-03	3.80E-03	mg/kg	41SB2A	1/13	2.10E-02 - 3.30E-02	3.80E-03	N/A	1.70E+02 N	N/A	N/A	No	BSL
	127-18-4	Tetrachloroethene	5.10E-03	5.10E-03	mg/kg	41TP2A	1/11	5.00E-03 - 5.00E-03	5.10E-03	N/A	5.70E-01 C	N/A	N/A	No	BSL
	108-88-3	Toluene	1.80E-04	1.30E-03	mg/kg	41TP2B	10/11	5.00E-03 - 5.00E-03	1.30E-03	N/A	5.00E+02 N	N/A	N/A	No	BSL
	79-01-6	Trichloroethene	8.90E-04	8.90E-04	mg/kg	41TP2A	1/11	5.00E-03 - 5.00E-03	1.40E-03	N/A	2.80E+00 C	N/A	N/A	No	BSL
	75-69-4	Trichlorofluoromethane	3.80E-04	6.40E-04	mg/kg	41TP2B	3/11	5.00E-03 - 5.00E-03	7.30E-04	N/A	8.00E+01 N	N/A	N/A	No	BSL
	75-01-4	Vinyl Chloride	1.20E-03	1.20E-03	mg/kg	41TP2A	1/11	5.00E-03 - 5.00E-03	1.20E-03	N/A	6.00E-02 C	N/A	N/A	No	BSL
	1330-20-7	Xylenes (total)	4.10E-04	1.30E-03	mg/kg	41SB2B	3/11	5.00E-03 - 5.00E-03	1.30E-03	N/A	6.00E+01 N	N/A	N/A	No	BSL
	7429-90-5	Aluminum	1.88E+04	4.06E+04	mg/kg	41SB4C	13/13	N/A	4.06E+04	N/A	7.70E+03 N	N/A	N/A	Yes	ASL
	7440-36-0	Antimony	2.10E-01	1.50E+00	mg/kg	41SB2A	11/13	7.14E+00 - 7.14E+00	1.50E+00	N/A	3.10E+00 N	N/A	N/A	No	BSL
	7440-38-2	Arsenic	4.30E+00	1.90E+01	mg/kg	41SB4C	13/13	N/A	1.90E+01	N/A	3.90E-01 C	N/A	N/A	Yes	ASL
	7440-39-3	Barium	7.20E+01	5.53E+02	mg/kg	41SB5A	13/13	N/A	5.53E+02	N/A	1.50E+03 N	N/A	N/A	No	BSL
	7440-41-7	Beryllium	3.40E-01	1.80E+00	mg/kg	41SB4C	11/13	5.00E-01 - 5.00E-01	1.80E+00	N/A	1.60E+01 N	N/A	N/A	No	BSL
	7440-43-9	Cadmium	1.50E+00	3.00E+00	mg/kg	41SB4C	11/13	7.00E-01 - 7.00E-01	3.00E+00	N/A	7.00E+00 N	N/A	N/A	No	BSL
	7440-70-2	Calcium	8.21E+02	1.56E+05	mg/kg	41SB5A	13/13	N/A	1.56E+05	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-47-3	Chromium	1.30E+01	6.00E+01	mg/kg	41SB1 (RVFS*45)	13/13	N/A	6.00E+01	N/A	2.80E+02 C	N/A	N/A	No	BSL
	7440-48-4	Cobalt	7.80E+00	1.59E+01	mg/kg	41SB1 (RVFS*45)	13/13	N/A	2.10E+01	N/A	2.30E+00 N	N/A	N/A	Yes	ASL
	7440-50-8	Copper	1.60E+01	6.90E+01	mg/kg	41SB2A	13/13	N/A	6.90E+01	N/A	3.10E+02 N	N/A	N/A	No	BSL
	7439-89-6	Iron	2.11E+04	7.55E+04	mg/kg	41SB4C	13/13	N/A	7.55E+04	N/A	5.50E+03 N	N/A	N/A	Yes	ASL
	7439-92-1	Lead	3.35E+01	2.34E+02	mg/kg	41TP2B	13/13	N/A	2.34E+02	N/A	4.00E+02 N	N/A	N/A	No	BSL
	7439-95-4	Magnesium	2.70E+03	8.28E+04	mg/kg	41SB5A	13/13	N/A	8.28E+04	N/A	N/A	1.00E+06	RDA	No	BSL
	7439-96-5	Manganese	5.17E+02	1.70E+03	mg/kg	41SB4B	13/13	N/A	1.70E+03	N/A	1.80E+02 N	N/A	N/A	Yes	ASL
	7439-97-6	Mercury (Inorganic)	3.45E-02	8.80E-02	mg/kg	41SB4C	11/13	5.00E-02 - 5.00E-02	8.80E-02	N/A	2.30E+00 N	N/A	N/A	No	BSL
	7440-02-0	Nickel	1.50E+01	3.40E+01	mg/kg	41SB5B	13/13	N/A	3.40E+01	N/A	1.50E+02 N	N/A	N/A	No	BSL
	7440-09-7	Potassium	1.18E+03	3.42E+03	mg/kg	41SB3B	13/13	N/A	3.42E+03	N/A	N/A	1.00E+06	RDA	No	BSL
	7782-49-2	Selenium	5.10E-01	1.30E+00	mg/kg	41SB4C	11/13	2.50E-01 - 2.50E-01	1.30E+00	N/A	3.90E+01 N	N/A	N/A	No	BSL
	7440-22-4	Silver	6.80E-02	1.45E+00	mg/kg	41SB5B	11/13	5.89E-01 - 5.89E-01	1.45E+00	N/A	3.90E+01 N	N/A	N/A	No	BSL
	7440-23-5	Sodium	3.60E+01	2.04E+03	mg/kg	41SB1 (RVFS*44)	12/13	1.00E+02 - 1.00E+02	2.04E+03	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-28-0	Thallium	1.50E-01	4.40E-01	mg/kg	41SB4C	11/13	6.62E+00 - 6.62E+00	4.40E-01	N/A	5.10E-01 N	N/A	N/A	No	BSL
	7440-62-2	Vanadium (8)	2.90E+01	6.90E+01	mg/kg	41SB4C	13/13	N/A	6.90E+01	N/A	3.90E+01 N	N/A	N/A	Yes	ASL
	7440-66-6	Zinc	6.50E+01	1.49E+03	mg/kg	41SB2A	13/13	N/A	1.49E+03	N/A	2.30E+03 N	N/A	N/A	No	BSL
	57-12-5	Total Cyanide	1.00E-02	4.20E-01	mg/kg	41SB3B	11/11	N/A	4.20E-01	N/A	1.60E+02 N	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for residential soil from USEPA Regional Screening Level Table (April 2009) and are based on a risk level of 1.0E-06 and a hazard index of 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes
Selection Reason:
Infrequent Detection but Associated Historically (HIST)
Toxicity Information Available (TX)
Above Screening Levels (ASL)
Deletion Reason:
Background Levels (BKG)
No Toxicity Information (NTX)
Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value for 1,2,3-Trichlorobenzene is based on 1,2,4-Trichlorobenzene.

(6) The screening value for endrin ketone is based on endrin.

(7) The screening value for gamma-chlordane is based on chlordane.

(8) The screening value for vanadium is based on vanadium and compounds.

Definitions:
N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Table E.1-5
Summary of Screening for Non-Detected Chemicals
Current/Future - Total Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
Total Soil	95-94-3	1,2,4,5-Tetrachlorobenzene			mg/kg		0/11	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+00 (N)	No
	96-12-8	1,2-Dibromo-3-chloropropane			mg/kg		0/11	1.00E-02 - 1.00E-02	1.00E-02	N/A	5.60E-03 (C)	Yes
	106-93-4	1,2-Dibromoethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.40E-02 (C)	No
	122-66-7	1,2-Diphenylhydrazine			mg/kg		0/2	1.40E-01 - 1.40E-01	1.40E-01	N/A	6.10E-01 (C)	No
	99-35-4	1,3,5-Trinitrobenzene			mg/kg		0/13	4.88E-01 - 1.00E+00	1.00E+00	N/A	2.20E+02 (N)	No
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/13	4.96E-01 - 5.00E-01	5.00E-01	N/A	6.10E-01 (N)	No
	118-96-7	2,4,6-Trinitrotoluene			mg/kg		0/13	4.56E-01 - 5.00E-01	5.00E-01	N/A	3.60E+00 (N)	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/11	5.00E-01 - 5.00E-01	5.00E-01	N/A	1.50E+01 (N)	No
	88-72-2	2-Nitrotoluene			mg/kg		0/11	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.90E+00 (C)	No
	99-08-1	3-Nitrotoluene			mg/kg		0/11	1.00E+00 - 1.00E+00	1.00E+00	N/A	1.20E+02 (N)	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/11	5.00E-01 - 5.00E-01	5.00E-01	N/A	1.50E+01 (N)	No
	99-99-0	4-Nitrotoluene			mg/kg		0/11	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.40E+01 (N)	No
	1912-24-9	Atrazine			mg/kg		0/11	1.70E-01 - 1.70E-01	1.70E-01	N/A	2.10E+00 (C)	No
	92-87-5	Benzidine			mg/kg		0/2	8.50E-01 - 8.50E-01	8.50E-01	N/A	5.00E-04 (C)	Yes
	100-51-6	Benzyl alcohol			mg/kg		0/2	1.90E-01 - 1.90E-01	1.90E-01	N/A	3.10E+03 (N)	No
	92-52-4	Biphenyl			mg/kg		0/11	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.90E+02 (N)	No
	105-60-2	Caprolactam			mg/kg		0/11	3.30E-01 - 3.30E-01	3.30E-01	N/A	3.10E+03 (N)	No
	74-97-5	Chlorobromomethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	121-82-4	Cyclonite			mg/kg		0/13	5.00E-01 - 5.87E-01	5.87E-01	N/A	5.50E+00 (C)	No
	75-71-8	Dichlorodifluoromethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.90E+01 (N)	No
	76-13-1	Freon 113			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.30E+03 (N)	No
	2691-41-0	HMX			mg/kg		0/13	6.66E-01 - 1.00E+00	1.00E+00	N/A	3.80E+02 (N)	No
	98-82-8	Isopropylbenzene			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.20E+02 (N)	No
	1634-04-4	Methyl tert-butyl ether			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.90E+01 (C)	No
	62-75-9	N-Nitrosodimethylamine			mg/kg		0/2	1.40E-01 - 1.40E-01	1.40E-01	N/A	2.30E-03 (C)	Yes
	55-63-0	Nitroglycerin			mg/kg		0/11	1.00E+01 - 1.00E+01	1.00E+01	N/A	6.10E-01 (N)	Yes
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/11	1.00E+01 - 1.00E+01	1.00E+01	N/A	N/A	NTX
	479-45-8	Tetryl			mg/kg		0/13	7.31E-01 - 1.00E+00	1.00E+00	N/A	2.40E+01 (N)	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E+01 (N)	No
	93-76-5	2,4,5-T			mg/kg		0/3	5.00E-02 - 5.00E-02	5.00E-02	N/A	6.10E+01 (N)	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/3	5.00E-02 - 5.00E-02	5.00E-02	N/A	4.90E+01 (N)	No
	94-75-7	2,4-D			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	N/A	6.90E+01 (N)	No
	94-82-6	2,4-DB			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	N/A	4.90E+01 (N)	No
	72-54-8	4,4'-DDD			mg/kg		0/5	2.00E-02 - 2.70E-01	2.70E-01	N/A	2.00E+00 (C)	No
	72-55-9	4,4'-DDE			mg/kg		0/5	2.00E-02 - 3.10E-01	3.10E-01	N/A	1.40E+00 (C)	No
	309-00-2	Aldrin			mg/kg		0/5	2.00E-02 - 3.30E-01	3.30E-01	N/A	2.90E-02 (C)	Yes
	319-84-6	alpha-BHC			mg/kg		0/5	2.00E-02 - 2.70E-01	2.70E-01	N/A	7.70E-02 (C)	Yes
	319-85-7	beta-BHC			mg/kg		0/5	2.00E-02 - 2.70E-01	2.70E-01	N/A	2.70E-01 (C)	No
	75-99-0	Dalapon			mg/kg		0/3	2.60E-01 - 2.90E-01	2.90E-01	N/A	1.80E+02 (N)	No
	319-86-8	delta-BHC			mg/kg		0/5	2.00E-02 - 2.70E-01	2.70E-01	N/A	5.20E-01 (C)	No

Table E.1-5
Summary of Screening for Non-Detected Chemicals
Current/Future - Total Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	1918-00-9	Dicamba			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	N/A	1.80E+02 (N)	No
	120-36-5	Dichloroprop			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	N/A	N/A	NTX
	959-98-8	Endosulfan I			mg/kg		0/5	2.00E-02 - 6.20E-01	6.20E-01	N/A	3.70E+01 (N)	No
	1031-07-8	Endosulfan sulfate (5)			mg/kg		0/5	2.00E-02 - 6.20E-01	6.20E-01	N/A	3.70E+01 (N)	No
	7421-93-4	Endrin aldehyde (6)			mg/kg		0/5	2.00E-02 - 5.30E-01	5.30E-01	N/A	1.80E+00 (N)	No
	58-89-9	gamma-BHC (Lindane)			mg/kg		0/5	2.00E-02 - 2.70E-01	2.70E-01	N/A	5.20E-01 (C)	No
	76-44-8	Heptachlor			mg/kg		1/5	2.00E-02 - 1.30E-01	1.30E-01	N/A	1.10E-01 (C)	Yes
	94-74-6	MCPA			mg/kg		0/6	2.00E+01 - 2.00E+01	2.00E+01	N/A	3.10E+00 (N)	Yes
	93-65-2	MCPP			mg/kg		0/3	2.00E+01 - 2.00E+01	2.00E+01	N/A	6.10E+00 (N)	Yes
	72-43-5	Methoxychlor			mg/kg		0/5	2.00E-02 - 3.30E-01	3.30E-01	N/A	3.10E+01 (N)	No
	8001-35-2	Toxaphene			mg/kg		0/5	1.70E-01 - 2.60E+00	2.60E+00	N/A	4.40E-01 (C)	Yes
	12674-11-2	Aroclor 1016			mg/kg		0/5	6.60E-02 - 1.40E+00	1.40E+00	N/A	3.90E-01 (N)	Yes
	11104-28-2	Aroclor 1221			mg/kg		0/5	6.60E-02 - 1.40E+00	1.40E+00	N/A	1.70E-01 (C)	Yes
	11141-16-5	Aroclor 1232			mg/kg		0/5	6.60E-02 - 1.40E+00	1.40E+00	N/A	1.70E-01 (C)	Yes
	53469-21-9	Aroclor 1242			mg/kg		0/5	3.30E-02 - 1.40E+00	1.40E+00	N/A	2.20E-01 (C)	Yes
	12672-29-6	Aroclor 1248			mg/kg		0/5	3.30E-02 - 2.00E+00	2.00E+00	N/A	2.20E-01 (C)	Yes
	11096-82-5	Aroclor 1260			mg/kg		0/5	6.60E-02 - 2.60E+00	2.60E+00	N/A	2.20E-01 (C)	Yes
	131-11-3	Dimethylphthalate			mg/kg		0/13	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	95-50-1	1,2-Dichlorobenzene			mg/kg		0/13	5.00E-03 - 1.10E-01	1.10E-01	N/A	2.00E+02 (N)	No
	541-73-1	1,3-Dichlorobenzene			mg/kg		0/13	5.00E-03 - 1.30E-01	1.30E-01	N/A	N/A	NTX
	106-46-7	1,4-Dichlorobenzene			mg/kg		0/13	5.00E-03 - 9.80E-02	9.80E-02	N/A	2.60E+00 (C)	No
	95-95-4	2,4,5-Trichlorophenol			mg/kg		0/13	1.00E-01 - 1.70E-01	1.70E-01	N/A	6.10E+02 (N)	No
	88-06-2	2,4,6-Trichlorophenol			mg/kg		0/13	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+00 (N)	No
	120-83-2	2,4-Dichlorophenol			mg/kg		0/13	1.70E-01 - 1.80E-01	1.80E-01	N/A	1.80E+01 (N)	No
	105-67-9	2,4-Dimethylphenol			mg/kg		0/13	1.70E-01 - 6.90E-01	6.90E-01	N/A	1.20E+02 (N)	No
	51-28-5	2,4-Dinitrophenol			mg/kg		0/13	3.30E-01 - 1.20E+00	1.20E+00	N/A	1.20E+01 (N)	No
	121-14-2	2,4-Dinitrotoluene (7)			mg/kg		0/13	1.40E-01 - 5.00E-01	5.00E-01	N/A	7.10E-01 (C)	No
	606-20-2	2,6-Dinitrotoluene (7)			mg/kg		0/13	8.50E-02 - 1.00E+00	1.00E+00	N/A	7.10E-01 (C)	Yes
	91-58-7	2-Chloronaphthalene			mg/kg		0/13	3.60E-02 - 1.70E-01	1.70E-01	N/A	6.30E+02 (N)	No
	95-57-8	2-Chlorophenol			mg/kg		0/13	6.00E-02 - 1.70E-01	1.70E-01	N/A	3.90E+01 (N)	No
	91-57-6	2-Methylnaphthalene			mg/kg		0/13	4.90E-02 - 1.70E-01	1.70E-01	N/A	3.10E+01 (N)	No
	88-74-4	2-Nitroaniline			mg/kg		0/13	6.20E-02 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/kg		0/13	1.40E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	N/A	6.10E+00 (N)	No
	91-94-1	3,3'-Dichlorobenzidine			mg/kg		0/13	5.50E-01 - 6.30E+00	6.30E+00	N/A	1.10E+00 (C)	Yes
	99-09-2	3-Nitroaniline			mg/kg		0/13	1.70E-01 - 4.50E-01	4.50E-01	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/13	2.10E-01 - 5.50E-01	5.50E-01	N/A	6.10E-01 (N)	No
	100-01-6	4-Nitroaniline			mg/kg		0/13	1.70E-01 - 4.10E-01	4.10E-01	N/A	2.40E+01 (C)	No
	100-02-7	4-Nitrophenol			mg/kg		0/13	3.30E-01 - 1.40E+00	1.40E+00	N/A	N/A	NTX
	83-32-9	Acenaphthene			mg/kg		0/13	3.60E-02 - 1.00E-01	1.00E-01	N/A	3.40E+02 (N)	No

Table E.1-5
Summary of Screening for Non-Detected Chemicals
Current/Future - Total Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future

Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	208-96-8	Acenaphthylene (8)			mg/kg		0/13	3.30E-02 - 2.10E-01	2.10E-01	N/A	1.70E+02 (N)	No
	98-86-2	Acetophenone			mg/kg		0/11	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+02 (N)	No
	120-12-7	Anthracene			mg/kg		0/13	2.10E-02 - 3.30E-02	3.30E-02	N/A	1.70E+03 (N)	No
	100-52-7	Benzaldehyde			mg/kg		0/11	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+02 (N)	No
	56-55-3	Benzo(a)anthracene			mg/kg		0/13	2.10E-02 - 1.70E-01	1.70E-01	N/A	1.50E-01 (C)	Yes
	50-32-8	Benzo(a)pyrene			mg/kg		0/13	2.10E-02 - 2.50E-01	2.50E-01	N/A	1.50E-02 (C)	Yes
	205-99-2	Benzo(b)fluoranthene			mg/kg		0/13	2.10E-02 - 2.10E-01	2.10E-01	N/A	1.50E-01 (C)	Yes
	191-24-2	Benzo(g,h,i)perylene (8)			mg/kg		0/13	6.00E-02 - 2.50E-01	2.50E-01	N/A	1.70E+02 (N)	No
	207-08-9	Benzo(k)fluoranthene			mg/kg		0/13	2.10E-02 - 6.60E-02	6.60E-02	N/A	1.50E+00 (C)	No
	65-85-0	Benzoic Acid			mg/kg		0/2	6.10E+00 - 6.10E+00	6.10E+00	N/A	2.40E+04 (N)	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/13	5.90E-02 - 1.70E-01	1.70E-01	N/A	1.80E+01 (N)	No
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/13	3.30E-02 - 1.70E-01	1.70E-01	N/A	1.90E-01 (C)	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/13	1.70E-01 - 2.00E-01	2.00E-01	N/A	3.50E+00 (C)	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/13	1.70E-01 - 1.70E-01	1.70E-01	N/A	2.60E+02 (C)	No
	86-74-8	Carbazole			mg/kg		0/11	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	218-01-9	Chrysene			mg/kg		0/13	2.10E-02 - 1.20E-01	1.20E-01	N/A	1.50E+01 (C)	No
	117-84-0	Di-n-octyl phthalate			mg/kg		0/13	1.70E-01 - 1.90E-01	1.90E-01	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/kg		0/13	2.10E-02 - 2.10E-01	2.10E-01	N/A	1.50E-02 (C)	Yes
	132-64-9	Dibenzofuran			mg/kg		0/13	3.50E-02 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	84-66-2	Diethyl phthalate			mg/kg		0/13	1.70E-01 - 2.40E-01	2.40E-01	N/A	4.90E+03 (N)	No
	86-73-7	Fluorene			mg/kg		0/13	2.10E-02 - 3.30E-02	3.30E-02	N/A	2.30E+02 (N)	No
	118-74-1	Hexachlorobenzene			mg/kg		0/13	3.30E-02 - 1.70E-01	1.70E-01	N/A	3.00E-01 (C)	No
	87-68-3	Hexachlorobutadiene			mg/kg		0/13	1.70E-01 - 2.30E-01	2.30E-01	N/A	6.10E+00 (N)	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/13	1.70E-01 - 6.20E+00	6.20E+00	N/A	3.70E+01 (N)	No
	67-72-1	Hexachloroethane			mg/kg		0/13	1.50E-01 - 1.70E-01	1.70E-01	N/A	6.10E+00 (N)	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/kg		0/13	2.10E-02 - 2.90E-01	2.90E-01	N/A	1.50E-01 (C)	Yes
	78-59-1	Isophorone			mg/kg		0/13	3.30E-02 - 1.70E-01	1.70E-01	N/A	5.10E+02 (C)	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/13	1.70E-01 - 2.00E-01	2.00E-01	N/A	6.90E-02 (C)	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/13	1.70E-01 - 1.90E-01	1.90E-01	N/A	9.90E+01 (C)	No
	91-20-3	Naphthalene			mg/kg		0/13	3.70E-02 - 1.00E-01	1.00E-01	N/A	3.90E+00 (C)	No
	98-95-3	Nitrobenzene			mg/kg		0/13	4.50E-02 - 5.00E-01	5.00E-01	N/A	4.40E+00 (C)	No
	95-48-7	o-Cresol			mg/kg		0/13	2.90E-02 - 1.70E-01	1.70E-01	N/A	3.10E+02 (N)	No
	106-47-8	p-Chloroaniline			mg/kg		0/13	1.70E-01 - 8.10E-01	8.10E-01	N/A	2.40E+00 (C)	No
	106-44-5	p-Cresol			mg/kg		0/13	1.70E-01 - 2.40E-01	2.40E-01	N/A	3.10E+01 (N)	No
	87-86-5	Pentachlorophenol			mg/kg		0/13	3.30E-01 - 1.30E+00	1.30E+00	N/A	3.00E+00 (C)	No
	85-01-8	Phenanthrene (8)			mg/kg		0/13	2.10E-02 - 3.30E-02	3.30E-02	N/A	1.70E+02 (N)	No
	108-95-2	Phenol			mg/kg		0/13	1.10E-01 - 1.70E-01	1.70E-01	N/A	1.80E+03 (N)	No
	71-55-6	1,1,1-Trichloroethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	9.00E+02 (N)	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E+00 (C)	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.40E+00 (C)	No

Table E.1-5
Summary of Screening for Non-Detected Chemicals
Current/Future - Total Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	75-35-4	1,1-Dichloroethene			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.50E+01 (N)	No
	107-06-2	1,2-Dichloroethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.50E-01 (C)	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	9.30E-01 (C)	No
	591-78-6	2-Hexanone			mg/kg		0/11	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/13	3.30E-02 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/13	3.30E-02 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/11	1.00E-02 - 1.00E-02	1.00E-02	N/A	5.30E+02 (N)	No
	75-27-4	Bromodichloromethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.80E-01 (C)	No
	56-23-5	Carbon tetrachloride			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.50E-01 (C)	No
	108-90-7	Chlorobenzene			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.10E+01 (N)	No
	75-00-3	Chloroethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.50E+03 (N)	No
	74-87-3	Chloromethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.20E+01 (N)	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.70E+00 (C)	No
	124-48-1	Dibromochloromethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	7.00E-01 (C)	No
	100-41-4	Ethylbenzene			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	5.70E+00 (C)	No
	100-42-5	Styrene			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	6.50E+02 (N)	No
	10061-02-6	trans-1,3-Dichloropropene			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.70E+00 (C)	No
	75-25-2	Tribromomethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	6.10E+01 (C)	No
	67-66-3	Trichloromethane			mg/kg		0/11	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.00E-01 (C)	No

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening toxicity values for residential soil from USEPA Regional Screening Level Table (April 2009) and based on a risk level of 1.0E-06 and a hazard index of 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes
Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- No Toxicity Information (NTX)

Deletion Reason:
- Infrequent Detection (<= 5%, IFD)
- Background Levels (BKG)
- Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value is based on endosulfan.

(6) The screening value is based on endrin.

(7) The screening value is based on dinitrotoluene mixtures.

(8) The screening value is based on pyrene as a surrogate.

Definitions:
- N/A = Not Applicable or Not Available
- SQL = Sample Quantitation Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
- MCL = Federal Maximum Contaminant Level
- SMCL = Secondary Maximum Contaminant Level
- J = Estimated Value
- C = Carcinogenic
- N = Non-Carcinogenic
- RDA = Recommended Daily Allowance

Table E.1-6
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant SWMU 41 Area A - Sediment

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	N/A	2,3,7,8-TCDD-TE	2.31E-06	5.21E-06	mg/kg	41SD10	3/3	N/A	5.21E-06	N/A	4.50E-05 C	N/A	N/A	No	BSL
Sediment	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.22E-05	6.22E-05	mg/kg	41SD08	3/3	N/A	6.22E-05	N/A	N/A	N/A	N/A	No	TEQ
	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	2.08E-05	4.67E-05	mg/kg	41SD08	3/3	N/A	4.67E-05	N/A	N/A	N/A	N/A	No	TEQ
	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.98E-07 J	1.26E-06 J	mg/kg	41SD08	3/3	N/A	1.26E-06	N/A	N/A	N/A	N/A	No	TEQ
	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	3.07E-06 J	8.37E-06 J	mg/kg	41SD08	3/3	N/A	8.37E-06	N/A	N/A	N/A	N/A	No	TEQ
	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	3.16E-07 J	8.05E-07 J	mg/kg	41SD10	2/3	1.43E-06 - 1.43E-06	8.05E-07	N/A	N/A	N/A	N/A	No	TEQ
	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	1.88E-06 J	4.78E-06 J	mg/kg	41SD08	3/3	N/A	4.78E-06	N/A	N/A	N/A	N/A	No	TEQ
	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	5.95E-07 J	1.41E-06 J	mg/kg	41SD10	2/3	1.43E-06 - 1.43E-06	1.41E-06	N/A	N/A	N/A	N/A	No	TEQ
	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	1.89E-07 J	5.41E-07 J	mg/kg	41SD10	2/3	1.43E-06 - 1.43E-06	5.41E-07	N/A	N/A	N/A	N/A	No	TEQ
	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.01E-06 J	3.18E-06 J	mg/kg	41SD08	3/3	N/A	3.18E-06	N/A	N/A	N/A	N/A	No	TEQ
	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	1.15E-06 J	2.90E-06 J	mg/kg	41SD08	3/3	N/A	2.90E-06	N/A	N/A	N/A	N/A	No	TEQ
	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	2.59E-07 J	6.01E-07 J	mg/kg	41SD10	2/3	1.43E-06 - 1.43E-06	6.01E-07	N/A	N/A	N/A	N/A	No	TEQ
	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	4.82E-07 J	1.68E-06 J	mg/kg	41SD10	3/3	N/A	1.68E-06	N/A	N/A	N/A	N/A	No	TEQ
	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	6.33E-07 J	1.40E-06 J	mg/kg	41SD08	3/3	N/A	1.40E-06	N/A	N/A	N/A	N/A	No	TEQ
	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	2.80E-07 J	7.48E-07 J	mg/kg	41SD08	3/3	N/A	7.48E-07	N/A	N/A	N/A	N/A	No	TEQ
	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	8.66E-07 J	1.58E-06 J	mg/kg	41SD10	3/3	N/A	1.58E-06	N/A	N/A	N/A	N/A	No	TEQ
	3268-87-9	Octachlorodibenzodioxin	8.97E-04	2.08E-03	mg/kg	41SD08	3/3	N/A	2.08E-03	N/A	N/A	N/A	N/A	No	TEQ
	39001-02-0	Octachlorodibenzofuran	2.08E-05	5.39E-05	mg/kg	41SD08	3/3	N/A	5.39E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 05	Total Heptachlorodibenzofuran	2.72E-05	7.56E-05	mg/kg	41SD08	3/3	N/A	7.56E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 04	Total Heptachlorodibenzo-p-dioxin	4.44E-05	9.90E-05	mg/kg	41SD08	3/3	N/A	9.90E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 07	Total Hexachlorodibenzofuran	1.63E-05	4.53E-05 J	mg/kg	41SD08	3/3	N/A	4.53E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 06	Total Hexachlorodibenzo-p-dioxin	6.76E-06 J	1.44E-05 J	mg/kg	41SD10	3/3	N/A	1.44E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 09	Total Pentachlorodibenzofuran	1.30E-05 J	3.26E-05 J	mg/kg	41SD08	3/3	N/A	3.26E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 08	Total Pentachlorodibenzo-p-dioxin	2.15E-06 J	4.57E-06	mg/kg	41SD08	3/3	N/A	4.57E-06	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 11	Total Tetrachlorodibenzofuran	1.03E-05 J	2.76E-05 J	mg/kg	41SD08	3/3	N/A	2.76E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 10	Total Tetrachlorodibenzo-p-dioxin	2.80E-07 J	3.52E-06 J	mg/kg	41SD08	3/3	N/A	3.52E-06	N/A	N/A	N/A	N/A	No	TEQ
	120-82-1	1,2,4-Trichlorobenzene	3.90E-03	4.40E-03	mg/kg	41SD7	2/6	5.00E-03 - 4.50E-01	4.40E-03	N/A	8.70E+01 N	N/A	N/A	No	BSL
	78-93-3	2-Butanone	2.60E-02	4.88E-02 J	mg/kg	41SD08	4/6	2.80E-02 - 3.70E-02	4.88E-02	N/A	2.80E+04 N	N/A	N/A	No	BSL
	50-29-3	4,4'-DDT	1.04E-03	1.98E-03	mg/kg	41SD7	2/6	2.00E-02 - 8.80E-02	1.98E-03	N/A	1.70E+01 C	N/A	N/A	No	BSL
	83-32-9	Acenaphthene	1.70E-02	1.70E-02	mg/kg	41SD5	1/6	1.00E-01 - 7.20E-01	1.70E-02	N/A	3.40E+03 N	N/A	N/A	No	BSL
	67-64-1	Acetone	2.53E-01 J	2.53E-01 J	mg/kg	41SD08	1/6	5.50E-02 - 7.30E-02	2.53E-01	N/A	6.10E+04 N	N/A	N/A	No	BSL
	120-12-7	Anthracene	1.10E-03	1.90E-02	mg/kg	41SD5	3/6	3.20E-01 - 7.20E-01	1.90E-02	N/A	1.70E+04 N	N/A	N/A	No	BSL
	71-43-2	Benzene	2.00E-04	2.80E-04	mg/kg	41SD7	3/6	5.50E-03 - 1.70E-02	2.80E-04	N/A	1.10E+01 C	N/A	N/A	No	BSL
	56-55-3	Benzo(a)anthracene	1.70E-02	6.70E-02	mg/kg	41SD5	6/6	N/A	6.70E-02	N/A	1.50E+00 C	N/A	N/A	No	BSL
	50-32-8	Benzo(a)pyrene	1.70E-02	7.90E-02	mg/kg	41SD5	6/6	N/A	7.90E-02	N/A	1.50E-01 C	N/A	N/A	No	BSL
	205-99-2	Benzo(b)fluoranthene	2.10E-02	1.20E-01 J	mg/kg	41SD08	5/6	2.10E-02 - 2.10E-02	1.20E-01	N/A	1.50E+00 C	N/A	N/A	No	BSL
	191-24-2	Benzo(g,h,i)perylene (5)	2.00E-02 L	1.00E-01	mg/kg	41SD5	6/6	N/A	1.00E-01	N/A	1.70E+03 N	N/A	N/A	No	BSL
	207-08-9	Benzo(k)fluoranthene	8.40E-03	6.69E-02 J	mg/kg	41SD08	6/6	N/A	6.69E-02	N/A	1.50E+01 C	N/A	N/A	No	BSL
	117-81-7	bis(2-Ethylhexyl) phthalate	2.30E-02	4.70E-02	mg/kg	41SD5	3/6	4.00E-01 - 9.00E-01	4.70E-02	N/A	3.50E+02 C	N/A	N/A	No	BSL
	74-83-9	Bromomethane	1.50E-03	1.50E-03	mg/kg	41SD7	1/6	5.00E-03 - 1.70E-02	1.50E-03	N/A	7.90E+00 N	N/A	N/A	No	BSL
	75-15-0	Carbon disulfide	5.50E-03	6.70E-03	mg/kg	41SD5	2/6	5.00E-03 - 1.70E-02	6.70E-03	N/A	6.70E+02 N	N/A	N/A	No	BSL
	67-66-3	Chloroform	5.40E-04	5.40E-04	mg/kg	41SD6	1/6	5.00E-03 - 1.70E-02	5.40E-04	N/A	3.00E+00 C	N/A	N/A	No	BSL
	218-01-9	Chrysene	1.90E-02	9.82E-02 J	mg/kg	41SD08	6/6	N/A	9.82E-02	N/A	1.50E+02 C	N/A	N/A	No	BSL
	84-74-2	Di-n-butyl phthalate	4.80E-02	6.90E-02	mg/kg	41SD5	3/6	4.00E-01 - 9.00E-01	6.90E-02	N/A	6.10E+03 N	N/A	N/A	No	BSL
	7421-93-4	Endrin aldehyde (6)	2.45E-03	2.45E-03	mg/kg	41SD7	1/6	4.00E-03 - 2.00E-02	2.45E-03	N/A	1.80E+01 N	N/A	N/A	No	BSL
	206-44-0	Fluoranthene	3.40E-02	2.00E-01	mg/kg	41SD5	5/6	3.20E-01 - 3.20E-01	2.00E-01	N/A	2.30E+03 N	N/A	N/A	No	BSL

Table E.1-6
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant SWMU 41 Area A - Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
Sediment	86-73-7	Fluorene	1.00E-02	1.00E-02	mg/kg	41SD5	1/6	2.10E-02 - 7.20E-01	1.00E-02	N/A	2.30E+03 N	N/A	N/A	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	1.50E-02	6.71E-02 J	mg/kg	41SD08	6/6	N/A	6.71E-02	N/A	1.50E+00 C	N/A	N/A	No	BSL
	79-20-9	Methyl Acetate	7.60E-04	7.60E-04	mg/kg	41SD6	1/3	1.00E-02 - 1.00E-02	7.60E-04	N/A	7.80E+04 N	N/A	N/A	No	BSL
	75-09-2	Methylene chloride	3.80E-03	7.80E-03	mg/kg	41SD6	3/6	1.10E-02 - 3.50E-02	7.80E-03	N/A	1.10E+02 C	N/A	N/A	No	BSL
	55-63-0	Nitroglycerin	5.80E+00	5.80E+00	mg/kg	41SD6	1/6	1.60E+00 - 1.00E+01	5.80E+00	N/A	6.10E+00 N	N/A	N/A	No	BSL
	59-50-7	p-Chloro-m-cresol	1.70E-02	1.70E-02	mg/kg	41SD5	1/6	1.70E-01 - 4.50E-01	1.70E-02	N/A	N/A	N/A	N/A	Yes	NTX
	85-01-8	Phenanthrene (5)	6.30E-03	1.10E-01	mg/kg	41SD5	4/6	3.20E-01 - 7.20E-01	1.10E-01	N/A	1.70E+03 N	N/A	N/A	No	BSL
	129-00-0	Pyrene	2.80E-02	1.50E-01	mg/kg	41SD5	5/6	3.20E-01 - 3.20E-01	1.50E-01	N/A	1.70E+03 N	N/A	N/A	No	BSL
	108-88-3	Toluene	2.60E-04	1.10E-03	mg/kg	41SD5	3/6	5.50E-03 - 1.70E-02	1.10E-03	N/A	5.00E+03 N	N/A	N/A	No	BSL
	7429-90-5	Aluminum	6.17E+03	1.55E+04	mg/kg	41SD7	6/6	N/A	1.55E+04	N/A	7.70E+04 N	N/A	N/A	No	BSL
	7440-36-0	Antimony	1.80E-01	4.50E-01	mg/kg	41SD6	3/4	7.20E-01 - 7.20E-01	4.50E-01	N/A	3.10E+01 N	N/A	N/A	No	BSL
	7440-38-2	Arsenic	3.70E+00	1.80E+01	mg/kg	41SD6	6/6	N/A	1.80E+01	N/A	3.90E+00 C	N/A	N/A	Yes	ASL
	7440-39-3	Barium	6.30E+01	1.95E+02	mg/kg	41SD6	6/6	N/A	1.95E+02	N/A	1.50E+04 N	N/A	N/A	No	BSL
	7440-41-7	Beryllium	2.30E-01	8.80E-01	mg/kg	41SD08	6/6	N/A	8.80E-01	N/A	1.60E+02 N	N/A	N/A	No	BSL
	7440-43-9	Cadmium	5.60E-01	2.20E+00	mg/kg	41SD6	3/6	6.30E-02 - 5.80E-01	2.20E+00	N/A	7.00E+01 N	N/A	N/A	No	BSL
	7440-70-2	Calcium	5.59E+03	2.56E+04	mg/kg	41SD08	6/6	N/A	2.56E+04	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-47-3	Chromium	9.60E+00	3.30E+01	mg/kg	41SD6	6/6	N/A	3.30E+01	N/A	2.80E+03 C	N/A	N/A	No	BSL
	7440-48-4	Cobalt	6.90E+00	2.00E+01	mg/kg	41SD6	6/6	N/A	2.00E+01	N/A	2.30E+01 N	N/A	N/A	No	BSL
	7440-50-8	Copper	1.27E+01	2.60E+01	mg/kg	41SD6	6/6	N/A	2.60E+01	N/A	3.10E+03 N	N/A	N/A	No	BSL
	7439-89-6	Iron	1.25E+04	4.79E+04	mg/kg	41SD6	6/6	N/A	4.79E+04	N/A	5.50E+04 N	N/A	N/A	No	BSL
	7439-92-1	Lead	1.04E+01 K	3.50E+01	mg/kg	41SD7	6/6	N/A	3.50E+01	N/A	4.00E+02 N	N/A	N/A	No	BSL
	7439-95-4	Magnesium	3.68E+03	1.09E+04	mg/kg	41SD6	6/6	N/A	1.09E+04	N/A	N/A	1.00E+06	RDA	No	BSL
	7439-96-5	Manganese	2.99E+02	1.64E+03	mg/kg	41SD6	6/6	N/A	1.64E+03	N/A	1.80E+03 N	N/A	N/A	No	BSL
	7439-97-6	Mercury (7)	2.40E-02	3.30E-02	mg/kg	41SD7	3/3	N/A	3.30E-02	N/A	7.80E+00 N	N/A	N/A	No	BSL
	7440-02-0	Nickel	1.00E+01	2.50E+01	mg/kg	41SD6	6/6	N/A	2.50E+01	N/A	1.50E+03 N	N/A	N/A	No	BSL
	7440-09-7	Potassium	9.68E+02	1.82E+03	mg/kg	41SD7	3/3	N/A	1.82E+03	N/A	N/A	1.00E+06	RDA	No	BSL
	7782-49-2	Selenium	3.40E-01	7.70E+00 K	mg/kg	41SD09	4/4	N/A	7.70E+00	N/A	3.90E+02 N	N/A	N/A	No	BSL
	7440-22-4	Silver	7.20E-02 J	1.60E-01	mg/kg	41SD5	4/6	5.20E-02 - 1.20E-01	1.60E-01	N/A	3.90E+02 N	N/A	N/A	No	BSL
	7440-23-5	Sodium	3.60E+01	6.60E+01	mg/kg	41SD7	3/3	N/A	6.60E+01	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-28-0	Thallium	8.80E-02	1.30E-01	mg/kg	41SD7	2/6	5.00E-01 - 1.20E+00	1.30E-01	N/A	5.10E+00 N	N/A	N/A	No	BSL
	57-12-5	Total Cyanide	8.00E-02	1.30E-01	mg/kg	41SD7	3/3	N/A	1.30E-01	N/A	1.60E+03 N	N/A	N/A	No	BSL
	7440-62-2	Vanadium (8)	1.21E+01	3.60E+01	mg/kg	41SD6	6/6	N/A	3.60E+01	N/A	3.90E+02 N	N/A	N/A	No	BSL
	7440-66-6	Zinc	5.79E+01	1.21E+02	mg/kg	41SD6	6/6	N/A	1.21E+02	N/A	2.30E+04 N	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for residential soil from USEPA Regional Screening Level Table (April 2009) and
are based on a risk level of 1.0E-06 and a hazard index of 0.1, then adjusted by a factor of 10 for sediment exposures.
See text for derivation of Nutrient RDAs.

(4) Rationale Codes
Selection Reason:
Infrequent Detection but Associated Historically (HIST)
Toxicity Information Available (TX)
Above Screening Levels (ASL)
No Toxicity Information (NTX)
Deletion Reason:
Infrequent Detection (<= 5%, IFD)
Background Levels (BKG)
Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value for pyrene was used as a surrogate.

(6) The screening value for endrin was used as a surrogate.

(7) The screening value for methylmercury was used for sediment.

(8) The screening value for vanadium and compounds was used as a surrogate.

Definitions:
N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Table E.1-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
Sediment	87-61-6	1,2,3-Trichlorobenzene			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	8.70E+01 (N)	No
	95-94-3	1,2,4,5-Tetrachlorobenzene			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+01 (N)	No
	96-12-8	1,2-Dibromo-3-chloropropane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	N/A	5.60E-02 (C)	No
	106-93-4	1,2-Dibromoethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.40E-01 (C)	No
	90-12-0	1-Methylnaphthalene			mg/kg		0/3	3.20E-01 - 7.20E-01	7.20E-01	N/A	2.20E+02 (C)	No
	ICF14A-AA-I	3&4-Methylphenol			mg/kg		0/3	2.00E-01 - 4.50E-01	4.50E-01	N/A	3.10E+02 (N)	No
	1912-24-9	Atrazine			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	2.10E+01 (C)	No
	100-51-6	Benzyl alcohol			mg/kg		0/3	2.00E-01 - 4.50E-01	4.50E-01	N/A	3.10E+04 (N)	No
	92-52-4	Biphenyl			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.90E+03 (N)	No
	105-60-2	Caprolactam			mg/kg		0/3	3.30E-01 - 3.30E-01	3.30E-01	N/A	3.10E+04 (N)	No
	74-97-5	Chlorobromomethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	110-82-7	Cyclohexane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	N/A	7.20E+03 (N)	No
	75-71-8	Dichlorodifluoromethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.90E+02 (N)	No
	76-13-1	Freon 113			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.30E+04 (N)	No
	98-82-8	Isopropylbenzene			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.20E+03 (N)	No
	ICF87	m+p-Xylenes			mg/kg		0/3	1.10E-02 - 3.50E-02	3.50E-02	N/A	6.00E+02 (N)	No
	1634-04-4	Methyl tert-butyl ether			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.90E+02 (C)	No
	108-87-2	Methylcyclohexane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	95-47-6	o-Xylene			mg/kg		0/3	5.50E-03 - 1.70E-02	1.70E-02	N/A	5.30E+03 (N)	No
	75-69-4	Trichlorofluoromethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	8.00E+02 (N)	No
	98-86-2	Acetophenone			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+03 (N)	No
	100-52-7	Benzaldehyde			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+03 (N)	No
	65-85-0	Benzoic Acid			mg/kg		0/3	1.00E+00 - 2.30E+00	2.30E+00	N/A	2.40E+05 (N)	No
	106-44-5	p-Cresol			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.10E+02 (N)	No
	1330-20-7	Xylenes (total)			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	6.00E+02 (N)	No
	99-35-4	1,3,5-Trinitrobenzene			mg/kg		0/6	2.00E-01 - 1.00E+00	1.00E+00	N/A	2.20E+03 (N)	No
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/6	2.00E-01 - 5.00E-01	5.00E-01	N/A	6.10E+00 (N)	No
	118-96-7	2,4,6-Trinitrotoluene			mg/kg		0/6	2.00E-01 - 5.00E-01	5.00E-01	N/A	3.60E+01 (N)	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/6	2.00E-01 - 5.00E-01	5.00E-01	N/A	1.50E+02 (N)	No
	88-72-2	2-Nitrotoluene			mg/kg		0/6	2.00E-01 - 1.00E+00	1.00E+00	N/A	2.90E+01 (C)	No
	99-08-1	3-Nitrotoluene			mg/kg		0/6	2.00E-01 - 1.00E+00	1.00E+00	N/A	1.20E+03 (N)	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/6	2.00E-01 - 5.00E-01	5.00E-01	N/A	1.50E+02 (N)	No
	99-99-0	4-Nitrotoluene			mg/kg		0/6	2.00E-01 - 1.00E+00	1.00E+00	N/A	2.40E+02 (N)	No
	156-59-2	cis-1,2-Dichloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	7.80E+02 (N)	No
	121-82-4	Cyclonite			mg/kg		0/6	2.00E-01 - 5.00E-01	5.00E-01	N/A	5.50E+01 (C)	No
	2691-41-0	HMX			mg/kg		0/6	2.00E-01 - 1.00E+00	1.00E+00	N/A	3.80E+03 (N)	No
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/6	1.60E+00 - 1.00E+01	1.00E+01	N/A	N/A	NTX
	479-45-8	Tetryl			mg/kg		0/6	4.10E-01 - 1.00E+00	1.00E+00	N/A	2.40E+02 (N)	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	1.10E+02 (N)	No
	93-76-5	2,4,5-T			mg/kg		0/6	8.10E-03 - 5.00E-02	5.00E-02	N/A	6.10E+02 (N)	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/6	1.60E-02 - 5.00E-02	5.00E-02	N/A	4.90E+02 (N)	No

Table E.1-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	94-75-7	2,4-D			mg/kg		0/6	4.00E-02 - 2.00E-01	2.00E-01	N/A	6.90E+02 (N)	No
	94-82-6	2,4-DB			mg/kg		0/6	8.10E-02 - 2.00E-01	2.00E-01	N/A	4.90E+02 (N)	No
	72-54-8	4,4'-DDD			mg/kg		0/6	4.00E-03 - 2.00E-02	2.00E-02	N/A	2.00E+01 (C)	No
	72-55-9	4,4'-DDE			mg/kg		0/6	4.00E-03 - 2.00E-02	2.00E-02	N/A	1.40E+01 (C)	No
	309-00-2	Aldrin			mg/kg		0/6	2.00E-03 - 2.00E-02	2.00E-02	N/A	2.90E-01 (C)	No
	319-84-6	alpha-BHC			mg/kg		0/6	2.00E-03 - 2.00E-02	2.00E-02	N/A	7.70E-01 (C)	No
	5103-71-9	alpha-Chlordane (5)			mg/kg		0/6	2.00E-03 - 2.00E-02	2.00E-02	N/A	1.60E+01 (C)	No
	319-85-7	beta-BHC			mg/kg		0/6	2.00E-03 - 2.00E-02	2.00E-02	N/A	2.70E+00 (C)	No
	75-99-0	Dalapon			mg/kg		0/6	4.00E-02 - 3.60E-01	3.60E-01	N/A	1.80E+03 (N)	No
	319-86-8	delta-BHC			mg/kg		0/6	2.00E-03 - 2.00E-02	2.00E-02	N/A	5.20E+00 (C)	No
	1918-00-9	Dicamba			mg/kg		0/6	8.10E-03 - 2.00E-01	2.00E-01	N/A	1.80E+03 (N)	No
	120-36-5	Dichloroprop			mg/kg		0/6	4.00E-02 - 2.00E-01	2.00E-01	N/A	N/A	NTX
	60-57-1	Dieldrin			mg/kg		0/6	2.00E-03 - 2.00E-02	2.00E-02	N/A	3.00E-01 (C)	No
	959-98-8	Endosulfan I			mg/kg		0/6	2.00E-03 - 2.00E-02	2.00E-02	N/A	3.70E+02 (N)	No
	33213-65-9	Endosulfan II (6)			mg/kg		0/6	4.00E-03 - 2.00E-02	2.00E-02	N/A	3.70E+02 (N)	No
	1031-07-8	Endosulfan sulfate (6)			mg/kg		0/6	4.00E-03 - 2.00E-02	2.00E-02	N/A	3.70E+02 (N)	No
	72-20-8	Endrin			mg/kg		0/6	4.00E-03 - 2.00E-02	2.00E-02	N/A	1.80E+01 (N)	No
	53494-70-5	Endrin ketone (7)			mg/kg		0/6	4.00E-03 - 2.00E-02	2.00E-02	N/A	1.80E+01 (N)	No
	58-89-9	gamma-BHC (Lindane)			mg/kg		0/6	2.00E-03 - 2.00E-02	2.00E-02	N/A	5.20E+00 (C)	No
	5103-74-2	gamma-Chlordane (5)			mg/kg		0/6	2.00E-03 - 2.00E-02	2.00E-02	N/A	1.60E+01 (C)	No
	76-44-8	Heptachlor			mg/kg		0/6	2.00E-02 - 4.40E-02	4.40E-02	N/A	1.10E+00 (C)	No
	1024-57-3	Heptachlor epoxide			mg/kg		0/6	2.00E-03 - 2.00E-02	2.00E-02	N/A	5.30E-01 (C)	No
	94-74-6	MCPA			mg/kg		0/6	2.00E-01 - 2.00E+01	2.00E+01	N/A	3.10E+01 (N)	No
	93-65-2	MCPP			mg/kg		0/6	2.00E-01 - 2.00E+01	2.00E+01	N/A	6.10E+01 (N)	No
	72-43-5	Methoxychlor			mg/kg		0/6	2.00E-02 - 8.80E-02	8.80E-02	N/A	3.10E+02 (N)	No
	8001-35-2	Toxaphene			mg/kg		0/6	1.00E-01 - 3.50E-01	3.50E-01	N/A	4.40E+00 (C)	No
	12674-11-2	Aroclor 1016			mg/kg		0/6	2.00E-02 - 6.60E-02	6.60E-02	N/A	3.90E+00 (N)	No
	11104-28-2	Aroclor 1221			mg/kg		0/6	2.00E-02 - 6.60E-02	6.60E-02	N/A	1.70E+00 (C)	No
	11141-16-5	Aroclor 1232			mg/kg		0/6	2.00E-02 - 6.60E-02	6.60E-02	N/A	1.70E+00 (C)	No
	53469-21-9	Aroclor 1242			mg/kg		0/6	2.00E-02 - 4.40E-02	4.40E-02	N/A	2.20E+00 (C)	No
	12672-29-6	Aroclor 1248			mg/kg		0/6	2.00E-02 - 4.40E-02	4.40E-02	N/A	2.20E+00 (C)	No
	11097-69-1	Aroclor 1254			mg/kg		0/6	2.00E-02 - 6.60E-02	6.60E-02	N/A	1.10E+00 (N)	No
	11096-82-5	Aroclor 1260			mg/kg		0/6	2.00E-02 - 6.60E-02	6.60E-02	N/A	2.20E+00 (C)	No
	131-11-3	Dimethylphthalate			mg/kg		0/6	1.70E-01 - 9.00E-01	9.00E-01	N/A	N/A	NTX
	95-50-1	1,2-Dichlorobenzene			mg/kg		0/6	5.00E-03 - 4.50E-01	4.50E-01	N/A	2.00E+03 (N)	No
	541-73-1	1,3-Dichlorobenzene			mg/kg		0/6	5.00E-03 - 4.50E-01	4.50E-01	N/A	N/A	NTX
	106-46-7	1,4-Dichlorobenzene			mg/kg		0/6	5.00E-03 - 4.50E-01	4.50E-01	N/A	2.60E+01 (C)	No
	95-95-4	2,4,5-Trichlorophenol			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	6.10E+03 (N)	No
	88-06-2	2,4,6-Trichlorophenol			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	6.10E+01 (N)	No
	120-83-2	2,4-Dichlorophenol			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	1.80E+02 (N)	No
	105-67-9	2,4-Dimethylphenol			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	1.20E+03 (N)	No
	51-28-5	2,4-Dinitrophenol			mg/kg		0/6	3.30E-01 - 2.30E+00	2.30E+00	N/A	1.20E+02 (N)	No

Table E.1-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	121-14-2	2,4-Dinitrotoluene (8)			mg/kg		0/6	2.00E-01 - 5.00E-01	5.00E-01	N/A	7.10E+00 (C)	No
	606-20-2	2,6-Dinitrotoluene (8)			mg/kg		0/6	2.00E-01 - 1.00E+00	1.00E+00	N/A	7.10E+00 (C)	No
	91-58-7	2-Chloronaphthalene			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	6.30E+03 (N)	No
	95-57-8	2-Chlorophenol			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	3.90E+02 (N)	No
	91-57-6	2-Methylnaphthalene			mg/kg		0/6	1.70E-01 - 7.20E-01	7.20E-01	N/A	3.10E+02 (N)	No
	88-74-4	2-Nitroaniline			mg/kg		0/6	1.70E-01 - 9.00E-01	9.00E-01	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	N/A	NTX
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/kg		0/6	8.10E-03 - 2.00E-01	2.00E-01	N/A	6.10E+01 (N)	No
	91-94-1	3,3'-Dichlorobenzidine			mg/kg		0/6	4.00E-01 - 1.00E+00	1.00E+00	N/A	1.10E+01 (C)	No
	99-09-2	3-Nitroaniline			mg/kg		0/6	2.25E-01 - 9.00E-01	9.00E-01	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/6	2.25E-01 - 9.00E-01	9.00E-01	N/A	6.10E+00 (N)	No
	100-01-6	4-Nitroaniline			mg/kg		0/6	2.25E-01 - 9.00E-01	9.00E-01	N/A	2.40E+02 (C)	No
	100-02-7	4-Nitrophenol			mg/kg		0/6	3.30E-01 - 2.30E+00	2.30E+00	N/A	N/A	NTX
	208-96-8	Acenaphthylene (9)			mg/kg		0/6	2.10E-01 - 7.20E-01	7.20E-01	N/A	1.70E-03 (N)	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	1.80E+02 (N)	No
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	1.90E+00 (C)	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	3.50E+01 (C)	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/6	1.70E-01 - 9.00E-01	9.00E-01	N/A	2.60E+03 (C)	No
	86-74-8	Carbazole			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/kg		0/6	2.10E-02 - 1.40E-01	1.40E-01	N/A	1.50E-01 (C)	No
	132-64-9	Dibenzofuran			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	N/A	NTX
	84-66-2	Diethyl phthalate			mg/kg		0/6	1.70E-01 - 9.00E-01	9.00E-01	N/A	4.90E+04 (N)	No
	117-84-0	Di-n-octyl phthalate			mg/kg		0/6	1.70E-01 - 9.00E-01	9.00E-01	N/A	N/A	NTX
	118-74-1	Hexachlorobenzene			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	3.00E+00 (C)	No
	87-68-3	Hexachlorobutadiene			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	6.10E+01 (N)	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	3.70E+02 (N)	No
	67-72-1	Hexachloroethane			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	6.10E+01 (N)	No
	78-59-1	Isophorone			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	5.10E+03 (C)	No
	91-20-3	Naphthalene			mg/kg		0/6	1.00E-01 - 7.20E-01	7.20E-01	N/A	3.90E+01 (C)	No
	98-95-3	Nitrobenzene			mg/kg		0/6	2.00E-01 - 5.00E-01	5.00E-01	N/A	4.40E+01 (C)	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	6.90E-01 (C)	No
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	9.90E+02 (C)	No
	95-48-7	o-Cresol			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	3.10E+03 (N)	No
	106-47-8	p-Chloroaniline			mg/kg		0/6	2.25E-01 - 9.00E-01	9.00E-01	N/A	2.40E+01 (C)	No
	87-86-5	Pentachlorophenol			mg/kg		0/6	3.30E-01 - 2.30E+00	2.30E+00	N/A	3.00E+01 (C)	No
	108-95-2	Phenol			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	1.80E+04 (N)	No
	71-55-6	1,1,1-Trichloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	9.00E+03 (N)	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	5.90E+00 (C)	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	1.10E+01 (C)	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	3.40E+01 (C)	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	2.50E+02 (N)	No
	107-06-2	1,2-Dichloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	4.50E+00 (C)	No

Table E.1-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	78-87-5	1,2-Dichloropropane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	9.30E+00 (C)	No
	591-78-6	2-Hexanone			mg/kg		0/6	1.00E-02 - 8.60E-02	8.60E-02	N/A	N/A	NTX
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/6	1.00E-02 - 8.60E-02	8.60E-02	N/A	5.30E+03 (N)	No
	75-27-4	Bromodichloromethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	2.80E+00 (C)	No
	56-23-5	Carbon tetrachloride			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	2.50E+00 (C)	No
	108-90-7	Chlorobenzene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	3.10E+02 (N)	No
	75-00-3	Chloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	1.50E+04 (N)	No
	74-87-3	Chloromethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	1.20E+02 (N)	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	1.70E+01 (C)	No
	124-48-1	Dibromochloromethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	7.00E+00 (C)	No
	100-41-4	Ethylbenzene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	5.70E+01 (C)	No
	100-42-5	Styrene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	6.50E+03 (N)	No
	127-18-4	Tetrachloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	5.70E+00 (C)	No
	10061-02-6	trans-1,3-Dichloropropene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	1.70E+01 (C)	No
	75-25-2	Tribromomethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	6.10E+02 (C)	No
	79-01-6	Trichloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	2.80E+01 (C)	No
	75-01-4	Vinyl Chloride			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	6.00E-01 (C)	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	N/A	2.50E+02 (N)	No

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening toxicity values from USEPA Regional Screening Level Table (April 2009) and
based on a risk level of 1.0E-06 and a hazard index of 0.1, then adjusted by a factor of 10 for sediment exposures.

(4) See text for derivation of Nutrient RDAs.

Rationale Codes Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- No Toxicity Information (NTX)

Deletion Reason:
- Infrequent Detection (<= 5%, IFD)
- Background Levels (BKG)
- Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value is based on chlordane.

(6) The screening value is based on endosulfan.

(7) The screening value is based on endrin.

(8) The screening value is based on dinitrotoluene mixtures.

(9) The screening value is based on pyrene as a surrogate.

Definitions:
- N/A = Not Applicable or Not Available
- SQL = Sample Quantitation Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
- MCL = Federal Maximum Contaminant Level
- SMCL = Secondary Maximum Contaminant Level
- J = Estimated Value
- C = Carcinogenic
- N = Non-Carcinogenic
- RDA = Recommended Daily Allowance

Table E.1-8
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant SWMU 41 Area A - Surface Water

Scenario Timeframe: Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	1746-01-6	2,3,7,8-TCDD-TE	6.57E-12	1.43E-08	mg/L	41SW09	3/3	N/A	1.43E-08	N/A	5.20E-09 C	N/A	N/A	Yes	ASL
	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	5.64E-09 J	5.64E-09 J	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	5.64E-09	N/A	N/A	N/A	N/A	No	TEQ
	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	5.36E-09 J	5.36E-09 J	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	5.36E-09	N/A	N/A	N/A	N/A	No	TEQ
	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.02E-09 J	4.02E-09 J	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	4.02E-09	N/A	N/A	N/A	N/A	No	TEQ
	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	4.68E-09 J	4.68E-09 J	mg/l	41SW09	1/3	5.25E-09 - 6.89E-09	4.68E-09	N/A	N/A	N/A	N/A	No	TEQ
	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	5.32E-09 J	5.32E-09 J	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	5.32E-09	N/A	N/A	N/A	N/A	No	TEQ
	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	4.75E-09 J	4.75E-09 J	mg/l	41SW09	1/3	5.25E-09 - 7.02E-09	4.75E-09	N/A	N/A	N/A	N/A	No	TEQ
	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	5.09E-09 J	5.09E-09 J	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	5.09E-09	N/A	N/A	N/A	N/A	No	TEQ
	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	4.95E-09 J	4.95E-09 J	mg/l	41SW09	1/3	5.25E-09 - 7.12E-09	4.95E-09	N/A	N/A	N/A	N/A	No	TEQ
	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	5.01E-09 J	5.01E-09 J	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	5.01E-09	N/A	N/A	N/A	N/A	No	TEQ
	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	6.07E-09 J	6.07E-09 J	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	6.07E-09	N/A	N/A	N/A	N/A	No	TEQ
	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	6.62E-09 J	6.62E-09 J	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	6.62E-09	N/A	N/A	N/A	N/A	No	TEQ
	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	1.47E-09 J	1.47E-09 J	mg/l	41SW09	1/3	1.28E-09 - 5.25E-09	1.47E-09	N/A	N/A	N/A	N/A	No	TEQ
	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	4.09E-09 J	4.09E-09 J	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	4.09E-09	N/A	N/A	N/A	N/A	No	TEQ
	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	5.89E-09 J	5.89E-09 J	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	5.89E-09	N/A	N/A	N/A	N/A	No	TEQ
	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	2.57E-09 J	2.57E-09 J	mg/l	41SW09	1/3	1.64E-09 - 1.79E-09	2.57E-09	N/A	N/A	N/A	N/A	No	TEQ
	3268-87-9	Octachlorodibenzodioxin	2.19E-08 J	6.18E-08 J	mg/l	41SW10	3/3	N/A	6.18E-08	N/A	N/A	N/A	N/A	No	TEQ
	39001-02-0	Octachlorodibenzofuran	8.74E-09 J	8.74E-09 J	mg/l	41SW09	1/3	1.05E-08 - 1.08E-08	8.74E-09	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 04	Total Heptachlorodibenzo-p-dioxin	5.64E-09	5.64E-09	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	5.64E-09	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 05	Total Heptachlorodibenzofuran	9.55E-09 J	9.55E-09 J	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	9.55E-09	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 06	Total Hexachlorodibenzo-p-dioxin	1.44E-08	1.44E-08	mg/l	41SW09	1/3	5.25E-09 - 7.12E-09	1.44E-08	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 07	Total Hexachlorodibenzofuran	1.95E-08	1.95E-08	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	1.95E-08	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 08	Total Pentachlorodibenzo-p-dioxin	6.07E-09	6.07E-09	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	6.07E-09	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 09	Total Pentachlorodibenzofuran	1.25E-08	1.25E-08	mg/l	41SW09	1/3	5.25E-09 - 5.38E-09	1.25E-08	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 11	Total Tetrachlorodibenzofuran	1.47E-09	1.47E-09	mg/l	41SW09	1/3	1.28E-09 - 5.25E-09	1.47E-09	N/A	N/A	N/A	N/A	No	TEQ
	118-96-7	2,4,6-Trinitrotoluene	1.30E-03	1.30E-03	mg/l	41SW10	1/6	2.00E-04 - 6.50E-04	1.30E-03	N/A	1.80E-02 N	N/A	N/A	No	BSL
	35572-78-2	2-amino-4,6-Dinitrotoluene	2.70E-04	1.10E-03	mg/l	41SW10	3/6	1.00E-03 - 1.00E-03	1.10E-03	N/A	7.30E-02 N	N/A	N/A	No	BSL
	19406-51-0	4-amino-2,6-Dinitrotoluene	8.70E-04	2.50E-03	mg/l	41SW10	3/6	1.00E-03 - 1.00E-03	2.50E-03	N/A	7.30E-02 N	N/A	N/A	No	BSL
	84-66-2	Diethyl phthalate	1.80E-04	2.10E-04	mg/l	41SW7	3/6	4.90E-03 - 5.70E-03	2.10E-04	N/A	2.90E+01 N	N/A	N/A	No	BSL
	7429-90-5	Aluminum	8.30E-02	2.35E-01 L	mg/l	41SW10	3/5	2.00E-01 - 2.00E-01	2.35E-01	12800	3.70E+01 N	N/A	N/A	No	BSL
	7440-39-3	Barium	4.80E-02	6.49E-02 J	mg/l	41SW08	6/6	N/A	6.49E-02	161	7.30E+00 N	N/A	N/A	No	BSL
	7440-70-2	Calcium	4.00E+01	5.30E+01	mg/l	41SW10	6/6	N/A	5.30E+01	5990	N/A	5.00E+02	RDA	No	BSL
	7440-47-3	Chromium	9.00E-04	9.80E-04	mg/l	41SW7	3/6	6.00E-04 - 6.00E-04	9.80E-04	23.8	1.10E-01 N	N/A	N/A	No	BSL
	7439-89-6	Iron	5.40E-02	2.00E-01	mg/l	41SW6	3/4	1.50E-02 - 1.50E-02	2.00E-01	67600	2.60E+01 N	N/A	N/A	No	BSL
	7439-92-1	Lead	3.00E-04	3.00E-04	mg/l	41SW6	1/6	1.00E-03 - 3.40E-03	3.00E-04	38.8	N/A	1.50E-02	TAL	No	BSL
	7439-95-4	Magnesium	1.80E+01	3.20E+01	mg/l	41SW6	6/6	N/A	3.20E+01	4260	N/A	1.75E+02	RDA	No	BSL
	7439-96-5	Manganese	2.10E-03	6.19E-02	mg/l	41SW08	5/6	1.00E-02 - 1.00E-02	6.19E-02	2740	8.80E-01 N	N/A	N/A	No	BSL
	7440-09-7	Potassium	1.50E+00	2.10E+00	mg/l	41SW7	3/3	N/A	2.10E+00	821	N/A	1.00E+03	RDA	No	BSL
	7440-23-5	Sodium	1.10E+01	1.66E+01	mg/l	41SW10	6/6	N/A	1.66E+01	638	N/A	2.00E+01	RDA	No	BSL
	7440-62-2	Vanadium (5)	1.10E-03 J	1.40E-03 J	mg/l	41SW09	3/6	2.50E-02 - 2.50E-02	1.40E-03	72.4	1.80E-01 N	N/A	N/A	No	BSL
	7440-66-6	Zinc	2.60E-03 J	6.70E-03 J	mg/l	41SW09	3/6	2.00E-02 - 2.00E-02	6.70E-03	171	1.10E+01 N	N/A	N/A	No	BSL
	57-12-5	Total Cyanide	2.00E-03	3.00E-03	mg/l	41SW7	3/3	N/A	3.00E-03	N/A	7.30E-01 N	N/A	N/A	No	BSL
	14797-73-0	Perchlorate	1.35E-04 J	1.68E-04 J	mg/l	41SW08	3/6	1.00E-03 - 1.00E-03	1.68E-04	N/A	2.60E-02 N	N/A	N/A	No	BSL

Table E.1-8
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant SWMU 41 Area A - Surface Water

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for tap water from USEPA Regional Screening Level Table (April 2009) and
are based on a risk level of 1.0E-06 and a hazard index of 0.1, then adjusted by a factor of 10 for surface water exposures.
See text for derivation of Nutrient RDAs.

(4) Rationale Codes

Selection Reason:	Infrequent Detection but Associated Historically (HIST)	
	Toxicity Information Available (TX)	
	Above Screening Levels (ASL)	
	No Toxicity Information (NTX)	
Deletion Reason:	Infrequent Detection (<= 5%, IFD)	
	Background Levels (BKG)	
	Below Screening and/or ARAR/TBC Level (BSL)	

(5) Screening value for vandaium based on vanadium and compounds

Definitions:
N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance
TAL = Treatment Action Level

Table E.1-9
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	87-61-6	1,2,3-Trichlorobenzene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	8.20E-03 (N)	No
Surface Water	95-94-3	1,2,4,5-Tetrachlorobenzene			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E-02 (N)	No
	96-12-8	1,2-Dibromo-3-chloropropane			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.20E-06 (C)	Yes
	106-93-4	1,2-Dibromoethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	6.50E-05 (C)	Yes
	99-35-4	1,3,5-Trinitrobenzene			mg/l		0/6	2.00E-04 - 6.50E-04	6.50E-04	N/A	1.10E+00 (N)	No
	99-65-0	1,3-Dinitrobenzene			mg/l		0/6	2.00E-04 - 1.00E-03	1.00E-03	N/A	3.70E-03 (N)	No
	90-12-0	1-Methylnaphthalene			mg/l		0/3	9.70E-04 - 1.10E-03	1.10E-03	N/A	2.30E-02 (C)	No
	88-72-2	2-Nitrotoluene			mg/l		0/6	2.00E-04 - 1.00E-03	1.00E-03	N/A	3.10E-03 (C)	No
	ICF14A-AA-I	3&4-Methylphenol			mg/l		0/3	4.90E-03 - 5.70E-03	5.70E-03	N/A	1.80E-01 (N)	No
	99-08-1	3-Nitrotoluene			mg/l		0/6	2.00E-04 - 2.00E-03	2.00E-03	N/A	7.30E-01 (N)	No
	99-99-0	4-Nitrotoluene			mg/l		0/6	2.00E-04 - 2.00E-03	2.00E-03	N/A	4.20E-02 (C)	No
	1912-24-9	Atrazine			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.90E-03 (C)	Yes
	100-51-6	Benzyl alcohol			mg/l		0/3	4.90E-03 - 5.70E-03	5.70E-03	N/A	1.80E+01 (N)	No
	92-52-4	Biphenyl			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.80E+00 (N)	No
	105-60-2	Caprolactam			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.80E+01 (N)	No
	74-97-5	Chlorobromomethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	N/A	NTX
	156-59-2	cis-1,2-Dichloroethene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.70E-01 (N)	No
	110-82-7	Cyclohexane			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.30E+01 (N)	No
	121-82-4	Cyclonite			mg/l		0/6	2.00E-04 - 6.50E-04	6.50E-04	N/A	6.10E-03 (C)	No
	75-71-8	Dichlorodifluoromethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.90E-01 (N)	No
	76-13-1	Freon 113			mg/l		0/3	2.00E-03 - 2.00E-03	2.00E-03	N/A	5.90E+01 (N)	No
	2691-41-0	HMX			mg/l		0/6	2.00E-04 - 1.00E-03	1.00E-03	N/A	1.80E+00 (N)	No
	98-82-8	Isopropylbenzene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	6.80E-01 (N)	No
	79-20-9	Methyl Acetate			mg/l		0/3	1.00E-02 - 1.00E-02	1.00E-02	N/A	3.70E+01 (N)	No
	1634-04-4	Methyl tert-butyl ether			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.20E-01 (C)	No
	108-87-2	Methylcyclohexane			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	55-63-0	Nitroglycerin			mg/l		0/6	2.00E-03 - 5.00E-03	5.00E-03	N/A	3.70E-03 (N)	Yes
	95-47-6	o-Xylene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.40E+00 (N)	No
	78-11-5	Pentaerythritol tetranitrate			mg/l		0/6	2.00E-03 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	479-45-8	Tetryl			mg/l		0/6	2.00E-04 - 2.00E-03	2.00E-03	N/A	1.50E-01 (N)	No
	Shaw 10	Total Tetrachlorodibenzo-p-dioxin			mg/l		0/3	1.79E-09 - 5.25E-09	5.25E-09	N/A	N/A	NTX
	156-60-5	trans-1,2-Dichloroethene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.10E-01 (N)	No
	75-69-4	Trichlorofluoromethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.30E+00 (N)	No
	7440-36-0	Antimony			mg/l		0/6	2.00E-03 - 3.40E-03	3.40E-03	N/A	1.50E-02 (N)	No
	7440-38-2	Arsenic			mg/l		0/6	1.00E-03 - 2.80E-03	2.80E-03	N/A	4.50E-04 (C)	Yes
	7440-41-7	Beryllium			mg/l		0/6	1.00E-03 - 4.00E-03	4.00E-03	N/A	7.30E-02 (N)	No
	7440-43-9	Cadmium			mg/l		0/6	5.00E-04 - 1.00E-03	1.00E-03	N/A	1.80E-02 (N)	No
	7440-48-4	Cobalt			mg/l		0/6	1.00E-03 - 1.00E-02	1.00E-02	N/A	1.10E-02 (N)	No
	7440-50-8	Copper			mg/l		0/5	1.00E-03 - 2.00E-02	2.00E-02	N/A	1.50E+00 (N)	No
	7439-97-6	Mercury (5)			mg/l		0/6	1.00E-04 - 4.00E-04	4.00E-04	N/A	1.10E-02 (N)	No

Table E.1-9
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	7440-02-0	Nickel			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	7.30E-01 (N)	No
	7782-49-2	Selenium			mg/l		0/6	2.00E-03 - 2.80E-03	2.80E-03	N/A	1.80E-01 (N)	No
	7440-22-4	Silver			mg/l		0/6	5.00E-04 - 9.00E-04	9.00E-04	N/A	1.80E-01 (N)	No
	7440-28-0	Thallium			mg/l		0/6	1.00E-03 - 2.90E-03	2.90E-03	N/A	2.40E-03 (N)	Yes
	93-76-5	2,4,5-T			mg/l		0/3	2.00E-04 - 2.00E-04	2.00E-04	N/A	3.70E-01 (N)	No
	93-72-1	2,4,5-TP (Silvex)			mg/l		0/3	2.00E-04 - 2.00E-04	2.00E-04	N/A	2.90E-01 (N)	No
	94-75-7	2,4-D			mg/l		0/3	1.50E-03 - 1.50E-03	1.50E-03	N/A	3.70E-01 (N)	No
	94-82-6	2,4-DB			mg/l		0/3	2.00E-03 - 2.00E-03	2.00E-03	N/A	2.90E-01 (N)	No
	72-54-8	4,4'-DDD			mg/l		0/3	9.80E-05 - 1.10E-04	1.10E-04	N/A	2.80E-03 (C)	No
	72-55-9	4,4'-DDE			mg/l		0/3	9.80E-05 - 1.10E-04	1.10E-04	N/A	2.00E-03 (C)	No
	50-29-3	4,4-DDT			mg/l		0/3	9.80E-05 - 1.10E-04	1.10E-04	N/A	2.00E-03 (C)	No
	309-00-2	Aldrin			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	N/A	4.00E-05 (C)	Yes
	319-84-6	alpha-BHC			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	N/A	1.10E-04 (C)	No
	5103-71-9	alpha-Chlordane (6)			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	N/A	1.90E-03 (C)	No
	319-85-7	beta-BHC			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	N/A	3.70E-04 (C)	No
	75-99-0	Dalapon			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.10E+00 (N)	No
	319-86-8	delta-BHC			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	N/A	6.10E-04 (C)	No
	1918-00-9	Dicamba			mg/l		0/3	2.00E-04 - 2.00E-04	2.00E-04	N/A	1.10E+00 (N)	No
	120-36-5	Dichloroprop			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	N/A	NTX
	60-57-1	Dieldrin			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	N/A	4.20E-05 (C)	Yes
	959-98-8	Endosulfan I			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	N/A	2.20E-01 (N)	No
	33213-65-9	Endosulfan II (7)			mg/l		0/3	9.80E-05 - 1.10E-04	1.10E-04	N/A	2.20E-01 (N)	No
	1031-07-8	Endosulfan sulfate (7)			mg/l		0/3	9.80E-05 - 1.10E-04	1.10E-04	N/A	2.20E-01 (N)	No
	72-20-8	Endrin			mg/l		0/3	9.80E-05 - 1.10E-04	1.10E-04	N/A	1.10E-02 (N)	No
	7421-93-4	Endrin aldehyde (8)			mg/l		0/3	9.80E-05 - 1.10E-04	1.10E-04	N/A	1.10E-02 (N)	No
	53494-70-5	Endrin ketone (8)			mg/l		0/3	9.80E-05 - 1.10E-04	1.10E-04	N/A	1.10E-02 (N)	No
	58-89-9	gamma-BHC (Lindane)			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	N/A	6.10E-04 (C)	No
	5103-74-2	gamma-Chlordane (6)			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	N/A	1.90E-03 (C)	No
	76-44-8	Heptachlor			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	N/A	1.50E-04 (C)	No
	1024-57-3	Heptachlor epoxide			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	N/A	7.40E-05 (C)	No
	94-74-6	MCPA			mg/l		0/6	5.00E-02 - 5.00E-02	5.00E-02	N/A	1.80E-02 (N)	Yes
	93-65-2	MCPP			mg/l		0/3	5.00E-02 - 5.00E-02	5.00E-02	N/A	3.70E-02 (N)	Yes
	72-43-5	Methoxychlor			mg/l		0/3	9.80E-05 - 1.10E-04	1.10E-04	N/A	1.80E-01 (N)	No
	8001-35-2	Toxaphene			mg/l		0/3	2.50E-03 - 2.70E-03	2.70E-03	N/A	6.10E-04 (C)	Yes
	12674-11-2	Aroclor 1016			mg/l		0/3	4.90E-04 - 5.30E-04	5.30E-04	N/A	2.60E-03 (N)	No
	11104-28-2	Aroclor 1221			mg/l		0/3	4.90E-04 - 5.30E-04	5.30E-04	N/A	6.80E-05 (C)	Yes
	11141-16-5	Aroclor 1232			mg/l		0/3	4.90E-04 - 5.30E-04	5.30E-04	N/A	6.80E-05 (C)	Yes
	53469-21-9	Aroclor 1242			mg/l		0/3	4.90E-04 - 5.30E-04	5.30E-04	N/A	3.40E-04 (C)	Yes
	12672-29-6	Aroclor 1248			mg/l		0/3	4.90E-04 - 5.30E-04	5.30E-04	N/A	3.40E-04 (C)	Yes
	11097-69-1	Aroclor 1254			mg/l		0/3	4.90E-04 - 5.30E-04	5.30E-04	N/A	3.40E-04 (C)	Yes

Table E.1-9
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	11096-82-5	Aroclor 1260			mg/l		0/3	4.90E-04 - 5.30E-04	5.30E-04	N/A	3.40E-04 (C)	Yes
	131-11-3	Dimethylphthalate			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	N/A	NTX
	120-82-1	1,2,4-Trichlorobenzene			mg/l		0/6	1.00E-03 - 5.70E-03	5.70E-03	N/A	8.20E-03 (N)	No
	95-50-1	1,2-Dichlorobenzene			mg/l		0/6	1.00E-03 - 5.70E-03	5.70E-03	N/A	3.70E-01 (N)	No
	541-73-1	1,3-Dichlorobenzene			mg/l		0/6	1.00E-03 - 5.70E-03	5.70E-03	N/A	N/A	NTX
	106-46-7	1,4-Dichlorobenzene			mg/l		0/6	1.00E-03 - 5.70E-03	5.70E-03	N/A	4.30E-03 (C)	Yes
	95-95-4	2,4,5-Trichlorophenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	3.70E+00 (N)	No
	88-06-2	2,4,6-Trichlorophenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	3.70E-02 (N)	No
	120-83-2	2,4-Dichlorophenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	1.10E-01 (N)	No
	105-67-9	2,4-Dimethylphenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	7.30E-01 (N)	No
	51-28-5	2,4-Dinitrophenol			mg/l		0/6	1.00E-02 - 2.80E-02	2.80E-02	N/A	7.30E-02 (N)	No
	121-14-2	2,4-Dinitrotoluene (9)			mg/l		0/6	2.00E-04 - 6.50E-04	6.50E-04	N/A	9.90E-04 (C)	No
	606-20-2	2,6-Dinitrotoluene (9)			mg/l		0/6	2.00E-04 - 1.00E-03	1.00E-03	N/A	9.90E-04 (C)	Yes
	91-58-7	2-Chloronaphthalene			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	2.90E+00 (N)	No
	95-57-8	2-Chlorophenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	1.80E-01 (N)	No
	91-57-6	2-Methylnaphthalene			mg/l		0/6	9.70E-04 - 5.00E-03	5.00E-03	N/A	1.50E-01 (N)	No
	88-74-4	2-Nitroaniline			mg/l		0/6	5.00E-03 - 1.10E-02	1.10E-02	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	N/A	NTX
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/l		0/3	2.00E-04 - 2.00E-04	2.00E-04	N/A	3.70E-02 (N)	No
	91-94-1	3,3'-Dichlorobenzidine			mg/l		0/6	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.50E-03 (C)	Yes
	99-09-2	3-Nitroaniline			mg/l		0/6	5.00E-03 - 1.10E-02	1.10E-02	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/l		0/6	5.00E-03 - 1.10E-02	1.10E-02	N/A	3.70E-03 (N)	Yes
	100-01-6	4-Nitroaniline			mg/l		0/6	6.00E-03 - 1.10E-02	1.10E-02	N/A	3.40E-02 (C)	No
	100-02-7	4-Nitrophenol			mg/l		0/6	1.00E-02 - 2.80E-02	2.80E-02	N/A	N/A	NTX
	83-32-9	Acenaphthene			mg/l		0/6	9.70E-04 - 1.20E-03	1.20E-03	N/A	2.20E+00 (N)	No
	208-96-8	Acenaphthylene (10)			mg/l		0/6	9.70E-04 - 1.20E-03	1.20E-03	N/A	1.10E+00 (N)	No
	98-86-2	Acetophenone			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.70E+00 (N)	No
	120-12-7	Anthracene			mg/l		0/6	9.70E-04 - 1.20E-03	1.20E-03	N/A	1.10E+01 (N)	No
	100-52-7	Benzaldehyde			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.70E+00 (N)	No
	56-55-3	Benzo(a)anthracene			mg/l		0/6	6.20E-05 - 2.30E-04	2.30E-04	N/A	2.90E-04 (C)	No
	50-32-8	Benzo(a)pyrene			mg/l		0/6	6.20E-05 - 2.30E-04	2.30E-04	N/A	2.90E-05 (C)	Yes
	205-99-2	Benzo(b)fluoranthene			mg/l		0/6	9.00E-05 - 2.30E-04	2.30E-04	N/A	2.90E-04 (C)	No
	191-24-2	Benzo(g,h,i)perylene (10)			mg/l		0/6	1.90E-04 - 1.20E-03	1.20E-03	N/A	1.10E+00 (N)	No
	207-08-9	Benzo(k)fluoranthene			mg/l		0/6	1.20E-04 - 2.30E-04	2.30E-04	N/A	2.90E-03 (C)	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	1.10E-01 (N)	No
	111-44-4	bis(2-Chloroethyl)ether			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	1.20E-04 (C)	Yes
	108-60-1	bis(2-Chloroisopropyl)ether			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	3.20E-03 (C)	Yes
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	4.80E-02 (C)	No
	85-68-7	Butyl benzyl phthalate			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	3.50E-01 (C)	No
	86-74-8	Carbazole			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	N/A	NTX

Table E.1-9
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	218-01-9	Chrysene			mg/l		0/6	1.90E-04 - 1.20E-03	1.20E-03	N/A	2.90E-02 (C)	No
	84-74-2	Di-n-butyl phthalate			mg/l		0/6	4.90E-03 - 2.00E-02	2.00E-02	N/A	3.70E+00 (N)	No
	117-84-0	Di-n-octyl phthalate			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/l		0/6	1.90E-04 - 2.40E-04	2.40E-04	N/A	2.90E-05 (C)	Yes
	132-64-9	Dibenzofuran			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	N/A	NTX
	206-44-0	Fluoranthene			mg/l		0/6	9.70E-04 - 1.20E-03	1.20E-03	N/A	1.50E+00 (N)	No
	86-73-7	Fluorene			mg/l		0/6	9.70E-04 - 1.20E-03	1.20E-03	N/A	1.50E+00 (N)	No
	118-74-1	Hexachlorobenzene			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	4.20E-04 (C)	Yes
	87-68-3	Hexachlorobutadiene			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	8.60E-03 (C)	No
	77-47-4	Hexachlorocyclopentadiene			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	2.20E-01 (N)	No
	67-72-1	Hexachloroethane			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	3.70E-02 (N)	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/l		0/6	6.20E-05 - 2.30E-04	2.30E-04	N/A	2.90E-04 (C)	No
	78-59-1	Isophorone			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	7.10E-01 (C)	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	9.60E-05 (C)	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	1.40E-01 (C)	No
	91-20-3	Naphthalene			mg/l		0/6	6.20E-04 - 1.10E-03	1.10E-03	N/A	1.40E-03 (C)	No
	98-95-3	Nitrobenzene			mg/l		0/6	2.00E-04 - 6.50E-04	6.50E-04	N/A	1.20E-03 (N)	No
	95-48-7	o-Cresol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	1.80E+00 (N)	No
	59-50-7	p-Chloro-m-cresol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	N/A	NTX
	106-47-8	p-Chloroaniline			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	3.40E-03 (C)	Yes
	106-44-5	p-Cresol			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.80E-01 (N)	No
	87-86-5	Pentachlorophenol			mg/l		0/9	5.00E-05 - 2.80E-02	2.80E-02	N/A	5.60E-03 (C)	Yes
	85-01-8	Phenanthrene (10)			mg/l		0/6	9.70E-04 - 1.20E-03	1.20E-03	N/A	1.10E+00 (N)	No
	108-95-2	Phenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	1.10E+01 (N)	No
	129-00-0	Pyrene			mg/l		0/6	9.70E-04 - 1.20E-03	1.20E-03	N/A	1.10E+00 (N)	No
	71-55-6	1,1,1-Trichloroethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.10E+00 (N)	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	6.70E-04 (C)	Yes
	79-00-5	1,1,2-Trichloroethane			mg/l		0/6	1.00E-03 - 2.00E-03	2.00E-03	N/A	2.40E-03 (C)	No
	75-34-3	1,1-Dichloroethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.40E-02 (C)	No
	75-35-4	1,1-Dichloroethene			mg/l		0/6	1.00E-03 - 2.00E-03	2.00E-03	N/A	3.40E-01 (N)	No
	107-06-2	1,2-Dichloroethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.50E-03 (C)	No
	78-87-5	1,2-Dichloropropane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.90E-03 (C)	No
	78-93-3	2-Butanone			mg/l		0/6	5.00E-03 - 2.00E-02	2.00E-02	N/A	7.10E+00 (N)	No
	591-78-6	2-Hexanone			mg/l		0/6	5.00E-03 - 2.00E-02	2.00E-02	N/A	N/A	NTX
	101-55-3	4-Bromophenyl phenylether			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/l		0/6	5.00E-03 - 2.00E-02	2.00E-02	N/A	2.00E+00 (N)	No
	67-64-1	Acetone			mg/l		0/6	2.00E-02 - 2.50E-02	2.50E-02	N/A	2.20E+01 (N)	No
	71-43-2	Benzene			mg/l		0/6	1.00E-03 - 2.00E-03	2.00E-03	N/A	4.10E-03 (C)	No
	75-27-4	Bromodichloromethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.20E-03 (C)	No

Table E.1-9
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	74-83-9	Bromomethane			mg/l		0/6	2.00E-03 - 2.00E-03	2.00E-03	N/A	8.70E-03 (N)	No
	75-15-0	Carbon disulfide			mg/l		0/6	2.00E-03 - 2.00E-02	2.00E-02	N/A	1.00E+00 (N)	No
	56-23-5	Carbon tetrachloride			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.00E-03 (C)	No
	108-90-7	Chlorobenzene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.10E-02 (N)	No
	75-00-3	Chloroethane			mg/l		0/6	2.00E-03 - 2.00E-03	2.00E-03	N/A	2.10E+01 (N)	No
	74-87-3	Chloromethane			mg/l		0/6	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.90E-01 (N)	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	4.30E-03 (C)	No
	124-48-1	Dibromochloromethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.50E-03 (C)	No
	100-41-4	Ethylbenzene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.50E-02 (C)	No
	75-09-2	Methylene chloride			mg/l		0/6	4.00E-03 - 5.00E-03	5.00E-03	N/A	4.80E-02 (C)	No
	100-42-5	Styrene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.60E+00 (N)	No
	127-18-4	Tetrachloroethene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.10E-03 (C)	No
	108-88-3	Toluene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.30E+00 (N)	No
	10061-02-6	trans-1,3-Dichloropropene			mg/l		0/6	1.00E-03 - 2.00E-03	2.00E-03	N/A	4.30E-03 (C)	No
	75-25-2	Tribromomethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	8.50E-02 (C)	No
	79-01-6	Trichloroethene			mg/l		0/6	1.00E-03 - 2.00E-03	2.00E-03	N/A	1.70E-02 (C)	No
	67-66-3	Trichloromethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.90E-03 (C)	No
	75-01-4	Vinyl Chloride			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.60E-04 (C)	Yes
	1330-20-7	Xylenes (total)			mg/l		0/6	2.00E-03 - 3.00E-03	3.00E-03	N/A	2.00E-01 (N)	No

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening toxicity values for tap water from USEPA Regional Screening Level Table (April 2009) and based on a risk level of 1.0E-06 and a hazard index of 0.1, then adjusted by a factor of 10 for surface water.
See text for derivation of Nutrient RDAs.

(4) Rationale Codes
Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- No Toxicity Information (NTX)

Deletion Reason:
- Infrequent Detection (<= 5%, IFD)
- Background Levels (BKG)
- Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value is based on inorganic mercury.

(6) The screening value is based on chlordane.

(7) The screening value is based on endosulfan.

(8) The screening value is based on endrin.

(9) The screening value is based on dinitrotoluene mixtures.

(10) The screening value is based on pyrene as a surrogate.

Definitions:
- N/A = Not Applicable or Not Available
- SQL = Sample Quantitation Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
- MCL = Federal Maximum Contaminant Level
- SMCL = Secondary Maximum Contaminant Level
- J = Estimated Value
- C = Carcinogenic
- N = Non-Carcinogenic
- RDA = Recommended Daily Allowance

Table E.1-10
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant SWMU 41 Area A - Groundwater

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
Groundwater	99-35-4	1,3,5-Trinitrobenzene	2.70E-02	2.70E-02	mg/l	41MW04-100710	1/1	N/A	2.70E-02	N/A	1.1E-01 (N)	N/A	N/A	No	BSL
	35572-78-2	2-amino-4,6-Dinitrotoluene	1.20E-03 J	1.20E-03 J	mg/l	41MW04-100710	1/1	N/A	1.20E-03	N/A	7.3E-03 (N)	N/A	N/A	No	BSL
	19406-51-0	4-amino-2,6-Dinitrotoluene	1.95E-03	1.95E-03	mg/l	41MW04-100710	1/1	N/A	1.95E-03	N/A	7.3E-03 (N)	N/A	N/A	No	BSL
	5103-71-9	alpha-Chlordane	3.50E-05 J	3.50E-05 J	mg/l	41MW04-100710	1/1	N/A	3.50E-05	N/A	1.9E-04 (C)	N/A	N/A	No	BSL
	50-32-8	Benzo(a)pyrene	2.75E-05 J	2.75E-05 J	mg/l	41MW04-100710	1/1	N/A	2.75E-05	N/A	2.9E-06 (C)	N/A	N/A	Yes	ASL
	205-99-2	Benzo(b)fluoranthene	3.20E-05 J	3.20E-05 J	mg/l	41MW04-100710	1/1	N/A	3.20E-05	N/A	2.9E-05 (C)	N/A	N/A	Yes	ASL
	191-24-2	Benzo(ghi)perylene	3.65E-05 J	3.65E-05 J	mg/l	41MW04-100710	1/1	N/A	3.65E-05	N/A	1.1E-01 (N)	N/A	N/A	No	BSL
	207-08-9	Benzo(k)fluoranthene	2.65E-05 J	2.65E-05 J	mg/l	41MW04-100710	1/1	N/A	2.65E-05	N/A	2.9E-04 (C)	N/A	N/A	No	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate (BEHP)	1.68E-03 J	1.68E-03 J	mg/l	41MW04-100710	1/1	N/A	1.68E-03	N/A	4.8E-03 (C)	N/A	N/A	No	BSL
	67-66-3	Chloroform	4.70E-03 J	4.70E-03 J	mg/l	41MW04-100710	1/1	N/A	4.70E-03	N/A	1.9E-04 (C)	N/A	N/A	Yes	ASL
	218-01-9	Chrysene	2.90E-05 J	2.90E-05 J	mg/l	41MW04-100710	1/1	N/A	2.90E-05	N/A	2.9E-03 (C)	N/A	N/A	No	BSL
	53-70-3	Dibenzo(a,h)anthracene	3.30E-05 J	3.30E-05 J	mg/l	41MW04-100710	1/1	N/A	3.30E-05	N/A	2.9E-06 (C)	N/A	N/A	Yes	ASL
	206-44-0	Fluoranthene	2.95E-05 J	2.95E-05 J	mg/l	41MW04-100710	1/1	N/A	2.95E-05	N/A	1.5E-01 (N)	N/A	N/A	No	BSL
	5103-74-2	gamma-Chlordane	1.55E-04 J	1.55E-04 J	mg/l	41MW04-100710	1/1	N/A	1.55E-04	N/A	1.9E-04 (C)	N/A	N/A	No	BSL
	76-44-8	Heptachlor	7.80E-05 J	7.80E-05 J	mg/l	41MW04-100710	1/1	N/A	7.80E-05	N/A	1.5E-05 (C)	N/A	N/A	Yes	ASL
	193-39-5	Indeno(1,2,3-cd)pyrene	3.45E-05 J	3.45E-05 J	mg/l	41MW04-100710	1/1	N/A	3.45E-05	N/A	2.9E-05 (C)	N/A	N/A	Yes	ASL
	14797-73-0	Perchlorate	3.74E-04	3.74E-04	mg/l	41MW04-100710	1/1	N/A	3.74E-04	N/A	2.6E-03 (N)	N/A	N/A	No	BSL
	85-01-8	Phenanthrene	2.95E-05 J	2.95E-05 J	mg/l	41MW04-100710	1/1	N/A	2.95E-05	N/A	1.1E-01 (N)	N/A	N/A	No	BSL
	129-00-0	Pyrene	3.55E-05 J	3.55E-05 J	mg/l	41MW04-100710	1/1	N/A	3.55E-05	N/A	1.1E-01 (N)	N/A	N/A	No	BSL
	7429-90-5	Aluminum	1.69E+00 J	1.69E+00 J	mg/l	41MW04-100710	1/1	N/A	1.69E+00	N/A	3.7E+00 (N)	N/A	N/A	No	BSL
	7440-39-3	Barium	5.74E-02	5.74E-02	mg/l	41MW04-100710	1/1	N/A	5.74E-02	N/A	7.3E-01 (N)	N/A	N/A	No	BSL
	7440-41-7	Beryllium	1.05E-04 J	1.05E-04 J	mg/l	41MW04-100710	1/1	N/A	1.05E-04	N/A	7.3E-03 (N)	N/A	N/A	No	BSL
	7440-70-2	Calcium	5.87E+01	5.87E+01	mg/l	41MW04-100710	1/1	N/A	5.87E+01	N/A	N/A	5.00E+02	RDA	No	BSL
	7440-48-4	Cobalt	8.04E-04 J	8.04E-04 J	mg/l	41MW04-100710	1/1	N/A	8.04E-04	N/A	1.1E-03 (N)	N/A	N/A	No	BSL
	7439-89-6	Iron	2.28E+00 J	2.28E+00 J	mg/l	41MW04-100710	1/1	N/A	2.28E+00	N/A	2.6E+00 (N)	N/A	N/A	No	BSL
	7439-92-1	Lead	1.18E-02	1.18E-02	mg/l	41MW04-100710	1/1	N/A	1.18E-02	N/A	N/A	1.50E-02	TAL	No	BSL
	7439-95-4	Magnesium	2.47E+01	2.47E+01	mg/l	41MW04-100710	1/1	N/A	2.47E+01	N/A	N/A	1.75E+02	RDA	No	BSL
	7439-96-5	Manganese	2.26E-02	2.26E-02	mg/l	41MW04-100710	1/1	N/A	2.26E-02	N/A	8.8E-02 (N)	N/A	N/A	No	BSL
	7439-97-6	Mercury (5)	7.50E-05 J	7.50E-05 J	mg/l	41MW04-100710	1/1	N/A	7.50E-05	N/A	1.1E-03 (N)	N/A	N/A	No	BSL
	7440-02-0	Nickel	4.44E-03 J	4.44E-03 J	mg/l	41MW04-100710	1/1	N/A	4.44E-03	N/A	7.3E-02 (N)	N/A	N/A	No	BSL
	7440-09-7	Potassium	2.51E+00 J	2.51E+00 J	mg/l	41MW04-100710	1/1	N/A	2.51E+00	N/A	N/A	1.00E+03	RDA	No	BSL
	7440-23-5	Sodium	9.06E+01	9.06E+01	mg/l	41MW04-100710	1/1	N/A	9.06E+01	N/A	N/A	2.00E+01	RDA	Yes	ASL
	7440-66-6	Zinc	5.90E-02 J	5.90E-02 J	mg/l	41MW04-100710	1/1	N/A	5.90E-02	N/A	1.1E+00 (N)	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for tap water from USEPA Regional Screening Level Table (April 2009) and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
See text for derivation of Nutrient RDAs.

(4) Rationale Codes

Selection Reason: Infrequent Detection but Associated Historically (HIST)
Above Screening Levels (ASL)
Break Down Product (BDP)
No Toxicity Information (NTX)

Deletion Reason: Infrequent Detection (<= 5%, IFD)
Background Levels (BKG)

Definitions: N/A = Not Applicable or Not Available
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance
TAL = Treatment Action Level

Table E.1-10
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant SWMU 41 Area A - Groundwater

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)

Below Screening and/or ARAR/TBC Level (BSL)

(5) Screening value for inorganic mercury was used.

Table E.1-11
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
Groundwater	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	5.2E-08	N/A	N/A	Yes (9)
	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	5.2E-08	N/A	N/A	Yes (9)
	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	5.2E-08	N/A	N/A	Yes (9)
	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	5.2E-09	N/A	N/A	Yes (9)
	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	5.2E-09	N/A	N/A	Yes (9)
	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	5.2E-09	N/A	N/A	Yes (9)
	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	5.2E-09	N/A	N/A	Yes (9)
	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	5.2E-09	N/A	N/A	Yes (9)
	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	5.2E-09	N/A	N/A	Yes (9)
	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	1.7E-08	N/A	N/A	Yes (9)
	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	5.2E-10	N/A	N/A	Yes (9)
	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran			mg/L		0/1	1.19E-08 - 1.19E-08	1.19E-08	N/A	5.2E-09	N/A	N/A	Yes (9)
	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	5.2E-09	N/A	N/A	Yes (9)
	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	1.7E-09	N/A	N/A	Yes (9)
	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin			mg/L		0/1	1.19E-08 - 1.19E-08	1.19E-08	N/A	5.2E-10	N/A	N/A	Yes (9)
	3268-87-9	Octachlorodibenzodioxin			mg/L		0/1	8.99E-09 - 8.99E-09	8.99E-09	N/A	1.7E-06	N/A	N/A	No (9)
	39001-02-0	Octachlorodibenzofuran			mg/L		0/1	1.19E-07 - 1.19E-07	1.19E-07	N/A	1.7E-06	N/A	N/A	No (9)
	N/A	Total Heptachlorodibenzofuran			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	N/A	N/A	N/A	N/A
	N/A	Total Heptachlorodibenzo-p-dioxin			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	N/A	N/A	N/A	N/A
	N/A	Total Hexachlorodibenzofuran			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	N/A	N/A	N/A	N/A
	N/A	Total Hexachlorodibenzo-p-dioxin			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	N/A	N/A	N/A	N/A
	N/A	Total Pentachlorodibenzofuran			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	N/A	N/A	N/A	N/A
	N/A	Total Pentachlorodibenzo-p-dioxin			mg/L		0/1	5.93E-08 - 5.93E-08	5.93E-08	N/A	N/A	N/A	N/A	N/A
	N/A	Total Tetrachlorodibenzo-p-dioxin			mg/L		0/1	1.19E-08 - 1.19E-08	1.19E-08	N/A	N/A	N/A	N/A	N/A
	71-55-6	1,1,1-Trichloroethane			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	9.10E-01 (N)	N/A	N/A	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	6.70E-05 (C)	N/A	N/A	Yes
	79-00-5	1,1,2-Trichloroethane			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	2.40E-04 (C)	N/A	N/A	Yes
	75-34-3	1,1-Dichloroethane			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	2.40E-03 (C)	N/A	N/A	No
	75-35-4	1,1-Dichloroethylene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	3.40E-02 (N)	N/A	N/A	No
	120-82-1	1,2,4-Trichlorobenzene			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	8.20E-04 (N)	N/A	N/A	Yes
	107-06-2	1,2-Dichloroethane			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	1.50E-04 (C)	N/A	N/A	Yes
	78-87-5	1,2-Dichloropropane			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	3.90E-04 (C)	N/A	N/A	Yes
	93-76-5	2,4,5-T			mg/L		0/1	2.64E-04 - 2.64E-04	2.64E-04	N/A	3.70E-02 (N)	N/A	N/A	No
	95-95-4	2,4,5-Trichlorophenol			mg/L		0/1	5.80E-03 - 5.80E-03	5.80E-03	N/A	3.70E-01 (N)	N/A	N/A	No
	88-06-2	2,4,6-Trichlorophenol			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	6.10E-03 (C)	N/A	N/A	No
	94-75-7	2,4-D			mg/L		0/1	2.64E-04 - 2.64E-04	2.64E-04	N/A	3.70E-02 (N)	N/A	N/A	No
	94-82-6	2,4-DB			mg/L		0/1	2.64E-04 - 2.64E-04	2.64E-04	N/A	2.90E-02 (N)	N/A	N/A	No
	120-83-2	2,4-Dichlorophenol			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	1.10E-02 (N)	N/A	N/A	No
	105-67-9	2,4-Dimethylphenol			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	7.30E-02 (N)	N/A	N/A	No
	51-28-5	2,4-Dinitrophenol			mg/L		0/1	1.20E-02 - 1.20E-02	1.20E-02	N/A	7.30E-03 (N)	N/A	N/A	Yes
	121-14-2	2,4-Dinitrotoluene (4)			mg/L		0/1	1.20E-03 - 4.70E-03	4.70E-03	N/A	9.90E-05 (C)	N/A	N/A	Yes

Table E.1-11
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
Groundwater	606-20-2	2,6-Dinitrotoluene (4)			mg/L		0/1	1.20E-03 - 4.70E-03	4.70E-03	N/A	9.90E-05 (C)	N/A	N/A	Yes
	91-58-7	2-Chloronaphthalene			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	2.90E-01 (N)	N/A	N/A	No
	95-57-8	2-Chlorophenol			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	1.80E-02 (N)	N/A	N/A	No
	591-78-6	2-Hexanone			mg/L		0/1	4.00E-03 - 4.00E-03	4.00E-03	N/A	N/A	N/A	N/A	NTX
	91-57-6	2-Methylnaphthalene			mg/L		0/1	5.80E-05 - 5.80E-05	5.80E-05	N/A	1.50E-02 (N)	N/A	N/A	No
	91-94-1	3,3-Dichlorobenzidine			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	1.50E-04 (C)	N/A	N/A	Yes
	72-54-8	4,4'-DDD			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	2.80E-04 (C)	N/A	N/A	No
	72-55-9	4,4'-DDE			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	2.00E-04 (C)	N/A	N/A	No
	50-29-3	4,4'-DDT			mg/L		0/1	4.70E-05 - 4.70E-05	4.70E-05	N/A	2.00E-04 (C)	N/A	N/A	No
	534-52-1	4,6-Dinitro-o-cresol			mg/L		0/1	5.80E-03 - 5.80E-03	5.80E-03	N/A	3.70E-04 (N)	N/A	N/A	Yes
	101-55-3	4-Bromophenoxybenzene			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	N/A	N/A	N/A	NTX
	83-32-9	Acenaphthene			mg/L		0/1	5.80E-05 - 5.80E-05	5.80E-05	N/A	2.20E-01 (N)	N/A	N/A	No
	208-96-8	Acenaphthylene (5)			mg/L		0/1	5.80E-05 - 5.80E-05	5.80E-05	N/A	1.10E-01 (N)	N/A	N/A	No
	67-64-1	Acetone			mg/L		0/1	4.00E-03 - 4.00E-03	4.00E-03	N/A	2.20E+00 (N)	N/A	N/A	No
	309-00-2	Aldrin			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	4.00E-06 (C)	N/A	N/A	Yes
	319-84-6	alpha-BHC			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	1.10E-05 (C)	N/A	N/A	Yes
	93-65-2	MCPP			mg/L		0/1	5.28E-02 - 5.28E-02	5.28E-02	N/A	3.70E-03 (N)	N/A	N/A	Yes
	120-12-7	Anthracene			mg/L		0/1	5.80E-05 - 5.80E-05	5.80E-05	N/A	1.10E+00 (N)	N/A	N/A	No
	12674-11-2	Aroclor 1016			mg/L		0/1	5.75E-04 - 5.75E-04	5.75E-04	N/A	2.60E-04 (N)	N/A	N/A	Yes
	11104-28-2	Aroclor 1221			mg/L		0/1	5.75E-04 - 5.75E-04	5.75E-04	N/A	6.80E-06 (C)	N/A	N/A	Yes
	11141-16-5	Aroclor 1232			mg/L		0/1	5.75E-04 - 5.75E-04	5.75E-04	N/A	6.80E-06 (C)	N/A	N/A	Yes
	53469-21-9	Aroclor 1242			mg/L		0/1	5.75E-04 - 5.75E-04	5.75E-04	N/A	3.40E-05 (C)	N/A	N/A	Yes
	12672-29-6	Aroclor 1248			mg/L		0/1	5.75E-04 - 5.75E-04	5.75E-04	N/A	3.40E-05 (C)	N/A	N/A	Yes
	11097-69-1	Aroclor 1254			mg/L		0/1	5.75E-04 - 5.75E-04	5.75E-04	N/A	3.40E-05 (C)	N/A	N/A	Yes
	11096-82-5	Aroclor 1260			mg/L		0/1	5.75E-04 - 5.75E-04	5.75E-04	N/A	3.40E-05 (C)	N/A	N/A	Yes
	71-43-2	Benzene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	4.10E-04 (C)	N/A	N/A	No
	56-55-3	Benzo(a)anthracene			mg/L		0/1	5.80E-05 - 5.80E-05	5.80E-05	N/A	2.90E-05 (C)	N/A	N/A	Yes
	65-85-0	Benzoic Acid			mg/L		0/1	9.30E-02 - 9.30E-02	9.30E-02	N/A	1.50E+01 (N)	N/A	N/A	No
	100-51-6	Benzyl alcohol			mg/L		0/1	5.80E-03 - 5.80E-03	5.80E-03	N/A	1.80E+00 (N)	N/A	N/A	No
	319-85-7	beta-BHC			mg/L		0/1	4.70E-05 - 4.70E-05	4.70E-05	N/A	3.70E-05 (C)	N/A	N/A	Yes
	108-60-1	Bis(2-chloroisopropyl) ether			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	3.20E-04 (C)	N/A	N/A	Yes
	111-91-1	bis(2-Chloroethoxy)methane			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	1.10E-02 (N)	N/A	N/A	No
	111-44-4	bis(2-Chloroethyl)ether			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	1.20E-05 (C)	N/A	N/A	Yes
	75-27-4	Bromodichloromethane			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	1.20E-04 (C)	N/A	N/A	Yes
	75-25-2	Bromoform			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	8.50E-03 (C)	N/A	N/A	No
	85-68-7	Butyl benzyl phthalate			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	3.50E-02 (C)	N/A	N/A	No
	86-74-8	Carbazole			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	N/A	N/A	N/A	NTX
	75-15-0	Carbon disulfide			mg/L		0/1	8.00E-04 - 8.00E-04	8.00E-04	N/A	1.00E-01 (N)	N/A	N/A	No
	56-23-5	Carbon tetrachloride			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	2.00E-04 (C)	N/A	N/A	Yes
	12789-03-6	Chlordane (technical)			mg/L		0/1	5.80E-04 - 5.80E-04	5.80E-04	N/A	1.90E-04 (C)	N/A	N/A	Yes
	108-90-7	Chlorobenzene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	9.10E-03 (N)	N/A	N/A	No

Table E.1-11
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
Groundwater	75-00-3	Chloroethane			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	2.10E+00 (N)	N/A	N/A	No
	156-59-2	cis-1,2-Dichloroethylene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	3.70E-02 (N)	N/A	N/A	No
	10061-01-5	cis-1,3-Dichloropropylene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	4.30E-04 (C)	N/A	N/A	No
	75-99-0	Dalapon			mg/L		0/1	5.28E-03 - 5.28E-03	5.28E-03	N/A	1.10E-01 (N)	N/A	N/A	No
	319-86-8	delta-BHC			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	6.10E-05 (C)	N/A	N/A	No
	132-64-9	Dibenzofuran			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	N/A	N/A	N/A	NTX
	124-48-1	Dibromochloromethane			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	1.50E-04 (C)	N/A	N/A	Yes
	1918-00-9	Dicamba			mg/L		0/1	2.64E-04 - 2.64E-04	2.64E-04	N/A	1.10E-01 (N)	N/A	N/A	No
	26638-19-7	Dichloropropane, NOS			mg/L		0/1	2.64E-04 - 2.64E-04	2.64E-04	N/A	3.90E-04 (C)	N/A	N/A	No
	120-36-5	Dichlorprop			mg/L		0/1	2.64E-04 - 2.64E-04	2.64E-04	N/A	N/A	N/A	N/A	NTX
	60-57-1	Dieldrin			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	4.20E-06 (C)	N/A	N/A	Yes
	84-66-2	Diethyl phthalate			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	2.90E+00 (N)	N/A	N/A	No
	131-11-3	Dimethyl phthalate			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	N/A	N/A	N/A	NTX
	84-74-2	Di-n-butyl phthalate			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	3.70E-01 (N)	N/A	N/A	No
	117-84-0	Di-n-octyl phthalate			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	N/A	N/A	N/A	NTX
	88-85-7	Dinoseb			mg/L		0/1	2.64E-04 - 2.64E-04	2.64E-04	N/A	3.70E-03 (N)	N/A	N/A	No
	959-98-8	Endosulfan I			mg/L		0/1	4.70E-05 - 4.70E-05	4.70E-05	N/A	2.20E-02 (N)	N/A	N/A	No
	33213-65-9	Endosulfan II (6)			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	2.20E-02 (N)	N/A	N/A	No
	1031-07-8	Endosulfan sulfate (6)			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	2.20E-02 (N)	N/A	N/A	No
	72-20-8	Endrin			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	1.10E-03 (N)	N/A	N/A	No
	7421-93-4	Endrin aldehyde (7)			mg/L		0/1	4.70E-05 - 4.70E-05	4.70E-05	N/A	1.10E-03 (N)	N/A	N/A	No
	53494-70-5	Endrin ketone (7)			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	1.10E-03 (N)	N/A	N/A	No
	100-41-4	Ethylbenzene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	1.50E-03 (C)	N/A	N/A	No
	86-73-7	Fluorene			mg/L		0/1	5.80E-05 - 5.80E-05	5.80E-05	N/A	1.50E-01 (N)	N/A	N/A	No
	1024-57-3	Heptachlor epoxide			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	7.40E-06 (C)	N/A	N/A	Yes
	118-74-1	Hexachlorobenzene			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	4.20E-05 (C)	N/A	N/A	Yes
	87-68-3	Hexachlorobutadiene			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	8.60E-04 (C)	N/A	N/A	Yes
	77-47-4	Hexachlorocyclopentadiene			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	2.20E-02 (N)	N/A	N/A	No
	67-72-1	Hexachloroethane			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	3.70E-03 (N)	N/A	N/A	Yes
	2691-41-0	HMX			mg/L		0/1	1.20E-03 - 1.20E-03	1.20E-03	N/A	1.80E-01 (N)	N/A	N/A	No
	78-59-1	Isophorone			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	7.10E-02 (C)	N/A	N/A	No
	58-89-9	Lindane			mg/L		0/1	2.80E-05 - 2.80E-05	2.80E-05	N/A	6.10E-05 (C)	N/A	N/A	No
	N/A	m&p-Xylenes			mg/L		0/1	8.00E-04 - 8.00E-04	8.00E-04	N/A	2.00E-02 (N)	N/A	N/A	No
	94-74-6	MCPA			mg/L		0/1	5.28E-02 - 5.28E-02	5.28E-02	N/A	1.80E-03 (N)	N/A	N/A	Yes
	541-73-1	1,3-Dichlorobenzene			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	N/A	N/A	N/A	NTX
	99-65-0	1,3-Dinitrobenzene			mg/L		0/1	1.20E-03 - 1.20E-03	1.20E-03	N/A	3.70E-04 (N)	N/A	N/A	Yes
	72-43-5	Methoxychlor			mg/L		0/1	4.70E-05 - 4.70E-05	4.70E-05	N/A	1.80E-02 (N)	N/A	N/A	No
	74-83-9	Methyl bromide			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	8.70E-04 (N)	N/A	N/A	No
	74-87-3	Methyl chloride			mg/L		0/1	2.63E-04 - 2.63E-04	2.63E-04	N/A	1.90E-02 (N)	N/A	N/A	No
	78-93-3	Methyl ethyl ketone			mg/L		0/1	2.00E-03 - 2.00E-03	2.00E-03	N/A	7.10E-01 (N)	N/A	N/A	No
	108-10-1	Methyl isobutyl ketone (MIBK)			mg/L		0/1	4.00E-03 - 4.00E-03	4.00E-03	N/A	2.00E-01 (N)	N/A	N/A	No

Table E.1-11
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	75-09-2	Methylene chloride			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	4.80E-03 (C)	N/A	N/A	No
	99-08-1	3-Nitrotoluene			mg/L		0/1	1.20E-03 - 1.20E-03	1.20E-03	N/A	7.30E-02 (N)	N/A	N/A	No
Groundwater	91-20-3	Naphthalene			mg/L		0/1	5.80E-05 - 5.80E-05	5.80E-05	N/A	1.40E-04 (C)	N/A	N/A	No
	98-95-3	Nitrobenzene			mg/L		0/1	1.20E-03 - 4.70E-03	4.70E-03	N/A	1.20E-04 (C)	N/A	N/A	Yes
	55-63-0	Nitroglycerin			mg/L		0/1	4.80E-03 - 4.80E-03	4.80E-03	N/A	3.70E-04 (N)	N/A	N/A	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/L		0/1	9.30E-03 - 9.30E-03	9.30E-03	N/A	1.40E-02 (C)	N/A	N/A	No
	621-64-7	N-Nitrosodipropylamine			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	9.60E-06 (C)	N/A	N/A	Yes
	95-48-7	o-Cresol			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	1.80E-01 (N)	N/A	N/A	No
	95-50-1	1,2-Dichlorobenzene			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	3.70E-02 (N)	N/A	N/A	No
	88-75-5	2-Nitrophenol			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	N/A	N/A	N/A	NTX
	88-72-2	2-Nitrotoluene			mg/L		0/1	1.20E-03 - 1.20E-03	1.20E-03	N/A	3.10E-04 (C)	N/A	N/A	Yes
	95-47-6	o-Xylene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	1.40E-01 (N)	N/A	N/A	No
	1336-36-3	Polychlorinated Biphenyls			mg/L		0/1	5.75E-04 - 5.75E-04	5.75E-04	N/A	3.40E-05 (C)	N/A	N/A	Yes
	106-47-8	p-Chloroaniline			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	3.40E-04 (C)	N/A	N/A	Yes
	59-50-7	p-Chloro-m-cresol			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	N/A	N/A	N/A	NTX
	87-86-5	Pentachlorophenol			mg/L		0/1	5.80E-03 - 5.80E-03	5.80E-03	N/A	5.60E-04 (C)	N/A	N/A	Yes
	106-44-5	p-Cresol			mg/L		0/1	5.80E-03 - 5.80E-03	5.80E-03	N/A	1.80E-02 (N)	N/A	N/A	No
	106-46-7	1,4-Dichlorobenzene			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	4.30E-04 (C)	N/A	N/A	Yes
	78-11-5	PETN			mg/L		0/1	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	N/A	N/A	NTX
	108-95-2	Phenol			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	1.10E+00 (N)	N/A	N/A	No
	100-01-6	4-Nitroaniline			mg/L		0/1	4.70E-03 - 4.70E-03	4.70E-03	N/A	3.40E-03 (C)	N/A	N/A	Yes
	99-99-0	4-Nitrotoluene			mg/L		0/1	1.20E-03 - 1.20E-03	1.20E-03	N/A	4.20E-03 (C)	N/A	N/A	No
	121-82-4	RDX			mg/L		0/1	1.20E-03 - 1.20E-03	1.20E-03	N/A	6.10E-04 (C)	N/A	N/A	Yes
	93-72-1	Silvex			mg/L		0/1	2.64E-04 - 2.64E-04	2.64E-04	N/A	2.90E-02 (N)	N/A	N/A	No
	100-42-5	Styrene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	1.60E-01 (N)	N/A	N/A	No
	127-18-4	Tetrachloroethylene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	1.10E-04 (C)	N/A	N/A	Yes
	479-45-8	Tetryl			mg/L		0/1	1.20E-03 - 1.20E-03	1.20E-03	N/A	1.50E-02 (N)	N/A	N/A	No
	108-88-3	Toluene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	2.30E-01 (N)	N/A	N/A	No
	8001-35-2	Toxaphene			mg/L		0/1	5.80E-04 - 5.80E-04	5.80E-04	N/A	6.10E-05 (C)	N/A	N/A	Yes
	156-60-5	trans-1,2-Dichloroethylene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	1.10E-02 (N)	N/A	N/A	No
	10061-02-6	trans-1,3-Dichloropropene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	4.30E-04 (C)	N/A	N/A	No
	79-01-6	Trichloroethylene			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	1.70E-03 (C)	N/A	N/A	No
	118-96-7	Trinitrotoluene, 2,4,6- (TNT)			mg/L		0/1	1.20E-03 - 1.20E-03	1.20E-03	N/A	2.20E-03 (C)	N/A	N/A	No
	75-01-4	Vinyl Chloride			mg/L		0/1	2.00E-04 - 2.00E-04	2.00E-04	N/A	1.60E-05 (C)	N/A	N/A	Yes
	7440-36-0	Antimony			mg/L		0/1	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.50E-03 (N)	N/A	N/A	Yes
	7440-43-9	Cadmium			mg/L		0/1	2.20E-04 - 2.20E-04	2.20E-04	N/A	1.80E-03 (N)	N/A	N/A	No
	7440-47-3	Chromium			mg/L		0/1	4.00E-03 - 4.00E-03	4.00E-03	N/A	1.10E-02 (N)	N/A	N/A	No
	7440-50-8	Copper			mg/L		0/1	5.96E-03 - 5.96E-03	5.96E-03	N/A	1.50E-01 (N)	N/A	N/A	No
	7782-49-2	Selenium			mg/L		0/1	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.80E-02 (N)	N/A	N/A	No
	7440-22-4	Silver			mg/L		0/1	4.00E-04 - 4.00E-04	4.00E-04	N/A	1.80E-02 (N)	N/A	N/A	No
	7440-28-0	Thallium			mg/L		0/1	6.00E-04 - 6.00E-04	6.00E-04	N/A	2.40E-04 (N)	N/A	N/A	Yes

Table E.1-11
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	7440-62-2	Vanadium (8)			mg/L		0/1	6.00E-03 - 6.00E-03	6.00E-03	N/A	1.80E-02 (N)	N/A	N/A	No

(1) Maximum non-detect concentration used for screening.
(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.
(3) Screening level values for tap water from USEPA Regional Screening Level Table (April 2009) and
are based on a risk level of 1.0E-06 and a hazard index of 0.1.
(4) Screening value is based on Dinitrotoluene mixture
(5) Screening value is based on pyrene
(6) Screening value is based on Endosulfan I
(7) Screening value is based on Endrin
(8) Screening value is based on vanadium and compounds
(9) Congener-specific values based on the 2,3,7,8-TCDD tapwater RSL of 5.20E-10 mg/L [USEPA, April 2009] divided by the 2,3,7,8-TCDD dioxin toxicity equivalency factors (TEFs) [WHO, 2005]:

Congeners	TEF	TEF Adjusted Screening Value (mg/L)
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.01	5.20E-08
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.01	5.20E-08
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.01	5.20E-08
1,2,3,4,7,8-Hexachlorodibenzofuran	0.1	5.20E-09
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.1	5.20E-09
1,2,3,6,7,8-Hexachlorodibenzofuran	0.1	5.20E-09
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.1	5.20E-09
1,2,3,7,8,9-Hexachlorodibenzofuran	0.1	5.20E-09
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.1	5.20E-09
1,2,3,7,8-Pentachlorodibenzofuran	0.03	1.73E-08
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1	5.20E-10
2,3,7,8-Tetrachlorodibenzofuran	0.1	5.20E-09
2,3,4,6,7,8-Hexachlorodibenzofuran	0.1	5.20E-09
2,3,4,7,8-Pentachlorodibenzofuran	0.3	1.73E-09
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1	5.20E-10
Octachlorodibenzodioxin	0.0003	1.73E-06
Octachlorodibenzofuran	0.0003	1.73E-06

Definitions:
N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
C = Carcinogenic
N = Non-Carcinogenic

Table E.1-12
Medium-Specific Exposure Point Concentration Summary for SWMU 41 Area A - Surface Soil

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean of Detects	Multiple Detection Limits? (Yes/No) [1]	95% UCL (Distribution) [2]	Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic [3]	Rationale [4]
Surface Soil	Aroclor 1254	mg/kg	1.50E-01	N/A	N/A	1.50E-01	1.50E-01	mg/kg	Max	Test (7)
	Methylcyclohexane	mg/kg	3.84E-04	N/A	N/A	6.60E-04	6.60E-04	mg/kg	Max	Test (7)
	p-Chloro-m-cresol	mg/kg	8.00E-03	N/A	N/A	8.00E-03	8.00E-03	mg/kg	Max	Test (7)
	Aluminum	mg/kg	2.58E+04	N/A	N/A	3.11E+04	3.11E+04	mg/kg	Max	Test (7)
	Arsenic	mg/kg	8.44E+00	N/A	N/A	1.20E+01	1.20E+01	mg/kg	Max	Test (7)
	Cobalt	mg/kg	1.05E+01	N/A	N/A	1.40E+01	1.40E+01	mg/kg	Max	Test (7)
	Iron	mg/kg	3.29E+04	N/A	N/A	4.32E+04	4.32E+04	mg/kg	Max	Test (7)
	Manganese	mg/kg	7.49E+02	N/A	N/A	9.18E+02	9.18E+02	mg/kg	Max	Test (7)
	Vanadium	mg/kg	4.32E+01	N/A	N/A	5.10E+01	5.10E+01	mg/kg	Max	Test (7)

Notes: N/A = Not applicable

[1] ProUCL software (version 4.0, USEPA, 2007) recommends use of Kaplan-Meier method if there are multiple detection limits.

[2] Statistical Distribution and 95% UCL as determined by ProUCL (unless otherwise noted): (G) the data were determined to follow gamma distribution; (L) the data were determined to follow lognormal distribution; (NP) the data were determined to be non-parametric; (N) the data were determined to be normally distributed.

[3] Statistic: Maximum Detected Value (Max); 95% KM Chebyshev (95% KM-Cheby); 97.5% KM Chebyshev (97.5% KM-Cheby); 99% KM Chebyshev (99% KM-Cheby); 95% KM Percentile Bootstrap (95% KM-% Btstrp); 95% KM-t (95% KM-t); 95% KM-BCA (95% KM-BCA); 95% H-UCL (95% H-UCL); 95% Chebyshev -Mean, SD- UCL (95% Cheby, Mean, SD); 97.5% Chebyshev -Mean, SD- UCL (97.5% Cheby, Mean, SD); 99% Chebyshev -Mean, SD- UCL (99% Cheby, Mean, SD); 95% UCL of Log-transformed Data (95% UCL-T) 95% Student's-t (95% Student's-t); 95% Modified-t (95% Modified-t); 95% UCL based on bootstrap statistic (95% UCL-Bst); 95% Approximate Gamma UCL (95% Approx. Gamma).

[4] Unless otherwise noted (see footnote 5), ProUCL EPC selection rationale based on, detection limit values, distribution, standard deviation, and sample size (see ProUCL output in appendix for further details):

Test (1): Kaplan-Meier method recommended by ProUCL due to multiple detection limits.
Test (2): 95% UCL recommended by statistical software (e.g., ProUCL) exceeds maximum detected concentration, therefore, maximum concentration used for EPC.
Test (3): Shapiro-Wilk W test, Kolmogorov-Smirnov (K-S), and Anderson-Darling (A-D) tests, indicate data follow nonparametric distribution.
Test (4): Shapiro-Wilk W test indicates data are normally distributed.
Test (5): Shapiro-Wilk W test indicates data are log-normally distributed.
Test (6): Kolmogorov-Smirnov (K-S) and/or Anderson-Darling (A-D) tests indicate data follow gamma distribution.
Test (7): Sample size is less than or equal to 5, therefore, maximum concentration used for EPC.

[5] Infrequent detection resulted in ProUCL modeling error for this constituent, therefore distribution, average, and UCL determined using non-ProUCL bootstrap method with random numbers for NDs (see text for details).

Table E.1-13
Medium-Specific Exposure Point Concentration Summary for SWMU 41 Area A - Total Soil

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean of Detects	Multiple Detection Limits? (Yes/No) [1]	95% UCL (Distribution) [2]	Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic [3]	Rationale [4]
Total Soil	2,3,7,8-TCDD-TE	mg/kg	4.53E-06	N/A	N/A	8.69E-06	8.69E-06	mg/kg	Max	Test (7)
	Aroclor 1254	mg/kg	1.50E-01	N/A	N/A	1.50E-01	1.50E-01	mg/kg	Max	Test (7)
	Methylcyclohexane	mg/kg	4.71E-04	No	8.08E-04 (G)	1.70E-03	8.08E-04	mg/kg	95% KM-BCA	Test (6)
	p-Chloro-m-cresol[5]	mg/kg	8.00E-03	N/A	9.34E-02 (NP)	8.00E-03	8.00E-03	mg/kg	Max	Test (2)
	Aluminum	mg/kg	2.54E+04	No	2.83E+04 (N)	4.06E+04	2.83E+04	mg/kg	95% Student's-t	Test (4)
	Arsenic	mg/kg	9.18E+00	No	1.10E+01 (N)	1.90E+01	1.10E+01	mg/kg	95% Student's-t	Test (4)
	Cobalt	mg/kg	1.23E+01	No	1.35E+01 (N)	1.59E+01	1.35E+01	mg/kg	95% Student's-t	Test (4)
	Iron	mg/kg	3.49E+04	No	4.18E+04 (G)	7.55E+04	4.18E+04	mg/kg	95% Approx. Gamma	Test (6)
	Manganese	mg/kg	1.00E+03	No	1.18E+03 (N)	1.70E+03	1.18E+03	mg/kg	95% Student's-t	Test (4)
	Vanadium	mg/kg	4.50E+01	No	5.06E+01 (N)	6.90E+01	5.06E+01	mg/kg	95% Student's-t	Test (4)

Notes: N/A = Not applicable

[1] ProUCL software (version 4.0, USEPA, 2007) recommends use of Kaplan-Meier method if there are multiple detection limits.

[2] Statistical Distribution and 95% UCL as determined by ProUCL (unless otherwise noted): (G) the data were determined to follow gamma distribution; (L) the data were determined to follow lognormal distribution; (NP) the data were determined to be non-parametric; (N) the data were determined to be normally distributed.

[3] Statistic: Maximum Detected Value (Max); 95% KM Chebyshev (95% KM-Cheby); 97.5% KM Chebyshev (97.5% KM-Cheby); 99% KM Chebyshev (99% KM-Cheby); 95% KM Percentile Bootstrap (95% KM-% Btstrp); 95% KM-t (95% KM-t); 95% KM-BCA (95% KM-BCA); 95% H-UCL (95% H-UCL); 95% Chebyshev -Mean, SD- UCL (95% Cheby, Mean, SD); 97.5% Chebyshev -Mean, SD- UCL (97.5% Cheby, Mean, SD); 99% Chebyshev -Mean, SD- UCL (99% Cheby, Mean, SD); 95% UCL of Log-transformed Data (95% UCL-T) 95% Student's-t (95% Student's-t); 95% Modified-t (95% Modified-t); 95% UCL based on bootstrap statistic (95% UCL-Bst); 95% Approximate Gamma UCL (95% Approx. Gamma); 95% KM Chebyshev-MVUE (95% KM-Cheby-MVUE).

[4] Unless otherwise noted (see footnote 5), ProUCL EPC selection rationale based on, detection limit values, distribution, standard deviation, and sample size (see ProUCL output in appendix for further details):

Test (1): Kaplan-Meier method recommended by ProUCL due to multiple detection limits.
Test (2): The 95% UCL exceeds the maximum detected concentration, therefore, maximum concentration used for EPC.
Test (3): Shapiro-Wilk W test, Kolmogorov-Smirnov (K-S), and Anderson-Darling (A-D) tests, indicate data follow nonparametric distribution.
Test (4): Shapiro-Wilk W test indicates data are normally distributed.
Test (5): Shapiro-Wilk W test indicates data are log-normally distributed.
Test (6): Kolmogorov-Smirnov (K-S) and/or Anderson-Darling (A-D) tests indicate data follow gamma distribution.
Test (7): Sample size is less than or equal to 5, therefore, maximum concentration used for EPC.
Test (8): 95% UCL estimated by a non-Pro-UCL bootstrap method.

[5] Infrequent detection resulted in ProUCL modeling error for this constituent, therefore the distribution was assumed to be non-parametric and the UCL was determined using a non-ProUCL bootstrap method with random numbers for NDs (see text for details).

Table E.1-14
Medium-Specific Exposure Point Concentration Summary for SWMU 41 Area A - Sediment

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean of Detects	Multiple Detection Limits? (Yes/No) [1]	95% UCL (Distribution) [2]	Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic [3]	Rationale [4]
Sediment	p-Chloro-m-cresol [5]	mg/kg	1.70E-02	N/A	1.58E-01 (NP)	1.70E-02	1.70E-02	mg/kg	Max	Test (2)
	Arsenic	mg/kg	7.47E+00	No	1.32E+01 (G)	1.80E+01	1.32E+01	mg/kg	95% Approx. Gamma	Test (6)

Notes:

N/A = Not applicable

[1] ProUCL software (version 4.0, USEPA, 2007) recommends use of Kaplan-Meier method if there are multiple detection limits.

[2] Statistical Distribution and 95% UCL as determined by ProUCL (unless otherwise noted): (G) the data were determined to follow gamma distribution; (L) the data were determined to follow lognormal distribution; (NP) the data were determined to be non-parametric; (N) the data were determined to be normally distributed.

[3] Statistic: Maximum Detected Value (Max); 95% KM Chebyshev (95% KM-Cheby); 97.5% KM Chebyshev (97.5% KM-Cheby); 99% KM Chebyshev (99% KM-Cheby); 95% KM Percentile Bootstrap (95% KM-% Btstrp); 95% KM-t (95% KM-t); 95% KM-BCA (95% KM-BCA); 95% H-UCL (95% H-UCL); 95% Chebyshev -Mean, SD- UCL (95% Cheby, Mean, SD); 97.5% Chebyshev -Mean, SD- UCL (97.5% Cheby, Mean, SD); 99% Chebyshev -Mean, SD- UCL (99% Cheby, Mean, SD); 95% UCL of Log-transformed Data (95% UCL-T) 95% Student's-t (95% Student's-t); 95% Modified-t (95% Modified-t); 95% UCL based on bootstrap statistic (95% UCL-Bst); 95% Approximate Gamma UCL (95% Approx. Gamma); 95% KM Chebyshev-MVUE (95% KM-Cheby-MVUE).

[4] Unless otherwise noted (see footnote 5), ProUCL EPC selection rationale based on, detection limit values, distribution, standard deviation, and sample size (see ProUCL output in appendix for further details):

Test (1): Kaplan-Meier method recommended by ProUCL due to multiple detection limits.
Test (2): The 95% UCL exceeds the maximum detected concentration, therefore, maximum concentration used for EPC.
Test (3): Shapiro-Wilk W test, Kolmogorov-Smirnov (K-S), and Anderson-Darling (A-D) tests, indicate data follow nonparametric distribution.
Test (4): Shapiro-Wilk W test indicates data are normally distributed.
Test (5): Shapiro-Wilk W test indicates data are log-normally distributed.
Test (6): Kolmogorov-Smirnov (K-S) and/or Anderson-Darling (A-D) tests indicate data follow gamma distribution.
Test (7): Sample size is less than or equal to 5, therefore, maximum concentration used for EPC.
Test (8): 95% UCL estimated by a non-Pro-UCL bootstrap method.

[5] Infrequent detection resulted in ProUCL modeling error for this constituent, therefore the distribution was assumed to be non-parametric and the UCL was determined using a non-ProUCL bootstrap method with random numbers for NDs (see text for details).

Table E.1-15
Medium-Specific Exposure Point Concentration Summary for SWMU 41 Area A - Surface Water

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean of Detects	Multiple Detection Limits? (Yes/No) [1]	95% UCL (Distribution) [2]	Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic [3]	Rationale [4]
Surface Water	2,3,7,8-TCDD-TE	mg/L	4.78E-09	N/A	N/A	1.43E-08	1.43E-08	mg/L	Max	Test (7)

Notes: N/A = Not applicable

[1] ProUCL software (version 4.0, USEPA, 2007) recommends use of Kaplan-Meier method if there are multiple detection limits.

[2] Statistical Distribution and 95% UCL as determined by ProUCL (unless otherwise noted): (G) the data were determined to follow gamma distribution; (L) the data were determined to follow lognormal distribution; (NP) the data were determined to be non-parametric; (N) the data were determined to be normally distributed.

[3] Statistic: Maximum Detected Value (Max); 95% KM Chebyshev (95% KM-Cheby); 97.5% KM Chebyshev (97.5% KM-Cheby); 99% KM Chebyshev (99% KM-Cheby); 95% KM Percentile Bootstrap (95% KM-% Btstrp); 95% KM-t (95% KM-t); 95% KM-BCA (95% KM-BCA); 95% H-UCL (95% H-UCL); 95% Chebyshev -Mean, SD- UCL (95% Cheby, Mean, SD); 97.5% Chebyshev -Mean, SD- UCL (97.5% Cheby, Mean, SD); 99% Chebyshev -Mean, SD- UCL (99% Cheby, Mean, SD); 95% UCL of Log-transformed Data (95% UCL-T) 95% Student's-t (95% Student's-t); 95% Modified-t (95% Modified-t); 95% UCL based on bootstrap statistic (95% UCL-Bst); 95% Approximate Gamma UCL (95% Approx. Gamma); 95% KM Chebyshev-MVUE (95% KM-Cheby-MVUE).

[4] Unless otherwise noted (see footnote 5), ProUCL EPC selection rationale based on, detection limit values, distribution, standard deviation, and sample size (see ProUCL output in appendix for further details):

Test (1): Kaplan-Meier method recommended by ProUCL due to multiple detection limits.
Test (2): The 95% UCL exceeds the maximum detected concentration, therefore, maximum concentration used for EPC.
Test (3): Shapiro-Wilk W test, Kolmogorov-Smirnov (K-S), and Anderson-Darling (A-D) tests, indicate data follow nonparametric distribution.
Test (4): Shapiro-Wilk W test indicates data are normally distributed.
Test (5): Shapiro-Wilk W test indicates data are log-normally distributed.
Test (6): Kolmogorov-Smirnov (K-S) and/or Anderson-Darling (A-D) tests indicate data follow gamma distribution.
Test (7): Sample size is less than or equal to 5, therefore, maximum concentration used for EPC.
Test (8): 95% UCL estimated by a non-Pro-UCL bootstrap method.

[5] Infrequent detection resulted in ProUCL modeling error for this constituent, therefore the distribution was assumed to be non-parametric and the UCL was determined using a non-ProUCL bootstrap method with random numbers for NDs (see text for details).

Table E.1-16
Medium-Specific Exposure Point Concentration Summary for SWMU 41 Area A - Groundwater

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean of Detects	Multiple Detection Limits? (Yes/No) [1]	95% UCL (Distribution) [2]	Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic [3]	Rationale [4]
Groundwater	Benzo(a)pyrene	mg/L	N/A	N/A	N/A	2.75E-05	2.75E-05	mg/L	Max	Test (7)
	Benzo(b)fluoranthene	mg/L	N/A	N/A	N/A	3.20E-05	3.20E-05	mg/L	Max	Test (7)
	Chloroform	mg/L	N/A	N/A	N/A	4.70E-03	4.70E-03	mg/L	Max	Test (7)
	Dibenzo(a,h)anthracene	mg/L	N/A	N/A	N/A	3.30E-05	3.30E-05	mg/L	Max	Test (7)
	Heptachlor	mg/L	N/A	N/A	N/A	7.80E-05	7.80E-05	mg/L	Max	Test (7)
	Indeno(1,2,3-cd)pyrene	mg/L	N/A	N/A	N/A	3.45E-05	3.45E-05	mg/L	Max	Test (7)
	Sodium	mg/L	N/A	N/A	N/A	9.06E+01	9.06E+01	mg/L	Max	Test (7)

Notes:

N/A = Not applicable

[1] ProUCL software (version 4.0, USEPA, 2007) recommends use of Kaplan-Meier method if there are multiple detection limits.

[2] Statistical Distribution and 95% UCL as determined by ProUCL (unless otherwise noted): (G) the data were determined to follow gamma distribution; (L) the data were determined to follow lognormal distribution; (NP) the data were determined to be non-parametric; (N) the data were determined to be normally distributed.

[3] Statistic: Maximum Detected Value (Max); 95% KM Chebyshev (95% KM-Cheby); 97.5% KM Chebyshev (97.5% KM-Cheby); 99% KM Chebyshev (99% KM-Cheby); 95% KM Percentile Bootstrap (95% KM-% Btstrp); 95% KM-t (95% KM-t); 95% KM-BCA (95% KM-BCA); 95% H-UCL (95% H-UCL); 95% Chebyshev -Mean, SD- UCL (95% Cheby, Mean, SD); 97.5% Chebyshev -Mean, SD- UCL (97.5% Cheby, Mean, SD); 99% Chebyshev -Mean, SD- UCL (99% Cheby, Mean, SD); 95% UCL of Log-transformed Data (95% UCL-T) 95% Student's-t (95% Student's-t); 95% Modified-t (95% Modified-t); 95% UCL based on bootstrap statistic (95% UCL-Bst); 95% Approximate Gamma UCL (95% Approx. Gamma); 95% KM Chebyshev-MVUE (95% KM-Cheby-MVUE).

[4] Unless otherwise noted (see footnote 5), ProUCL EPC selection rationale based on, detection limit values, distribution, standard deviation, and sample size (see ProUCL output in appendix for further details):

Test (1): Kaplan-Meier method recommended by ProUCL due to multiple detection limits.
Test (2): The 95% UCL exceeds the maximum detected concentration, therefore, maximum concentration used for EPC.
Test (3): Shapiro-Wilk W test, Kolmogorov-Smirnov (K-S), and Anderson-Darling (A-D) tests, indicate data follow nonparametric distribution.
Test (4): Shapiro-Wilk W test indicates data are normally distributed.
Test (5): Shapiro-Wilk W test indicates data are log-normally distributed.
Test (6): Kolmogorov-Smirnov (K-S) and/or Anderson-Darling (A-D) tests indicate data follow gamma distribution.
Test (7): Sample size is less than or equal to 5, therefore, maximum concentration used for EPC.
Test (8): 95% UCL estimated by a non-Pro-UCL bootstrap method.

[5] Infrequent detection resulted in ProUCL modeling error for this constituent, therefore the distribution was assumed to be non-parametric and the UCL was determined using a non-ProUCL bootstrap method with random numbers for NDs (see text for details).

Table E.1-17
Values Used for Daily Intake Calculations - Current/Future Exposures to Surface Soil
SWMU 41A

Scenario Timeframe:	Current/Future
Medium:	Surface Soil
Exposure Medium:	Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Maintenance Worker	Adult	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	100	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	50	days/year	(1)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
Dermal Absorption	Maintenance Worker	Adult	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 1997, 2002	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(2)	--	USEPA, 1995, 2003	$[(L)ADD_{int}]$ (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (3)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	50	days/year	(1)	$\frac{CS \times SSAF \times DABS \times SA \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	

(1) Best professional judgement. Based on site maintenance/inspection activities conducted 1day/week and assuming 2 weeks on vacation.
(2) Dermal absorption factors are presented in **Table E.1-29**.
(3) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, and forearms are exposed to surface soil.

USEPA, 1995: Assessing Dermal Exposure from Soil Hazardous Waste Management Division. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
USEPA, 2003: Updated Dermal Exposure Assessment Guidance. Office of Superfund Programs, Region III, Philadelphia, PA.

Table E.1-18
Values Used for Daily Intake Calculations - Future Exposures to Total Soil
SWMU 41A

Scenario Timeframe:	Future
Medium:	Total Soil
Exposure Medium:	Total Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Maintenance Worker	Adult	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	100	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	50	days/year	(1)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Excavation Worker	Adult	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	330	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	125	days/year	USEPA, 2002	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	1	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	1	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Resident	Adult	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	100	mg/day	USEPA, 1991a	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	350	days/year	USEPA, 1991a	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	30	years	USEPA, 1991a	
				ED_c	Exposure Duration	24	years	USEPA, 1991b	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
		Child	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	200	mg/day	USEPA, 1991a	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	350	days/year	USEPA, 1991a	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	6	years	USEPA, 1991a	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	15	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
Dermal Absorption	Maintenance Worker	Adult	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 1997, 2001	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(2)	--	USEPA, 1995, 2003	$[(L)ADD_{int}]$ (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (3)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	50	days/year	(1)	$\frac{CS \times SSAF \times DABS \times SA \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	

Table E.1-18
Values Used for Daily Intake Calculations - Future Exposures to Total Soil
SWMU 41A

Scenario Timeframe:	Future
Medium:	Total Soil
Exposure Medium:	Total Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal Absorption (con't)	Excavation Worker	Adult	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	USEPA, 2002	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(2)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (3)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	125	days/year	USEPA, 2002	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	1	years	USEPA, 2002	BW x AT x CF2
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	1	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Resident	Adult	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	USEPA, 1997, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(2)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700 (4)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	350	days/year	USEPA, 1991a	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	30	years	USEPA, 1991a	BW x AT x CF2
				ED$_c$	Exposure Duration	24	years	USEPA, 1991b	
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
		Child	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 1997, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(2)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800 (5)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	350	days/year	USEPA, 1991a	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	6	years	USEPA, 1991a	BW x AT x CF2
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	15	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	

(1) Best professional judgement. Based on site maintenance/inspection activities conducted 1day/week and assuming 2 weeks on vacation.
(2) Dermal absorption factors are presented in **Table E.1-29**.
(3) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, and forearms are exposed to soil.
(4) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, forearms, and lower legs are exposed to soil.
(5) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, forearms, lower legs, and feet are exposed to soil.

USEPA, 1991a: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.
USEPA, 1991b: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). OSWER 9285.7-01B.
USEPA, 1995: Assessing Dermal Exposure from Soil. Hazardous Waste Management Division. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.
USEPA, 2003: Updated Dermal Exposure Assessment Guidance. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
USEPA, 2004: Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final.

Table E.1-19
Values Used for Daily Intake Calculations - Current/Future Exposures to Surface Soil - Air
SWMU 41A

Scenario Timeframe:	Current/Future
Medium:	Surface Soil
Exposure Medium:	Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Particulates)	Maintenance Worker	Adult	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	50	days/year	USEPA, 2002	Intake concentration (mg/m^3) =
				ED	Exposure Duration	25	years	USEPA, 2002	CA*FI*EF*ED
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	AT
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	
Inhalation (Volatiles)	Maintenance Worker	Adult	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	50	days/year	USEPA, 2002	Intake concentration (mg/m^3) =
				ED	Exposure Duration	25	years	USEPA, 2002	CA*FI*EF*ED
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	AT
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	

(1) Chemical concentration for particulates in air (mg/m^3) = Concentration in soil (mg/kg) x 1/PEF (kg/m^3).
Chemical concentration of volatiles in air (mg/m^3) = Concentration in soil (mg/kg) x 1/VF (kg/m^3).

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table E.1-20
Values Used for Daily Intake Calculations - Future Exposures to Total Soil - Air
SWMU 41A

Scenario Timeframe:	Future
Medium:	Total Soil
Exposure Medium:	Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Particulates and Volatiles)	Maintenance Worker	Adult	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	Intake concentration (mg/m^3) = $\frac{CA*FI*EF*ED}{AT}$
				FI	Fraction Inhaled	1	unitless	--	
				EF	Exposure Frequency	50	days/year	USEPA, 2002	
				ED	Exposure Duration	25	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	
	Excavation Worker	Adult	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	Intake concentration (mg/m^3) = $\frac{CA*FI*EF*ED}{AT}$
				FI	Fraction Inhaled	1	unitless	--	
				EF	Exposure Frequency	125	days/year	USEPA, 2002	
				ED	Exposure Duration	1	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	365	days	Based on ED	
	Resident	Adult	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	Intake concentration (mg/m^3) = $\frac{CA*FI*EF*ED}{AT}$
				FI	Fraction Inhaled	1	unitless	--	
				EF	Exposure Frequency	350	days/year	USEPA, 2002	
				ED_c	Exposure Duration (Cancer)	24	years	USEPA, 2002 (2)	
				ED	Exposure Duration (Noncancer)	30	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	Reference	
				AT-N	Averaging Time (Non-Cancer)	10,950	days	Based on ED (3)	
		Child	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	Intake concentration (mg/m^3) = $\frac{CA*FI*EF*ED}{AT}$
				FI	Fraction Inhaled	1	unitless	--	
				EF	Exposure Frequency	350	days/year	USEPA, 2002	
				ED	Exposure Duration	6	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	--	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	Based on ED	

(1) Chemical concentration for particulates in air (mg/m^3) = Concentration in soil (mg/kg) x 1/PEF (kg/m^3).
Chemical concentration of volatiles in air (mg/m^3) = Concentration in soil (mg/kg) x 1/VF (kg/m^3).
(2) For carcinogens, risks for adults and children are averaged over a lifetime of 70 years (USEPA, 2002)
(3) AT for chronic exposures = 30 years x 365 days/year.

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table E.1-21
Values Used for Daily Intake Calculations - Future Exposures to Surface and Total Soil
SWMU 41A

Scenario Timeframe:	Future
Medium:	Surface and Total Soil
Exposure Medium:	Surface and Total Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker (outdoor)	Adult	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	100	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	225	days/year	USEPA, 2002	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
Dermal Absorption	Industrial Worker (outdoor)	Adult	SWMU 41A	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 1997, 2002	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(1)	--	USEPA, 1995, 2003	$[(L)ADD_{int}]$ (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (2)	cm^2	USEPA, 1997, 2004	
				EF	Exposure Frequency	225	days/year	USEPA, 2002	$\frac{CS \times SSAF \times DABS \times SA \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	

(1) Dermal absorption factors are presented in **Table E.1-29.**
(2) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, and forearms are exposed to surface soil.

USEPA, 1995: Assessing Dermal Exposure from Soil Hazardous Waste Management Division. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
USEPA, 2003: Updated Dermal Exposure Assessment Guidance. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 2004: Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final.

Table E.1-22
Values Used for Daily Intake Calculations - Future Exposures to Surface and Total Soil - Air
SWMU 41A

Scenario Timeframe:	Future
Medium:	Surface and Total Soil
Exposure Medium:	Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Particulates and Volatiles)	Industrial Worker (Outdoor)	Adult	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	Intake concentration (mg/m3) = $\frac{CA*FI*EF*ED}{AT}$
				FI	Fraction Inhaled	1	unitless	--	
				EF	Exposure Frequency	225	days/year	USEPA, 2002	
				ED	Exposure Duration	25	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	

(1) Chemical concentration for particulates in air (mg/m^3) = Concentration in soil (mg/kg) x 1/PEF (kg/m^3).
Chemical concentration of volatiles in air (mg/m^3) = Concentration in soil (mg/kg) x 1/VF (kg/m^3).

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table E.1-23
Values Used for Daily Intake Calculations - Current/Future Exposures to Groundwater, Inhalation
SWMU 41A

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Maintenance Worker	Adult	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	
				FI	Fraction Inhaled	1	unitless	--	Intake concentration (mg/m^3) =
				EF	Exposure Frequency	50	days/year	USEPA, 2002	$\frac{CA*FI*EF*ED}{AT}$
				ED	Exposure Duration	25	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	

(1) Ambient air concentrations are modeled by a volatilization model (ASTM, 1995). None of the COPCs in the groundwater at SWMU 41A were VOCs.

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table E.1-24
Values Used for Daily Intake Calculations - Future Exposures to Groundwater
SWMU 41A

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference
Ingestion	Industrial Worker (Outdoor and Indoor)	Adult	SWMU 41A	CW	Chemical Concentration in Groundwater	See site-specific EPC tables	µg/l	See site-specific EPC tables
				IR-W	Ingestion Rate of Groundwater	1	liters/day	USEPA, 1991a
				EF	Exposure Frequency	225	days/year	USEPA, 2002
				ED	Exposure Duration	25	years	USEPA, 2002
				CF1	Conversion Factor 1	$1/10^3$	mg/µg	---
				BW	Body Weight	70	kg	USEPA, 2002
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002
				CF2	Conversion Factor 2	365	days/year	---
	Resident (On-site and Off-site)	Adult	SWMU 41A	CW	Chemical Concentration in Groundwater	See site-specific EPC tables	µg/l	See site-specific EPC tables
				IR-W	Ingestion Rate of Groundwater	2	liters/day	USEPA, 1991a, 2003
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003
				ED	Exposure Duration	30	years	USEPA, 1991a, 2003
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b
				CF1	Conversion Factor 1	$1/10^3$	mg/µg	---
				BW	Body Weight	70	kg	USEPA, 1991a, 2003
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a, 2003
				CF2	Conversion Factor 2	365	days/year	---
		Child	SWMU 41A	CW	Chemical Concentration in Groundwater	See site-specific EPC tables	µg/l	See site-specific EPC tables
				IR-W	Ingestion Rate of Groundwater	1	liters/day	USEPA, 2003
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003
				ED	Exposure Duration	6	years	USEPA, 1991a, 2003
				CF1	Conversion Factor 1	$1/10^3$	mg/µg	---
				BW	Body Weight	15	kg	USEPA, 1991a, 2003
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a, 2003
				CF2	Conversion Factor 2	365	days/year	---
Dermal Absorption	Resident (On-site and Off-site)	Adult	SWMU 41A	DA	Dose Absorbed per Unit Area per Event	--	mg/cm^2-event	(1)
				SA	Skin Surface Area Available for Contact	18,000	cm^2	USEPA, 2004
				EV	Event Frequency	1	events/day	USEPA, 2004
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003
				ED	Exposure Duration	30	years	USEPA, 1991a, 2003
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b, 2003
				BW	Body Weight	70	kg	USEPA, 1991a, 2003
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a, 2003
				CF1	Conversion Factor 1	365	days/year	---

Table E.1-24
Values Used for Daily Intake Calculations - Future Exposures to Groundwater
SWMU 41A

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference
Dermal Absorption (cont.)	Resident (On-site and Off-site)	Child	SWMU 41A	DA	Dose Absorbed per Unit Area per Event	--	mg/cm^2-event	(2)
				SA	Skin Surface Area Available for Contact	6,600	cm^2	USEPA, 2004
				EV	Event Frequency	1	events/day	USEPA, 2004
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003
				ED	Exposure Duration	6	years	USEPA, 1991a, 2003
				BW	Body Weight	15	kg	USEPA, 1991a, 2003
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a, 2003
				CF1	Conversion Factor 1	365	days/year	---

(1) Value is derived using the worksheets for calculating dermal exposure to chemicals in aqueous media (USEPA, 2001) and assuming an exposure time of 30 minutes (ET = 0.50 hr; USEPA, 2004).

(2) Value is derived using the worksheets for calculating dermal exposure to chemicals in aqueous media (USEPA, 2001) and assuming an exposure time of 60 minutes (ET = 1.0 hr; USEPA, 2004).

USEPA, 1991a: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.
USEPA, 1991b: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). OSWER 9285.7-01B.
USEPA, 2001: Worksheet to calculate Dermal Absorption of Organic Chemicals from Aqueous Media and Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media; versions dated April, 2001. (http://www.epa.gov/oswer/riskassessment/ragse/index.htm.)
USEPA, 2003: EPA Region 3 Risk-Based Concentration Table: Technical Background Information, Region 3, Philadelphia, PA.
USEPA, 2004: Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final.
USEPA, 2005: EPA Region 3 web site - http://www.epa.gov/reg3hwmd/risk/human/index.htm.

Table E.1-24
Values Used for Daily Intake Calculations - Future Exposures to Groundwater
SWMU 41A

Intake Equation/ Model Name
Potential (Lifetime) Average Daily Dose $[(L)ADD_{pot}]$ (mg/kg-day) = $\frac{CW \times IR\text{-}W \times EF \times ED \times CF1}{BW \times AT \times CF2}$
Potential (Lifetime) Average Daily Dose $[(L)ADD_{pot}]$ (mg/kg-day) = $\frac{CW \times IR\text{-}W \times EF \times ED \times CF1}{BW \times AT \times CF2}$
Potential (Lifetime) Average Daily Dose $[(L)ADD_{pot}]$ (mg/kg-day) = $\frac{CW \times IR\text{-}W \times EF \times ED \times CF1}{BW \times AT \times CF2}$
Internal (Lifetime) Average Daily Dose $[(L)ADD_{int}]$ (mg/kg-day) = $\frac{DA \times SA \times EV \times EF \times ED}{BW \times AT \times CF1}$

Table E.1-24
Values Used for Daily Intake Calculations - Future Exposures to Groundwater
SWMU 41A

Intake Equation/ Model Name
Internal (Lifetime) Average Daily Dose $[(L)ADD_{int}]$ (mg/kg-day) = $\frac{DA \times SA \times EV \times EF \times ED}{BW \times AT \times CF1}$

Table E.1-25
Values Used for Daily Intake Calculations - Future Exposures to Groundwater, Inhalation
SWMU 41A

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Industrial Worker (Outdoor and Indoor)	Adult	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1, 2)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	225	days/year	USEPA, 2002	Intake concentration (mg/m^3) =
				ED	Exposure Duration	25	years	USEPA, 2002	$\frac{CA*FI*EF*ED}{AT}$
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	
	Excavation Worker	Adult	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(3)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	125	days/year	(4)	Intake concentration (mg/m^3) =
				ED	Exposure Duration	1	years	(4)	$\frac{CA*FI*EF*ED}{AT}$
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	365	days	Based on ED	
	Resident (On-site and Off-site)	Adult	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(2, 5)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	350	days/year	USEPA, 2002	Intake concentration (mg/m^3) =
				ED	Exposure Duration (Non-Cancer)	30	years	USEPA, 2002	$\frac{CA*FI*EF*ED}{AT}$
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	10,950	days	Based on ED	
		Child	SWMU 41A	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	350	days/year	USEPA, 2002	Intake concentration (mg/m^3) =
				ED	Exposure Duration	6	years	USEPA, 2002	$\frac{CA*FI*EF*ED}{AT}$
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	Based on ED	

(1) Ambient air concentrations were modeled by a volatilization model (ASTM, 1995).
(2) Indoor air concentrations were modeled using the Johnson and Ettinger (1991) model.
(3) Trench air concentrations were modeled by the Trench Model (VDEQ, 2007).
(4) The excavation scenario is based on a worker working on an excavation project for 125 days/year for 1 year. The excavation worker is assumed to be exposed to groundwater for 4 hrs a day (VDEQ, 2007).
(5) Shower room air concentrations were modeled using the Foster and Chrostowski (1987) Shower Inhalation Model.

American Society for Testing and Materials (ASTM). 1995. Standard Guide for Risk-Based Corrective Action at Petroleum Release Sites. ASTM Committee E-50 on Environmental Assessment, Report No. E1739-95. West Conshohocken, Pennsylvania.
Foster, S.A. and P.C. Chrostowski. 1987. Inhalation Exposures to Volatile Organic Contaminants in the Shower. In the proceedings of the 80th Annual Meeting of the Air Pollution Control Association (APCA), June 21-26, New York.
Johnson, P.C. and Ettinger, R.A. 1991: Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Buildings. Environmental Science & Technology. 25:1445-1452.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening for Superfund Sites. OSWER 9355.4-24.
VDEQ, 2007: Voluntary Remediation Program Risk Assessment Guidance, Virginia Department of Environmental Quality.

Table E.1-26
Values Used for Daily Intake Calculations
Future Exposures to Home Grown Produce for Residents
SWMU 41A

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Home Grown Produce

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident (On-site and Off-site)	Adult	SWMU 41A	CV	Chemical Concentration in Produce	(1)	mg/kg	(1)	
				ABS	Chemical-Specific	(1)	unitless	(1)	
				IR-P	Ingestion Rate of Produce	18.6 (3)	g/d	USEPA, 1997	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	30	years	USEPA, 1991a, 2003	
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b	
				CF1	Conversion Factor 1	$1/10^3$	mg/µg	---	$\frac{CV \times ABS \times IR\text{-}P \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 1991a, 2003	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a, 2003	
				CF2	Conversion Factor 2	365	days/year	---	
		Child	SWMU 41A	CV	Chemical Concentration in Produce	(1)	mg/kg	(1)	
				ABS	Chemical-Specific	(1)	unitless	(2)	
				IR-P	Ingestion Rate of Produce	18.6 (3)	g/d	USEPA, 1997	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	6	years	USEPA, 1991a, 2003	
				CF1	Conversion Factor 1	$1/10^3$	mg/µg	---	$\frac{CV \times ABS \times IR\text{-}P \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	15	kg	USEPA, 1991a, 2003	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a, 2003	
				CF2	Conversion Factor 2	365	days/year	---	

(1) Concentration of COPCs in homegrown vegetables/fruits were modeled as shown in **Table E.1-39**.
(2) Value includes 7.5 g/d of vegetables and 11.1 g/d of fruit. The ingestion rate is based on 95th percentile values for home grown food intake (Table 1-2; USEPA, 1997).

USEPA, 1991a: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.
USEPA, 1991b: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). OSWER 9285.7-01B.
USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.
USEPA 2003: EPA Region 3 Risk-Based Concentration Table: Technical Background Information, Region 3, Philadelphia, PA.

Table E.1-27
Values Used for Daily Intake Calculations
Future Exposures to Sediment
SWMU 41A

Scenario Timeframe:	Future
Medium:	Sediment
Exposure Medium:	Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Maintenance Worker	Adult	SWMU 41A	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Sediment	100	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	50	days/year	(1)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Industrial Worker (Outdoor)	Adult	SWMU 41A	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Sediment	100	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	225	days/year	USEPA, 2002	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Excavation Worker	Adult	SWMU 41A	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Sediment	330	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	125	days/year	USEPA, 2002	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	1	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	1	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Resident	Adult	SWMU 41A (wading)	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Sediment	100	mg/day	USEPA, 1991a	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	40	days/year	(2)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	30	years	USEPA, 1991a	
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
		Child	SWMU 41A (wading)	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Sediment	200	mg/day	USEPA, 1991a	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	40	days/year	(2)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	6	years	USEPA, 1991a	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	15	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
Dermal Absorption	Maintenance Worker	Adult	SWMU 41A	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.6	mg/cm^2-day	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(3)	--	USEPA, 1995, 2003	$[(L)ADD_{int}]$ (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (4)	cm^2	USEPA, 1997, 2002	
				EF	Exposure Frequency	50	days/year	(1)	$\frac{CS \times SSAF \times DABS \times SA \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	

Table E.1-27
Values Used for Daily Intake Calculations
Future Exposures to Sediment
SWMU 41A

Scenario Timeframe:	Future
Medium:	Sediment
Exposure Medium:	Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal Absorption (cont.)	Industrial Worker (Outdoor)	Adult	SWMU 41A	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.6	mg/cm^2-day	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(3)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (4)	cm^2	USEPA, 1997, 2004	
				EF	Exposure Frequency	225	days/year	USEPA, 2002	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	25	years	USEPA, 2002	BW x AT x CF2
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Excavation Worker	Adult	SWMU 41A	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.6	mg/cm^2-day	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(3)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (4)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	125	days/year	USEPA, 2002	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	1	years	USEPA, 2002	BW x AT x CF2
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	1	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Resident	Adult	SWMU 41A (wading)	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(3)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700 (5)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	40	days/year	(2)	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	30	years	USEPA, 1991a	BW x AT x CF2
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b	
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
		Child	SWMU 41A (wading)	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(3)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800 (5)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	40	days/year	(2)	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	6	years	USEPA, 1991a	BW x AT x CF2
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	15	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	

(1) Best professional judgement. Based on site maintenance/inspection activities conducted 1 day/week and assuming 2 weeks on vacation. Assumed sediment exposures were similar to soil exposures.

(2) The exposure frequency is based on best professional judgment that the time an adult resident would spend wading would be similar to the time spent gardening or doing yard work, approximately 40 events/year (USEPA, 1992, 1997). For the child resident, it is assumed that a child under 6 years of age would be accompanied by an adult while wading.

(3) Dermal absorption factors are presented in **Table E.1-29**.

(4) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, and forearms are exposed to sediment.

(5) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, face, hands, forearms, lower legs, and feet are exposed to sediment.

USEPA, 1991a: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.
USEPA, 1991b: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). OSWER 9285.7-01B.
USEPA, 1992: Dermal Exposure Assessment: Principles and Applications. Office of Research and Development. EPA/600/8-91/011B.
USEPA, 1995: Assessing Dermal Exposure from Soil Hazardous Waste Management Division. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
USEPA, 2003: Updated Dermal Exposure Assessment Guidance. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 2004: Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final.

Table E.1-28
Values Used for Daily Intake Calculations
Future Exposures to Surface Water
SWMU 41A

Scenario Timeframe:	Future
Medium:	Surface Water
Exposure Medium:	Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal Absorption	Maintenance Worker	Adult	SWMU 41A (Wading)	DA	Dose Absorbed Per Unit Area per Event	(1)	mg/cm^2-event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	3,300 (2)	cm^2	USEPA, 1997	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	events/day	(1)	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	50	days/year	(3)	
				ED	Exposure Duration	25	years	EPA, 2002	DA x SA x EV x EF x ED
				BW	Body Weight	70	kg	EPA, 2002	BW x AT x CF1
				AT-C	Averaging Time (Cancer)	70	years	EPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	EPA, 2002	
				CF1	Conversion Factor 1	365	days/year	---	
	Industrial Worker (Outdoor)	Adult	SWMU 41A (Wading)	DA	Dose Absorbed Per Unit Area per Event	(1)	mg/cm^2-event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	3,300 (2)	cm^2	USEPA, 1997, 2004	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	events/day	(1)	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	225	days/year	USEPA, 2002	
				ED	Exposure Duration	25	years	USEPA, 2002	DA x SA x EV x EF x ED
				BW	Body Weight	70	kg	USEPA, 2002	BW x AT x CF1
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	365	days/year	---	
	Excavation Worker	Adult	SWMU 41A (Wading)	DA	Dose Absorbed Per Unit Area per Event	(1)	mg/cm^2-event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	3,300 (2)	cm^2	USEPA, 1997	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	events/day	(1)	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	125	days/year	USEPA, 2002	
				ED	Exposure Duration	1	years	USEPA, 2002	DA x SA x EV x EF x ED
				BW	Body Weight	70	kg	USEPA, 2002	BW x AT x CF1
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	1	years	USEPA, 2002	
				CF1	Conversion Factor 1	365	days/year	---	
	Resident	Adult	SWMU 41A (Wading)	DA	Dose Absorbed Per Unit Area per Event	(1)	mg/cm^2-event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	5,700(4)	cm^2	USEPA, 1997	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	events/day	(1)	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	40	days/year	(5)	
				ED	Exposure Duration	30	years	USEPA, 1991a	
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b	DA x SA x EV x EF x ED
				BW	Body Weight	70	kg	USEPA, 1991a	BW x AT x CF1
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a	
				CF1	Conversion Factor 1	365	days/year	---	
		Child	SWMU 41A (Wading)	DA	Dose Absorbed Per Unit Area per Event	(1)	mg/cm^2-event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	1,900 (4)	cm^2	USEPA, 1997	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	events/day	(1)	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	40	days/year	(5)	
				ED	Exposure Duration	6	years	(6)	DA x SA x EV x EF x ED
				BW	Body Weight	15	kg	USEPA, 1991a	BW x AT x CF1
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a	
				CF1	Conversion Factor 1	365	days/year	---	

(1) Value is derived using the worksheets for calculating dermal exposure to chemicals in aqueous media (USEPA, 2001) and assuming the exposure time of 1 hour (ET = 1 hour/day).
(2) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, and forearms are exposed to surface water; the worker's legs and feet would be protected by boots.
(3) Best professional judgement. Based on site maintenance/inspection activities conducted 1 day/week and assuming 2 weeks on vacation.
(4) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that hands, forearms, lower legs, and feet are exposed to surface water while wading.
(5) The exposure frequency is based on best professional judgment that the time an adult resident would spend wading would be similar to the time spent gardening or doing yard work, approximately 40 events/year (USEPA, 1992, 1997). For the child resident, it is assumed that a child under 6 years of age would be accompanied by an adult while wading.
(6) The exposure duration was based on the age range evaluated (i.e., 0 to 6 years of age).

USEPA, 1991a: Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.
USEPA, 1991b: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). OSWER 9285.7-01B.
USEPA, 1992: Dermal Exposure Assessment: Principles and Applications. Office of Research and Development. EPA/600/8-91/011B.
USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.
USEPA, 2001: Worksheet to calculate Dermal Absorption of Organic Chemicals from Aqueous Media; version dated April, 2001. (http://www.epa.gov/oswer/riskassessment/ragse/index.htm.)
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
USEPA, 2004: Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) EPA/540/R/99/005

Table E.1-29
Dermal Absorption Fractions and Physical/Chemical Properties for Soil - SWMU 41A
Radford Army Ammunition Plant, Radford, Virginia

Analyte	CAS NO.	ABS_d [a] (m^3/kg)	D_i [b] (cm^2/s)	D_w [b] (cm^2/s)	K_{oc} [b] (cm^3/g)	K_d [c] (cm^3/g)	H [b] (unitless)	D_A (cm^2/s)
Aluminum	7429-90-5	1.0E-02						
Arsenic	7440-38-2	3.0E-02						
Cobalt	7440-48-4	1.0E-02						
Iron	7439-89-6	1.0E-02						
Lead	7439-92-1	1.0E-02						
Manganese	7439-96-5	1.0E-02						
Methylcyclohexane [d]	108-87-2		7.30E-02	8.20E-06	1.49E+02	8.94E-01	7.40E+01	

CAS No. = Chemical Abstract Service No.
ABS_d = Dermal Absorption Factor
VF = Volatilization Factor
D_A = Apparent Diffusivity
m^3/kg = cubic meters per kilogram
cm^2/s = centimeter squared per second

[a] ABS_d values are taken from Exhibit 3-4, Risk Assessment Guidance for Superfund (RAGS), Volume 1, Human Health Evaluation and Manual, Part E; Supplemental Guidance for Dermal Risk Assessment, July 2004, and Region III Technical Guidance, Assessing Dermal Exposure in Soil, December 1995, unless otherwise noted.

[b] Values for derivation of VF are taken from the USEPA Regional Screening Levels Table, Physical-Chemical Parameters (dated September 12, 2008).

[c] Calculated value: $K_d = K_{oc} \times f_{oc}$

[d] Hexane was used as a surrogate for the chemical-physical values as recommended in the Virginia Department of Environmental Quality (VDEQ) Proxy Table (from VDEQ web site dated August 1, 2008).

Table E.1-30
PEF Calculation - Construction Worker
Radford Army Ammunition Plant - SWMU 41A

Site Name: **Radford SWMU 41A**

Calculation of Site-Specific Construction Worker PEF:

$$PEF_{sc} = Q / C_{sr} \; x \; \frac{1}{F_D} \; x \left[\frac{T \; x \; A_R}{556 \; x \; (W/3)^{0.4} \; x \; \frac{365 \; day/yr - p)}{365 \; day/yr} \; x \; \sum VKT} \right]$$

Variable	Value	Units	Description
Q/C_{sr} =	**27.74**	g/m^2-s per kg/m^3	**calculated below**
Duration of construction =	**6**	months	
	25	weeks	
	125	days	assuming 5 days per week
t_c =	1,000	hours	assuming 8 hour days
	60,000	min	
T =	3,600,000	sec	
F_D =	0.185		dispersion correction factor
Surface area of site =	**0.19**	acres	**Site-specific**
Surface area of site =	768.9	m^2	
Length of side of area configured as a square =	27.7	m	equal to the square root of the area of the site
L_R =	91	ft	of area configured as a square
W_R =	20	ft	width of roadway segment - default
A_R =	169.0	m^2	surface area of contaminated roadway segment
W =	**5**	tons	mean vehicle weight - default, assuming 2, 2-ton cars and 1, 10-ton truck
p =	**119**	days/yr	Number of days/yr with at least 0.01 inches of precipitation - value for Radford Area from Exhibit 5-2
Number of vehicles on site =	**2**	cars	value based on assumptions for W
	1	truck	
VKT =	6.9	km	sum of vehicle km traveled during exposure duration - assuming each vehicles travels road once per day and 5 days/week for total time

Variables in **BOLD** are site-specific and should be entered for each site

PEF_{sc} = 2.86E+07 m^3/kg

$$Q / C_{sr} = A \; x \; \exp \left[\frac{(\ln A_s - B)^2}{C} \right]$$

Variable	Value	Units	Description
A_s =	**0.19**	acres	Site specific area
A =	12.9351		default constant
B =	5.7383		default constant
C =	71.7711		default constant

Q/C_{sr} = 27.74 g/m^2-s per kg/m^3

A_s is site-specific and a value should be entered for each site

Table E.1-31
PEF Calculation - Commercial/Industrial Worker
Radford Army Ammunition Plant - SWMU 41A

Site Name: Radford SWMU 41A

Calculation of Site-Specific Commercial/Industrial Worker PEF:
This value can be applied to workers as well as residents unless site area is greater than 0.5 acres.
Equation 4-5 from USEPA, 2002

$$PEF = \frac{Q}{C_{wind}} \times \frac{3{,}600 \text{ sec/hr}}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

Variable	Value	Units	Description
Q/C_{wind} =	58.17	g/m^2-s per kg/m^3	Calculated below
V =	**0.5**	unitless	fraction of vegetative cover
U_m =	**3.5**	m/s	mean annual windspeed
U_t =	**11.32**	m/s	equivalent threshold value of windspeed at 7 m
F(x) =	**0.194**	unitless	function dependent on U_m/U_t derived using Cowherd et al., 1985

Q/C_{wind} can be used for any source size from 0.5 acres to 500 acres using the equation and look up tables in Appendix D, Exhibit D-2. Source of 0.5 acres is the size of a typical exposure unit.
Even though the actual site is 0.19 acres in size, a value of A_s = 0.5 acres will be used as that is the smallest area used in the development of the model for Q/C_{wind}.

PEF = 2.03E+09 m^3/kg

From Exhibit D-2 from USEPA 2002:

$$Q/C_{wind} = A \times \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	9.9253		Site-specific value
B =	18.6636		Site-specific value
C =	211.8862		Site-specific value
A_s =	**0.5**	acres	**Contaminated site area**

Q/C_{wind} = 58.17 g/m^2-s/kg/m^3

Table E.1-32
PEF Calculation - Residents
Radford Army Ammunition Plant - SWMU 41A

Site Name: Radford SWMU 41A

Calculation of Site-Specific Residential PEF:
A separate PEF for residents must be calculated if the site in question is greater than 0.5 acres in size.
This residential PEF is based on a 0.5 acre residential site.
Equation 4-5 from USEPA, 2002

$$PEF = \frac{Q}{C_{wind}} \; x \; \frac{3{,}600 \text{ sec/hr}}{0.036 \; x \; (1-V) \; x \; (U_m/U_t)^3 \; x \; F(x)}$$

Variable	Value	Units	Description
Q/C_{wind} =	58.17	g/m^2-s per kg/m^3	Calculated below
V =	**0.5**	unitless	fraction of vegetative cover
U_m =	**3.5**	m/s	mean annual windspeed
U_t =	**11.32**	m/s	equivalent threshold value of windspeed at 7 m
F(x) =	**0.194**	unitless	function dependent on U_m/U_t derived using Cowherd et al., 1985

Q/C_{wind} can be used for any source size from 0.5 acres to 500 acres using the equation and look up tables in Appendix D, Exhibit D-2. Source of 0.5 acres is the size of a typical exposure unit.

PEF_R = 2.03E+09 m^3/kg

From Exhibit D-2 from USEPA 2002:

$$Q/C_{wind} = A \; x \; \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	9.9253		Site-specific value
B =	18.6636		Site-specific value
C =	211.8862		Site-specific value
A_s =	0.5	acres	**Residential exposure**

Q/C_{wind} = 58.17 g/m^2-s/kg/m^3

Table E.1-33
VF Calculation - Construction Worker
Radford Army Ammunition Plant - SWMU 41A

Site Name: Radford SWMU 41A

D_A values calculated using the following equation and values from the Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites. OSWER 9355.4-24. USEPA, 2002.

Equation 4-8 from USEPA, 2002.

This equation is chemical-specific.

$$D_A = \frac{[((\theta_a^{10/3} x D_i x H) + (\theta_w^{10/3} x D_w))/n^2]}{((\rho_b x K_d) + \theta_w + (\theta_a x H))}$$

Chemical name: **Methylcyclohexane**

Variable	Value	Units	Description
θ_a =	0.28	L_{air}/L_{soil}	default
θ_w =	0.15	L_{water}/L_{soil}	default
D_i =	**7.30E-02**	cm^2/s	**chemical-specific from VF table**
D_w =	**8.20E-06**	cm^2/s	**chemical-specific from VF table**
H =	**7.40E+01**	unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =	**0.894**	cm^3/g	**chemical-specific from VF table**
K_{oc} =	**149.0**	cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = 1.9E-02 cm^2/s

This equation is chemical-specific. Bold variables - information is required for each chemical
Copy this worksheet for each volatile COPC to calculate VF.

VF (soil only) values for construction worker were calculated using the following equations from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. USEPA, 2002. Equation 5-14 from USEPA, 2002

$$VF_{sc} = \frac{(3.14 x D_A x T)^{1/2} x CF}{2 x \rho_b x D_A} \; x \; \frac{Q}{C_{sa}} \; x \; \frac{1}{F_D}$$

Variable	Value	Units	Description
Q/C_{sa} =	17.34	g/m^2-s/kg/m^3	calculated below
F_D =	0.185	unitless	default
D_A =	1.9E-02	cm^2/s	**chemical specific - calculated above**
T =	**3,600,000**	**seconds**	Receptor-specific exposure interval (example: T= 1 yr*125 days/yr*8 hr/day*60 min/hr*60 sec/min)
CF =	1.00E-04	m^2/cm^2	default conversion factor
ρ_b =	1.5	g/cm^3	default

VF_{sc} = 7.6E+01 m^3/kg

Equation 5-15 from USEPA, 2002:

$$Q / C_{sa} = A \; x \exp\left[\frac{(\ln A_c - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	2.4538		default constant
B =	17.566		default constant
C =	189.0426		default constant
A_c =	**0.19**	acres	**site-specific**

A_c is site specific - area should change for each site

Q/C_{sa} = 17.34 g/m^2-s/kg/m^3

Table E.1-34
VF Calculation - Maintenance Worker
Radford Army Ammunition Plant - SWMU 41A

Site Name: Radford SWMU 41A

D_A values calculated using the following equation and values from the Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites. OSWER 9355.4-24. USEPA, 2002.
Equation 4-8 from USEPA, 2002.
This equation is chemical-specific.

$$D_A = \frac{[((\theta_a^{10/3} x D_i x H) + (\theta_w^{10/3} x D_w))/n^2]}{((\rho_b x K_d) + \theta_w + (\theta_a x H))}$$

Chemical name: **Methylcyclohexane**

Variable	Value	Units	Description
θ_a =	0.28	L_{air}/L_{soil}	default
θ_w =	0.15	L_{water}/L_{soil}	default
D_i =	**7.30E-02**	cm^2/s	**chemical-specific from VF table**
D_w =	**8.20E-06**	cm^2/s	**chemical-specific from VF table**
H	**7.40E+01**	unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =	**0.894**	cm^3/g	**chemical-specific from VF table**
K_{oc} =	**149.0**	cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = 1.9E-02 cm^2/s

VF (soil only) values for commercial/industrial worker, adult resident and child resident were calculated using the following equations from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. USEPA, 2002. Equation 4-8 from USEPA, 2002

$$VF = \frac{Q}{C_{vol}} \; x \; \frac{(3.14 x D_A x T)^{1/2} x CF}{2 x \rho_b x D_A}$$

Variable	Value	Units	Description
Q/C_{vol} =	99.02	$(g/m^2\text{-}s)/kg/m^3$	calculated below
D_A =	1.9E-02	cm^2/s	chemical specific - calculated above
T =	**788,400,000**	seconds	**Receptor-specific exposure interval (T= 25 yrs*365 days/yr*24hr/day*60 min/hr*60 sec/min)**
CF =	1.00E-04	m^2/cm^2	default
ρ_b =	1.5	g/cm^3	default

VF = 1.19E+03 m^3/kg

From Exhibit D-3 from USEPA 2002:

$$Q/C_{vol} = A \; x \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	14.1901		Site-specific value - see tab D-3 for values
B =	18.5634		Site-specific value - see tab D-3 for values
C =	210.5281		Site-specific value - see tab D-3 for values
A_s =	**0.19**	acres	Contaminated site area

Q/C_{vol} = 99.02 $g/m^2\text{-}s/kg/m^3$

Table E.1-35
VF Calculation - Industrial Worker
Radford Army Ammunition Plant - SWMU 41A

Site Name: Radford SWMU 41A

D_A values calculated using the following equation and values from the Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites. OSWER 9355.4-24. USEPA, 2002.
Equation 4-8 from USEPA, 2002.
This equation is chemical-specific.

$$D_A = \frac{[((\theta_a^{10/3} x D_i x H) + (\theta_w^{10/3} x D_w))/n^2]}{((\rho_b x K_d) + \theta_w + (\theta_a x H))}$$

Chemical name: **Methylcyclohexane**

Variable	Value	Units	Description
θ_a =	0.28	L_{air}/L_{soil}	default
θ_w =	0.15	L_{water}/L_{soil}	default
D_i =	**7.30E-02**	cm^2/s	**chemical-specific from VF table**
D_w =	**8.20E-06**	cm^2/s	**chemical-specific from VF table**
H	**7.40E+01**	unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =	**0.894**	cm^3/g	**chemical-specific from VF table**
K_{oc} =	**149.0**	cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = 1.9E-02 cm^2/s

VF (soil only) values for commercial/industrial worker, adult resident and child resident were calculated using the following equations from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. USEPA, 2002. Equation 4-8 from USEPA, 2002

$$VF = \frac{Q}{C_{vol}} \; x \; \frac{(3.14 x D_A x T)^{1/2} x CF}{2 x \rho_b x D_A}$$

Variable	Value	Units	Description
Q/C_{vol} =	99.02	$(g/m^2\text{-s})/kg/m^3$	calculated below
D_A =	1.9E-02	cm^2/s	chemical specific - calculated above
T =	**788,400,000**	seconds	**Receptor-specific exposure interval (T= 25 yrs*365 days/yr*24hr/day*60 min/hr*60 sec/min)**
CF =	1.00E-04	m^2/cm^2	default
ρ_b =	1.5	g/cm^3	default

VF = **1.19E+03** m^3/kg

From Exhibit D-3 from USEPA 2002:

$$Q/C_{vol} = A \; x \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	14.1901		Site-specific value - see tab D-3 for values
B =	18.5634		Site-specific value - see tab D-3 for values
C =	210.5281		Site-specific value - see tab D-3 for values
A_s =	**0.19**	acres	Contaminated site area

Q/C_{vol} = 99.02 $g/m^2\text{-s/kg/m}^3$

Table E.1-36
VF Calculation - Adult Resident
Radford Army Ammunition Plant - SWMU 41A

Site Name: Radford SWMU 41A

D_A values calculated using the following equation and values from the Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites. OSWER 9355.4-24. USEPA, 2002.
Equation 4-8 from USEPA, 2002.
This equation is chemical-specific.

$$D_A = \frac{[((\theta_a^{10/3} x D_i x H) + (\theta_w^{10/3} x D_w))/n^2]}{((\rho_b x K_d) + \theta_w + (\theta_a x H))}$$

Chemical name: **Methylcyclohexane**

Variable	Value	Units	Description
θ_a =	0.28	L_{air}/L_{soil}	default
θ_w =	0.15	L_{water}/L_{soil}	default
D_i =	**7.30E-02**	cm^2/s	**chemical-specific from VF table**
D_w =	**8.20E-06**	cm^2/s	**chemical-specific from VF table**
H	**7.40E+01**	unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =	**0.894**	cm^3/g	**chemical-specific from VF table**
K_{oc} =	**149.0**	cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = 1.9E-02 cm^2/s

VF (soil only) values for commercial/industrial worker, adult resident and child resident were calculated using the following equations from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. USEPA, 2002. Equation 4-8 from USEPA, 2002

$$VF = \frac{Q}{C_{vol}} \; x \; \frac{(3.14 x D_A x T)^{1/2} x CF}{2 x \rho_b x D_A}$$

Variable	Value	Units	Description
Q/C_{vol} =	82.59	g/m^2-s)/kg/m^3	calculated below
D_A =	1.9E-02	cm^2/s	chemical specific - calculated above
T =	**756,864,000**	seconds	**Receptor-specific exposure interval (T= 24 yrs*365 days/yr*24hr/day*60 min/hr*60 sec/min)**
CF =	1.00E-04	m^2/cm^2	default
ρ_b =	1.5	g/cm^3	default

VF = 9.76E+02 m^3/kg

From Exhibit D-3 from USEPA 2002:

$$Q/C_{vol} = A \; x \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	14.1901		Site-specific value - see tab D-3 for values
B =	18.5634		Site-specific value - see tab D-3 for values
C =	210.5281		Site-specific value - see tab D-3 for values
A_s =	0.5	acres	Residential exposure

Q/C_{vol} = 82.59 g/m^2-s/kg/m^3

Table E.1-37
VF Calculation - Child Resident
Radford Army Ammunition Plant - SWMU 41A

Site Name: Radford SWMU 41A

D_A values calculated using the following equation and values from the Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites. OSWER 9355.4-24. USEPA, 2002.
Equation 4-8 from USEPA, 2002.
This equation is chemical-specific.

$$D_A = \frac{[((\theta_a^{10/3} x D_i x H) + (\theta_w^{10/3} x D_w))/n^2]}{((\rho_b x K_d) + \theta_w + (\theta_a x H))}$$

Chemical name: **Methylcyclohexane**

Variable	Value	Units	Description
Θ_a =	0.28	L_{air}/L_{soil}	default
Θ_w =	0.15	L_{water}/L_{soil}	default
D_i =	**7.30E-02**	cm^2/s	**chemical-specific from VF table**
D_w =	**8.20E-06**	cm^2/s	**chemical-specific from VF table**
H	**7.40E+01**	unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =	**0.894**	cm^3/g	**chemical-specific from VF table**
K_{oc} =	**149.0**	cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = 1.9E-02 cm^2/s

VF (soil only) values for commercial/industrial worker, adult resident and child resident were calculated using the following equations from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. USEPA, 2002.

$$VF = \frac{Q}{C_{vol}} \; x \; \frac{(3.14 x D_A x T)^{1/2} x CF}{2 x \rho_b x D_A}$$

Variable	Value	Units	Description
Q/C_{vol} =	82.59	g/m^2-s)/kg/m^3	calculated below
D_A =	1.9E-02	cm^2/s	chemical specific - calculated above
T =	**189,216,000**	seconds	**Receptor-specific exposure interval (T= 6 yrs*365 days/yr*24hr/day*60 min/hr*60 sec/min)**
CF =	1.00E-04	m^2/cm^2	default
ρ_b =	1.5	g/cm^3	default

VF = 4.88E+02 m^3/kg

From Exhibit D-3 from USEPA 2002:

$$Q/C_{vol} = A \; x \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	14.1901		Site-specific value - see tab D-3 for values
B =	18.5634		Site-specific value - see tab D-3 for values
C =	210.5281		Site-specific value - see tab D-3 for values
A_s =	0.5	acres	Residential exposure

Q/C_{vol} = 82.59 g/m^2-s/kg/m^3

Table E.1-38
Parameter Values Used for Surface Water - SWMU 41A

Dermal Absorption - Chemicals of Potential Concern (COPC) in Surface Water

COPC	CAS No.	FA	Kp (cm/hr)	tau_{event} (hr)	B	t* (hr)	COPC Assessed?
Organics							
TCDD TE (1)	1746-01-6	0.5	8.1E-01	6.82	5.60	30.09	Yes

(1) COPC is outside the effective predictive domain (Exhibits B-2 and B-3; USEPA, 2004).

USEPA, 2001. Organic parameter values are taken from Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media; version dated April, 2001. (http://ww.epa.gov/oswer/riskassessment/ragse/index.htm)

USEPA, 2004. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final.

Table E.1-39
Parameter Values Used for Groundwater - SWMU 41A

Dermal Absorption - Chemicals of Potential Concern (COPC) in Groundwater

COPC	CAS No.	FA	Kp (cm/hr)	tau_{event} (hr)	B	t* (hr)	COPC Assessed?
Organics							
Benzo(a)pyrene (1)	50-32-8	1.0	7.0E-01	2.69	4.30	11.67	Yes
Benzo(b)fluoranthene (1)	205-99-2	1.0	7.0E-01	2.77	4.30	12.03	Yes
Chloroform (2,3)	67-66-3	1.0	6.8E-03	0.50	0.00	1.19	No
Dibenzo(a,h)anthracene (1)	53-70-3	0.6	1.5E+00	3.88	9.70	17.57	Yes
Heptachlor	76-44-8	0.8	8.6E-03	13.27	0.10	31.85	Yes
Indeno(1,2,3-cd)pyrene (1)	193-39-5	0.6	1.0E+00	3.78	6.70	16.83	Yes
Inorganics							
Sodium (4)	7440-23-5		1.0E-03				No

(1) COPC is outside the effective predictive domain (Exhibits B-2 and B-3; USEPA, 2004).

(1) COPC is a halogenated compound. The K_p correlation based on molecular weight of the hydrocarbon will tend to under estimate the permeability coefficient (USEPA, 2004).

(3) Dermal exposure is less than 10% of drinking water exposure. COPC is not included in the dermal risk assessment based on Exhibits B-2 and B-3 (USEPA, 2004).

(4) COPC was added to the USEPA spreadsheet. The default value of 1.0E-03 cm/hr was assumed for the Kp value.

USEPA, 2001. Parameter values are taken from Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media and Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media; versions dated April, 2001. (http://www.epa.gov/oswer/riskassessment/ragse/index.htm)

USEPA, 2004. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final.

Table E.1-40
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - SWMU 41A

$$VF_{wamb} = (H\ /1 + (U_a d_{air} L_{GW}\ / WD_{effws}))\ X\ 10^3 L / m^3$$

Where:

VF_{wamb} (mg/m^3 air per mg/L water) =	calculated	Volatilization factor
H (cm^3-water per cm^3-air) =	chemical-specific	Henry's Law Constant
U_a (cm/sec) =	353	Wind speed above ground surface (NOAA, 2007)
d_{air} (cm) =	200	Ambient air mixing zone height (ASTM, 1995)
L_{GW} (cm) =	975	Depth to groundwater (site specific; average depth measured in August 2007)
W (cm) =	3,048	Width of source area parallel to wind flow direction (site-specific; measured from GIS mapping)
D_{effws} (cm^2/sec) =	calculated	Effective diffusion coefficient between groundwater and soil surface

$$D_{effws} = \left(h_{cap} + h_v\right)\left[\frac{h_{cap}}{D_{effcap}} + \frac{h_v}{D_{effs}}\right]^{-1}$$

Where:

D_{effws} (cm^2/sec) =	calculated	Effective diffusion coefficient between groundwater and soil surface
h_{cap} (cm) =	305	Thickness of capillary fringe (estimated to be low because groundwater is found in bedrock)
h_v (cm) =	671	Thickness of vadose zone (estimated as depth to water minus thickness of capillary fringe)
D_{effcap} (cm^2/sec) =	calculated	Effective diffusion coefficient through capillary fringe
D_{effs} (cm^2/sec) =	calculated	Effective diffusion coefficient in soil based on vapor phase concentration

Table E.1-40
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - SWMU 41A

$$D_{effcap} = D^{air} \frac{\theta_{acap}^{3.33}}{\theta_T^2} + D^{wat} \frac{1}{H} \frac{\theta_{wcap}^{3.33}}{\theta_T^2}$$

Where:

D_{effcap} (cm^2/sec) =	calculated	Effective diffusion coefficient through capillary fringe
D_{air} (cm^2/sec) =	chemical-specific	Diffusion coefficient in air
D_{wat} (cm^2/sec) =	chemical-specific	Diffusion coefficient in water
θ_{acap} (cm^3-air/cm^3-soil)	0.0481	Volumetric air content in capillary fringe soils
θ_{wcap} (cm^3-water/cm^3-soil)	0.433	Volumetric water content in capillary fringe soils
θ_T (cm^3/cm^3-soil)	0.481	Total soil porosity (based on value used in the Johnson & Ettinger model for consistency)

$$D_{effs} = D^{air} \frac{\theta_{as}^{3.33}}{\theta_T^2} + D^{wat} \frac{1}{H} \frac{\theta_{ws}^{3.33}}{\theta_T^2}$$

Where:

D_{effs} (cm^2/sec) =	calculated	Effective diffusion coefficient in soil based on vapor phase concentration
D_{air} (cm^2/sec) =	chemical-specific	Diffusion coefficient in air
D_{wat} (cm^2/sec) =	chemical-specific	Diffusion coefficient in water
θ_{as} (cm^3-air/cm^3-soil)	0.265	Volumetric air content in vadose zone soils
θ_{ws} (cm^3-water/cm^3-soil)	0.216	Volumetric water content in vadose zone soils (based on value used in Johnson & Ettinger model for consistency)
H (cm^3-water per cm^3-air) =	chemical-specific	Henry's Law Constant
θ_T (cm^3/cm^3-soil)	0.481	Total soil porosity (based on value used in Johnson & Ettinger model for consistency)

Table E.1-40
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - SWMU 41A

The concentration of the COPC in the ambient air is calculated using the following equation:

$$C_{air} = C_{GW} \times VF_{wamb}$$

Where:

C_{air} (mg/m^3) =	calculated	Concentration of chemical in ambient air
C_{GW} (mg/L) =	site-specific	Maximum detected concentration of chemical in groundwater
VF_{wamb} (mg/m^3 air per mg/L water) =	calculated	Volatilization factor

References:

American Society for Testing and Materials (ASTM), 1995. Standard Guide for Risk-Based Corrective Action at Petroleum Release Sites. ASTM Committee E-50 on Environmental Assessment. Report No. E1739-95. West Conshohocken, Pennsylvania.

National Oceanic and Atmospheric Administration (NOAA), 2007. Comprehensive Climatic Data for the United States through 2006. National Climatic Data Center, Asheville, North Carolina.

Table E.1-40 (con't)
Calculation of Ambient Air Concentration from Groundwater - SWMU 41A

Spreadsheet to calculate outdoor air vapor concentration from groundwater, based on ASTM method.

Constituent	Henry's Law Const.	Wind Speed	Mixing Zone Height	Thickness of Capillary Fringe	Thickness of Vadose Zone	Depth to Groundwater	Effec. Diffus. Coeff. from GW to Soil	Width of Source Area Parallel to Wind	Effec. Diffus. Coeff. in Cap-illary Fringe	Effec. Diffus. Coeff. in Soil	Total Soil Porosity	Vol. Air Cont. in Capillary Fringe Soil	Vol. Water Cont. in Capillary Fringe Soil	Vol. Air Cont. in Vadose Zone Soil	Vol. H2O Cont. in Vadose Zone Soil	Diffusion Coeff. in Air	Diffusion Coeff. in H2O	**OUTPUT** Volatilization Factor
symbol:	(H)	(Uair)	(ht)	(hcap)	(hv)	(Lgw)	(DwsEff)	(W)	(DcapEff)	(DsEff)	(0t)	(0acap)	(0wcap)	(0as)	(0ws)	(Dair)	(Dwat)	(VFamb)
units:	cm3-H2O / cm3-Air	(cm/sec)	(cm)	(cm)	(cm)	(cm)	(cm^2/sec)	(cm)	(cm^2/sec)	(cm^2/sec)	cm3 / cm3-soil	cm3-Air / cm3-soil	cm3-H2O / cm3-soil	cm3-Air / cm3-soil	cm3-H2O / cm3-soil	cm2/sec	cm2/sec	mg/m3-Air / mg/L-H2O
Chloroform	1.50E-01	353	200	305	671	975	0.0001	3,048	0.000035	0.0052	0.481	0.0481	0.433	0.265	0.216	1.00E-01	1.00E-05	7.41E-07

Source: ASTM, 1994

Constituents	Groundwater Concentration (mg/L)	VFamb	**"Ca"** Concentration (mg/m^3)
Chloroform	4.70E-03	7.41E-07	3.48E-09

Table E.1-41
Groundwater Inhalation Indoor Air Concentration Summary - SWMU 41A
Radford Army Ammunition Plant, Radford, Virginia

Chemicals of Potential Concern in Groundwater and Indoor Air

Analyte	CAS No.	Cw ug/L	Ca mg/m^3
Organics			
Chloroform	67-66-3	4.70E+00	8.63E-06

Notes:
Indoor air concentrations modeled using Johnson and Ettinger Model
Model output provided in **Appendix E.6**

Non-default model inputs (based on site-specific data):

Average soil temperature (T_s) is set at 51°F or 10.6°C, based on the average temperature of soil for the vicinity of SWMU 41A.

Depth below grade to bottom of enclosed space floor (L_F) is set at the default value of 200 cm because building construction is likely to include a basement

Depth below grade to water table (L_{wt}) is set at 975 cm (32 ft), conservatively based on the shallowest depth of groundwater measured at SWMU 41A.

The soil type in the vadose zone was modeled as silty clay (SIC). Silty clay was selected as the soil type to conservatively represent clay and silt found at SWMU 41A.

The thickness and properties of the capillary zone are based on values in the "lookup" table for the SIC soil type.

The vadose zone soil total porosity is set at 0.481, based on the "lookup" soil parameter in the model for silty clay.

The vadose zone soil water-filled porosity is set at 0.216 cm^3/cm^3, based on the "lookup" soil parameter in the model for silty clay.

The vadose zone soil dry bulk density (pb) is set at the "lookup" soil parameter of 1.38 g/cm^3 for silty clay in the model.

The calculated concentration of each COPC in building air ($C_{building}$) served as the EPC in the intake calculations for inhalation.

Table E.1-42
Groundwater Inhalation -Excavation Worker - Trench Gas Concentration Calculations -
SWMU 41A

Analyte	CAS No.	C_w ug/L	H_i atm-m^3/mole	D_{air} cm^2/sec	VF L/min^3	C_a mg/m^3
Chloroform	67-66-3	4.70E+00	3.67E-03	1.04E-01	6.43E-03	3.02E-05

NA = Not Applicable.
NV = No Value.

Exposure point calculations calculated using trench model for construction worker/ utility worker in a trench where average depth to groundwater is greater than 15 feet (VDEQ,2007).

$$VF = \frac{(H_i \times D_{air} \times AC_{vad}^{3.33} \times A \times F \times 10^{-3} \times 10^{4} \times 3600)}{(R \times T \times L_d \times ACH \times V \times Por_{vad}^{2})}$$

where:

Parameters	Value	
H_i (atm-m^3/mol) =	chemical-specific	Henry's Law constant for contaminant
D_{air} (cm^2/s) =	chemical-specific	Diffusion coefficient in air
AC_{vad} (cm^3/cm^3) =	0.265	Volumetric air content in vadose zone soil
A (m^2) =	2.22	Area of trench (default)
F (unitless) =	1	Fraction of floor through which contaminant can enter
R (atm-m^3/mole-°K) =	8.2×10^{-5}	ideal gas constant
T (°K) =	284	Average system absolute temperature
L_d (cm) =	518	Distance between trench bottom and groundwater (site-specific)
ACH (h^{-1}) =	2	Air changes per hour
V (m^3) =	10.14	Volume of trench (length x width x depth)
Por_{vad} (cm^3/cm^3) =	0.481	Total soil porosity in vadose zone (silty clay)
Conversion Factor (L/cm^3) =	0.001	
Conversion Factor (cm^2/m^2) =	10,000	
Conversion Factor (s/hr) =	3,600	

$$C_a = C_w \times VF \times 0.001$$

C_a (µg/m^3) =	chemical-specific	Concentration in trench air
C_w (µg/L) =	chemical-specific	Concentration in groundwater
VF (L/min^3) =	chemical-specific	Volatilization factor
Conversion Factor (mg/µg) =	0.001	

Table E.1-43
Groundwater Inhalation Shower Air Concentration Calculations - SWMU 41A

Analyte	CAS No.	Cw mg/L	MW g/mole	H atm-m^3/mole	k_l cm/hr	k_g cm/hr	K_L cm/hr	K_{aL} cm/hr	C_{wd} mg/L	S mg/m^3-min	Ca mg/m^3
Organics											
Chloroform	67-66-3	4.70E-03	1.19E+02	3.66E-03	1.21E+01	1.17E+03	1.14E+01	1.54E+01	1.88E-03	1.57E-03	2.46E-02

NA = Not Applicable.

Variable	Equations:	
k_l (cm/hr) =	$20 \times (44/MW)^{0.5}$	Liquid-film transfer coefficient
k_g (cm/hr) =	$3000 \times (18/MW)^{0.5}$	Gas-film transfer coefficient
K_L (cm/hr) =	$(1/k_l + (R \times T/H^* k_g))^{-1}$	overall mass transfer coefficient
K_{aL} (cm/hr) =	$K_L \times ((T \times \mu_s/T_s \times \mu_l)^{-0.5}$	overall mass transfer coefficient adjusted to shower water temperature
C_{wd} (mg/L) =	$C_w \times (1-\exp(-K_{aL} \times t_s/60 \times d)$	VOC concentration leaving shower droplet after time t_s
S (mg/m^3-min) =	$C_{wd} \times FR/SV$	VOC generation rate
C_a (mg/m^3) =	$\left[\frac{S}{R_a \times t}\right] x \left[D_s + \frac{e^{(-R a x t)}}{R_a} - \frac{e^{R_a (D_s - t)}}{R_a}\right]$	VOC concentration in shower air

Constants:	Value	
R (atm-m^3/mole-K) =	8.2×10^{-5}	Gas constant
T (K) =	293	Room Temperature
T_s (K) =	318	Water Temperature
μ_s (centapoise) =	0.596	Water viscosity at Ts
μ_l (centapoise) =	1.002	Water viscosity at T
t_s (sec) =	0.5	Shower droplet drop time
d (mm) =	1	Droplet diameter
FR (L/min) =	10	Shower flow rate
SV (m^3) =	12	Shower room air volume
R_a (per min) =	0.01667	Air exchange rate
D_s (min) =	30	Shower Duration
t (min) =	60	Total time in shower room

Table E.1-44
Summary of Groundwater-to-Air Exposure Point Concentrations
SWMU 41A

Chemical of Potential Concern (COPC)	Ground Water Concentration (mg/L)	ASTM Model Ambient Air Concentration (mg/m^3)	J & E Vapor Intrusion Model Building Air Concentration (mg/m^3)	Trench Model Trench Air Concentration (mg/m^3)	F & C Model Shower Room Air Concentration (mg/m^3)
Chloroform	4.70E-03	3.48E-09	8.63E-06	3.02E-05	2.46E-02

NA = Not Applicable; COPC is not defined as a volatile.
NV = Chemical-specific parameters are not available for this COPC.

Table E.1-45
Cancer Toxicity Data - Oral/Dermal

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (2)		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source	Date (3) (MM/DD/YY)
Organics								
Aroclor 1254	2.0E+00	$(mg/kg\text{-}day)^{-1}$	100%	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	EPA, 2008	12/31/08:9/12/08
Benzo(a)pyrene	7.3E+00	$(mg/kg\text{-}day)^{-1}$	100%	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	2/16/11:11/1/94
Benzo(b)fluoranthene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	100%	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	EPA, 2008	2/16/11:3/1/94
Chloroform	3.1E-02	$(mg/kg\text{-}day)^{-1}$	100%	3.1E-02	$(mg/kg\text{-}day)^{-1}$	B2	EPA, 2008; Cal EPA	2/16/11:9/12/08
p-Chloro-m-cresol (4)	N/A	N/A	N/A	N/A	N/A	C	IRIS	12/31/08:8/1/91
Dibenzo(a,h)anthracene	7.3E+00	$(mg/kg\text{-}day)^{-1}$	100%	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	EPA, 2008	2/16/11:3/1/94
Heptachlor	4.5E+00	$(mg/kg\text{-}day)^{-1}$	100%	4.5E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	2/16/11:7/1/93
Indeno(1,2,3-cd)pyrene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	100%	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	EPA, 2008	2/16/11:3/1/94
Methylcyclohexane (5)	N/A	N/A	N/A	N/A	N/A	Inadequate	IRIS	12/31/08:12/23/05
TCDD TE	1.3E+05	$(mg/kg\text{-}day)^{-1}$	100%	1.3E+05	$(mg/kg\text{-}day)^{-1}$	B2	EPA, 2008	12/31/08:9/12/08
Inorganics								
Aluminum	N/A	N/A	N/A	N/A	N/A	N/A	EPA, 2008	12/31/08:9/12/08
Arsenic	1.5E+00	$(mg/kg\text{-}day)^{-1}$	100%	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	12/31/08:4/10/98
Cobalt	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12/31/08:9/12/08
Iron	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12/31/08:9/12/08
Manganese	N/A	N/A	N/A	N/A	N/A	D	IRIS	12/31/08:12/1/96
Sodium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12/31/08:9/12/08

(1) Source: Risk Assessment Guidance for Fuperfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Section 4.2 and Exhibit 4-1.
(2) The equation for deriving the adjusted dermal cancer slope factors are presented in the text.
(3) For IRIS values, the date IRIS was searched and the date of the most recent review are provided. For HEAST values, the date of HEAST is provided.
(4) 3-Methylphenol (m-cresol) was used as a surrogate for this COPC.
(5) n-Hexane was used as a surrogate for this COPC.

Definitions:
N/A = Not Available
IRIS = Integrated Risk Information System
Cal EPA = California EPA
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment
PPRTV = Provisional Peer-Reviewed Toxicity Values
EPA, 2008 = Regional Screening Values, ORNL Sept 12, 2008
VDEQ, 2008 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.1, Non-Cancer Toxicity Data, August 1, 2008.

EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

Table E.1-46
Non-Cancer Toxicity Data - Oral/Dermal

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral to Dermal Efficiency for Dermal (1)	Absorbed RfD for Dermal (2)		Primary Target Organ(s)	Combined Uncertainty/ Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Dates of RfD (3): (MM/DD/YY)
Organics										
Aroclor 1254	Chronic	2.0E-05	mg/kg-day	100%	2.0E-05	mg/kg-day	Immune system, eyes	300	IRIS	12/31/08:11/1/96
Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform	Chronic	1E-02	mg/kg-day	100%	1.0E-02	mg/kg-day	Liver	100	IRIS	2/16/11:10/19/01
p-Chloro-m-cresol (4)	Chronic	5.0E-02	mg/kg-day	100%	5.0E-02	mg/kg-day	Nervous System	1,000	IRIS	12/31/08:9/1/90
Dibenzo(a,h)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Heptachlor	Chronic	5E-04	mg/kg-day	100%	5.0E-04	mg/kg-day	Liver	300	IRIS	2/16/11:3/1/91
Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Methylcyclohexane (5)	Chronic	6.0E-02	mg/kg-day	100%	6.0E-02	mg/kg-day	Nervous System	10,000	HEAST	1997
TCDD TE	Chronic	1.0E-09	mg/kg-day	100%	1.0E-09	mg/kg-day	Developmental nervous system	N/A	EPA, 2008; ATSDR	12/31/08:9/12/08
Inorganics										
Aluminum	Chronic	1.0E+00	mg/kg-day	100%	1.0E+00	mg/kg-day	Developmental nervous system	N/A	PPRTV; EPA, 2008; VDEQ, 2008	12/31/08:9/12/08
Arsenic	Chronic	3.0E-04	mg/kg-day	100%	3.0E-04	mg/kg-day	Skin, Vascular System	3	IRIS	12/31/08:2/1/93
Cobalt	Chronic	3.0E-04	mg/kg-day	100%	3.0E-04	mg/kg-day	N/A	N/A	PPRTV; EPA, 2008	12/31/08:9/12/08
Iron	Chronic	7.0E-01	mg/kg-day	100%	7.0E-01	mg/kg-day	Blood, Liver, GI Tract	N/A	PPRTV; EPA, 2008; VDEQ, 2008	12/31/08:9/12/08
Manganese	Chronic	2.4E-02	mg/kg-day	4%	9.6E-04	mg/kg-day	CNS	1	IRIS	12/31/08:5/1/96
Sodium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium (6)	Chronic	5.0E-03	mg/kg-day	2.6%	1.3E-04	mg/kg-day	Kidney	N/A	EPA, 2008; VDEQ, 2008; NCEA	12/31/08:9/12/08

(1) Source: Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Section 4.2 and Exhibit 4-1.

(2) The equation used to derive the adjusted dermal RfD is presented in the text.

(3) For IRIS values, the date IRIS was searched and the date of the most recent review are provided. For HEAST values, the date of HEAST is provided.

(4) The toxicity value for 3-Methylphenol (m-cresol) was used as a surrogate for this COPC.

(5) The toxicity value for n-Hexane was used as a surrogate for this COPC.

(6) The toxicity value for Vanadium was based on Vanadium and Compounds.

Definitions:

N/A = Not Available
ATSDR = Agency for Toxic Substances Disease Registry
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment
PPRTV = Provisional Peer-Reviewed Toxicity Values
EPA, 2008 = Regional Screening Values, ORNL, September 12, 2008
VDEQ, 2008 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.1, Non-Cancer Toxicity Data, August 1, 2008.

Table E.1-47
Cancer Toxicity Data - Inhalation

Chemical of Potential Concern	Unit Risk		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation CSF	
	Value	Units		Source	Date (1) (MM/DD/YY)
Organics					
Aroclor 1254	5.70E-01	$(mg/m^3)^{-1}$	B2	EPA, 2008	12/31/08:9/12/08
Benzo(a)pyrene	1.10E+00	$(mg/m^3)^{-1}$	B2	EPA, 2008; Cal EPA	2/16/11:9/12/08
Benzo(b)fluoranthene	1.10E-01	$(mg/m^3)^{-1}$	N/A	EPA, 2008; Cal EPA	2/16/11:9/12/08
Chloroform	2.30E-02	$(mg/m^3)^{-1}$	B2	IRIS	10/19/2001
p-Chloro-m-cresol (2)	N/A	N/A	C	IRIS	12/31/08: 8/1/91
Dibenzo(a,h)anthracene	1.20E+00	$(mg/m^3)^{-1}$	N/A	EPA, 2008; Cal EPA	2/16/11:9/12/08
Heptachlor	1.30E+00	$(mg/m^3)^{-1}$	B2	IRIS	2/16/11:7/1/93
Indeno(1,2,3-cd)pyrene	1.10E-01	$(mg/m^3)^{-1}$	N/A	EPA, 2008; Cal EPA	2/16/11:9/12/08
Methylcyclohexane (3)	N/A	N/A	Inadequate	IRIS	12/31/08:12/23/05
TCDD TE	3.80E+04	$(mg/m^3)^{-1}$	B2	EPA, 2008	12/31/08:9/12/08
Inorganics					
Aluminum	N/A	N/A	N/A	N/A	12/31/08:9/12/08
Arsenic	4.30E+00	$(mg/m^3)^{-1}$	A	IRIS	12/31/08:4/10/98
Cobalt	9.00E+00	$(mg/m^3)^{-1}$	N/A	PPRTV; EPA, 2008	12/31/08:9/12/08
Iron	N/A	N/A	N/A	EPA, 2008	12/31/08:9/12/08
Manganese	N/A	N/A	D	IRIS	12/31/08:12/1/96
Sodium	N/A	N/A	N/A	N/A	12/31/2008
Vanadium	N/A	N/A	N/A	EPA, 2008	12/31/08:9/12/08

(1) For IRIS values, the date IRIS was searched and the date of the most recent review are provided.
For HEAST values, the date of HEAST is provided.
(2) 3-Methylphenol (m-cresol) was used as a surrogate for this COPC.
(3) n-Hexane was used as a surrogate for this COPC.

Definition:
N/A = Not Available
IRIS = Integrated Risk Information System
Cal EPA = California EPA
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment
PPRTV = Provisional Peer-Reviewed Toxicity Values
EPA, 2008 = Regional Screening Values, ORNL, September 12, 2008
VDEQ, 2008 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.2, Cancer Toxicity Data, August 1, 2008.

EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

Table E.1-48
Non-Cancer Toxicity Data - Inhalation

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Primary Target Organ (s)	Combined Uncertainty/ Modifying Factors	RfC:Target Organ(s)	
		Value	Units			Source(s) (2)	Dates of RfD: (MM/DD/YY)
Organics							
Aroclor 1254	N/A	N/A	N/A	N/A	N/A	N/A	12/31/08:11/1/96
Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform	Chronic	9.8E-02	mg/m^3	Liver	N/A	EPA, 2008; ATSDR	2/16/11:9/12/08
p-Chloro-m-cresol (3)	N/A	N/A	N/A	N/A	N/A	IRIS	12/31/08:4/1/92
Dibenzo(a,h)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Heptachlor	N/A	N/A	N/A	N/A	N/A	EPA, 2008	2/16/11:9/12/08
Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Methylcyclohexane (4)	Chronic	7.0E-01	mg/m^3	Nervous System	300	IRIS	12/31/08:12/23/05
TCDD TE	N/A	N/A	N/A	N/A	N/A	N/A	12/31/2008
Inorganics							
Aluminum	Chronic	5.0E-03	mg/m^3	N/A	N/A	EPA, 2008; VDEQ, 2008; PPRTV	12/31/08:9/12/08
Arsenic	Chronic	3.0E-05	mg/m^3	N/A	N/A	EPA, 2008	12/31/08:9/12/08
Cobalt	Chronic	6.0E-06	mg/m^3	N/A	N/A	PPRTV; EPA, 2008	12/31/08:9/12/08
Iron	N/A	N/A	N/A	N/A	N/A	EPA, 2008	12/31/08:9/12/08
Manganese	Chronic	5.0E-05	mg/m^3	CNS	1,000	IRIS	12/31/08:12/1/93
Sodium	N/A	N/A	N/A	N/A	N/A	N/A	12/31/2008
Vanadium	N/A	N/A	N/A	N/A	N/A	EPA, 2008	12/31/08:9/12/08

(1) The adjusted inhalation RfD was derived from the RfC value assuming a 70 kg adult inhales 20 m^3/day as follows: RfD = RfC * (20 m^3/day / 70 kg).
(2) For NCEA values, the date of the article provided by NCEA is provided.
For IRIS values, the date IRIS was searched and the date of the most recent review are provided.
For HEAST values, the date of HEAST is provided.
(3) 3-Methylphenol (m-cresol) was used as a surrogate for this COPC.
(4) n-Hexane was used as a surrogate for this COPC.

Definitions: N/A = Not Available
ATSDR = Agency for Toxic Substances Disease Registry
IRIS = Integrated Risk Information System
NCEA = National Center for Environmental Assessment
HEAST = Health Effects Assessment Tables
PPRTV = Provisional Peer-Reviewed Toxicity Values
EPA, 2008 - Regional Screening Valules, ORNL, September 12, 2008
VDEQ, 2008 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.1, Non-Cancer Toxicity Data, August 1, 2008.

Table E.1-49
Calculation of Cancer Risks
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Surface Soil	Surface Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	4.6E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	5.6E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	1.0E-08	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	2.1E-08
				Inorganics							
				Aluminum	3.11E+04	mg/kg	2.2E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	1.20E+01	mg/kg	8.4E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	1.3E-06
				Cobalt	1.40E+01	mg/kg	9.8E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.32E+04	mg/kg	3.0E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	9.18E+02	mg/kg	6.4E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	5.10E+01	mg/kg	3.6E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								1.3E-06
			Dermal Absorption	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	9.1E-12	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	3.7E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	9.7E-09	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	1.9E-08
				Inorganics							
				Aluminum	3.11E+04	mg/kg	1.4E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	1.20E+01	mg/kg	1.7E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	2.5E-07
				Cobalt	1.40E+01	mg/kg	6.5E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.32E+04	mg/kg	2.0E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	9.18E+02	mg/kg	4.2E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	5.10E+01	mg/kg	2.4E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								2.7E-07
		Exposure Point Total									1.5E-06
	Exposure Media Total										1.5E-06
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	1.9E-13	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Aroclor 1254	7.39E-11	mg/m^3	3.6E-12	mg/m^3	5.7E-01	$(mg/m^3)^{-1}$	2.1E-12
				Inorganics							
				Aluminum	1.53E-05	mg/m^3	7.5E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	5.91E-09	mg/m^3	2.9E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	1.2E-09
				Cobalt	6.90E-09	mg/m^3	3.4E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	3.0E-09
				Iron	2.13E-05	mg/m^3	1.0E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	4.52E-07	mg/m^3	2.2E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.51E-08	mg/m^3	1.2E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								4.3E-09
		Exposure Point Total									4.3E-09
	Exposure Media Total										4.3E-09
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	5.55E-07	mg/m^3	2.7E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Soil Total											1.6E-06

Table E.1-49
Calculation of Cancer Risks
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	1.2E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	9.2E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-06
			Exp. Route Total								1.4E-06
			Dermal Absorption	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	2.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	5.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.2E-07
			Exp. Route Total								8.2E-07
		Exposure Point Total									2.2E-06
	Exposure Media Total										2.2E-06
Sediment Total											2.2E-06
Surface Water	Surface Water	SWMU 41A	**Dermal Absorption**	**Organics**							
				TCDD TE	1.43E-08	mg/L	9.7E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.3E-05
				Inorganics							
				No COPCs							
			Exp. Route Total								1.3E-05
		Exposure Point Total									1.3E-05
	Exposure Media Total										1.3E-05
Surface Water Total											1.3E-05
Groundwater	Air	SWMU 41A	**Inhalation** (Ambient Air)	**Organics**							
				Chloroform	3.48E-09	mg/m^3	1.7E-10	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	3.9E-12
			Exp. Route Total								3.9E-12
		Exposure Point Total									3.9E-12
	Exposure Media Total										3.9E-12
Groundwater Total											3.9E-12
										Total of Receptor Risks Across All Media	1.6E-05

N/A = Not Applicable.

Table E.1-50
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Surface Soil	Surface Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	1.3E-10	mg/kg-day	6.0E-02	mg/kg-day	2.2E-09
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.6E-09	mg/kg-day	5.0E-02	mg/kg-day	3.1E-08
				Aroclor 1254	1.50E-01	mg/kg	2.9E-08	mg/kg-day	2.0E-05	mg/kg-day	1.5E-03
				Inorganics							
				Aluminum	3.11E+04	mg/kg	6.1E-03	mg/kg-day	1.0E+00	mg/kg-day	6.1E-03
				Arsenic	1.20E+01	mg/kg	2.3E-06	mg/kg-day	3.0E-04	mg/kg-day	7.8E-03
				Cobalt	1.40E+01	mg/kg	2.7E-06	mg/kg-day	3.0E-04	mg/kg-day	9.1E-03
				Iron	4.32E+04	mg/kg	8.5E-03	mg/kg-day	7.0E-01	mg/kg-day	1.2E-02
				Manganese	9.18E+02	mg/kg	1.8E-04	mg/kg-day	2.4E-02	mg/kg-day	7.5E-03
				Vanadium	5.10E+01	mg/kg	1.0E-05	mg/kg-day	5.0E-03	mg/kg-day	2.0E-03
			Exp. Route Total								4.6E-02
			Dermal Absorption	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	2.6E-11	mg/kg-day	6.0E-02	mg/kg-day	4.3E-10
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.0E-09	mg/kg-day	5.0E-02	mg/kg-day	2.1E-08
				Aroclor 1254	1.50E-01	mg/kg	2.7E-08	mg/kg-day	2.0E-05	mg/kg-day	1.4E-03
				Inorganics							
				Aluminum	3.11E+04	mg/kg	4.0E-04	mg/kg-day	1.0E+00	mg/kg-day	4.0E-04
				Arsenic	1.20E+01	mg/kg	4.6E-07	mg/kg-day	3.0E-04	mg/kg-day	1.5E-03
				Cobalt	1.40E+01	mg/kg	1.8E-07	mg/kg-day	3.0E-04	mg/kg-day	6.0E-04
				Iron	4.32E+04	mg/kg	5.6E-04	mg/kg-day	7.0E-01	mg/kg-day	8.0E-04
				Manganese	9.18E+02	mg/kg	1.2E-05	mg/kg-day	9.6E-04	mg/kg-day	1.2E-02
				Vanadium	5.10E+01	mg/kg	6.6E-07	mg/kg-day	1.3E-04	mg/kg-day	5.1E-03
			Exp. Route Total								2.2E-02
		Exposure Point Total									6.8E-02
	Exposure Media Total										6.8E-02
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	5.4E-13	mg/m^3	N/A	(mg/m^3)	---
				Aroclor 1254	7.39E-11	mg/m^3	1.0E-11	mg/m^3	N/A	(mg/m^3)	---
				Inorganics							
				Aluminum	1.53E-05	mg/m^3	2.1E-06	mg/m^3	5.0E-03	(mg/m^3)	4.2E-04
				Arsenic	5.91E-09	mg/m^3	8.1E-10	mg/m^3	3.0E-05	(mg/m^3)	2.7E-05
				Cobalt	6.90E-09	mg/m^3	9.4E-10	mg/m^3	6.0E-06	(mg/m^3)	1.6E-04
				Iron	2.13E-05	mg/m^3	2.9E-06	mg/m^3	N/A	(mg/m^3)	---
				Manganese	4.52E-07	mg/m^3	6.2E-08	mg/m^3	5.0E-05	(mg/m^3)	1.2E-03
				Vanadium	2.51E-08	mg/m^3	3.4E-09	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								1.8E-03
		Exposure Point Total									1.8E-03
	Exposure Media Total										1.8E-03
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	5.55E-07	mg/m^3	7.6E-08	mg/m^3	7.0E-01	(mg/m^3)	1.1E-07
			Exp. Route Total								1.1E-07
		Exposure Point Total									1.1E-07
	Exposure Media Total										1.1E-07
Surface Soil Total											7.0E-02

Table E.1-50
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	3.3E-09	mg/kg-day	5.0E-02	mg/kg-day	6.7E-08
				Inorganics							
				Arsenic	1.32E+01	mg/kg	2.6E-06	mg/kg-day	3.0E-04	mg/kg-day	8.6E-03
			Exp. Route Total								8.6E-03
			Dermal Absorption	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	6.6E-09	mg/kg-day	5.0E-02	mg/kg-day	1.3E-07
				Inorganics							
				Arsenic	1.32E+01	mg/kg	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	5.1E-03
			Exp. Route Total								5.1E-03
		Exposure Point Total									1.4E-02
	Exposure Media Total										1.4E-02
Sediment Total											1.4E-02
Surface Water	Surface Water	SWMU 41A	**Dermal Absorption**	**Organics**							
				TCDD TE	1.43E-08	mg/L	2.7E-10	mg/kg-day	1.0E-09	mg/kg-day	2.7E-01
				Inorganics							
				No COPCs							
			Exp. Route Total								2.7E-01
		Exposure Point Total									2.7E-01
	Exposure Media Total										2.7E-01
Surface Water Total											2.7E-01
Groundwater	Air	SWMU 41A	**Inhalation**	**Organics**							
			(Ambient Air)	Chloroform	3.48E-09	mg/m^3	4.8E-10	mg/m^3	9.8E-02	(mg/m^3)	4.9E-09
			Exp. Route Total								4.9E-09
		Exposure Point Total									4.9E-09
	Exposure Media Total										4.9E-09
Groundwater Total											4.9E-09
										Total of Receptor Hazards Across All Media	3.5E-01

N/A = Not Applicable.

Table E.1-51
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Total Soil	Total Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	5.6E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	5.6E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	1.0E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-08
				TCDD TE	8.69E-06	mg/kg	6.1E-13	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	7.9E-08
				Inorganics							
				Aluminum	2.83E+04	mg/kg	2.0E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.10E+01	mg/kg	7.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-06
				Cobalt	1.35E+01	mg/kg	9.4E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.18E+04	mg/kg	2.9E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.18E+03	mg/kg	8.2E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.06E+01	mg/kg	3.5E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.3E-06
			Dermal Absorption	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.1E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	3.7E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	9.7E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-08
				TCDD TE	8.69E-06	mg/kg	1.2E-13	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.6E-08
				Inorganics							
				Aluminum	2.83E+04	mg/kg	1.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.10E+01	mg/kg	1.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-07
				Cobalt	1.35E+01	mg/kg	6.2E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.18E+04	mg/kg	1.9E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.18E+03	mg/kg	5.4E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.06E+01	mg/kg	2.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								2.6E-07
		Exposure Point Total									1.5E-06
	Exposure Media Total										1.5E-06
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	1.9E-13	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Aroclor 1254	7.39E-11	mg/m^3	3.6E-12	mg/m^3	5.7E-01	$(mg/m^3)^{-1}$	2.1E-12
				TCDD TE	4.28E-15	mg/m^3	2.1E-16	mg/m^3	3.8E+04	$(mg/m^3)^{-1}$	8.0E-12
				Inorganics							
				Aluminum	1.39E-05	mg/m^3	6.8E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	5.42E-09	mg/m^3	2.7E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	1.1E-09
				Cobalt	6.65E-09	mg/m^3	3.3E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	2.9E-09
				Iron	2.06E-05	mg/m^3	1.0E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	5.81E-07	mg/m^3	2.8E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.49E-08	mg/m^3	1.2E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								4.1E-09
		Exposure Point Total									4.1E-09
	Exposure Media Total										4.1E-09
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	6.79E-07	mg/m^3	3.3E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											1.5E-06

Table E.1-51
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Surface Soil	Surface Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	4.6E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	5.6E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	1.0E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-08
				Inorganics							
				Aluminum	3.11E+04	mg/kg	2.2E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.20E+01	mg/kg	8.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-06
				Cobalt	1.40E+01	mg/kg	9.8E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.32E+04	mg/kg	3.0E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	9.18E+02	mg/kg	6.4E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.10E+01	mg/kg	3.6E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.3E-06
			Dermal Absorption	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	9.1E-12	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	3.7E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	9.7E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-08
				Inorganics							
				Aluminum	3.11E+04	mg/kg	1.4E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.20E+01	mg/kg	1.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-07
				Cobalt	1.40E+01	mg/kg	6.5E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.32E+04	mg/kg	2.0E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	9.18E+02	mg/kg	4.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.10E+01	mg/kg	2.4E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								2.7E-07
		Exposure Point Total									1.5E-06
	Exposure Media Total										1.5E-06
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	1.9E-13	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Aroclor 1254	7.39E-11	mg/m^3	3.6E-12	mg/m^3	5.7E-01	$(mg/m^3)^{-1}$	2.1E-12
				Inorganics							
				Aluminum	1.53E-05	mg/m^3	7.5E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	5.91E-09	mg/m^3	2.9E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	1.2E-09
				Cobalt	6.90E-09	mg/m^3	3.4E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	3.0E-09
				Iron	2.13E-05	mg/m^3	1.0E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	4.52E-07	mg/m^3	2.2E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.51E-08	mg/m^3	1.2E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								4.3E-09
		Exposure Point Total									4.3E-09
	Exposure Media Total										4.3E-09
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	5.55E-07	mg/m^3	2.7E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Soil Total											1.6E-06

Table E.1-51
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	1.2E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	9.2E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-06
			Exp. Route Total								1.4E-06
			Dermal Absorption	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	2.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	5.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.2E-07
			Exp. Route Total								8.2E-07
		Exposure Point Total									2.2E-06
	Exposure Media Total										2.2E-06
Sediment Total											2.2E-06
Surface Water	Surface Water	SWMU 41A	**Dermal Absorption**	**Organics**							
				TCDD TE	1.43E-08	mg/L	9.7E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.3E-05
				Inorganics							
				No COPCs							
			Exp. Route Total								1.3E-05
		Exposure Point Total									1.3E-05
	Exposure Media Total										1.3E-05
Surface Water Total											1.3E-05
Groundwater	Air	SWMU 41A	**Inhalation** (Ambient Air)	**Organics**							
				Chloroform	3.48E-09	mg/m^3	1.7E-10	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	3.9E-12
			Exp. Route Total								3.9E-12
		Exposure Point Total									3.9E-12
	Exposure Media Total										3.9E-12
Groundwater Total											3.9E-12
										Total of Receptor Risks Across All Media	1.6E-05

N/A = Not Applicable.
Since surface soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-52
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Total Soil	Total Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.6E-10	mg/kg-day	6.0E-02	mg/kg-day	2.6E-09
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.6E-09	mg/kg-day	5.0E-02	mg/kg-day	3.1E-08
				Aroclor 1254	1.50E-01	mg/kg	2.9E-08	mg/kg-day	2.0E-05	mg/kg-day	1.5E-03
				TCDD TE	8.69E-06	mg/kg	1.7E-12	mg/kg-day	1.0E-09	mg/kg-day	1.7E-03
				Inorganics							
				Aluminum	2.83E+04	mg/kg	5.5E-03	mg/kg-day	1.0E+00	mg/kg-day	5.5E-03
				Arsenic	1.10E+01	mg/kg	2.2E-06	mg/kg-day	3.0E-04	mg/kg-day	7.2E-03
				Cobalt	1.35E+01	mg/kg	2.6E-06	mg/kg-day	3.0E-04	mg/kg-day	8.8E-03
				Iron	4.18E+04	mg/kg	8.2E-03	mg/kg-day	7.0E-01	mg/kg-day	1.2E-02
				Manganese	1.18E+03	mg/kg	2.3E-04	mg/kg-day	2.4E-02	mg/kg-day	9.6E-03
				Vanadium	5.06E+01	mg/kg	9.9E-06	mg/kg-day	5.0E-03	mg/kg-day	2.0E-03
			Exp. Route Total								4.8E-02
			Dermal Absorption	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	3.1E-11	mg/kg-day	6.0E-02	mg/kg-day	5.2E-10
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.0E-09	mg/kg-day	5.0E-02	mg/kg-day	2.1E-08
				Aroclor 1254	1.50E-01	mg/kg	2.7E-08	mg/kg-day	2.0E-05	mg/kg-day	1.4E-03
				TCDD TE	8.69E-06	mg/kg	3.4E-13	mg/kg-day	1.0E-09	mg/kg-day	3.4E-04
				Inorganics							
				Aluminum	2.83E+04	mg/kg	3.7E-04	mg/kg-day	1.0E+00	mg/kg-day	3.7E-04
				Arsenic	1.10E+01	mg/kg	4.3E-07	mg/kg-day	3.0E-04	mg/kg-day	1.4E-03
				Cobalt	1.35E+01	mg/kg	1.7E-07	mg/kg-day	3.0E-04	mg/kg-day	5.8E-04
				Iron	4.18E+04	mg/kg	5.4E-04	mg/kg-day	7.0E-01	mg/kg-day	7.7E-04
				Manganese	1.18E+03	mg/kg	1.5E-05	mg/kg-day	9.6E-04	mg/kg-day	1.6E-02
				Vanadium	5.06E+01	mg/kg	6.5E-07	mg/kg-day	1.3E-04	mg/kg-day	5.0E-03
			Exp. Route Total								2.6E-02
		Exposure Point Total									7.4E-02
	Exposure Media Total										7.4E-02
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	5.4E-13	mg/m^3	N/A	(mg/m^3)	---
				Aroclor 1254	7.39E-11	mg/m^3	1.0E-11	mg/m^3	N/A	(mg/m^3)	---
				TCDD TE	4.28E-15	mg/m^3	5.9E-16	mg/m^3	N/A	(mg/m^3)	---
				Inorganics							
				Aluminum	1.39E-05	mg/m^3	1.9E-06	mg/m^3	5.0E-03	(mg/m^3)	3.8E-04
				Arsenic	5.42E-09	mg/m^3	7.4E-10	mg/m^3	3.0E-05	(mg/m^3)	2.5E-05
				Cobalt	6.65E-09	mg/m^3	9.1E-10	mg/m^3	6.0E-06	(mg/m^3)	1.5E-04
				Iron	2.06E-05	mg/m^3	2.8E-06	mg/m^3	N/A	(mg/m^3)	---
				Manganese	5.81E-07	mg/m^3	8.0E-08	mg/m^3	5.0E-05	(mg/m^3)	1.6E-03
				Vanadium	2.49E-08	mg/m^3	3.4E-09	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								2.2E-03
		Exposure Point Total									2.2E-03
	Exposure Media Total										2.2E-03
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	6.79E-07	mg/m^3	9.3E-08	mg/m^3	7.0E-01	(mg/m^3)	1.3E-07
			Exp. Route Total								1.3E-07
		Exposure Point Total									1.3E-07
	Exposure Media Total										1.3E-07
Total Soil Total											7.6E-02

Table E.1-52
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	1.3E-10	mg/kg-day	6.0E-02	mg/kg-day	2.2E-09
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.6E-09	mg/kg-day	5.0E-02	mg/kg-day	3.1E-08
				Aroclor 1254	1.50E-01	mg/kg	2.9E-08	mg/kg-day	2.0E-05	mg/kg-day	1.5E-03
				Inorganics							
				Aluminum	3.11E+04	mg/kg	6.1E-03	mg/kg-day	1.0E+00	mg/kg-day	6.1E-03
				Arsenic	1.20E+01	mg/kg	2.3E-06	mg/kg-day	3.0E-04	mg/kg-day	7.8E-03
				Cobalt	1.40E+01	mg/kg	2.7E-06	mg/kg-day	3.0E-04	mg/kg-day	9.1E-03
				Iron	4.32E+04	mg/kg	8.5E-03	mg/kg-day	7.0E-01	mg/kg-day	1.2E-02
				Manganese	9.18E+02	mg/kg	1.8E-04	mg/kg-day	2.4E-02	mg/kg-day	7.5E-03
				Vanadium	5.10E+01	mg/kg	1.0E-05	mg/kg-day	5.0E-03	mg/kg-day	2.0E-03
			Exp. Route Total								4.6E-02
			Dermal Absorption	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	2.6E-11	mg/kg-day	6.0E-02	mg/kg-day	4.3E-10
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.0E-09	mg/kg-day	5.0E-02	mg/kg-day	2.1E-08
				Aroclor 1254	1.50E-01	mg/kg	2.7E-08	mg/kg-day	2.0E-05	mg/kg-day	1.4E-03
				Inorganics							
				Aluminum	3.11E+04	mg/kg	4.0E-04	mg/kg-day	1.0E+00	mg/kg-day	4.0E-04
				Arsenic	1.20E+01	mg/kg	4.6E-07	mg/kg-day	3.0E-04	mg/kg-day	1.5E-03
				Cobalt	1.40E+01	mg/kg	1.8E-07	mg/kg-day	3.0E-04	mg/kg-day	6.0E-04
				Iron	4.32E+04	mg/kg	5.6E-04	mg/kg-day	7.0E-01	mg/kg-day	8.0E-04
				Manganese	9.18E+02	mg/kg	1.2E-05	mg/kg-day	9.6E-04	mg/kg-day	1.2E-02
				Vanadium	5.10E+01	mg/kg	6.6E-07	mg/kg-day	1.3E-04	mg/kg-day	5.1E-03
			Exp. Route Total								2.2E-02
		Exposure Point Total									6.8E-02
	Exposure Media Total										6.8E-02
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	5.4E-13	mg/m^3	N/A	(mg/m^3)	---
				Aroclor 1254	7.39E-11	mg/m^3	1.0E-11	mg/m^3	N/A	(mg/m^3)	---
				Inorganics							
				Aluminum	1.53E-05	mg/m^3	2.1E-06	mg/m^3	5.0E-03	(mg/m^3)	4.2E-04
				Arsenic	5.91E-09	mg/m^3	8.1E-10	mg/m^3	3.0E-05	(mg/m^3)	2.7E-05
				Cobalt	6.90E-09	mg/m^3	9.4E-10	mg/m^3	6.0E-06	(mg/m^3)	1.6E-04
				Iron	2.13E-05	mg/m^3	2.9E-06	mg/m^3	N/A	(mg/m^3)	---
				Manganese	4.52E-07	mg/m^3	6.2E-08	mg/m^3	5.0E-05	(mg/m^3)	1.2E-03
				Vanadium	2.51E-08	mg/m^3	3.4E-09	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								1.8E-03
		Exposure Point Total									1.8E-03
	Exposure Media Total										1.8E-03
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	5.55E-07	mg/m^3	7.6E-08	mg/m^3	7.0E-01	(mg/m^3)	1.1E-07
			Exp. Route Total								1.1E-07
		Exposure Point Total									1.1E-07
	Exposure Media Total										1.1E-07
Surface Soil Total											7.0E-02

Table E.1-52
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	3.3E-09	mg/kg-day	5.0E-02	mg/kg-day	6.7E-08
				Inorganics							
				Arsenic	1.32E+01	mg/kg	2.6E-06	mg/kg-day	3.0E-04	mg/kg-day	8.6E-03
			Exp. Route Total								8.6E-03
			Dermal Absorption	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	6.6E-09	mg/kg-day	5.0E-02	mg/kg-day	1.3E-07
				Inorganics							
				Arsenic	1.32E+01	mg/kg	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	5.1E-03
			Exp. Route Total								5.1E-03
		Exposure Point Total									1.4E-02
	Exposure Media Total										1.4E-02
Sediment Total											1.4E-02
Surface Water	Surface Water	SWMU 41A	**Dermal Absorption**	**Organics**							
				TCDD TE	1.43E-08	mg/L	2.7E-10	mg/kg-day	1.0E-09	mg/kg-day	2.7E-01
				Inorganics							
				No COPCs							
			Exp. Route Total								2.7E-01
		Exposure Point Total									2.7E-01
	Exposure Media Total										2.7E-01
Surface Water Total											2.7E-01
Groundwater	Air	SWMU 41A	**Inhalation** (Ambient Air)	**Organics**							
				Chloroform	3.48E-09	mg/m^3	4.8E-10	mg/m^3	9.8E-02	(mg/m^3)	4.9E-09
			Exp. Route Total								4.9E-09
		Exposure Point Total									4.9E-09
	Exposure Media Total										4.9E-09
Groundwater Total											4.9E-09
										Total of Receptor Hazards Across All Media	3.6E-01

N/A = Not Applicable.
Since total soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-53
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Total Soil	Total Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	2.5E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	2.5E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	4.7E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	9.4E-08
				TCDD TE	8.69E-06	mg/kg	2.7E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	3.6E-07
				Inorganics							
				Aluminum	2.83E+04	mg/kg	8.9E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.10E+01	mg/kg	3.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.2E-06
				Cobalt	1.35E+01	mg/kg	4.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.18E+04	mg/kg	1.3E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.18E+03	mg/kg	3.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.06E+01	mg/kg	1.6E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								5.6E-06
			Dermal Absorption	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	5.0E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.7E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	4.4E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.7E-08
				TCDD TE	8.69E-06	mg/kg	5.4E-13	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	7.0E-08
				Inorganics							
				Aluminum	2.83E+04	mg/kg	5.9E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.10E+01	mg/kg	6.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-06
				Cobalt	1.35E+01	mg/kg	2.8E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.18E+04	mg/kg	8.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.18E+03	mg/kg	2.4E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.06E+01	mg/kg	1.1E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.2E-06
		Exposure Point Total									6.8E-06
	Exposure Media Total										6.8E-06
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	8.7E-13	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Aroclor 1254	7.39E-11	mg/m^3	1.6E-11	mg/m^3	5.7E-01	$(mg/m^3)^{-1}$	9.3E-12
				TCDD TE	4.28E-15	mg/m^3	9.4E-16	mg/m^3	3.8E+04	$(mg/m^3)^{-1}$	3.6E-11
				Inorganics							
				Aluminum	1.39E-05	mg/m^3	3.1E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	5.42E-09	mg/m^3	1.2E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	5.1E-09
				Cobalt	6.65E-09	mg/m^3	1.5E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	1.3E-08
				Iron	2.06E-05	mg/m^3	4.5E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	5.81E-07	mg/m^3	1.3E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.49E-08	mg/m^3	5.5E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								1.8E-08
		Exposure Point Total									1.8E-08
	Exposure Media Total										1.8E-08
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	6.79E-07	mg/m^3	1.5E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											6.8E-06

Table E.1-53
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Surface Soil	Surface Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	2.1E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	2.5E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	4.7E-08	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	9.4E-08
				Inorganics							
				Aluminum	3.11E+04	mg/kg	9.8E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	1.20E+01	mg/kg	3.8E-06	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	5.7E-06
				Cobalt	1.40E+01	mg/kg	4.4E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.32E+04	mg/kg	1.4E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	9.18E+02	mg/kg	2.9E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	5.10E+01	mg/kg	1.6E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								5.8E-06
			Dermal Absorption	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	4.1E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.7E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	4.4E-08	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	8.7E-08
				Inorganics							
				Aluminum	3.11E+04	mg/kg	6.5E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	1.20E+01	mg/kg	7.5E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	1.1E-06
				Cobalt	1.40E+01	mg/kg	2.9E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.32E+04	mg/kg	9.0E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	9.18E+02	mg/kg	1.9E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	5.10E+01	mg/kg	1.1E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								1.2E-06
		Exposure Point Total									7.0E-06
	Exposure Media Total										7.0E-06
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	8.7E-13	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Aroclor 1254	7.39E-11	mg/m^3	1.6E-11	mg/m^3	5.7E-01	$(mg/m^3)^{-1}$	9.3E-12
				Inorganics							
				Aluminum	1.53E-05	mg/m^3	3.4E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	5.91E-09	mg/m^3	1.3E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	5.6E-09
				Cobalt	6.90E-09	mg/m^3	1.5E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	1.4E-08
				Iron	2.13E-05	mg/m^3	4.7E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	4.52E-07	mg/m^3	1.0E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.51E-08	mg/m^3	5.5E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								1.9E-08
		Exposure Point Total									1.9E-08
	Exposure Media Total										1.9E-08
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	5.55E-07	mg/m^3	1.2E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Soil Total											7.0E-06

Table E.1-53
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	5.3E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	4.2E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.2E-06
			Exp. Route Total								6.2E-06
			Dermal Absorption	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	1.1E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	2.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-06
			Exp. Route Total								3.7E-06
		Exposure Point Total									9.9E-06
	Exposure Media Total										9.9E-06
Sediment Total											9.9E-06
Surface Water	Surface Water	SWMU 41A	**Dermal Absorption**	**Organics**							
				TCDD TE	1.43E-08	mg/L	4.4E-10	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	5.7E-05
				Inorganics							
				No COPCs							
			Exp. Route Total								5.7E-05
		Exposure Point Total									5.7E-05
	Exposure Media Total										5.7E-05
Surface Water Total											5.7E-05
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	8.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.3E-07
				Benzo(b)fluoranthene	3.20E-02	µg/L	1.0E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.3E-08
				Chloroform	4.70E+00	µg/L	1.5E-05	mg/kg-day	3.1E-02	$(mg/kg\text{-}day)^{-1}$	4.6E-07
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	1.0E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.6E-07
				Heptachlor	7.80E-02	µg/L	2.5E-07	mg/kg-day	4.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-06
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	1.1E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.9E-08
				Inorganics							
				Sodium	9.06E+04	µg/L	2.8E-01	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								3.1E-06
		Exposure Point Total									3.1E-06
	Exposure Media Total										3.1E-06
	Air	SWMU 41A	**Inhalation** (Ambient Air)	**Organics** Chloroform	3.48E-09	mg/m^3	7.7E-10	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	1.8E-11
			Exp. Route Total								1.8E-11
		Exposure Point Total									1.8E-11
	Exposure Media Total										1.8E-11
	Air	SWMU 41A	**Inhalation** (Indoor Air)	**Organics** Chloroform	8.63E-06	mg/m^3	1.9E-06	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	4.4E-08
			Exp. Route Total								4.4E-08
		Exposure Point Total									4.4E-08
	Exposure Media Total										4.4E-08
Groundwater Total											3.1E-06
										Total of Receptor Risks Across All Media	7.7E-05

N/A = Not Applicable.

Since surface soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this data grouping.

Since indoor air represents the more highly contaminated portion of groundwater to air, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-54
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Total Soil	Total Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	7.1E-10	mg/kg-day	6.0E-02	mg/kg-day	1.2E-08
				p-Chloro-m-cresol	8.00E-03	mg/kg	7.0E-09	mg/kg-day	5.0E-02	mg/kg-day	1.4E-07
				Aroclor 1254	1.50E-01	mg/kg	1.3E-07	mg/kg-day	2.0E-05	mg/kg-day	6.6E-03
				TCDD TE	8.69E-06	mg/kg	7.7E-12	mg/kg-day	1.0E-09	mg/kg-day	7.7E-03
				Inorganics							
				Aluminum	2.83E+04	mg/kg	2.5E-02	mg/kg-day	1.0E+00	mg/kg-day	2.5E-02
				Arsenic	1.10E+01	mg/kg	9.7E-06	mg/kg-day	3.0E-04	mg/kg-day	3.2E-02
				Cobalt	1.35E+01	mg/kg	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	4.0E-02
				Iron	4.18E+04	mg/kg	3.7E-02	mg/kg-day	7.0E-01	mg/kg-day	5.3E-02
				Manganese	1.18E+03	mg/kg	1.0E-03	mg/kg-day	2.4E-02	mg/kg-day	4.3E-02
				Vanadium	5.06E+01	mg/kg	4.5E-05	mg/kg-day	5.0E-03	mg/kg-day	8.9E-03
			Exp. Route Total								2.2E-01
			Dermal Absorption	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.4E-10	mg/kg-day	6.0E-02	mg/kg-day	2.3E-09
				p-Chloro-m-cresol	8.00E-03	mg/kg	4.6E-09	mg/kg-day	5.0E-02	mg/kg-day	9.3E-08
				Aroclor 1254	1.50E-01	mg/kg	1.2E-07	mg/kg-day	2.0E-05	mg/kg-day	6.1E-03
				TCDD TE	8.69E-06	mg/kg	1.5E-12	mg/kg-day	1.0E-09	mg/kg-day	1.5E-03
				Inorganics							
				Aluminum	2.83E+04	mg/kg	1.6E-03	mg/kg-day	1.0E+00	mg/kg-day	1.6E-03
				Arsenic	1.10E+01	mg/kg	1.9E-06	mg/kg-day	3.0E-04	mg/kg-day	6.4E-03
				Cobalt	1.35E+01	mg/kg	7.8E-07	mg/kg-day	3.0E-04	mg/kg-day	2.6E-03
				Iron	4.18E+04	mg/kg	2.4E-03	mg/kg-day	7.0E-01	mg/kg-day	3.5E-03
				Manganese	1.18E+03	mg/kg	6.9E-05	mg/kg-day	9.6E-04	mg/kg-day	7.1E-02
				Vanadium	5.06E+01	mg/kg	2.9E-06	mg/kg-day	1.3E-04	mg/kg-day	2.3E-02
			Exp. Route Total								1.2E-01
		Exposure Point Total									3.3E-01
	Exposure Media Total										3.3E-01
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	2.4E-12	mg/m^3	N/A	(mg/m^3)	---
				Aroclor 1254	7.39E-11	mg/m^3	4.6E-11	mg/m^3	N/A	(mg/m^3)	---
				TCDD TE	4.28E-15	mg/m^3	2.6E-15	mg/m^3	N/A	(mg/m^3)	---
				Inorganics							
				Aluminum	1.39E-05	mg/m^3	8.6E-06	mg/m^3	5.0E-03	(mg/m^3)	1.7E-03
				Arsenic	5.42E-09	mg/m^3	3.3E-09	mg/m^3	3.0E-05	(mg/m^3)	1.1E-04
				Cobalt	6.65E-09	mg/m^3	4.1E-09	mg/m^3	6.0E-06	(mg/m^3)	6.8E-04
				Iron	2.06E-05	mg/m^3	1.3E-05	mg/m^3	N/A	(mg/m^3)	---
				Manganese	5.81E-07	mg/m^3	3.6E-07	mg/m^3	5.0E-05	(mg/m^3)	7.2E-03
				Vanadium	2.49E-08	mg/m^3	1.5E-08	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								9.7E-03
		Exposure Point Total									9.7E-03
	Exposure Media Total										9.7E-03
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	6.79E-07	mg/m^3	4.2E-07	mg/m^3	7.0E-01	(mg/m^3)	6.0E-07
			Exp. Route Total								6.0E-07
		Exposure Point Total									6.0E-07
	Exposure Media Total										6.0E-07
Total Soil Total											3.4E-01

Table E.1-54
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Surface Soil	Surface Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	5.8E-10	mg/kg-day	6.0E-02	mg/kg-day	9.7E-09
				p-Chloro-m-cresol	8.00E-03	mg/kg	7.0E-09	mg/kg-day	5.0E-02	mg/kg-day	1.4E-07
				Aroclor 1254	1.50E-01	mg/kg	1.3E-07	mg/kg-day	2.0E-05	mg/kg-day	6.6E-03
				Inorganics							
				Aluminum	3.11E+04	mg/kg	2.7E-02	mg/kg-day	1.0E+00	mg/kg-day	2.7E-02
				Arsenic	1.20E+01	mg/kg	1.1E-05	mg/kg-day	3.0E-04	mg/kg-day	3.5E-02
				Cobalt	1.40E+01	mg/kg	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	4.1E-02
				Iron	4.32E+04	mg/kg	3.8E-02	mg/kg-day	7.0E-01	mg/kg-day	5.4E-02
				Manganese	9.18E+02	mg/kg	8.1E-04	mg/kg-day	2.4E-02	mg/kg-day	3.4E-02
				Vanadium	5.10E+01	mg/kg	4.5E-05	mg/kg-day	5.0E-03	mg/kg-day	9.0E-03
			Exp. Route Total								2.1E-01
			Dermal Absorption	**Organics**							
				Methylcyclohexane	6.60E-04	mg/kg	1.2E-10	mg/kg-day	6.0E-02	mg/kg-day	1.9E-09
				p-Chloro-m-cresol	8.00E-03	mg/kg	4.6E-09	mg/kg-day	5.0E-02	mg/kg-day	9.3E-08
				Aroclor 1254	1.50E-01	mg/kg	1.2E-07	mg/kg-day	2.0E-05	mg/kg-day	6.1E-03
				Inorganics							
				Aluminum	3.11E+04	mg/kg	1.8E-03	mg/kg-day	1.0E+00	mg/kg-day	1.8E-03
				Arsenic	1.20E+01	mg/kg	2.1E-06	mg/kg-day	3.0E-04	mg/kg-day	7.0E-03
				Cobalt	1.40E+01	mg/kg	8.1E-07	mg/kg-day	3.0E-04	mg/kg-day	2.7E-03
				Iron	4.32E+04	mg/kg	2.5E-03	mg/kg-day	7.0E-01	mg/kg-day	3.6E-03
				Manganese	9.18E+02	mg/kg	5.3E-05	mg/kg-day	9.6E-04	mg/kg-day	5.6E-02
				Vanadium	5.10E+01	mg/kg	3.0E-06	mg/kg-day	1.3E-04	mg/kg-day	2.3E-02
			Exp. Route Total								1.0E-01
		Exposure Point Total									3.1E-01
	Exposure Media Total										3.1E-01
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	2.4E-12	mg/m^3	N/A	(mg/m^3)	---
				Aroclor 1254	7.39E-11	mg/m^3	4.6E-11	mg/m^3	N/A	(mg/m^3)	---
				Inorganics							
				Aluminum	1.53E-05	mg/m^3	9.4E-06	mg/m^3	5.0E-03	(mg/m^3)	1.9E-03
				Arsenic	5.91E-09	mg/m^3	3.6E-09	mg/m^3	3.0E-05	(mg/m^3)	1.2E-04
				Cobalt	6.90E-09	mg/m^3	4.3E-09	mg/m^3	6.0E-06	(mg/m^3)	7.1E-04
				Iron	2.13E-05	mg/m^3	1.3E-05	mg/m^3	N/A	(mg/m^3)	---
				Manganese	4.52E-07	mg/m^3	2.8E-07	mg/m^3	5.0E-05	(mg/m^3)	5.6E-03
				Vanadium	2.51E-08	mg/m^3	1.5E-08	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								8.3E-03
		Exposure Point Total									8.3E-03
	Exposure Media Total										8.3E-03
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	5.55E-07	mg/m^3	3.4E-07	mg/m^3	7.0E-01	(mg/m^3)	4.9E-07
			Exp. Route Total								4.9E-07
		Exposure Point Total									4.9E-07
	Exposure Media Total										4.9E-07
Surface Soil Total											3.2E-01

Table E.1-54
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	1.5E-08	mg/kg-day	5.0E-02	mg/kg-day	3.0E-07
				Inorganics							
				Arsenic	1.32E+01	mg/kg	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	3.9E-02
			Exp. Route Total								3.9E-02
			Dermal Absorption	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	3.0E-08	mg/kg-day	5.0E-02	mg/kg-day	5.9E-07
				Inorganics							
				Arsenic	1.32E+01	mg/kg	6.9E-06	mg/kg-day	3.0E-04	mg/kg-day	2.3E-02
			Exp. Route Total								2.3E-02
		Exposure Point Total									6.2E-02
	Exposure Media Total										6.2E-02
Sediment Total											6.2E-02
Surface Water	Surface Water	SWMU 41A	**Dermal Absorption**	**Organics**							
				TCDD TE	1.43E-08	mg/L	1.2E-09	mg/kg-day	1.0E-09	mg/kg-day	1.2E+00
				Inorganics							
				No COPCs							
			Exp. Route Total								1.2E+00
		Exposure Point Total									1.2E+00
	Exposure Media Total										1.2E+00
Surface Water Total											1.2E+00
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	2.4E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(b)fluoranthene	3.20E-02	µg/L	2.8E-07	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	4.70E+00	µg/L	4.1E-05	mg/kg-day	1.0E-02	mg/kg-day	4.1E-03
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	2.9E-07	mg/kg-day	N/A	mg/kg-day	---
				Heptachlor	7.80E-02	µg/L	6.9E-07	mg/kg-day	5.0E-04	mg/kg-day	1.4E-03
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	3.0E-07	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Sodium	9.06E+04	µg/L	8.0E-01	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								5.5E-03
		Exposure Point Total									5.5E-03
	Exposure Media Total										5.5E-03
	Air	SWMU 48	**Inhalation** (Ambient Air)	**Organics** Chloroform	3.48E-09	mg/m^3	2.1E-09	mg/m^3	9.8E-02	(mg/m^3)	2.2E-08
			Exp. Route Total								2.2E-08
		Exposure Point Total									2.2E-08
	Exposure Media Total										2.2E-08
	Air	SWMU 48	**Inhalation** (Indoor Air)	**Organics** Chloroform	8.63E-06	mg/m^3	5.3E-06	mg/m^3	9.8E-02	(mg/m^3)	5.4E-05
			Exp. Route Total								5.4E-05
		Exposure Point Total									5.4E-05
	Exposure Media Total										5.4E-05
Groundwater Total											5.6E-03
										Total of Receptor Hazards Across All Media	1.6E+00

N/A = Not Applicable.

Since total soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this data grouping.

Since indoor air represents the more highly contaminated portion of groundwater to air, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-55
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Total Soil	Total Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.9E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.8E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	3.5E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.9E-09
				TCDD TE	8.69E-06	mg/kg	2.0E-13	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	2.6E-08
				Inorganics							
				Aluminum	2.83E+04	mg/kg	6.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.10E+01	mg/kg	2.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.8E-07
				Cobalt	1.35E+01	mg/kg	3.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.18E+04	mg/kg	9.6E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.18E+03	mg/kg	2.7E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.06E+01	mg/kg	1.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								4.1E-07
			Dermal Absorption	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.7E-12	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	5.5E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	1.5E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-09
				TCDD TE	8.69E-06	mg/kg	1.8E-14	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	2.3E-09
				Inorganics							
				Aluminum	2.83E+04	mg/kg	2.0E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.10E+01	mg/kg	2.3E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-08
				Cobalt	1.35E+01	mg/kg	9.3E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.18E+04	mg/kg	2.9E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.18E+03	mg/kg	8.2E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.06E+01	mg/kg	3.5E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								4.0E-08
		Exposure Point Total									4.5E-07
	Exposure Media Total										4.5E-07
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	2.80E-10	mg/m^3	1.4E-12	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Aroclor 1254	5.24E-09	mg/m^3	2.6E-11	mg/m^3	5.7E-01	$(mg/m^3)^{-1}$	1.5E-11
				TCDD TE	3.04E-13	mg/m^3	1.5E-15	mg/m^3	3.8E+04	$(mg/m^3)^{-1}$	5.6E-11
				Inorganics							
				Aluminum	9.90E-04	mg/m^3	4.8E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	3.85E-07	mg/m^3	1.9E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	8.1E-09
				Cobalt	4.72E-07	mg/m^3	2.3E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	2.1E-08
				Iron	1.46E-03	mg/m^3	7.2E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	4.13E-05	mg/m^3	2.0E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	1.77E-06	mg/m^3	8.7E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								2.9E-08
		Exposure Point Total									2.9E-08
	Exposure Media Total										2.9E-08
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	1.06E-05	mg/m^3	5.2E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											4.8E-07

Table E.1-55
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	3.9E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	3.0E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.6E-07
			Exp. Route Total								4.6E-07
			Dermal Absorption	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	2.4E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	5.5E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.2E-08
			Exp. Route Total								8.2E-08
		Exposure Point Total									5.4E-07
	Exposure Media Total										5.4E-07
Sediment Total											5.4E-07
Surface Water	Surface Water	SWMU 41A	**Dermal Absorption**	**Organics**							
				TCDD TE	1.43E-08	mg/L	9.7E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.3E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								1.3E-06
		Exposure Point Total									1.3E-06
	Exposure Media Total										1.3E-06
Surface Water Total											1.3E-06
Groundwater	Air	SWMU 41A	**Inhalation** (Trench Air)	**Organics**							
				Chloroform	3.02E-05	mg/m^3	1.5E-07	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	3.4E-09
			Exp. Route Total								3.4E-09
		Exposure Point Total									3.4E-09
	Exposure Media Total										3.4E-09
Groundwater Total											3.4E-09
										Total of Receptor Risks Across All Media	2.3E-06

N/A = Not Applicable.

Table E.1-56
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Total Soil	Total Soil	SWMU 48	**Ingestion**	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.3E-09	mg/kg-day	6.0E-02	mg/kg-day	2.2E-08
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.3E-08	mg/kg-day	5.0E-02	mg/kg-day	2.6E-07
				Aroclor 1254	1.50E-01	mg/kg	2.4E-07	mg/kg-day	2.0E-05	mg/kg-day	1.2E-02
				TCDD TE	8.69E-06	mg/kg	1.4E-11	mg/kg-day	1.0E-09	mg/kg-day	1.4E-02
				Inorganics							
				Aluminum	2.83E+04	mg/kg	4.6E-02	mg/kg-day	1.0E+00	mg/kg-day	4.6E-02
				Arsenic	1.10E+01	mg/kg	1.8E-05	mg/kg-day	3.0E-04	mg/kg-day	5.9E-02
				Cobalt	1.35E+01	mg/kg	2.2E-05	mg/kg-day	3.0E-04	mg/kg-day	7.3E-02
				Iron	4.18E+04	mg/kg	6.7E-02	mg/kg-day	7.0E-01	mg/kg-day	9.6E-02
				Manganese	1.18E+03	mg/kg	1.9E-03	mg/kg-day	2.4E-02	mg/kg-day	7.9E-02
				Vanadium	5.06E+01	mg/kg	8.2E-05	mg/kg-day	5.0E-03	mg/kg-day	1.6E-02
			Exp. Route Total								4.0E-01
			Dermal Absorption	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.2E-10	mg/kg-day	6.0E-02	mg/kg-day	2.0E-09
				p-Chloro-m-cresol	8.00E-03	mg/kg	3.9E-09	mg/kg-day	5.0E-02	mg/kg-day	7.7E-08
				Aroclor 1254	1.50E-01	mg/kg	1.0E-07	mg/kg-day	2.0E-05	mg/kg-day	5.1E-03
				TCDD TE	8.69E-06	mg/kg	1.3E-12	mg/kg-day	1.0E-09	mg/kg-day	1.3E-03
				Inorganics							
				Aluminum	2.83E+04	mg/kg	1.4E-03	mg/kg-day	1.0E+00	mg/kg-day	1.4E-03
				Arsenic	1.10E+01	mg/kg	1.6E-06	mg/kg-day	3.0E-04	mg/kg-day	5.3E-03
				Cobalt	1.35E+01	mg/kg	6.5E-07	mg/kg-day	3.0E-04	mg/kg-day	2.2E-03
				Iron	4.18E+04	mg/kg	2.0E-03	mg/kg-day	7.0E-01	mg/kg-day	2.9E-03
				Manganese	1.18E+03	mg/kg	5.7E-05	mg/kg-day	9.6E-04	mg/kg-day	6.0E-02
				Vanadium	5.06E+01	mg/kg	2.5E-06	mg/kg-day	1.3E-04	mg/kg-day	1.9E-02
			Exp. Route Total								9.7E-02
		Exposure Point Total									4.9E-01
	Exposure Media Total										4.9E-01
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	2.80E-10	mg/m^3	9.6E-11	mg/m^3	N/A	(mg/m^3)	---
				Aroclor 1254	5.24E-09	mg/m^3	1.8E-09	mg/m^3	N/A	(mg/m^3)	---
				TCDD TE	3.04E-13	mg/m^3	1.0E-13	mg/m^3	N/A	(mg/m^3)	---
				Inorganics							
				Aluminum	9.90E-04	mg/m^3	3.4E-04	mg/m^3	5.0E-03	(mg/m^3)	6.8E-02
				Arsenic	3.85E-07	mg/m^3	1.3E-07	mg/m^3	3.0E-05	(mg/m^3)	4.4E-03
				Cobalt	4.72E-07	mg/m^3	1.6E-07	mg/m^3	6.0E-06	(mg/m^3)	2.7E-02
				Iron	1.46E-03	mg/m^3	5.0E-04	mg/m^3	N/A	(mg/m^3)	---
				Manganese	4.13E-05	mg/m^3	1.4E-05	mg/m^3	5.0E-05	(mg/m^3)	2.8E-01
				Vanadium	1.77E-06	mg/m^3	6.1E-07	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								3.8E-01
		Exposure Point Total									3.8E-01
	Exposure Media Total										3.8E-01
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	1.06E-05	mg/m^3	3.6E-06	mg/m^3	7.0E-01	(mg/m^3)	5.2E-06
			Exp. Route Total								5.2E-06
		Exposure Point Total									5.2E-06
	Exposure Media Total										5.2E-06
Total Soil Total											8.7E-01

Table E.1-56
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	2.7E-08	mg/kg-day	5.0E-02	mg/kg-day	5.5E-07
				Inorganics							
				Arsenic	1.32E+01	mg/kg	2.1E-05	mg/kg-day	3.0E-04	mg/kg-day	7.1E-02
			Exp. Route Total								7.1E-02
			Dermal Absorption	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	1.6E-08	mg/kg-day	5.0E-02	mg/kg-day	3.3E-07
				Inorganics							
				Arsenic	1.32E+01	mg/kg	3.8E-06	mg/kg-day	3.0E-04	mg/kg-day	1.3E-02
			Exp. Route Total								1.3E-02
		Exposure Point Total									8.4E-02
	Exposure Media Total										8.4E-02
Sediment Total											8.4E-02
Surface Water	Surface Water	SWMU 41A	**Dermal Absorption**	**Organics**							
				TCDD TE	1.43E-08	mg/L	6.8E-10	mg/kg-day	1.0E-09	mg/kg-day	6.8E-01
				Inorganics							
				No COPCs							
			Exp. Route Total								6.8E-01
		Exposure Point Total									6.8E-01
	Exposure Media Total										6.8E-01
Surface Water Total											6.8E-01
Groundwater	Air	SWMU 41A	**Inhalation** (Trench Air)	**Organics** Chloroform	3.02E-05	mg/m^3	1.0E-05	mg/m^3	9.8E-02	(mg/m^3)	1.1E-04
			Exp. Route Total								1.1E-04
		Exposure Point Total									1.1E-04
	Exposure Media Total										1.1E-04
Groundwater Total											1.1E-04
										Total of Receptor Hazards Across All Media	1.6E+00

N/A = Not Applicable.

Table E.1-57
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Lifetime Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Total Soil	Total Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.3E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.3E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	2.3E-07	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	4.7E-07
				TCDD TE	8.69E-06	mg/kg	1.4E-11	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	1.8E-06
				Inorganics							
				Aluminum	2.83E+04	mg/kg	4.4E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	1.10E+01	mg/kg	1.7E-05	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	2.6E-05
				Cobalt	1.35E+01	mg/kg	2.1E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.18E+04	mg/kg	6.5E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.18E+03	mg/kg	1.8E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	5.06E+01	mg/kg	7.9E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								2.8E-05
			Dermal Absorption	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.2E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	4.0E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	1.0E-07	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	2.1E-07
				TCDD TE	8.69E-06	mg/kg	1.3E-12	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	1.7E-07
				Inorganics							
				Aluminum	2.83E+04	mg/kg	1.4E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	1.10E+01	mg/kg	1.6E-06	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	2.4E-06
				Cobalt	1.35E+01	mg/kg	6.7E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.18E+04	mg/kg	2.1E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.18E+03	mg/kg	5.8E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	5.06E+01	mg/kg	2.5E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								2.8E-06
		Exposure Point Total									3.1E-05
	Exposure Media Total										3.1E-05
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	1.6E-12	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Aroclor 1254	7.39E-11	mg/m^3	1.7E-11	mg/m^3	5.7E-01	$(mg/m^3)^{-1}$	9.9E-12
				TCDD TE	4.28E-15	mg/m^3	6.7E-11	mg/m^3	3.8E+04	$(mg/m^3)^{-1}$	2.5E-06
				Inorganics							
				Aluminum	1.39E-05	mg/m^3	5.7E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	5.42E-09	mg/m^3	2.2E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	9.6E-09
				Cobalt	6.65E-09	mg/m^3	2.7E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	2.5E-08
				Iron	2.06E-05	mg/m^3	8.5E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	5.82E-07	mg/m^3	2.4E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.49E-08	mg/m^3	1.0E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								2.6E-06
		Exposure Point Total									2.6E-06
	Exposure Media Total										2.6E-06
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	NC	mg/m^3	4.1E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											3.3E-05

Table E.1-57
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Lifetime Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	3.0E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	2.4E-06	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	3.5E-06
			Exp. Route Total								3.5E-06
			Dermal Absorption	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	1.6E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	3.8E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	5.7E-07
			Exp. Route Total								5.7E-07
		Exposure Point Total									4.1E-06
	Exposure Media Total										4.1E-06
Sediment Total											4.1E-06
Surface Water	Surface Water	SWMU 41A	**Dermal Absorption**	**Organics**							
				TCDD TE	1.43E-08	mg/L	1.8E-10	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	2.3E-05
				Inorganics							
				No COPCs							
			Exp. Route Total								2.3E-05
		Exposure Point Total									2.3E-05
	Exposure Media Total										2.3E-05
Surface Water Total											2.3E-05
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	ADAF	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	9.3E-06
				Benzo(b)fluoranthene	3.20E-02	µg/L	ADAF	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	1.1E-06
				Chloroform	4.70E+00	µg/L	7.0E-05	mg/kg-day	3.1E-02	$(mg/kg-day)^{-1}$	2.2E-06
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	ADAF	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	1.1E-05
				Heptachlor	7.80E-02	µg/L	1.2E-06	mg/kg-day	4.5E+00	$(mg/kg-day)^{-1}$	5.2E-06
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	ADAF	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	1.2E-06
				Inorganics							
				Sodium	9.06E+04	µg/L	1.3E+00	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								3.0E-05
			Dermal Absorption	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	ADAF	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	1.9E-04
				Benzo(b)fluoranthene	3.20E-02	µg/L	ADAF	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	2.2E-05
				Chloroform	4.70E+00	µg/L	N/A	mg/kg-day	3.1E-02	$(mg/kg-day)^{-1}$	NV
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	ADAF	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	3.5E-04
				Heptachlor	7.80E-02	µg/L	6.5E-07	mg/kg-day	4.5E+00	$(mg/kg-day)^{-1}$	2.9E-06
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	ADAF	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	2.6E-05
				Inorganics							
				Sodium	9.06E+04	µg/L	N/A	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	NV
			Exp. Route Total								5.9E-04
		Exposure Point Total									6.2E-04
	Exposure Media Total										6.2E-04

Table E.1-57
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Lifetime Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Air	SWMU 41A	**Inhalation** (Indoor Air)	**Organics** Chloroform	8.63E-06	mg/m^3	3.5E-06	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	8.2E-08
			Exp. Route Total								8.2E-08
		Exposure Point Total									8.2E-08
	Exposure Media Total										8.2E-08
		SWMU 41A	**Inhalation** (Shower Room)	**Organics** Chloroform	2.46E-02	mg/m^3	3.2E-04	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	7.4E-06
			Exp. Route Total								7.4E-06
		Exposure Point Total									7.4E-06
	Exposure Media Total										7.4E-06
	Home Grown Produce	SWMU 41A	**Ingestion**	**Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											6.3E-04
										Total of Receptor Risks Across All Media	6.9E-04

N/A = Not Applicable.
NC = Not calculated. Intake for Lifetime Resident based on age-adjusted calculation.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.
ADAF = Age Dependent Adjustment Factor

Table E.1-58
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Adult Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Total Soil	Total Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.1E-09	mg/kg-day	6.0E-02	mg/kg-day	1.8E-08
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.1E-08	mg/kg-day	5.0E-02	mg/kg-day	2.2E-07
				Aroclor 1254	1.50E-01	mg/kg	2.1E-07	mg/kg-day	2.0E-05	mg/kg-day	1.0E-02
				TCDD TE	8.69E-06	mg/kg	1.2E-11	mg/kg-day	1.0E-09	mg/kg-day	1.2E-02
				Inorganics							
				Aluminum	2.83E+04	mg/kg	3.9E-02	mg/kg-day	1.0E+00	mg/kg-day	3.9E-02
				Arsenic	1.10E+01	mg/kg	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	5.0E-02
				Cobalt	1.35E+01	mg/kg	1.8E-05	mg/kg-day	3.0E-04	mg/kg-day	6.2E-02
				Iron	4.18E+04	mg/kg	5.7E-02	mg/kg-day	7.0E-01	mg/kg-day	8.2E-02
				Manganese	1.18E+03	mg/kg	1.6E-03	mg/kg-day	2.4E-02	mg/kg-day	6.7E-02
				Vanadium	5.06E+01	mg/kg	6.9E-05	mg/kg-day	5.0E-03	mg/kg-day	1.4E-02
			Exp. Route Total								3.4E-01
			Dermal Absorption	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.3E-10	mg/kg-day	6.0E-02	mg/kg-day	2.2E-09
				p-Chloro-m-cresol	8.00E-03	mg/kg	4.4E-09	mg/kg-day	5.0E-02	mg/kg-day	8.7E-08
				Aroclor 1254	1.50E-01	mg/kg	1.1E-07	mg/kg-day	2.0E-05	mg/kg-day	5.7E-03
				TCDD TE	8.69E-06	mg/kg	1.4E-12	mg/kg-day	1.0E-09	mg/kg-day	1.4E-03
				Inorganics							
				Aluminum	2.83E+04	mg/kg	1.5E-03	mg/kg-day	1.0E+00	mg/kg-day	1.5E-03
				Arsenic	1.10E+01	mg/kg	1.8E-06	mg/kg-day	3.0E-04	mg/kg-day	6.0E-03
				Cobalt	1.35E+01	mg/kg	7.4E-07	mg/kg-day	3.0E-04	mg/kg-day	2.5E-03
				Iron	4.18E+04	mg/kg	2.3E-03	mg/kg-day	7.0E-01	mg/kg-day	3.3E-03
				Manganese	1.18E+03	mg/kg	6.4E-05	mg/kg-day	9.6E-04	mg/kg-day	6.7E-02
				Vanadium	5.06E+01	mg/kg	2.8E-06	mg/kg-day	1.3E-04	mg/kg-day	2.1E-02
			Exp. Route Total								1.1E-01
		Exposure Point Total									4.4E-01
	Exposure Media Total										4.4E-01
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	3.8E-12	mg/m^3	N/A	(mg/m^3)	---
				Aroclor 1254	7.39E-11	mg/m^3	7.1E-11	mg/m^3	N/A	(mg/m^3)	---
				TCDD TE	4.28E-15	mg/m^3	4.1E-15	mg/m^3	N/A	(mg/m^3)	---
				Inorganics							
				Aluminum	1.39E-05	mg/m^3	1.3E-05	mg/m^3	5.0E-03	(mg/m^3)	2.7E-03
				Arsenic	5.42E-09	mg/m^3	5.2E-09	mg/m^3	3.0E-05	(mg/m^3)	1.7E-04
				Cobalt	6.65E-09	mg/m^3	6.4E-09	mg/m^3	6.0E-06	(mg/m^3)	1.1E-03
				Iron	2.06E-05	mg/m^3	2.0E-05	mg/m^3	N/A	(mg/m^3)	---
				Manganese	5.82E-07	mg/m^3	5.6E-07	mg/m^3	5.0E-05	(mg/m^3)	1.1E-02
				Vanadium	2.49E-08	mg/m^3	2.4E-08	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								1.5E-02
		Exposure Point Total									1.5E-02
	Exposure Media Total										1.5E-02
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	8.28E-07	mg/m^3	7.9E-07	mg/m^3	7.0E-01	(mg/m^3)	1.1E-06
			Exp. Route Total								1.1E-06
		Exposure Point Total									1.1E-06
	Exposure Media Total										1.1E-06
Total Soil Total											4.6E-01

Table E.1-58
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Adult Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	2.1E-09	mg/kg-day	5.0E-02	mg/kg-day	4.3E-08
				Inorganics							
				Arsenic	1.32E+01	mg/kg	1.7E-06	mg/kg-day	3.0E-04	mg/kg-day	5.5E-03
			Exp. Route Total								5.5E-03
			Dermal	**Organics**							
			Absorption	p-Chloro-m-cresol	1.70E-02	mg/kg	2.4E-09	mg/kg-day	5.0E-02	mg/kg-day	4.9E-08
				Inorganics							
				Arsenic	1.32E+01	mg/kg	5.7E-07	mg/kg-day	3.0E-04	mg/kg-day	1.9E-03
			Exp. Route Total								1.9E-03
		Exposure Point Total									7.4E-03
	Exposure Media Total										7.4E-03
Sediment Total											7.4E-03
Surface Water	Surface Water	SWMU 41A	**Dermal**	**Organics**							
			Absorption	TCDD TE	1.43E-08	mg/L	3.0E-10	mg/kg-day	1.0E-09	mg/kg-day	3.0E-01
				Inorganics							
				No COPCs							
			Exp. Route Total								3.0E-01
		Exposure Point Total									3.0E-01
	Exposure Media Total										3.0E-01
Surface Water Total											3.0E-01
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	7.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(b)fluoranthene	3.20E-02	µg/L	8.8E-07	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	4.70E+00	µg/L	1.3E-04	mg/kg-day	1.0E-02	mg/kg-day	1.3E-02
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	9.0E-07	mg/kg-day	N/A	mg/kg-day	---
				Heptachlor	7.80E-02	µg/L	2.1E-06	mg/kg-day	5.0E-04	mg/kg-day	4.3E-03
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	9.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Sodium	9.06E+04	µg/L	2.5E+00	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								1.7E-02
			Dermal	**Organics**							
			Absorption	Benzo(a)pyrene	2.75E-02	µg/L	1.5E-05	mg/kg-day	N/A	mg/kg-day	---
				Benzo(b)fluoranthene	3.20E-02	µg/L	1.8E-05	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	4.70E+00	µg/L	N/A	mg/kg-day	1.0E-02	mg/kg-day	NV
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	2.7E-05	mg/kg-day	N/A	mg/kg-day	---
				Heptachlor	7.80E-02	µg/L	9.4E-07	mg/kg-day	5.0E-04	mg/kg-day	1.9E-03
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	2.0E-05	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Sodium	9.06E+04	µg/L	N/A	mg/kg-day	N/A	mg/kg-day	NV
			Exp. Route Total								1.9E-03
		Exposure Point Total									1.9E-02
	Exposure Media Total										1.9E-02

Table E.1-58
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Adult Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Groundwater	Air	SWMU 41A	**Inhalation** (Indoor Air)	**Organics** Chloroform	8.63E-06	mg/m^3	8.3E-06	mg/m^3	9.8E-02	(mg/m^3)	8.4E-05
			Exp. Route Total								8.4E-05
		Exposure Point Total									8.4E-05
	Exposure Media Total										8.4E-05
		SWMU 41A	**Inhalation** (Shower Room)	**Organics** Chloroform	2.46E-02	mg/m^3	9.4E-04	mg/m^3	9.8E-02	(mg/m^3)	9.6E-03
			Exp. Route Total								9.6E-03
		Exposure Point Total									9.6E-03
	Exposure Media Total										9.6E-03
	Home Grown Produce	SWMU 41A	**Ingestion**	**Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											2.9E-02
										Total of Receptor Hazards Across All Media	8.0E-01

N/A = Not Applicable.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.1-59
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Total Soil	Total Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	8.9E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	8.8E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	1.6E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-07
				TCDD TE	8.69E-06	mg/kg	9.5E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.2E-06
				Inorganics							
				Aluminum	2.83E+04	mg/kg	3.1E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.10E+01	mg/kg	1.2E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-05
				Cobalt	1.35E+01	mg/kg	1.5E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.18E+04	mg/kg	4.6E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.18E+03	mg/kg	1.3E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.06E+01	mg/kg	5.5E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								2.0E-05
			Dermal Absorption	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	7.4E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	8.00E-03	mg/kg	2.5E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Aroclor 1254	1.50E-01	mg/kg	6.4E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-07
				TCDD TE	8.69E-06	mg/kg	8.0E-13	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.0E-07
				Inorganics							
				Aluminum	2.83E+04	mg/kg	8.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.10E+01	mg/kg	1.0E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-06
				Cobalt	1.35E+01	mg/kg	4.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.18E+04	mg/kg	1.3E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.18E+03	mg/kg	3.6E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.06E+01	mg/kg	1.6E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.8E-06
		Exposure Point Total									2.1E-05
	Exposure Media Total										2.1E-05
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	3.2E-13	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Aroclor 1254	7.39E-11	mg/m^3	6.1E-12	mg/m^3	5.7E-01	$(mg/m^3)^{-1}$	3.5E-12
				TCDD TE	4.28E-15	mg/m^3	3.5E-16	mg/m^3	3.8E+04	$(mg/m^3)^{-1}$	1.3E-11
				Inorganics							
				Aluminum	1.39E-05	mg/m^3	1.1E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	5.42E-09	mg/m^3	4.5E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	1.9E-09
				Cobalt	6.65E-09	mg/m^3	5.5E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	4.9E-09
				Iron	2.06E-05	mg/m^3	1.7E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	5.82E-07	mg/m^3	4.8E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.49E-08	mg/m^3	2.0E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								6.9E-09
		Exposure Point Total									6.9E-09
	Exposure Media Total										6.9E-09
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	1.66E-06	mg/m^3	1.4E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											2.1E-05

Table E.1-59
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	2.1E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	1.7E-06	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	2.5E-06
			Exp. Route Total								2.5E-06
			Dermal Absorption	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	6.0E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Inorganics							
				Arsenic	1.32E+01	mg/kg	1.4E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	2.1E-07
			Exp. Route Total								2.1E-07
		Exposure Point Total									2.7E-06
	Exposure Media Total										2.7E-06
Sediment Total											2.7E-06
Surface Water	Surface Water	SWMU 41A	**Dermal Absorption**	**Organics**							
				TCDD TE	1.43E-08	mg/L	5.0E-11	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	6.5E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								6.5E-06
		Exposure Point Total									6.5E-06
	Exposure Media Total										6.5E-06
Surface Water Total											6.5E-06
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	1.5E-07	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	1.1E-06
				Benzo(b)fluoranthene	3.20E-02	µg/L	1.8E-07	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	1.3E-07
				Chloroform	4.70E+00	µg/L	2.6E-05	mg/kg-day	3.1E-02	$(mg/kg-day)^{-1}$	8.0E-07
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	1.8E-07	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	1.3E-06
				Heptachlor	7.80E-02	µg/L	4.3E-07	mg/kg-day	4.5E+00	$(mg/kg-day)^{-1}$	1.9E-06
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	1.9E-07	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	1.4E-07
				Inorganics							
				Sodium	9.06E+04	µg/L	5.0E-01	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								5.4E-06
			Dermal Absorption	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	3.1E-06	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	2.3E-05
				Benzo(b)fluoranthene	3.20E-02	µg/L	3.6E-06	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	2.6E-06
				Chloroform	4.70E+00	µg/L	N/A	mg/kg-day	3.1E-02	$(mg/kg-day)^{-1}$	NV
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	5.8E-06	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	4.2E-05
				Heptachlor	7.80E-02	µg/L	2.0E-07	mg/kg-day	4.5E+00	$(mg/kg-day)^{-1}$	8.8E-07
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	4.3E-06	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	3.2E-06
				Inorganics							
				Sodium	9.06E+04	µg/L	N/A	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	NV
			Exp. Route Total								7.2E-05
		Exposure Point Total									7.7E-05
	Exposure Media Total										7.7E-05

Table E.1-59
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Air	SWMU 41A	**Inhalation** (Indoor Air)	**Organics** Chloroform	8.63E-06	mg/m^3	7.1E-07	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	1.6E-08
			Exp. Route Total								1.6E-08
		Exposure Point Total									1.6E-08
	Exposure Media Total										1.6E-08
	Home Grown Produce	SWMU 41A	**Ingestion**	**Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											7.7E-05
										Total of Receptor Risks Across All Media	1.1E-04

N/A = Not Applicable.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.1-60
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Total Soil	Total Soil	SWMU 41A	**Ingestion**	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	1.0E-08	mg/kg-day	6.0E-02	mg/kg-day	1.7E-07
				p-Chloro-m-cresol	8.00E-03	mg/kg	1.0E-07	mg/kg-day	5.0E-02	mg/kg-day	2.0E-06
				Aroclor 1254	1.50E-01	mg/kg	1.9E-06	mg/kg-day	2.0E-05	mg/kg-day	9.6E-02
				TCDD TE	8.69E-06	mg/kg	1.1E-10	mg/kg-day	1.0E-09	mg/kg-day	1.1E-01
				Inorganics							
				Aluminum	2.83E+04	mg/kg	3.6E-01	mg/kg-day	1.0E+00	mg/kg-day	3.6E-01
				Arsenic	1.10E+01	mg/kg	1.4E-04	mg/kg-day	3.0E-04	mg/kg-day	4.7E-01
				Cobalt	1.35E+01	mg/kg	1.7E-04	mg/kg-day	3.0E-04	mg/kg-day	5.8E-01
				Iron	4.18E+04	mg/kg	5.3E-01	mg/kg-day	7.0E-01	mg/kg-day	7.6E-01
				Manganese	1.18E+03	mg/kg	1.5E-02	mg/kg-day	2.4E-02	mg/kg-day	6.3E-01
				Vanadium	5.06E+01	mg/kg	6.5E-04	mg/kg-day	5.0E-03	mg/kg-day	1.3E-01
			Exp. Route Total								3.1E+00
			Dermal Absorption	**Organics**							
				Methylcyclohexane	8.08E-04	mg/kg	8.7E-10	mg/kg-day	6.0E-02	mg/kg-day	1.4E-08
				p-Chloro-m-cresol	8.00E-03	mg/kg	2.9E-08	mg/kg-day	5.0E-02	mg/kg-day	5.7E-07
				Aroclor 1254	1.50E-01	mg/kg	7.5E-07	mg/kg-day	2.0E-05	mg/kg-day	3.8E-02
				TCDD TE	8.69E-06	mg/kg	9.3E-12	mg/kg-day	1.0E-09	mg/kg-day	9.3E-03
				Inorganics							
				Aluminum	2.83E+04	mg/kg	1.0E-02	mg/kg-day	1.0E+00	mg/kg-day	1.0E-02
				Arsenic	1.10E+01	mg/kg	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	3.9E-02
				Cobalt	1.35E+01	mg/kg	4.8E-06	mg/kg-day	3.0E-04	mg/kg-day	1.6E-02
				Iron	4.18E+04	mg/kg	1.5E-02	mg/kg-day	7.0E-01	mg/kg-day	2.1E-02
				Manganese	1.18E+03	mg/kg	4.2E-04	mg/kg-day	9.6E-04	mg/kg-day	4.4E-01
				Vanadium	5.06E+01	mg/kg	1.8E-05	mg/kg-day	1.3E-04	mg/kg-day	1.4E-01
			Exp. Route Total								7.1E-01
		Exposure Point Total									3.8E+00
	Exposure Media Total										3.8E+00
	Air (Particulates)	SWMU 41A	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	3.94E-12	mg/m^3	3.8E-12	mg/m^3	N/A	(mg/m^3)	---
				Aroclor 1254	7.39E-11	mg/m^3	7.1E-11	mg/m^3	N/A	(mg/m^3)	---
				TCDD TE	4.28E-15	mg/m^3	4.1E-15	mg/m^3	N/A	(mg/m^3)	---
				Inorganics							
				Aluminum	1.39E-05	mg/m^3	1.3E-05	mg/m^3	5.0E-03	(mg/m^3)	2.7E-03
				Arsenic	5.42E-09	mg/m^3	5.2E-09	mg/m^3	3.0E-05	(mg/m^3)	1.7E-04
				Cobalt	6.65E-09	mg/m^3	6.4E-09	mg/m^3	6.0E-06	(mg/m^3)	1.1E-03
				Iron	2.06E-05	mg/m^3	2.0E-05	mg/m^3	N/A	(mg/m^3)	---
				Manganese	5.82E-07	mg/m^3	5.6E-07	mg/m^3	5.0E-05	(mg/m^3)	1.1E-02
				Vanadium	2.49E-08	mg/m^3	2.4E-08	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								1.5E-02
		Exposure Point Total									1.5E-02
	Exposure Media Total										1.5E-02
	Air (Volatiles)	SWMU 41A	**Inhalation**	**Organics**							
				Methylcyclohexane	1.66E-06	mg/m^3	1.6E-06	mg/m^3	7.0E-01	(mg/m^3)	2.3E-06
			Exp. Route Total								2.3E-06
		Exposure Point Total									2.3E-06
	Exposure Media Total										2.3E-06
Total Soil Total											3.9E+00

Table E.1-60
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Sediment	Sediment	SWMU 41A	**Ingestion**	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	2.5E-08	mg/kg-day	5.0E-02	mg/kg-day	5.0E-07
				Inorganics							
				Arsenic	1.32E+01	mg/kg	1.9E-05	mg/kg-day	3.0E-04	mg/kg-day	6.4E-02
			Exp. Route Total								6.4E-02
			Dermal Absorption	**Organics**							
				p-Chloro-m-cresol	1.70E-02	mg/kg	7.0E-09	mg/kg-day	5.0E-02	mg/kg-day	1.4E-07
				Inorganics							
				Arsenic	1.32E+01	mg/kg	1.6E-06	mg/kg-day	3.0E-04	mg/kg-day	5.4E-03
			Exp. Route Total								5.4E-03
		Exposure Point Total									7.0E-02
	Exposure Media Total										7.0E-02
Sediment Total											7.0E-02
Surface Water	Surface Water	SWMU 41A	**Dermal Absorption**	**Organics**							
				TCDD TE	1.43E-08	mg/L	5.8E-10	mg/kg-day	1.0E-09	mg/kg-day	5.8E-01
				Inorganics							
				No COPCs							
			Exp. Route Total								5.8E-01
		Exposure Point Total									5.8E-01
	Exposure Media Total										5.8E-01
Surface Water Total											5.8E-01
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	1.8E-06	mg/kg-day	N/A	mg/kg-day	---
				Benzo(b)fluoranthene	3.20E-02	µg/L	2.0E-06	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	4.70E+00	µg/L	3.0E-04	mg/kg-day	1.0E-02	mg/kg-day	3.0E-02
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	2.1E-06	mg/kg-day	N/A	mg/kg-day	---
				Heptachlor	7.80E-02	µg/L	5.0E-06	mg/kg-day	5.0E-04	mg/kg-day	1.0E-02
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	2.2E-06	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Sodium	9.06E+04	µg/L	5.8E+00	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								4.0E-02
			Dermal Absorption	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	3.7E-05	mg/kg-day	N/A	mg/kg-day	---
				Benzo(b)fluoranthene	3.20E-02	µg/L	4.2E-05	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	4.70E+00	µg/L	N/A	mg/kg-day	1.0E-02	mg/kg-day	NV
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	6.8E-05	mg/kg-day	N/A	mg/kg-day	---
				Heptachlor	7.80E-02	µg/L	2.3E-06	mg/kg-day	5.0E-04	mg/kg-day	4.6E-03
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	5.1E-05	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Sodium	9.06E+04	µg/L	N/A	mg/kg-day	N/A	mg/kg-day	NV
		Exposure Point Total									4.6E-03
	Exposure Media Total										4.5E-02

Table E.1-60
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
	Air	SWMU 41A	**Inhalation** (Indoor Air)	**Organics** Chloroform	8.63E-06	mg/m^3	8.3E-06	mg/m^3	9.8E-02	(mg/m^3)	8.4E-05
			Exp. Route Total								8.4E-05
		Exposure Point Total									8.4E-05
	Exposure Media Total										8.4E-05
	Home Grown Produce	SWMU 41A	**Ingestion**	**Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											4.5E-02
										Total of Receptor Hazards Across All Media	4.6E+00

N/A = Not Applicable.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.1-61
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Air	SWMU 41A	**Inhalation** (Ambient Air)	**Organics** Chloroform	3.48E-09	mg/m^3	1.7E-10	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	3.9E-12
			Exp. Route Total								3.9E-12
		Exposure Point Total									3.9E-12
	Exposure Media Total										3.9E-12
Groundwater Total											3.9E-12
										Total of Receptor Risks Across All Media	3.9E-12

N/A = Not Applicable.

Table E.1-62
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Groundwater	Air	SWMU 41A	**Inhalation** (Ambient Air)	**Organics** Chloroform	3.48E-09	mg/m^3	4.8E-10	mg/m^3	9.8E-02	(mg/m^3)	4.9E-09
			Exp. Route Total								4.9E-09
		Exposure Point Total									4.9E-09
	Exposure Media Total										4.9E-09
Groundwater Total											4.9E-09
Total of Receptor Hazards Across All Media											4.9E-09

N/A = Not Applicable.

Table E.1-63
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	8.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.3E-07
				Benzo(b)fluoranthene	3.20E-02	µg/L	1.0E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.3E-08
				Chloroform	4.70E+00	µg/L	1.5E-05	mg/kg-day	3.1E-02	$(mg/kg\text{-}day)^{-1}$	4.6E-07
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	1.0E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.6E-07
				Heptachlor	7.80E-02	µg/L	2.5E-07	mg/kg-day	4.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-06
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	1.1E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.9E-08
				Inorganics							
				Sodium	9.06E+04	µg/L	2.8E-01	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								3.1E-06
		Exposure Point Total									3.1E-06
	Exposure Media Total										3.1E-06
	Air	SWMU 41A	**Inhalation** (Ambient Air)	**Organics** Chloroform	3.48E-09	mg/m^3	7.7E-10	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	1.8E-11
			Exp. Route Total								1.8E-11
		Exposure Point Total									1.8E-11
	Exposure Media Total										1.8E-11
	Air	SWMU 41A	**Inhalation** (Indoor Air)	**Organics** Chloroform	8.63E-06	mg/m^3	1.9E-06	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	4.4E-08
			Exp. Route Total								4.4E-08
		Exposure Point Total									4.4E-08
	Exposure Media Total										4.4E-08
Groundwater Total											3.1E-06
										Total of Receptor Risks Across All Media	3.1E-06

N/A = Not Applicable.
Since indoor air represents the more highly contaminated portion of groundwater to air, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-64
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	2.4E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(b)fluoranthene	3.20E-02	µg/L	2.8E-07	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	4.70E+00	µg/L	4.1E-05	mg/kg-day	1.0E-02	mg/kg-day	4.1E-03
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	2.9E-07	mg/kg-day	N/A	mg/kg-day	---
				Heptachlor	7.80E-02	µg/L	6.9E-07	mg/kg-day	5.0E-04	mg/kg-day	1.4E-03
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	3.0E-07	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Sodium	9.06E+04	µg/L	8.0E-01	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								5.5E-03
		Exposure Point Total									5.5E-03
	Exposure Media Total										5.5E-03
	Air	SWMU 48	**Inhalation**	**Organics**							
			(Ambient Air)	Chloroform	3.48E-09	mg/m^3	2.1E-09	mg/m^3	9.8E-02	(mg/m^3)	2.2E-08
			Exp. Route Total								2.2E-08
		Exposure Point Total									2.2E-08
	Exposure Media Total										2.2E-08
	Air	SWMU 48	**Inhalation**	**Organics**							
			(Indoor Air)	Chloroform	8.63E-06	mg/m^3	5.3E-06	mg/m^3	9.8E-02	(mg/m^3)	5.4E-05
			Exp. Route Total								5.4E-05
		Exposure Point Total									5.4E-05
	Exposure Media Total										5.4E-05
Groundwater Total											5.6E-03
										Total of Receptor Hazards Across All Media	5.6E-03

N/A = Not Applicable.
Since indoor air represents the more highly contaminated portion of groundwater to air, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-65
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Air	SWMU 41A	**Inhalation** (Trench Air)	**Organics** Chloroform	3.02E-05	mg/m^3	1.5E-07	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	3.4E-09
			Exp. Route Total								3.4E-09
		Exposure Point Total									3.4E-09
	Exposure Media Total										3.4E-09
Groundwater Total											3.4E-09
										Total of Receptor Risks Across All Media	3.4E-09

N/A = Not Applicable.

Table E.1-66
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Groundwater	Air	SWMU 41A	**Inhalation**	**Organics**							
			(Trench Air)	Chloroform	3.02E-05	mg/m^3	1.0E-05	mg/m^3	9.8E-02	(mg/m^3)	1.1E-04
			Exp. Route Total								1.1E-04
		Exposure Point Total									1.1E-04
	Exposure Media Total										1.1E-04
Groundwater Total											1.1E-04
										Total of Receptor Hazards Across All Media	1.1E-04

N/A = Not Applicable.

Table E.1-67
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-site Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Off-site Lifetime Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	ADAF	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.3E-06
				Benzo(b)fluoranthene	3.20E-02	µg/L	ADAF	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-06
				Chloroform	4.70E+00	µg/L	7.0E-05	mg/kg-day	3.1E-02	$(mg/kg\text{-}day)^{-1}$	2.2E-06
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	ADAF	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-05
				Heptachlor	7.80E-02	µg/L	1.2E-06	mg/kg-day	4.5E+00	$(mg/kg\text{-}day)^{-1}$	5.2E-06
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	ADAF	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-06
				Inorganics							
				Sodium	9.06E+04	µg/L	1.3E+00	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								3.0E-05
			Dermal Absorption	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	ADAF	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-04
				Benzo(b)fluoranthene	3.20E-02	µg/L	ADAF	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-05
				Chloroform	4.70E+00	µg/L	N/A	mg/kg-day	3.1E-02	$(mg/kg\text{-}day)^{-1}$	NV
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	ADAF	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.5E-04
				Heptachlor	7.80E-02	µg/L	6.5E-07	mg/kg-day	4.5E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-06
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	ADAF	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-05
				Inorganics							
				Sodium	9.06E+04	µg/L	N/A	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	NV
			Exp. Route Total								5.9E-04
		Exposure Point Total									6.2E-04
	Exposure Media Total										6.2E-04
	Air	SWMU 41A	**Inhalation** (Indoor Air)	**Organics** Chloroform	8.63E-06	mg/m^3	3.5E-06	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	8.2E-08
			Exp. Route Total								8.2E-08
		Exposure Point Total									8.2E-08
	Exposure Media Total										8.2E-08
		SWMU 41A	**Inhalation** (Shower Room)	**Organics** Chloroform	2.46E-02	mg/m^3	3.2E-04	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	7.4E-06
			Exp. Route Total								7.4E-06
		Exposure Point Total									7.4E-06
	Exposure Media Total										7.4E-06
	Home Grown Produce	SWMU 41A	**Ingestion**	**Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											6.3E-04
										Total of Receptor Risks Across All Media	6.3E-04

N/A = Not Applicable.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.1-68
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-site Adult Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	7.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(b)fluoranthene	3.20E-02	µg/L	8.8E-07	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	4.70E+00	µg/L	1.3E-04	mg/kg-day	1.0E-02	mg/kg-day	1.3E-02
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	9.0E-07	mg/kg-day	N/A	mg/kg-day	---
				Heptachlor	7.80E-02	µg/L	2.1E-06	mg/kg-day	5.0E-04	mg/kg-day	4.3E-03
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	9.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Sodium	9.06E+04	µg/L	2.5E+00	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								1.7E-02
			Dermal	**Organics**							
			Absorption	Benzo(a)pyrene	2.75E-02	µg/L	1.5E-05	mg/kg-day	N/A	mg/kg-day	---
				Benzo(b)fluoranthene	3.20E-02	µg/L	1.8E-05	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	4.70E+00	µg/L	N/A	mg/kg-day	1.0E-02	mg/kg-day	NV
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	2.7E-05	mg/kg-day	N/A	mg/kg-day	---
				Heptachlor	7.80E-02	µg/L	9.4E-07	mg/kg-day	5.0E-04	mg/kg-day	1.9E-03
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	2.0E-05	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Sodium	9.06E+04	µg/L	N/A	mg/kg-day	N/A	mg/kg-day	NV
			Exp. Route Total								1.9E-03
		Exposure Point Total									1.9E-02
	Exposure Media Total										1.9E-02
	Air	SWMU 41A	**Inhalation**	**Organics**							
			(Indoor Air)	Chloroform	8.63E-06	mg/m^3	8.3E-06	mg/m^3	9.8E-02	(mg/m^3)	8.4E-05
			Exp. Route Total								8.4E-05
		Exposure Point Total									8.4E-05
	Exposure Media Total										8.4E-05
	Air	SWMU 41A	**Inhalation**	**Organics**							
			(Shower Room)	Chloroform	2.46E-02	mg/m^3	9.4E-04	mg/m^3	9.8E-02	(mg/m^3)	9.6E-03
			Exp. Route Total								9.6E-03
		Exposure Point Total									9.6E-03
	Exposure Media Total										9.6E-03
	Home Grown Produce	SWMU 41A	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											2.9E-02
										Total of Receptor Hazards Across All Media	2.9E-02

N/A = Not Applicable.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.1-69
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-site Child Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	1.5E-07	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	1.1E-06
				Benzo(b)fluoranthene	3.20E-02	µg/L	1.8E-07	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	1.3E-07
				Chloroform	4.70E+00	µg/L	2.6E-05	mg/kg-day	3.1E-02	$(mg/kg-day)^{-1}$	8.0E-07
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	1.8E-07	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	1.3E-06
				Heptachlor	7.80E-02	µg/L	4.3E-07	mg/kg-day	4.5E+00	$(mg/kg-day)^{-1}$	1.9E-06
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	1.9E-07	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	1.4E-07
				Inorganics							
				Sodium	9.06E+04	µg/L	5.0E-01	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								5.4E-06
			Dermal	**Organics**							
			Absorption	Benzo(a)pyrene	2.75E-02	µg/L	3.1E-06	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	2.3E-05
				Benzo(b)fluoranthene	3.20E-02	µg/L	3.6E-06	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	2.6E-06
				Chloroform	4.70E+00	µg/L	N/A	mg/kg-day	3.1E-02	$(mg/kg-day)^{-1}$	NV
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	5.8E-06	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	4.2E-05
				Heptachlor	7.80E-02	µg/L	2.0E-07	mg/kg-day	4.5E+00	$(mg/kg-day)^{-1}$	8.8E-07
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	4.3E-06	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	3.2E-06
				Inorganics							
				Sodium	9.06E+04	µg/L	N/A	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	NV
			Exp. Route Total								7.2E-05
		Exposure Point Total									7.7E-05
	Exposure Media Total										7.7E-05
	Air	SWMU 41A	**Inhalation**	**Organics**							
			(Indoor Air)	Chloroform	8.63E-06	mg/m^3	7.1E-07	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	1.6E-08
			Exp. Route Total								1.6E-08
		Exposure Point Total									1.6E-08
	Exposure Media Total										1.6E-08
	Home Grown Produce	SWMU 41A	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											7.7E-05
										Total of Receptor Risks Across All Media	7.7E-05

N/A = Not Applicable.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.1-70
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-site Child Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Groundwater	Groundwater	SWMU 41A	**Ingestion**	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	1.8E-06	mg/kg-day	N/A	mg/kg-day	---
				Benzo(b)fluoranthene	3.20E-02	µg/L	2.0E-06	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	4.70E+00	µg/L	3.0E-04	mg/kg-day	1.0E-02	mg/kg-day	3.0E-02
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	2.1E-06	mg/kg-day	N/A	mg/kg-day	---
				Heptachlor	7.80E-02	µg/L	5.0E-06	mg/kg-day	5.0E-04	mg/kg-day	1.0E-02
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	2.2E-06	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Sodium	9.06E+04	µg/L	5.8E+00	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								4.0E-02
			Dermal Absorption	**Organics**							
				Benzo(a)pyrene	2.75E-02	µg/L	3.7E-05	mg/kg-day	N/A	mg/kg-day	---
				Benzo(b)fluoranthene	3.20E-02	µg/L	4.2E-05	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	4.70E+00	µg/L	N/A	mg/kg-day	1.0E-02	mg/kg-day	NV
				Dibenzo(a,h)anthracene	3.30E-02	µg/L	6.8E-05	mg/kg-day	N/A	mg/kg-day	---
				Heptachlor	7.80E-02	µg/L	2.3E-06	mg/kg-day	5.0E-04	mg/kg-day	4.6E-03
				Indeno(1,2,3-cd)pyrene	3.45E-02	µg/L	5.1E-05	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Sodium	9.06E+04	µg/L	N/A	mg/kg-day	N/A	mg/kg-day	NV
		Exposure Point Total									4.6E-03
	Exposure Media Total										4.5E-02
	Air	SWMU 41A	**Inhalation** (Indoor Air)	**Organics** Chloroform	8.63E-06	mg/m^3	8.3E-06	mg/m^3	9.8E-02	(mg/m^3)	8.4E-05
			Exp. Route Total								8.4E-05
		Exposure Point Total									8.4E-05
	Exposure Media Total										8.4E-05
	Home Grown Produce	SWMU 41A	**Ingestion**	**Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											4.5E-02
										Total of Receptor Hazards Across All Media	4.5E-02

N/A = Not Applicable.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.1-71
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Current - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 41A	**Organics**									
			Methylcyclohexane	---		---	---	Nervous System	2.2E-09		4.3E-10	2.6E-09
			p-Chloro-m-cresol	---		---	---	Nervous System	3.1E-08		2.1E-08	5.2E-08
			Aroclor 1254	2.1E-08		1.9E-08	4.0E-08	Immune System, Eyes	1.5E-03		1.4E-03	2.8E-03
			Inorganics									
			Aluminum	---		---	---	Developmental nervous system	6.1E-03		4.0E-04	6.5E-03
			Arsenic	1.3E-06		2.5E-07	1.5E-06	Skin, Vascular Effects	7.8E-03		1.5E-03	9.4E-03
			Cobalt	---		---	---	N/A	9.1E-03		6.0E-04	9.7E-03
			Iron	---		---	---	Blood, Liver, GI Irritation	1.2E-02		8.0E-04	1.3E-02
			Manganese	---		---	---	CNS	7.5E-03		1.2E-02	2.0E-02
			Vanadium	---		---	---	Kidney	2.0E-03		5.1E-03	7.1E-03
			Chemical Total	1.3E-06		2.7E-07	1.5E-06		0.046		0.022	0.068
		Exposure Point Total					1.5E-06					0.068
	Exposure Media Total						1.5E-06					0.068
	Air (Particulates and Volatiles)	SWMU 41A	**Organics**									
			Methylcyclohexane		---		---	Nervous System		1.1E-07		1.1E-07
			p-Chloro-m-cresol		---		---	N/A		---		---
			Aroclor 1254		2.1E-12		2.1E-12	N/A		---		
			Inorganics									
			Aluminum		---		---	N/A		4.2E-04		4.2E-04
			Arsenic		1.2E-09		1.2E-09	N/A		2.7E-05		2.7E-05
			Cobalt		3.0E-09		3.0E-09	N/A		1.6E-04		1.6E-04
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		1.2E-03		1.2E-03
			Vanadium		---		---	N/A		---		---
			Chemical Total		4.3E-09		4.3E-09			0.0018		0.0018
		Exposure Point Total					4.3E-09					0.0018
	Exposure Media Total						4.3E-09					0.0018
Surface Soil Total							1.6E-06					0.070
Sediment	Sediment	SWMU 41A	**Organics**									
			p-Chloro-m-cresol	---		---	---	Nervous System	6.7E-08		1.3E-07	2.0.E-07
			Inorganics									
			Arsenic	1.4E-06		8.2E-07	2.2E-06	Skin, Vascular Effects	8.6E-03		5.1E-03	1.4.E-02
				1.4E-06		8.2E-07	2.2E-06		0.0086		0.0051	0.014
		Exposure Point Total					2.2E-06					0.014
	Exposure Media Total						2.2E-06					0.014
Sediment Total							2.2E-06					0.014

Table E.1-71
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Current - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface water	Surface water	SWMU 41A	**Organics**									
			TCDD TE			1.3E-05	1.3E-05	Developmental nervous system			2.7E-01	2.7.E-01
			Chemical Total			1.3E-05	1.3E-05					0.27
		Exposure Point Total					1.3E-05					0.27
	Exposure Media Total						1.3E-05					0.27
Surface water Total							1.3E-05					0.27
Groundwater	Air (Ambient Air)	SWMU 41A	**Organics**									
			Chloroform		3.9E-12		3.9E-12	Liver		4.9E-09		4.9.E-09
			Chemical Total		3.9E-12		3.9E-12			4.9E-09		4.9.E-09
		Exposure Point Total					3.9E-12					4.9E-09
	Exposure Media Total						3.9E-12					4.9E-09
Groundwater Total							3.9E-12					4.9E-09
Receptor Total							1.6E-05					0.35

Total Risk Across All Media = 1.6E-05

Total Hazard Across All Media = 0.35

Total CNS HI Across All Media =	0.30
Total Immune System HI Across All Media =	0.0028
Total Eyes HI Across All Media =	0.0028
Total Skin HI Across All Media =	0.023
Total Vascular Effects HI Across All Media =	0.023
Total Blood HI Across All Media =	0.013
Total Liver HI Across All Media =	0.013
Total GI Irritation HI Across All Media =	0.013
Total Kidney HI Across All Media =	0.0071

CNS = Central Nervous System.
GI = Gastrointestinal
N/A = Not Available.

Table E.1-72
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU41A	**Organics**									
			Methylcyclohexane	---		---	---	Nervous System	2.2E-09		4.3E-10	2.6E-09
			p-Chloro-m-cresol	---		---	---	Nervous System	3.1E-08		2.1E-08	5.2E-08
			Aroclor 1254	2.1E-08		1.9E-08	4.0E-08	Immune System, Eyes	1.5E-03		1.4E-03	2.8E-03
			Inorganics									
			Aluminum	---		---	---	Developmental nervous system	6.1E-03		4.0E-04	6.5E-03
			Arsenic	1.3E-06		2.5E-07	1.5E-06	Skin, Vascular Effects	7.8E-03		1.5E-03	9.4E-03
			Cobalt	---		---	---	N/A	9.1E-03		6.0E-04	9.7E-03
			Iron	---		---	---	Blood, Liver, GI Irritation	1.2E-02		8.0E-04	1.3E-02
			Manganese	---		---	---	CNS	7.5E-03		1.2E-02	2.0E-02
			Vanadium	---		---	---	Kidney	2.0E-03		5.1E-03	7.1E-03
			Chemical Total	1.3E-06		2.7E-07	1.5E-06		0.046		0.022	0.068
		Exposure Point Total					1.5E-06					0.068
	Exposure Media Total						1.5E-06					0.068
	Air (Particulates and Volatiles)	SWMU 41A	**Organics**									
			Methylcyclohexane		---		---	Nervous System		1.1E-07		1.1E-07
			p-Chloro-m-cresol		---		---	N/A		---		---
			Aroclor 1254		2.1E-12		2.1E-12	N/A		---		---
			Inorganics									
			Aluminum		---		---	N/A		4.2E-04		4.2E-04
			Arsenic		1.2E-09		1.2E-09	N/A		2.7E-05		2.7E-05
			Cobalt		3.0E-09		3.0E-09	N/A		1.6E-04		1.6E-04
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		1.2E-03		1.2E-03
			Vanadium		---		---	N/A		---		---
			Chemical Total		4.3E-09		4.3E-09			0.0018		0.0018
		Exposure Point Total					4.3E-09					0.0018
	Exposure Media Total						4.3E-09					0.0018
Surface Soil Total							1.6E-06					0.070

Table E.1-72
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41A	**Organics**									
			Methylcyclohexane	---		---	---	Nervous System	2.6E-09		5.2E-10	3.2E-09
			p-Chloro-m-cresol	---		---	---	Nervous System	3.1E-08		2.1E-08	5.2E-08
			Aroclor 1254	2.1E-08		1.9E-08	4.0E-08	Immune System, Eyes	1.5E-03		1.4E-03	2.8E-03
			TCDD TE	7.9E-08		1.6E-08	9.5E-08	Developmental nervous system	1.7E-03		3.4E-04	2.0E-03
			Inorganics									
			Aluminum	---		---	---	Developmental nervous system	5.5E-03		3.7E-04	5.9E-03
			Arsenic	1.2E-06		2.3E-07	1.4E-06	Skin, Vascular Effects	7.2E-03		1.4E-03	8.6E-03
			Cobalt	---		---	---	N/A	8.8E-03		5.8E-04	9.4E-03
			Iron	---		---	---	Blood, Liver, GI Irritation	1.2E-02		7.7E-04	1.2E-02
			Manganese	---		---	---	CNS	9.6E-03		1.6E-02	2.5E-02
			Vanadium	---		---	---	Kidney	2.0E-03		5.0E-03	7.0E-03
			Chemical Total	1.3E-06		2.6E-07	1.5E-06		0.048		0.026	0.074
		Exposure Point Total					1.5E-06					0.074
	Exposure Media Total						1.5E-06					0.074
	Air (Particulates and Volatiles)	SWMU 41A	**Organics**									
			Methylcyclohexane		---		---	Nervous System		1.3E-07		1.3E-07
			p-Chloro-m-cresol		---		---	N/A		---		---
			Aroclor 1254		2.1E-12		2.1E-12	N/A		---		---
			TCDD TE		8.0E-12		8.0E-12	N/A		---		---
			Inorganics									
			Aluminum		---		---	N/A		3.8E-04		3.8E-04
			Arsenic		1.1E-09		1.1E-09	N/A		2.5E-05		2.5E-05
			Cobalt		2.9E-09		2.9E-09	N/A		1.5E-04		1.5E-04
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		1.6E-03		1.6E-03
			Vanadium		---		---	N/A		---		---
			Chemical Total		4.1E-09		4.1E-09			0.0022		0.0022
		Exposure Point Total					4.1E-09					0.0022
	Exposure Media Total						4.1E-09					0.0022
Total Soil Total							1.5E-06					0.076

Table E.1-72
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 41A	**Organics**									
			p-Chloro-m-cresol	---		---	---	Nervous System	6.7E-08		1.3E-07	2.0.E-07
			Inorganics									
			Arsenic	1.4E-06		8.2E-07	2.2E-06	Skin, Vascular Effects	8.6E-03		5.1E-03	1.4.E-02
				1.4E-06		8.2E-07	2.2E-06		0.0086		0.0051	0.014
		Exposure Point Total					2.2E-06					0.014
	Exposure Media Total						2.2E-06					0.014
Sediment Total							2.2E-06					0.014
Surface water	Surface water	SWMU 41A	**Organics**									
			TCDD TE			1.3E-05	1.3E-05	Developmental nervous system			2.7E-01	2.7.E-01
			Chemical Total			1.3E-05	1.3E-05				0.27	0.27
		Exposure Point Total					1.3E-05					0.27
	Exposure Media Total						1.3E-05					0.27
Surface water Total							1.3E-05					0.27
Groundwater	Air (Ambient Air)	SWMU 41A	**Organics**									
			Chloroform		3.9E-12		3.9E-12	Liver		4.9E-09		4.9.E-09
			Chemical Total		3.9E-12		3.9E-12			4.9E-09		4.9.E-09
		Exposure Point Total					3.9E-12					4.9.E-09
	Exposure Media Total						3.9E-12					4.9.E-09
Groundwater Total							3.9E-12					4.9E-09
Receptor Total							1.6E-05					0.36

Total Risk Across All Media[a] = 1.6E-05

Total Hazard Across All Media[b] = 0.36

(a) Since surface soil represents the more highly contaminated portion of soil, total risk estimates are conservatively based on this soil data grouping.
(b) Since total soil represents the more highly contaminated portion of soil, total hazard estimates are conservatively based on this soil data grouping.

CNS = Central nervous system.
GI = Gastrointestinal.
N/A = Not Available.

Total CNS HI Across All Media =	0.31
Total Immune System HI Across All Media =	0.0028
Total Eyes HI Across All Media =	0.0028
Total Skin HI Across All Media =	0.022
Total Vascular Effects HI Across All Media =	0.022
Total Blood HI Across All Media =	0.012
Total Liver HI Across All Media =	0.012
Total GI Irritation HI Across All Media =	0.012
Total Kidney HI Across All Media =	0.0070

Table E.1-73
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 41A	**Organics**									
			Methylcyclohexane	---		---	---	Nervous System	9.7E-09		1.9E-09	1.2E-08
			p-Chloro-m-cresol	---		---	---	Nervous System	1.4E-07		9.3E-08	2.3E-07
			Aroclor 1254	9.4E-08		8.7E-08	1.8E-07	Immune System, Eyes	6.6E-03		6.1E-03	1.3E-02
			Inorganics									
			Aluminum	---		---	---	Developmental nervous system	2.7E-02		1.8E-03	2.9E-02
			Arsenic	5.7E-06		1.1E-06	6.8E-06	Skin, Vascular Effects	3.5E-02		7.0E-03	4.2E-02
			Cobalt	---		---	---	N/A	4.1E-02		2.7E-03	4.4E-02
			Iron	---		---	---	Blood, Liver, GI Irritation	5.4E-02		3.6E-03	5.8E-02
			Manganese	---		---	---	CNS	3.4E-02		5.6E-02	8.9E-02
			Vanadium	---		---	---	Kidney	9.0E-03		2.3E-02	3.2E-02
			Chemical Total	5.8E-06		1.2E-06	7.0E-06		0.21		0.10	0.31
		Exposure Point Total					7.0E-06					0.31
	Exposure Media Total						7.0E-06					0.31
	Air (Particulates and Volatiles)	SWMU 41A	**Organics**									
			Methylcyclohexane		---		---	Nervous System		4.9E-07		4.9E-07
			p-Chloro-m-cresol		---		---	N/A		---		---
			Aroclor 1254		9.3E-12		9.3E-12	N/A		---		---
			Inorganics									
			Aluminum		---		---	N/A		1.9E-03		1.9E-03
			Arsenic		5.6E-09		5.6E-09	N/A		1.2E-04		1.2E-04
			Cobalt		1.4E-08		1.4E-08	N/A		7.1E-04		7.1E-04
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		5.6E-03		5.6E-03
			Vanadium		---		---	N/A		---		---
			Chemical Total		1.9E-08		1.9E-08			0.0083		0.0083
		Exposure Point Total					1.9E-08					0.0083
	Exposure Media Total						1.9E-08					0.0083
Surface Soil Total							7.0E-06					0.32

Table E.1-73
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41A	**Organics**									
			Methylcyclohexane	---		---	---	Nervous System	1.2E-08		2.3E-09	1.4E-08
			p-Chloro-m-cresol	---		---	---	Nervous System	1.4E-07		9.3E-08	2.3E-07
			Aroclor 1254	9.4E-08		8.7E-08	1.8E-07	Immune System, Eyes	6.6E-03		6.1E-03	1.3E-02
			TCDD TE	3.6E-07		7.0E-08	4.3E-07	Developmental nervous system	7.7E-03		1.5E-03	9.2E-03
			Inorganics									
			Aluminum	---		---	---	Developmental nervous system	2.5E-02		1.6E-03	2.7E-02
			Arsenic	5.2E-06		1.0E-06	6.2E-06	Skin, Vascular Effects	3.2E-02		6.4E-03	3.9E-02
			Cobalt	---		---	---	N/A	4.0E-02		2.6E-03	4.2E-02
			Iron	---		---	---	Blood, Liver, GI Irritation	5.3E-02		3.5E-03	5.6E-02
			Manganese	---		---	---	CNS	4.3E-02		7.1E-02	1.1E-01
			Vanadium	---		---	---	Kidney	8.9E-03		2.3E-02	3.2E-02
			Chemical Total	5.6E-06		1.2E-06	6.8E-06		0.22		0.12	0.33
		Exposure Point Total					6.8E-06					0.33
	Exposure Media Total						6.8E-06					0.33
	Air (Particulates and Volatiles)	SWMU 41A	**Organics**									
			Methylcyclohexane		---		---	Nervous System		6.0E-07		6.0E-07
			p-Chloro-m-cresol		---		---	N/A		---		---
			Aroclor 1254		9.3E-12		9.3E-12	N/A		---		---
			TCDD TE		3.6E-11		3.6E-11	N/A		---		---
			Inorganics									
			Aluminum		---		---	N/A		1.7E-03		1.7E-03
			Arsenic		5.1E-09		5.1E-09	N/A		1.1E-04		1.1E-04
			Cobalt		1.3E-08		1.3E-08	N/A		6.8E-04		6.8E-04
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		7.2E-03		7.2E-03
			Vanadium		---		---	N/A		---		---
			Chemical Total		1.8E-08		1.8E-08			0.0097		0.0097
		Exposure Point Total					1.8E-08					0.0097
	Exposure Media Total						1.8E-08					0.0097
Total Soil Total							6.8E-06					0.34
Sediment	Sediment	SWMU 41A	**Organics**									
			p-Chloro-m-cresol	---		---	---	Nervous System	3.0E-07		5.9E-07	8.9.E-07
			Inorganics									
			Arsenic	6.2E-06		3.7E-06	9.9E-06	Skin, Vascular Effects	3.9E-02		2.3E-02	6.2.E-02
				6.2E-06		3.7E-06	9.9E-06		3.9E-02		0.023	0.062
		Exposure Point Total					9.9E-06					0.062
	Exposure Media Total						9.9E-06					0.062
Sediment Total							9.9E-06					0.062

Table E.1-73
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface water	Surface water	SWMU 41A	**Organics**									
			TCDD TE			5.7E-05	5.7E-05	Developmental nervous system			1.2E+00	1.2.E+00
			Chemical Total			5.7E-05	5.7E-05				1.2	1.2
		Exposure Point Total					5.7E-05					1.2
	Exposure Media Total						5.7E-05					1.2
Surface water Total							5.7E-05					1.2
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Benzo(a)pyrene	6.3E-07			6.3E-07	N/A	---			---
			Benzo(b)fluoranthene	7.3E-08			7.3E-08	N/A	---			---
			Chloroform	4.6E-07			4.6E-07	Liver	4.1E-03			4.1E-03
			Dibenzo(a,h)anthracene	7.6E-07			7.6E-07	N/A	---			---
			Heptachlor	1.1E-06			1.1E-06	Liver	1.4E-03			1.4E-03
			Indeno(1,2,3-cd)pyrene	7.9E-08			7.9E-08	N/A	---			---
			Inorganics									
			Sodium	---			---	N/A	---			---
			Chemical Total	3.1E-06			3.1E-06		0.0055			0.0055
		Exposure Point Total					3.1E-06					0.0055
	Exposure Media Total						3.1E-06					0.0055
	Air (Ambient Air)	SWMU 41A	**Organics**									
			Chloroform		1.8E-11		1.8E-11	Liver		2.2E-08		2.2.E-08
			Chemical Total		1.8E-11		1.8E-11			2.2E-08		2.2E-08
		Exposure Point Total					1.8E-11					2.2E-08
	Exposure Media Total						1.8E-11					2.2E-08
	Air (Indoor Air)	SWMU 41A	**Organics**									
			Chloroform		4.4E-08		4.4E-08	Liver		5.4E-05		5.4.E-05
			Chemical Total		4.4E-08		4.4E-08			0.000054		0.000054
		Exposure Point Total					4.4E-08					0.000054
	Exposure Media Total						4.4E-08					0.000054
Groundwater Total							3.1E-06					0.0056
Receptor Total							7.7E-05					1.6

Total Risk Across All Media[a] = 7.7E-05

Total Hazard Across All Media[b] = 1.6

Total CNS HI Across All Media =	1.4
Total Immune System HI Across All Media =	0.013
Total Eyes HI Across All Media =	0.013
Total Skin HI Across All Media =	0.10
Total Vascular Effects HI Across All Media =	0.10
Total Blood HI Across All Media =	0.056
Total Liver HI Across All Media =	0.062
Total GI Irritation HI Across All Media =	0.056
Total Kidney HI Across All Media =	0.032

(a) Since surface soil represents the more highly contaminated portion of soil, total risk estimates are conservatively based on this soil data grouping.
(b) Since total soil represents the more highly contaminated portion of soil, total hazard estimates are conservatively based on this soil data grouping.
Since indoor air represents the more highly contaminated portion of groundwater to air, total risk and hazard estimates are conservatively based on this data grouping.
CNS = Central nervous system.
GI = Gastrointestinal.
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.

Table E.1-74
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41A	**Organics**									
			Methylcyclohexane	---		---	---	Nervous System	2.2E-08		2.0E-09	2.4E-08
			p-Chloro-m-cresol	---		---	---	Nervous System	2.6E-07		7.7E-08	3.4E-07
			Aroclor 1254	6.9E-09		2.9E-09	9.8E-09	Immune System, Eyes	1.2E-02		5.1E-03	1.7E-02
			TCDD TE	2.6E-08		2.3E-09	2.8E-08	Developmental nervous system	1.4E-02		1.3E-03	1.5E-02
			Inorganics									
			Aluminum	---		---	---	Developmental nervous system	4.6E-02		1.4E-03	4.7E-02
			Arsenic	3.8E-07		3.4E-08	4.1E-07	Skin, Vascular Effects	5.9E-02		5.3E-03	6.5E-02
			Cobalt	---		---	---	N/A	7.3E-02		2.2E-03	7.5E-02
			Iron	---		---	---	Blood, Liver, GI Irritation	9.6E-02		2.9E-03	9.9E-02
			Manganese	---		---	---	CNS	7.9E-02		6.0E-02	1.4E-01
			Vanadium	---		---	---	Kidney	1.6E-02		1.9E-02	3.5E-02
			Chemical Total	4.1E-07		4.0E-08	4.5E-07		0.40		0.097	0.49
		Exposure Point Total					4.5E-07					0.49
	Exposure Media Total						4.5E-07					0.49
	Air (Particulates and Volatiles)	SWMU 41A	**Organics**									
			Methylcyclohexane		---		---	Nervous System		5.2E-06		5.2E-06
			p-Chloro-m-cresol		---		---	N/A		---		---
			Aroclor 1254		1.5E-11		1.5E-11	N/A		---		---
			TCDD TE		5.6E-11		5.6E-11	N/A		---		---
			Inorganics									
			Aluminum		---		---	N/A		6.8E-02		6.8E-02
			Arsenic		8.1E-09		8.1E-09	N/A		4.4E-03		4.4E-03
			Cobalt		2.1E-08		2.1E-08	N/A		2.7E-02		2.7E-02
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		2.8E-01		2.8E-01
			Vanadium		---		---	N/A		---		---
			Chemical Total		2.9E-08		2.9E-08			0.38		0.38
		Exposure Point Total					2.9E-08					0.38
	Exposure Media Total						2.9E-08					0.38
Total Soil Total							4.8E-07					0.87
Sediment	Sediment	SWMU 41A	**Organics**									
			p-Chloro-m-cresol	---		---	---	Nervous System	5.5E-07		3.3E-07	8.8.E-07
			Inorganics									
			Arsenic	4.6E-07		8.2E-08	5.4E-07	Skin, Vascular Effects	7.1E-02		1.3E-02	8.4.E-02
				4.6E-07		8.2E-08	5.4E-07		0.071		0.013	0.084
		Exposure Point Total					5.4E-07					0.084
	Exposure Media Total						5.4E-07					0.084
Sediment Total							5.4E-07					0.084

Table E.1-74
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface water	Surface water	SWMU 41A	**Organics** TCDD TE			1.3E-06	1.3E-06	Developmental nervous system			6.8E-01	6.8.E-01
			Chemical Total			1.3E-06	1.3E-06				0.68	0.68
		Exposure Point Total					1.3E-06					0.68
	Exposure Media Total						1.3E-06					0.68
Surface water Total							1.3E-06					0.68
Groundwater	Air (Trench Air)	SWMU 41A	**Organics** Chloroform		3.4E-09		3.4E-09	Liver		1.1E-04		1.1.E-04
			Chemical Total		3.4E-09		3.4E-09			0.00011		0.00011
		Exposure Point Total					3.4E-09					0.00011
	Exposure Media Total						3.4E-09					0.00011
Groundwater Total							3.4E-09					0.00011
Receptor Total							2.3E-06					1.6

Total Risk Across All Media = 2.3E-06

Total Hazard Across All Media = 1.6

Total CNS HI Across All Media =	1.2
Total Immune System HI Across All Media =	0.017
Total Eyes HI Across All Media =	0.017
Total Skin HI Across All Media =	0.15
Total Vascular Effects HI Across All Media =	0.15
Total Blood HI Across All Media =	0.099
Total Liver HI Across All Media =	0.099
Total GI Irritation HI Across All Media =	0.099
Total Kidney HI Across All Media =	0.035

CNS = Central nervous system.
GI = Gastrointestinal.
N/A = Not Available.

Table E.1-75
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41A	**Organics**									
			Methylcyclohexane	---		---	---	Nervous System	1.8E-08		2.2E-09	2.1E-08
			p-Chloro-m-cresol	---		---	---	Nervous System	2.2E-07		8.7E-08	3.1E-07
			Aroclor 1254	4.7E-07		2.1E-07	6.8E-07	Immune System, Eyes	1.0E-02		5.7E-03	1.6E-02
			TCDD TE	1.8E-06		1.7E-07	1.9E-06	Developmental nervous system	1.2E-02		1.4E-03	1.3E-02
			Inorganics									
			Aluminum	---		---	---	Developmental nervous system	3.9E-02		1.5E-03	4.0E-02
			Arsenic	2.6E-05		2.4E-06	2.8E-05	Skin, Vascular Effects	5.0E-02		6.0E-03	5.6E-02
			Cobalt	---		---	---	N/A	6.2E-02		2.5E-03	6.4E-02
			Iron	---		---	---	Blood, Liver, GI Irritation	8.2E-02		3.3E-03	8.5E-02
			Manganese	---		---	---	CNS	6.7E-02		6.7E-02	1.3E-01
			Vanadium	---		---	---	Kidney	1.4E-02		2.1E-02	3.5E-02
			Chemical Total	2.8E-05		2.8E-06	3.1E-05		0.34		0.11	0.44
		Exposure Point Total					3.1E-05					0.44
	Exposure Media Total						3.1E-05					0.44
	Air (Particulates and Volatiles)	SWMU 41A	**Organics**									
			Methylcyclohexane		---		---	Nervous System		1.1E-06		1.1E-06
			p-Chloro-m-cresol		---		---	N/A		---		---
			Aroclor 1254		9.9E-12		9.9E-12	N/A		---		---
			TCDD TE		2.5E-06		2.5E-06	N/A		---		---
			Inorganics									
			Aluminum		---		---	N/A		2.7E-03		2.7E-03
			Arsenic		9.6E-09		9.6E-09	N/A		1.7E-04		1.7E-04
			Cobalt		2.5E-08		2.5E-08	N/A		1.1E-03		1.1E-03
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		1.1E-02		1.1E-02
			Vanadium		---		---	N/A		---		---
			Chemical Total		2.6E-06		2.6E-06			0.015		0.015
		Exposure Point Total					2.6E-06					0.015
	Exposure Media Total						2.6E-06					0.015
Total Soil Total							3.3E-05					0.46
Sediment	Sediment	SWMU 41A	**Organics**									
			p-Chloro-m-cresol	---		---	---	Nervous System	4.3E-08		4.9E-08	9.1.E-08
			Inorganics									
			Arsenic	3.5E-06		5.7E-07	4.1E-06	Skin, Vascular Effects	5.5E-03		1.9E-03	7.4.E-03
				3.5E-06		5.7E-07	4.1E-06		0.0055		0.0019	0.0074
		Exposure Point Total					4.1E-06					0.0074
	Exposure Media Total						4.1E-06					0.0074
Sediment Total							4.1E-06					0.0074
Surface water	Surface water	SWMU 41A	**Organics**									
			TCDD TE			2.3E-05	2.3E-05	Developmental nervous system			3.0E-01	3.0.E-01
			Chemical Total			2.3E-05	2.3E-05				0.30	0.30
		Exposure Point Total					2.3E-05					0.30
	Exposure Media Total						2.3E-05					0.30
Surface water Total							2.3E-05					0.30

Table E.1-75
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Benzo(a)pyrene	9.3E-06		1.9E-04	2.0E-04	N/A	---		---	---
			Benzo(b)fluoranthene	1.1E-06		2.2E-05	2.3E-05		---		---	---
			Chloroform	2.2E-06		NV	2.2E-06	Liver	1.3E-02		NV	1.3E-02
			Dibenzo(a,h)anthracene	1.1E-05		3.5E-04	3.6E-04	N/A	---		---	---
			Heptachlor	5.2E-06		2.9E-06	8.2E-06	Liver	4.3E-03		1.9E-03	6.1E-03
			Indeno(1,2,3-cd)pyrene	1.2E-06		2.6E-05	2.7E-05	N/A	---		---	---
			Inorganics				---					
			Sodium	---		NV	---	N/A	---		NV	---
			Chemical Total	3.0E-05		5.9E-04	6.2E-04		0.017		0.0019	0.019
		Exposure Point Total					6.2E-04					0.019
	Exposure Media Total						6.2E-04					0.019
	Air (Indoor Air)	SWMU 41A	**Organics**									
			Chloroform		8.2E-08		8.2E-08	Liver		8.4E-05		8.4.E-05
			Chemical Total		8.2E-08		8.2E-08			0.00008		0.00008
		Exposure Point Total					8.2E-08					0.00008
	Exposure Media Total						8.2E-08					0.00008
	Air (Shower Room)	SWMU 41A	**Organics**									
			Chloroform		7.4E-06		7.4E-06	Liver		9.6E-03		9.6E-03
			Chemical Total		7.4E-06		7.4E-06			0.010		0.010
		Exposure Point Total					7.4E-06					0.010
	Exposure Media Total						7.4E-06					0.010
	Home Grown Produce	SWMU 41A	**Inorganics**									
			No COPCs									
			Chemical Total				0.0E+00					0.0
		Exposure Point Total					0.0E+00					0.0
	Exposure Media Total						0.0E+00					0.0
Groundwater Total							6.3E-04					0.029
Receptor Total							6.9E-04					0.80

Total Risk Across All Media = 6.9E-04

Total Hazard Across All Media = 0.80

CNS = Central nervous system.
GI = Gastrointestinal.
N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Total CNS HI Across All Media =	0.50
Total Immune System HI Across All Media =	0.016
Total Eyes HI Across All Media =	0.016
Total Skin HI Across All Media =	0.064
Total Vascular Effects HI Across All Media =	0.064
Total Blood HI Across All Media =	0.085
Total Liver HI Across All Media =	0.11
Total GI Irritation HI Across All Media =	0.085
Total Kidney HI Across All Media =	0.035

Table E.1-76
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41A	**Organics**									
			Methylcyclohexane	---		---	---	Nervous System	1.7E-07		1.4E-08	1.9E-07
			p-Chloro-m-cresol	---		---	---	Nervous System	2.0E-06		5.7E-07	2.6E-06
			Aroclor 1254	3.3E-07		1.3E-07	4.6E-07	Immune System, Eyes	9.6E-02		3.8E-02	1.3E-01
			TCDD TE	1.2E-06		1.0E-07	1.3E-06	Developmental nervous system	1.1E-01		9.3E-03	1.2E-01
			Inorganics									
			Aluminum	---		---	---	Developmental nervous system	3.6E-01		1.0E-02	3.7E-01
			Arsenic	1.8E-05		1.5E-06	2.0E-05	Skin, Vascular Effects	4.7E-01		3.9E-02	5.1E-01
			Cobalt	---		---	---	N/A	5.8E-01		1.6E-02	5.9E-01
			Iron	---		---	---	Blood, Liver, GI Irritation	7.6E-01		2.1E-02	7.8E-01
			Manganese	---		---	---	CNS	6.3E-01		4.4E-01	1.1E+00
			Vanadium	---		---	---	Kidney	1.3E-01		1.4E-01	2.7E-01
			Chemical Total	2.0E-05		1.8E-06	2.1E-05		3.1		0.71	3.8
		Exposure Point Total					2.1E-05					3.8
	Exposure Media Total						2.1E-05					3.8
	Air (Particulates and Volatiles)	SWMU 41A	**Organics**									
			Methylcyclohexane		---		---	Nervous System		2.3E-06		2.3E-06
			p-Chloro-m-cresol		---		---	N/A		---		---
			Aroclor 1254		3.5E-12		3.5E-12	N/A		---		---
			TCDD TE		1.3E-11		1.3E-11	N/A		---		---
			Inorganics									
			Aluminum		---		---	N/A		2.7E-03		2.7E-03
			Arsenic		1.9E-09		1.9E-09	N/A		1.7E-04		1.7E-04
			Cobalt		4.9E-09		4.9E-09	N/A		1.1E-03		1.1E-03
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		1.1E-02		1.1E-02
			Vanadium		---		---	N/A		---		---
			Chemical Total		6.9E-09		6.9E-09			0.015		0.015
		Exposure Point Total					6.9E-09					0.015
	Exposure Media Total						6.9E-09					0.015
Total Soil Total							2.1E-05					3.9
Sediment	Sediment	SWMU 41A	**Organics**									
			p-Chloro-m-cresol	---		---	---	Nervous System	5.0E-07		1.4E-07	6.4.E-07
			Inorganics									
			Arsenic	2.5E-06		2.1E-07	2.7E-06	Skin, Vascular Effects	6.4E-02		5.4E-03	7.0.E-02
				2.5E-06		2.1E-07	2.7E-06		0.064		0.0054	0.070
		Exposure Point Total					2.7E-06					0.070
	Exposure Media Total						2.7E-06					0.070
Sediment Total							2.7E-06					0.070
Surface water	Surface water	SWMU 41A	**Organics**									
			TCDD TE			6.5E-06	6.5E-06	Developmental nervous system			5.8E-01	5.8.E-01
			Chemical Total			6.5E-06	6.5E-06				0.58	0.58
		Exposure Point Total					6.5E-06					0.58
	Exposure Media Total						6.5E-06					0.58
Surface water Total							6.5E-06					0.58

Table E.1-76
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Benzo(a)pyrene	1.1E-06		2.3E-05	2.4E-05	N/A	---		---	---
			Benzo(b)fluoranthene	1.3E-07		2.6E-06	2.8E-06	N/A	---		---	---
			Chloroform	8.0E-07		NV	8.0E-07	Liver	3.0E-02		NV	3.0E-02
			Dibenzo(a,h)anthracene	1.3E-06		4.2E-05	4.4E-05	N/A	---		---	---
			Heptachlor	1.9E-06		8.8E-07	2.8E-06	Liver	1.0E-02		4.6E-03	1.5E-02
			Indeno(1,2,3-cd)pyrene	1.4E-07		3.2E-06	3.3E-06	N/A	---		---	---
			Inorganics									
			Sodium	---		NV	---	N/A	---		NV	---
			Chemical Total	5.4E-06		7.2E-05	7.7E-05		0.040		0.0046	0.045
		Exposure Point Total					7.7E-05					0.045
	Exposure Media Total						7.7E-05					0.045
	Air (Indoor Air)	SWMU 41A	**Organics**									
			Chloroform		1.6E-08		1.6E-08	Liver		8.4E-05		8.4.E-05
			Chemical Total		1.6E-08		1.6E-08			0.000084		0.000084
		Exposure Point Total					1.6E-08					0.000084
	Exposure Media Total						1.6E-08					0.000084
	Home Grown Produce	SWMU 41A	**Inorganics**									
			No COPCs									
			Chemical Total				0.0E+00					0.0
		Exposure Point Total					0.0E+00					0.0
	Exposure Media Total						0.0E+00					0.0
Groundwater Total							7.7E-05					0.045
Receptor Total							1.1E-04					4.6

Total Risk Across All Media = 1.1E-04

Total Hazard Across All Media = 4.6

CNS = Central nervous system.
GI = Gastrointestinal.
N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Total CNS HI Across All Media =	2.2
Total Immune System HI Across All Media =	0.13
Total Eyes HI Across All Media =	0.13
Total Skin HI Across All Media =	0.58
Total Vascular Effects HI Across All Media =	0.58
Total Blood HI Across All Media =	0.78
Total Liver HI Across All Media =	0.83
Total GI Irritation HI Across All Media =	0.78
Total Kidney HI Across All Media =	0.27

Table E.1-77
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air (Ambient Air)	SWMU 41A	**Organics**									
			Chloroform		3.9E-12		3.9E-12	Liver		4.9E-09		4.9E-09
			Chemical Total		3.9E-12		3.9E-12			4.9E-09		4.9E-09
		Exposure Point Total					3.9E-12					4.9E-09
	Exposure Media Total						3.9E-12					4.9E-09
Groundwater Total							3.9E-12					4.9E-09
Receptor Total							3.9E-12					4.9E-09

Total Risk Across All Media = 3.9E-12

Total Hazard Across All Media = 4.9E-09

Total Liver HI Across All Media = 4.9E-09

Table E.1-78
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Benzo(a)pyrene	6.3E-07			6.3E-07	N/A	---			---
			Benzo(b)fluoranthene	7.3E-08			7.3E-08	N/A	---			---
			Chloroform	4.6E-07			4.6E-07	Liver	4.1E-03			4.1E-03
			Dibenzo(a,h)anthracene	7.6E-07			7.6E-07	N/A	---			---
			Heptachlor	1.1E-06			1.1E-06	Liver	1.4E-03			1.4E-03
			Indeno(1,2,3-cd)pyrene	7.9E-08			7.9E-08	N/A	---			---
			Inorganics									
			Sodium	---			---	N/A	---			---
			Chemical Total	3.1E-06			3.1E-06		0.0055			0.0055
		Exposure Point Total					3.1E-06					0.0055
	Exposure Media Total						3.1E-06					0.0055
	Air (Ambient Air)	SWMU 41A	**Organics**									
			Chloroform		1.8E-11		1.8E-11	Liver		2.2E-08		2.2.E-08
			Chemical Total		1.8E-11		1.8E-11			2.2E-08		2.2E-08
		Exposure Point Total					1.8E-11					2.2E-08
	Exposure Media Total						1.8E-11					2.2E-08
	Air (Indoor Air)	SWMU 41A	**Organics**									
			Chloroform		4.4E-08		4.4E-08	Liver		5.4E-05		5.4.E-05
			Chemical Total		4.4E-08		4.4E-08			0.00005		0.00005
		Exposure Point Total					4.4E-08					0.00005
	Exposure Media Total						4.4E-08					0.00005
Groundwater Total							3.1E-06					0.0056
Receptor Total							3.1E-06					0.0056

Total Risk Across All Media = 3.1E-06

Total Hazard Across All Media = 0.0056

Total Liver HI Across All Media = 0.0056

CNS = Central nervous system.
N/A = Not Available.
Since indoor air represents the more highly contaminated portion of groundwater to air, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-78
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total

Table E.1-79
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Off-site Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air (Trench Air)	SWMU 41A	**Organics**									
			Chloroform		3.4E-09		3.4E-09	Liver		1.1E-04		1.1.E-04
			Chemical Total		3.4E-09		3.4E-09			0.00011		0.00011
		Exposure Point Total					3.4E-09					0.00011
	Exposure Media Total						3.4E-09					0.00011
Groundwater Total							3.4E-09					0.00011
Receptor Total							3.4E-09					0.00011

Total Risk Across All Media = 3.4E-09

Total Hazard Across All Media = 0.00011

Total Liver HI Across All Media = 0.00011

Table E.1-80
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-site Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Benzo(a)pyrene	9.3E-06		1.9E-04	2.0E-04	N/A	---		---	---
			Benzo(b)fluoranthene	1.1E-06		2.2E-05	2.3E-05		---		---	---
			Chloroform	2.2E-06		NV	2.2E-06	Liver	1.3E-02		NV	1.3E-02
			Dibenzo(a,h)anthracene	1.1E-05		3.5E-04	3.6E-04	N/A	---		---	---
			Heptachlor	5.2E-06		2.9E-06	8.2E-06	Liver	4.3E-03		1.9E-03	6.1E-03
			Indeno(1,2,3-cd)pyrene	1.2E-06		2.6E-05	2.7E-05	N/A	---		---	---
			Inorganics				---					
			Sodium	---		NV	---	N/A	---		NV	---
			Chemical Total	3.0E-05		5.9E-04	6.2E-04		0.017		0.0019	0.019
		Exposure Point Total					6.2E-04					0.019
	Exposure Media Total						6.2E-04					0.019
	Air (Indoor Air)	SWMU 41A	**Organics**									
			Chloroform		8.2E-08		8.2E-08	Liver		8.4E-05		8.4.E-05
			Chemical Total		8.2E-08		8.2E-08			0.000084		0.000084
		Exposure Point Total					8.2E-08					0.000084
	Exposure Media Total						8.2E-08					0.000084
	Air (Shower Room)	SWMU 41A	**Organics**									
			Chloroform		7.4E-06		7.4E-06	Liver		9.6E-03		9.6E-03
			Chemical Total		7.4E-06		7.4E-06			0.010		0.010
		Exposure Point Total					7.4E-06					0.010
	Exposure Media Total						7.4E-06					0.010
	Home Grown Produce	SWMU 41A	**Inorganics** No COPCs									
			Chemical Total				0.0E+00					0.0
		Exposure Point Total					0.0E+00					0.0
	Exposure Media Total						0.0E+00					0.0
Groundwater Total							6.3E-04					0.029
Receptor Total							6.3E-04					0.029

Total Risk Across All Media = 6.3E-04

Total Hazard Across All Media = 0.029

Total Liver HI Across All Media = 0.029

CNS = Central nervous system.
N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.1-81
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-site Child Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Benzo(a)pyrene	1.1E-06		2.3E-05	2.4E-05	N/A	---		---	---
			Benzo(b)fluoranthene	1.3E-07		2.6E-06	2.8E-06	N/A	---		---	---
			Chloroform	8.0E-07		NV	8.0E-07	Liver	3.0E-02		NV	3.0E-02
			Dibenzo(a,h)anthracene	1.3E-06		4.2E-05	4.4E-05	N/A	---		---	---
			Heptachlor	1.9E-06		8.8E-07	2.8E-06	Liver	1.0E-02		4.6E-03	1.5E-02
			Indeno(1,2,3-cd)pyrene	1.4E-07		3.2E-06	3.3E-06	N/A	---		---	---
			Inorganics									
			Sodium	---		NV	---	N/A	---		NV	---
			Chemical Total	5.4E-06		7.2E-05	7.7E-05		0.040		0.0046	0.045
		Exposure Point Total					7.7E-05					0.045
	Exposure Media Total						7.7E-05					0.045
	Air (Indoor Air)	SWMU 41A	**Organics**									
			Chloroform		1.6E-08		1.6E-08	Liver		8.4E-05		8.4.E-05
			Chemical Total		1.6E-08		1.6E-08			0.00008		0.00008
		Exposure Point Total					1.6E-08					0.00008
	Exposure Media Total						1.6E-08					0.00008
	Home Grown Produce	SWMU 41A	**Inorganics**									
			No COPCs									
			Chemical Total				0.0E+00					0.0
		Exposure Point Total					0.0E+00					0.0
	Exposure Media Total						0.0E+00					0.0
Groundwater Total							7.7E-05					0.045
Receptor Total							7.7E-05					0.045

Total Risk Across All Media = 7.7E-05

Total Hazard Across All Media = 0.045

Total Liver HI Across All Media = 0.045

CNS = Central nervous system.
N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.1-82
Risk Assessment Summary
Reasonable Maximum Exposure
Current - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 41A	**Inorganics**									
			Arsenic	1.3E-06		2.5E-07	1.5E-06					
			Chemical Total				1.5E-06					<1
		Exposure Point Total					1.5E-06					<1
	Exposure Media Total						1.5E-06					<1
	Air (Particulates and Volatiles)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Soil Total							1.5E-06					<1
Sediment	Sediment	SWMU 41A	**Inorganics**									
			Arsenic	1.4E-06		8.2E-07	2.2E-06					
			Chemical Total	1.4E-06		8.2E-07	2.2E-06					<1
		Exposure Point Total					2.2E-06					<1
	Exposure Media Total						2.2E-06					<1
Sediment Total							2.2E-06					<1
Surface Water	Surface Water	SWMU 41A	**Organics**									
			TCDD TE			1.3E-05	1.3E-05					
			Chemical Total			1.3E-05	1.3E-05					<1
		Exposure Point Total					1.3E-05					<1
	Exposure Media Total						1.3E-05					<1
Surface Water Total							1.3E-05					<1
Groundwater	Air (Ambient Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							<1.0E-06					
Receptor Total							1.6E-05					<1

Total Risk Across All Media = 1.6E-05

Total Hazard Across All Media = <1

Table E.1-83
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 41A	**Inorganics**									
			Arsenic	1.3E-06		2.5E-07	1.5E-06					
			Chemical Total	1.3E-06		2.5E-07	1.5E-06					<1
		Exposure Point Total					1.5E-06					<1
	Exposure Media Total						1.5E-06					<1
	Air (Particulates and Volatiles)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Soil Total							1.5E-06					<1
Total Soil	Total Soil	SWMU 41A	**Inorganics**									
			Arsenic	1.2E-06		2.3E-07	1.4E-06					
			Chemical Total	1.2E-06		2.3E-07	1.4E-06					<1
		Exposure Point Total					1.4E-06					<1
	Exposure Media Total						1.4E-06					<1
	Air (Particulates and Volatiles)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Total Soil Total							1.4E-06					<1
Sediment	Sediment	SWMU 41A	**Inorganics**									
			Arsenic	1.4E-06		8.2E-07	2.2E-06					
			Chemical Total	1.4E-06		8.2E-07	2.2E-06					<1
		Exposure Point Total					2.2E-06					<1
	Exposure Media Total						2.2E-06					<1
Sediment Total							2.2E-06					

Table E.1-83
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	SWMU 41A	**Organics**									
			TCDD TE			1.3E-05	1.3E-05					
			Chemical Total			1.3E-05	1.3E-05					<1
		Exposure Point Total					1.3E-05					<1
	Exposure Media Total						1.3E-05					<1
Surface Water Total							1.3E-05					
Groundwater	Air (Ambient Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							<1.0E-06					
Receptor Total[a]							1.6E-05					<1

Total Risk Across All Media [a] = 1.6E-05

Total Hazard Across All Media = <1

(a) Since surface soil represents the more highly contaminated portion of soil, total risk estimates are conservatively based on this soil data grouping.

Table E.1-84
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 41A	**Inorganics**									
			Arsenic	5.7E-06		1.1E-06	6.8E-06					
			Chemical Total	5.7E-06		1.1E-06	6.8E-06					<1
		Exposure Point Total					6.8E-06					<1
	Exposure Media Total						6.8E-06					<1
	Air (Particulates and Volatiles)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Soil Total							6.8E-06					<1
Total Soil	Total Soil	SWMU 41A	**Inorganics**									
			Arsenic	5.2E-06		1.0E-06	6.2E-06					
			Chemical Total	5.2E-06		1.0E-06	6.2E-06					<1
		Exposure Point Total					6.2E-06					<1
	Exposure Media Total						6.2E-06					<1
	Air (Particulates and Volatiles)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Total Soil Total							6.2E-06					<1
Sediment	Sediment	SWMU 41A	**Inorganics**									
			Arsenic	6.2E-06		3.7E-06	9.9E-06					
			Chemical Total	6.2E-06		3.7E-06	9.9E-06					<1
		Exposure Point Total					9.9E-06					<1
	Exposure Media Total						9.9E-06					<1
Sediment Total							9.9E-06					<1

Table E.1-84
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	SWMU 41A	**Organics**									
			TCDD TE			5.7E-05	5.7E-05	Developmental nervous system			1.2E+00	1.2E+00
			Chemical Total			5.7E-05	5.7E-05				1.2	1.2
		Exposure Point Total					5.7E-05					1.2
	Exposure Media Total						5.7E-05					1.2
Surface Water Total							5.7E-05					1.2
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Heptachlor	1.1E-06			1.1E-06					
			Chemical Total	1.1E-06			1.1E-06					<1.0E-06
		Exposure Point Total					1.1E-06					<1.0E-06
	Exposure Media Total						1.1E-06					<1.0E-06
	Air (Ambient Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1.0E-06
		Exposure Point Total					<1.0E-06					<1.0E-06
	Exposure Media Total						<1.0E-06					<1.0E-06
	Air (Indoor Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1.0E-06
		Exposure Point Total					<1.0E-06					<1.0E-06
	Exposure Media Total						<1.0E-06					<1.0E-06
Groundwater Total							1.1E-06					<1.0E-06
Receptor Total[a]							7.4E-05					1.2

Total Risk Across All Media [a] = 7.4E-05

Total Hazard Across All Media [b] = 1.2

Total CNS HI Across All Media = 1.2

[a] Since surface soil represents the more highly contaminated portion of soil, total risk estimates are conservatively based on this soil data grouping.

[b] Since total soil represents the more highly contaminated portion of soil, hazard estimates are conservatively based on this soil data grouping.

Table E.1-85
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Air (Particulates and Volatiles)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Total Soil Total							<1.0E-06					<1
Sediment	Sediment	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Sediment Total												<1
Surface Water	Surface Water	SWMU 41A	**Organics**									
			TCDD TE			1.3E-06	1.3E-06					
			Chemical Total			1.3E-06	1.3E-06					<1
		Exposure Point Total					1.3E-06					<1
	Exposure Media Total						1.3E-06					<1
Surface Water Total												<1
Groundwater	Air (Trench Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							1.3E-06					<1
Receptor Total							1.3E-06					1.6

Total Risk Across All Media = 1.3E-06

Total Hazard Across All Media [a] = 1.6

[a] Although the total hazard is greater than 1.0, no individual target organ value in a media exceeded 1.0.

Table E.1-86
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Lifetime Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41A	**Organics**									
			TCDD TE	1.8E-06		1.7E-07	1.9E-06					
			Inorganics									
			Arsenic	2.6E-05		2.4E-06	2.8E-05					
			Chemical Total	2.8E-05		2.6E-06	3.0E-05					<1
		Exposure Point Total					3.0E-05					<1
	Exposure Media Total						3.0E-05					<1
	Air (Particulates and Volatiles)	SWMU 41A	**Organics**									
			TCDD TE		2.5E-06		2.5E-06					
			Chemical Total		2.5E-06		2.5E-06					<1
		Exposure Point Total					2.5E-06					<1
	Exposure Media Total						2.5E-06					<1
Total Soil Total							3.0E-05					<1
Sediment	Sediment	SWMU 41A	**Inorganics**									
			Arsenic	3.5E-06		5.7E-07	4.1E-06					
			Chemical Total	3.5E-06		5.7E-07	4.1E-06					<1
		Exposure Point Total					4.1E-06					<1
	Exposure Media Total						4.1E-06					<1
Sediment Total							4.1E-06					<1
Surface Water	Surface Water	SWMU 41A	**Organics**									
			TCDD TE			2.3E-05	2.3E-05					
			Chemical Total			2.3E-05	2.3E-05					<1
		Exposure Point Total					2.3E-05					<1
	Exposure Media Total						2.3E-05					<1
Surface Water Total							2.3E-05					<1

Table E.1-86
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Lifetime Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Benzo(a)pyrene	9.3E-06		1.9E-04	2.0E-04					
			Benzo(b)fluoranthene	1.1E-06		2.2E-05	2.3E-05					
			Chloroform	2.2E-06		NV	2.2E-06					
			Dibenzo(a,h)anthracene	1.1E-05		3.5E-04	3.6E-04					
			Heptachlor	5.2E-06		2.9E-06	8.2E-06					
			Indeno(1,2,3-cd)pyrene	1.2E-06		2.6E-05	2.7E-05					
			Chemical Total	3.0E-05		5.9E-04	6.2E-04					<1
		Exposure Point Total					6.2E-04					<1
	Exposure Media Total						6.2E-04					<1
	Air (Indoor Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Air (Shower Room)	SWMU 41A	**Organics**									
			Chloroform		7.4E-06		7.4E-06					
			Chemical Total		7.4E-06		7.4E-06					<1
		Exposure Point Total					7.4E-06					<1
	Exposure Media Total						7.4E-06					<1
	Home Grown Produce	SWMU 41A	No COPCs									
			Chemical Total				0.0E+00					0.0
		Exposure Point Total					0.0E+00					0.0
	Exposure Media Total						0.0E+00					0.0
Groundwater Total							6.3E-04					<1
Receptor Total							6.9E-04					<1

Total Risk Across All Media = 6.9E-04

Total Hazard Across All Media = <1

N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.1-87
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41A	**Organics**									
			TCDD TE	1.2E-06		1.0E-07	1.3E-06		---		---	---
			Inorganics									
			Arsenic	1.8E-05		1.5E-06	2.0E-05		---		---	---
			Manganese	---		---	---	CNS	6.3E-01		4.4E-01	1.1
			Chemical Total	1.9E-05		1.6E-06	2.1E-05		0.63		0.44	1.1
		Exposure Point Total					2.1E-05					1.1
	Exposure Media Total						2.1E-05					1.1
	Air (Particulates and Volatiles)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Total Soil Total							2.1E-05					1.1
Sediment	Sediment	SWMU 41A	**Inorganics**									
			Arsenic	2.5E-06		2.1E-07	2.7E-06					
			Chemical Total	2.5E-06		2.1E-07	2.7E-06					<1
		Exposure Point Total					2.7E-06					<1
	Exposure Media Total						2.7E-06					<1
Sediment Total							2.7E-06					<1
Surface Water	Surface Water	SWMU 41A	**Organics**									
			TCDD TE			6.5E-06	6.5E-06					
			Chemical Total			6.5E-06	6.5E-06					<1
		Exposure Point Total					6.5E-06					<1
	Exposure Media Total						6.5E-06					<1
Surface Water Total							6.5E-06					<1
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Benzo(a)pyrene	1.1E-06		2.3E-05	2.4E-05					
			Benzo(b)fluoranthene	1.3E-07		2.6E-06	2.8E-06					
			Dibenzo(a,h)anthracene	1.3E-06		4.2E-05	4.4E-05					
			Heptachlor	1.9E-06		8.8E-07	2.8E-06					
			Indeno(1,2,3-cd)pyrene	1.4E-07		3.2E-06	3.3E-06					
			Chemical Total	4.6E-06		7.2E-05	7.7E-05					<1
		Exposure Point Total					7.7E-05					<1
	Exposure Media Total						7.7E-05					<1

Table E.1-87
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater (con't)	Air (Indoor Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Home Grown Produce	SWMU 41A	No COPCs									
			Chemical Total				0.0E+00					0.0
		Exposure Point Total					0.0E+00					0.0
	Exposure Media Total						0.0E+00					0.0
Groundwater Total							7.7E-05					<1
Receptor Total							1.1E-04					1.1

Total Risk Across All Media = 1.1E-04

Total Hazard Across All Media = 1.1

CNS = Central nervous system.
N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Total CNS HI Across All Media = 1.1

Table E.1-88
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air (Ambient Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
Exposure Media Total							<1.0E-06					<1
Groundwater Total							<1.0E-06					<1
Receptor Total							<1.0E-06					<1

Total Risk Across All Media = <1.0E-06

Total Hazard Across All Media = <1

Table E.1-89
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Heptachlor	1.1E-06			1.1E-06					
			Chemical Total	1.1E-06			1.1E-06					<1
		Exposure Point Total					1.1E-06					<1
	Exposure Media Total						1.1E-06					<1
	Air (Ambient Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Air (Indoor Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							1.1E-06					<1
Receptor Total							1.1E-06					<1

Total Risk Across All Media = 1.1E-06

Total Hazard Across All Media = <1

N/A = Not Available.

TABLE E.1-89
RAGS D IEUBK LEAD WORKSHEET
Radford Army Ammunition Plant – SWMU 41 – Area A
Child (Age 0 – 84 Months), Exposure to Groundwater

1. Lead Screening Questions

Medium	Lead Concentration Used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil	91	mg/kg	Average Detected Value	400	mg/kg	Recommended Soil Screening Level
Water	752	µg/L	Recommended Drinking Water Action Level	15	µg/L	Recommended Drinking Water Action Level

2. Lead Model Questions

Question	Response for Residential Lead Model
What lead model (version and date) was used?	Lead Model for Windows, Version 1.0 Build 264
Where are the input values located in the risk assessment report?	Located in **Appendix E.1** and IEUBKwin OUTPUT (Attached)
What range of media concentrations were used for the model?	Range of concentration for total soil = 33.5 to 234 mg/kg Range of concentrations for groundwater = 273 – 1,200 µg/L
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic Mean Concentration; Data are located in **Appendix E.1**
Was soil sample taken from top 2 cm? If not, why?	No – Future scenario based on assumption that soil would be disturbed. Surface and subsurface data sets were combined to represent total soil.
Was soil sample sieved? What size screen was used? If not sieved, provide rationale.	No -- Soil samples were collected for multiple analyses.
What was the point of exposure/location?	Total soil and groundwater at SWMU 41 – Area A
Where are the output values located in the risk assessment report?	IEUBKwin OUTPUT (Attached)
Was the model run using default values only?	No – Assumed site-specific arithmetic mean concentration of lead in soil and concentration of lead in groundwater.
Was the default soil bioavailability used?	Yes -- Default is 30%
Was the default soil ingestion rate used?	Yes -- Default values for 7 age groups are 85, 135, 135, 100, 090, and 85 mg/day
If non-default values were used, where is the rationale for the values located in the risk assessment report?	Located in **Section 6.4.1**.

3. Final Result

Medium	Result	Comment/PRG [1]
Groundwater	Input value of 752 µg/L Pb in groundwater results in a child geometric mean blood lead concentration of 31 µg/dL and 99% of children above a blood lead level of 10 µg/dL. This fails to meet the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children exceeding 10 µg/dL blood lead.	PRG not calculated.

1. Attach the IEUBK text output file and graph upon which the PRG was based as an appendix. For additional information, see www.epa.gov/superfund/programs/lead

LEAD MODEL FOR WINDOWS Version 1.0

Model Version: 1.0 Build 264
User Name: Shaw Environmental
Date: 01/29/2009
Site Name: Radford AAP
Operable Unit: SWMU 41 - Area A
Run Mode: Site Risk Assessment

Soil/Dust Data
Arithmetic mean soil concentration
Water Data
Arithmetic mean groundwater concentration

The time step used in this model run: 1 - Every 4 Hours (6 times a day).

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (ug Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(ug/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 752.000 ug Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 73.700 ug/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
.5-1	91.000	73.700
1-2	91.000	73.700
2-3	91.000	73.700
3-4	91.000	73.700
4-5	91.000	73.700
5-6	91.000	73.700
6-7	91.000	73.700

****** Alternate Intake ******

Age	Alternate (ug Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 2.500 ug Pb/dL

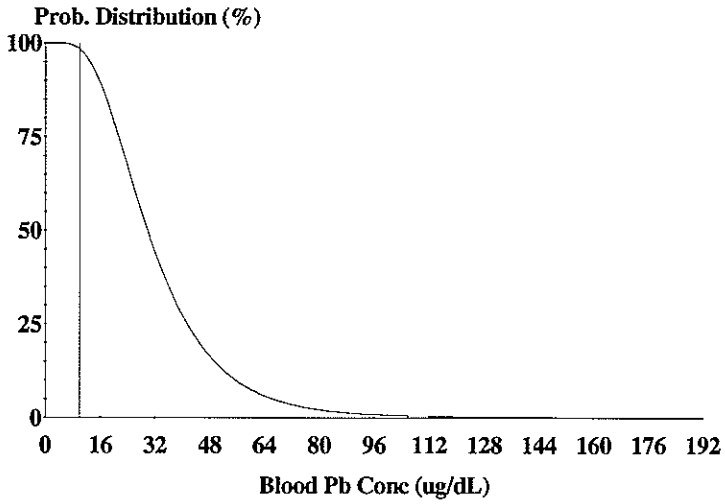
****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (ug/day)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	0.658	0.000	43.764
1-2	0.034	0.451	0.000	86.565
2-3	0.062	0.514	0.000	94.337
3-4	0.067	0.518	0.000	101.295
4-5	0.067	0.517	0.000	109.657
5-6	0.093	0.557	0.000	118.512
6-7	0.093	0.618	0.000	123.568

Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	1.209	45.651	22.9
1-2	1.520	88.570	32.8
2-3	1.592	96.505	33.1
3-4	1.677	103.558	33.3
4-5	1.296	111.537	33.7
5-6	1.196	120.358	33.8
6-7	1.157	125.437	32.8

Environmental exposures associated with blood lead levels above 30 µg/dl are above the range of values that have been used in the calibration and empirical validation of

this model. (Zaragoza, L. and Hogan, K. 1998. The Integrated Exposure Uptake Biokinetic Model for Lead In Children: Independent Validation and Verification. Environmental Health Perspectives 106 (supplement 6). p. 1555)



Cutoff = 10.000 ug/dl
Geo Mean = 31.165
GSD = 1.600
% Above = 99.221

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Site Risk Assessment

Environmental exposures associated with blood lead levels above 30 µg/dl are above the range of values that have been used in the calibration and empirical validation of this model. (Zaragoza, L. and Hogan, K. 1998. The Integrated Exposure Uptake Biokinetic Model for Lead In Children: Independent Validation and Verification. Environmental Health Perspectives 106 (supplement 6). p. 1555)

Table E.1-90
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air (Trench Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							<1.0E-06					<1
Receptor Total							<1.0E-06					<1

Total Risk Across All Media = <1.0E-06

Total Hazard Across All Media = <1

Table E.1-91
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-site Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Off-site Lifetime Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Benzo(a)pyrene	9.3E-06		1.9E-04	2.0E-04					
			Benzo(b)fluoranthene	1.1E-06		2.2E-05	2.3E-05					
			Chloroform	2.2E-06		NV	2.2E-06					
			Dibenzo(a,h)anthracene	1.1E-05		3.5E-04	3.6E-04					
			Heptachlor	5.2E-06		2.9E-06	8.2E-06					
			Indeno(1,2,3-cd)pyrene	1.2E-06		2.6E-05	2.7E-05					
			Chemical Total	3.0E-05		5.9E-04	6.2E-04					<1
		Exposure Point Total					6.2E-04					<1
	Exposure Media Total						6.2E-04					<1
	Air (Indoor Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Air (Shower Room)	SWMU 41A	**Organics**									
			Chloroform		7.4E-06		7.4E-06					
			Chemical Total		7.4E-06		7.4E-06					<1
		Exposure Point Total					7.4E-06					<1
	Exposure Media Total						7.4E-06					<1
	Home Grown Produce	SWMU 41A	No COPCs									
			Chemical Total				0.0E+00					0.0
		Exposure Point Total					0.0E+00					0.0
	Exposure Media Total						0.0E+00					0.0
Groundwater Total							6.3E-04					<1
Receptor Total							6.3E-04					<1

Total Risk Across All Media = 6.3E-04

Total Hazard Across All Media = <1

N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.1-92
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-site Child Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41A	**Organics**									
			Benzo(a)pyrene	1.1E-06		2.3E-05	2.4E-05					
			Benzo(b)fluoranthene	1.3E-07		2.6E-06	2.8E-06					
			Dibenzo(a,h)anthracene	1.3E-06		4.2E-05	4.4E-05					
			Heptachlor	1.9E-06		8.8E-07	2.8E-06					
			Indeno(1,2,3-cd)pyrene	1.4E-07		3.2E-06	3.3E-06					
			Chemical Total	4.6E-06		7.2E-05	7.7E-05					<1
		Exposure Point Total					7.7E-05					<1
	Exposure Media Total						7.7E-05					<1
	Air (Indoor Air)	SWMU 41A										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Home Grown Produce	SWMU 41A	No COPCs									
			Chemical Total				0.0E+00					0.0
		Exposure Point Total					0.0E+00					0.0
	Exposure Media Total						0.0E+00					0.0
Groundwater Total							7.7E-05					<1
Receptor Total							7.7E-05					<1

Total Risk Across All Media = 7.7E-05

Total Hazard Across All Media = <1

N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Appendix E-2

RAGS Part D Tables

SWMU 41B

Table E.2-1
Selection of Exposure Pathways - SWMU 41B

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Surface Soil	Surface Soil	SWMU 41B	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact surface soil at SWMU 41B and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact surface soil at SWMU 41B and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	None	There are no workers currently exposed to surface soil at SWMU 41B on a daily basis.
						Dermal	On-site	None	There are no workers currently exposed to surface soil at SWMU 41B on a daily basis.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
		Air	SWMU 41B	Maintenance Worker	Adult	Inhalation	On-site	Quant	Maintenance workers could be exposed to airborne volatiles or particulate matter released from surface soil at SWMU 41B.
				Industrial Worker	Adult	Inhalation	On-site	None	There are no workers currently exposed to airborne volatiles or particulates from surface soil at SWMU 41B on a daily basis.
				Trespasser	Adolescent	Inhalation	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Total Soil (Surface and Subsurface)	Total Soil (Surface and Subsurface)	SWMU 41B	None	None	None	On-site	None	Currently excavation or construction activities are not occurring at SWMU 41B.
	Sediment	Sediment	SWMU 41B	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact sediment at SWMU 41B and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact sediment at SWMU 41B and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	None	There are no workers currently exposed to sediment at SWMU 41B on a daily basis.
						Dermal	On-site	None	There are no workers currently exposed to sediment at SWMU 41B on a daily basis.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Surface Water	Surface Water	SWMU 41B	Maintenance Worker	Adult	Ingestion	On-site	None	Maintenance workers could contact surface water at SWMU 41 while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Maintenance workers could contact surface water at SWMU 41B and be exposed to COPCs via dermal absorption while wading.
				Industrial Worker	Adult	Ingestion	On-site	None	There are no workers currently exposed to surface water at SWMU 41B on a daily basis.
						Dermal	On-site	None	There are no workers currently exposed to surface water at SWMU 41B on a daily basis.

Table E.2-1
Selection of Exposure Pathways - SWMU 41B

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current (cont.)	Surface Water (cont.)	Surface Water	SWMU 41B	Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Groundwater	Groundwater	SWMU 41B	None	None	None	On-site	None	Groundwater is not currently being used at SWMU 41B. Therefore, there is currently no direct exposure to groundwater.
		Air	Volatile groundwater COPCs released to ambient air	Maintenance Worker	Adult	Inhalation	On-site	Quant	Volatiles could be released from groundwater into ambient air. Maintenance workers could be exposed via inhalation.
Future	Surface Soil	Surface Soil	SWMU 41B	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact surface soil at SWMU 41B and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact surface soil at SWMU 41B and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial workers could contact surface soil at SWMU 41B and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Industrial workers could contact surface soil at SWMU 41B and be exposed to COPCs via dermal absorption.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
		Air	SWMU 41B	Maintenance Worker	Adult	Inhalation	On-site	Quant	Maintenance workers could be exposed to airborne volatiles or particulate matter released from surface soil at SWMU 41B.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Industrial workers could be exposed to airborne volatiles or particulate matter released from surface soil at SWMU 41B.
				Trespasser	Adolescent	Inhalation	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Total Soil (Surface and Subsurface)	Total Soil (Surface and Subsurface)	SWMU 41B	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact soil at SWMU 41B and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact soil at SWMU 41B and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial workers could contact soil at SWMU 41B and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Industrial workers could contact soil at SWMU 41B and be exposed to COPCs via dermal absorption.
				Excavation Worker	Adult	Ingestion	On-site	Quant	Excavation workers could contact soil at SWMU 41B and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Excavation workers could contact soil at SWMU 41B and be exposed to COPCs via dermal absorption.
				Resident	Adult	Ingestion	On-site	Quant	If SWMU 41B were to be further developed for residential purposes, residents could be exposed to COPCs in total soil via ingestion. The residential scenario is not considered to be a reasonably anticipated land use; however, it is being included in this evaluation to meet "clean closure" requirements under RCRA.

Table E.2-1
Selection of Exposure Pathways - SWMU 41B

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
						Dermal	On-site	Quant	If SWMU 41B were to be further developed for residential purposes, residents could be exposed to COPCs in total soil via dermal absorption.
Future (cont.)	Total Soil (Surface and Subsurface) (cont.)	Total Soil (Surface and Subsurface)	SWMU 41B	Resident	Child	Ingestion	On-site	Quant	If SWMU 41B were to be further developed for residential purposes, residents could be exposed to COPCs in total soil via ingestion. The residential scenario is not considered to be a reasonably anticipated land use; however, it is being included in this evaluation to meet "clean closure" requirements under RCRA.
						Dermal	On-site	Quant	If SWMU 41B were to be further developed for residential purposes, residents could be exposed to COPCs in total soil via dermal absorption.
				Trespasser	Adolescent	Ingestion	On-site	None	Given the industrial nature of the site, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Given the industrial nature of the site, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
		Air	SWMU 41B	Maintenance Worker	Adult	Inhalation	On-site	Quant	Maintenance workers could be exposed to airborne volatiles or particulate matter released from soils at SWMU 41B.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Industrial workers could be exposed to airborne volatiles or particulate matter released from soils at SWMU 41B.
				Excavation Worker	Adult	Inhalation	On-site	Quant	Excavation workers could be exposed to airborne volatiles or particulate matter released from soils at SWMU 41B.
				Resident	Adult	Inhalation	On-site	Quant	If SWMU 41B were to be further developed for residential purposes, residents could be exposed to airborne volatiles or particulate matter released from total soil.
					Child	Inhalation	On-site	Quant	If SWMU 41B were to be further developed for residential purposes, residents could be exposed to airborne volatiles or particulate matter released from total soil.
				Trespasser	Adolescent	Inhalation	On-site	None	Given the industrial nature of the site, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Sediment	Sediment	SWMU 41B	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact sediment at SWMU 41B and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact sediment at SWMU 41B and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial workers could contact sediment at SWMU 41B and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Industrial workers could contact sediment at SWMU 41B and be exposed to COPCs via dermal absorption.
				Excavation Worker	Adult	Ingestion	On-site	Quant	Excavation workers could contact sediment at SWMU 41B and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Excavation workers could contact sediment at SWMU 41B and be exposed to COPCs via dermal absorption.
				Resident	Adult	Ingestion	On-site	Quant	Adult residents could contact sediment at SWMU 41B and be exposed to COPCs via incidental ingestion during wading.
						Dermal	On-site	Quant	Adult residents could contact sediment at SWMU 41B and be exposed to COPCs via dermal absorption during wading.
					Child	Ingestion	On-site	Quant	Child residents could contact sediment at SWMU 41B and be exposed to COPCs via incidental ingestion during wading.
						Dermal	On-site	Quant	Child residents could contact sediment at SWMU 41B and be exposed to COPCs via dermal absorption during wading.

Table E.2-1
Selection of Exposure Pathways - SWMU 41B

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
Future (cont.)	Surface Water	Surface Water	SWMU 41B	Trespasser	Adolescent	Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
				Maintenance Worker	Adult	Ingestion	On-site	None	Maintenance workers could contact surface water at SWMU 41B while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Maintenance workers could contact surface water at SWMU 41B and be exposed to COPCs via dermal absorption while wading.
				Industrial Worker	Adult	Ingestion	On-site	None	Industrial workers could contact surface water at SWMU 41B while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Industrial workers could contact surface water at SWMU 41B and be exposed to COPCs via dermal absorption while wading.
				Excavation Worker	Adult	Ingestion	On-site	None	Excavation workers could contact surface water at SWMU 41B while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Excavation workers could contact surface water at SWMU 41B and be exposed to COPCs via dermal absorption while wading.
				Resident	Adult	Ingestion	On-site	None	Residents could contact surface water at SWMU 41B while wading. However, due to the shallow depth of the creek, surface water ingestion while wading is considered unlikely.
						Dermal	On-site	Quant	Adult residents could contact surface water at SWMU 41B and be exposed to COPCs via dermal absorption while wading.
					Child	Ingestion	On-site	None	Residents could contact surface water at SWMU 41B while wading. However, due to the shallow depth of the creek, surface water ingestion while wading is considered unlikely.
						Dermal	On-site	Quant	Child residents could contact surface water at SWMU 41B and be exposed to COPCs via dermal absorption while wading.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Groundwater	Groundwater	SWMU 41B	Maintenance Worker	Adult	Ingestion	On-site	None	Maintenance workers would not contact groundwater at SWMU 41B.
						Dermal	On-site	None	Maintenance workers would not contact groundwater at SWMU 41B.
				Industrial Worker	Adult	Ingestion	On-site	Quant	If SWMU 41B were to be further developed for industrial purposes and groundwater wells were installed at the site, site workers could be exposed to COPCs in groundwater via ingestion.
						Dermal	On-site	None	Although site worker dermal exposures to groundwater could occur, the exposed body surface area of a worker (i.e., hands and arms) would be small and exposures would be infrequent.
				Excavation Worker	Adult	Ingestion	On-site	None	Based on the depth to groundwater, excavation workers would not contact groundwater at SWMU 41B.
						Dermal	On-site	None	Based on the depth to groundwater, excavation workers would not contact groundwater at SWMU 41B.

Table E.2-1
Selection of Exposure Pathways - SWMU 41B

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
				Resident	Adult	Ingestion	On-site	Quant	If SWMU 41B were to be further developed for residential purposes, residents could be exposed to COPCs in groundwater via ingestion. The residential scenario is not considered to be a reasonably anticipated land use; however, it is being included in this evaluation to meet "clean closure" requirements under RCRA.
						Dermal	On-site	Quant	If SWMU 41B were to be further developed for residential purposes, residents could be exposed to COPCs in groundwater via dermal absorption.
Future (cont.)	Groundwater (cont.)	Groundwater	SWMU 41B	Resident	Child	Ingestion	On-site	Quant	If SWMU 41B were to be further developed for residential purposes, residents could be exposed to COPCs in groundwater via ingestion. The residential scenario is not considered to be a reasonably anticipated land use; however, it is being included in this evaluation to meet "clean closure" requirements under RCRA.
						Dermal	On-site	Quant	If SWMU 41B were to be further developed for residential purposes, residents could be exposed to COPCs in groundwater via dermal absorption.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely.
		Homegrown fruits and vegetables	SWMU 41B	Resident	Adult	Ingestion	On-site	Quant	Residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables.
					Child	Ingestion	On-site	Quant	Residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables.
		Air	Volatile groundwater COPCs released to ambient air	Maintenance Worker	Adult	Inhalation	On-site	Quant	Volatiles could be released from groundwater into ambient air. Maintenance workers could be exposed via inhalation.
			Indoor Vapors	Industrial Worker	Adult	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into buildings via vapor intrusion.
			Trench Vapors	Excavation Worker	Adult	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into a construction or utility trench via vapor intrusion.
			Volatiles at Showerhead	Resident	Adult	Inhalation	On-site	Quant	If groundwater wells were installed for residential purposes, adult residents could contact volatiles in groundwater via showering.
					Child	Inhalation	On-site	None	Children are assumed to bathe rather than shower. Therefore, inhalation exposure is assessed using only indoor air.
			Indoor Vapors	Resident	Adult	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into residences via vapor intrusion.
					Child	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into residences via vapor intrusion.
			Volatile groundwater COPCs released to ambient air	Trespasser	Adolescent	Inhalation	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
		Groundwater	Off-site	Resident	Adult	Ingestion	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate off-site in the future, off-site residents could be exposed to COPCs in groundwater via ingestion.
						Dermal	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate off-site in the future, off-site residents could be exposed to COPCs in groundwater via dermal absorption.
					Child	Ingestion	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate off-site in the future, off-site residents could be exposed to COPCs in groundwater via ingestion.
						Dermal	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate off-site in the future, off-site residents could be exposed to COPCs in groundwater via dermal absorption.
				Trespasser	Adolescent	Ingestion	Off-site	None	The residential scenario would be protective of the limited exposures that would be experienced by a trespasser.

Table E.2-1
Selection of Exposure Pathways - SWMU 41B

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
						Dermal	Off-site	None	The residential scenario would be protective of the limited exposures that would be experienced by a trespasser.
		Homegrown fruits and vegetables	Off-site	Resident	Adult	Ingestion	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate off-site in the future, off-site residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables.
					Child	Ingestion	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate off-site in the future, off-site residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables.
Future (cont.)	Groundwater (cont.)	Air	Volatile groundwater COPCs released to ambient air	Maintenance Worker	Adult	Inhalation	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate off-site in the future, volatiles could be released from groundwater into ambient air. Off-site maintenance workers could be exposed via inhalation.
			Indoor Vapors	Industrial Worker	Adult	Inhalation	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into off-site buildings via vapor intrusion.
			Trench Vapors	Excavation Worker	Adult	Inhalation	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into an off-site construction or utility trench via vapor intrusion.
			Volatiles at Showerhead	Resident	Adult	Inhalation	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate to off-site wells in the future, adult residents could contact volatiles in groundwater via showering.
					Child	Inhalation	Off-site	None	Children are assumed to bathe rather than shower. Therefore, inhalation exposure is assessed using only indoor air.
			Indoor Vapors	Resident	Adult	Inhalation	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into off-site residences via vapor intrusion.
					Child	Inhalation	Off-site	Quant	If COPCs from SWMU 41B groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into off-site residences via vapor intrusion.
			Volatile groundwater COPCs released to ambient air	Trespasser	Adolescent	Inhalation	Off-site	None	The maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.

Table E.2-2
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant, SWMU 41 Area B - Surface Soil

Scenario Timeframe: Current/ Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	79-34-5	1,1,2,2-Tetrachloroethane	5.80E-03	5.80E-03	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	5.80E-03	N/A	5.90E-01 (C)	N/A	N/A	No	BSL
Surface Soil	87-61-6	1,2,3-Trichlorobenzene	4.00E-04	3.80E-03	mg/kg	41SB8A	5/8	5.00E-03 - 5.00E-03	3.80E-03	N/A	8.70E+00 (N)	N/A	N/A	No	BSL
	120-82-1	1,2,4-Trichlorobenzene	3.00E-04	4.40E-03	mg/kg	41SP2soil	4/8	5.00E-03 - 5.00E-03	4.40E-03	N/A	8.70E+00 (N)	N/A	N/A	No	BSL
	96-12-8	1,2-Dibromo-3-chloropropane	9.40E-03	9.40E-03	mg/kg	41SB6A	1/8	1.00E-02 - 1.00E-02	9.40E-03	N/A	5.60E-03 (C)	N/A	N/A	Yes	ASL
	106-93-4	1,2-Dibromoethane	9.60E-04	9.60E-04	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	9.60E-04	N/A	3.40E-02 (C)	N/A	N/A	No	BSL
	95-50-1	1,2-Dichlorobenzene	7.00E-04	7.00E-04	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	7.00E-04	N/A	2.00E+02 (N)	N/A	N/A	No	BSL
	107-06-2	1,2-Dichloroethane	5.70E-04	5.70E-04	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	5.70E-04	N/A	4.50E-01 (C)	N/A	N/A	No	BSL
	541-73-1	1,3-Dichlorobenzene (5)	5.20E-03	5.20E-03	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	5.20E-03	N/A	2.60E+00 (C)	N/A	N/A	No	BSL
	106-46-7	1,4-Dichlorobenzene	7.40E-04	7.40E-04	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	7.40E-04	N/A	2.60E+00 (C)	N/A	N/A	No	BSL
	78-93-3	2-Butanone	4.00E-03	4.00E-02	mg/kg	41SC20A	8/8	N/A	4.00E-02	N/A	2.80E+03 (N)	N/A	N/A	No	BSL
	591-78-6	2-Hexanone	1.00E-02	1.00E-02	mg/kg	41SB6A	1/8	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	N/A	N/A	Yes	NTX
	108-10-1	4-Methyl-2-pentanone	7.70E-03	7.70E-03	mg/kg	41SB6A	1/8	1.00E-02 - 1.00E-02	7.70E-03	N/A	5.30E+02 (N)	N/A	N/A	No	BSL
	67-64-1	Acetone	2.80E-02	7.30E-02	mg/kg	41SP2soil	6/8	6.00E-02 - 6.00E-02	7.30E-02	N/A	6.10E+03 (N)	N/A	N/A	No	BSL
	5103-71-9	alpha-Chlordane	3.80E-03	3.80E-03	mg/kg	41SB10A	1/3	2.00E-02 - 2.00E-02	3.80E-03	N/A	1.60E+00 (C)	N/A	N/A	No	BSL
	11097-69-1	Aroclor 1254	4.10E-02	4.10E-02	mg/kg	41SB10A	1/3	3.30E-02 - 3.30E-02	4.10E-02	N/A	1.10E-01 (N)	N/A	N/A	No	BSL
	71-43-2	Benzene	2.60E-04	2.80E-03	mg/kg	41SP2soil	8/8	N/A	2.80E-03	N/A	1.10E+00 (C)	N/A	N/A	No	BSL
	117-81-7	bis(2-Ethylhexyl) phthalate	1.60E-02	2.40E-01	mg/kg	41SB10A	8/8	N/A	2.40E-01	N/A	3.50E+01 (C)	N/A	N/A	No	BSL
	74-83-9	Bromomethane	1.70E-03	1.90E-03	mg/kg	41SB8A	4/8	5.00E-03 - 5.00E-03	1.90E-03	N/A	7.90E-01 (N)	N/A	N/A	No	BSL
	75-15-0	Carbon disulfide	1.00E-03	6.00E-03	mg/kg	41SP2soil	7/8	5.00E-03 - 5.00E-03	6.00E-03	N/A	6.70E+01 (N)	N/A	N/A	No	BSL
	108-90-7	Chlorobenzene	2.80E-04	2.80E-04	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	2.80E-04	N/A	3.10E+01 (N)	N/A	N/A	No	BSL
	156-59-2	cis-1,2-Dichloroethene	7.80E-04	7.80E-04	mg/kg	41SC20A	1/8	5.00E-03 - 5.00E-03	7.80E-04	N/A	7.80E+01 (N)	N/A	N/A	No	BSL
	10061-01-5	cis-1,3-Dichloropropene	3.20E-04	3.20E-04	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	3.20E-04	N/A	1.70E+00 (C)	N/A	N/A	No	BSL
	110-82-7	Cyclohexane	6.50E-04	3.20E-03	mg/kg	41SB7A	4/8	1.00E-02 - 1.00E-02	3.20E-03	N/A	7.20E+02 (N)	N/A	N/A	No	BSL
	124-48-1	Dibromochloromethane	5.50E-04	5.50E-04	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	5.50E-04	N/A	7.00E-01 (C)	N/A	N/A	No	BSL
	84-66-2	Diethyl phthalate	1.40E-02	2.30E-02	mg/kg	41SB9A	2/8	1.70E-01 - 1.70E-01	2.30E-02	N/A	4.90E+03 (N)	N/A	N/A	No	BSL
	84-74-2	Di-n-butyl phthalate	2.40E-02	4.00E-01	mg/kg	41SB6A	8/8	N/A	4.00E-01	N/A	6.10E+02 (N)	N/A	N/A	No	BSL
	33213-65-9	Endosulfan II (6)	4.20E-04	4.40E-04	mg/kg	41SP2soil	2/3	2.00E-02 - 2.00E-02	4.40E-04	N/A	3.70E+01 (N)	N/A	N/A	No	BSL
	7421-93-4	Endrin aldehyde (7)	6.00E-04	6.90E-04	mg/kg	41SP2soil	2/3	2.00E-02 - 2.00E-02	6.90E-04	N/A	1.80E+00 (N)	N/A	N/A	No	BSL
	53494-70-5	Endrin ketone (7)	8.60E-04	8.60E-04	mg/kg	41SP2soil	1/3	2.00E-02 - 2.00E-02	8.60E-04	N/A	1.80E+00 (N)	N/A	N/A	No	BSL
	100-41-4	Ethylbenzene	2.00E-04	2.00E-04	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	2.00E-04	N/A	5.70E+00 (C)	N/A	N/A	No	BSL
	206-44-0	Fluoranthene	5.00E-03	5.00E-03	mg/kg	41SB10A	1/8	2.10E-02 - 2.10E-02	5.00E-03	N/A	2.30E+02 (N)	N/A	N/A	No	BSL
	5103-74-2	gamma-Chlordane	8.75E-04	2.10E-03	mg/kg	41SB10A	2/3	2.00E-02 - 2.00E-02	2.10E-03	N/A	1.60E+00 (C)	N/A	N/A	No	BSL
	76-44-8	Heptachlor	5.26E-03	5.26E-03	mg/kg	41SB7A	1/3	2.00E-02 - 2.00E-02	5.26E-03	N/A	1.10E-01 (C)	N/A	N/A	No	BSL
	98-82-8	Isopropylbenzene	2.30E-04	2.30E-04	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	2.30E-04	N/A	2.20E+02 (N)	N/A	N/A	No	BSL
	72-43-5	Methoxychlor	1.10E-03	1.10E-03	mg/kg	41SB10A	1/3	2.00E-02 - 2.00E-02	1.10E-03	N/A	3.10E+01 (N)	N/A	N/A	No	BSL
	79-20-9	Methyl Acetate	5.00E-03	5.00E-03	mg/kg	41SB6A	1/8	1.00E-02 - 1.00E-02	5.00E-03	N/A	7.80E+03 (N)	N/A	N/A	No	BSL
	1634-04-4	Methyl tert-butyl ether	5.80E-04	5.80E-04	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	5.80E-04	N/A	3.90E+01 (C)	N/A	N/A	No	BSL
	108-87-2	Methylcyclohexane	4.20E-04	3.20E-03	mg/kg	41SP2soil	7/8	1.00E-02 - 1.00E-02	3.20E-03	N/A	N/A	N/A	N/A	Yes	NTX
	75-09-2	Methylene chloride	2.80E-03	4.70E-03	mg/kg	41SP2soil	3/8	5.00E-03 - 5.00E-03	4.70E-03	N/A	1.10E+01 (C)	N/A	N/A	No	BSL
	59-50-7	p-Chloro-m-cresol	2.00E-02	2.00E-02	mg/kg	41SB9A	1/8	1.70E-01 - 1.70E-01	2.00E-02	N/A	N/A	N/A	N/A	Yes	NTX
	85-01-8	Phenanthrene (8)	1.70E-03	1.70E-03	mg/kg	41SB10A	1/8	2.10E-02 - 2.10E-02	1.70E-03	N/A	1.70E+02 (N)	N/A	N/A	No	BSL
	129-00-0	Pyrene	3.80E-03	3.80E-03	mg/kg	41SB10A	1/8	2.10E-02 - 2.10E-02	3.80E-03	N/A	1.70E+02 (N)	N/A	N/A	No	BSL
	100-42-5	Styrene	2.70E-03	2.70E-03	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	2.70E-03	N/A	6.50E+02 (N)	N/A	N/A	No	BSL
	108-88-3	Toluene	2.30E-04	3.30E-03	mg/kg	41SP2soil	8/8	N/A	3.30E-03	N/A	5.00E+02 (N)	N/A	N/A	No	BSL
	10061-02-6	trans-1,3-Dichloropropene	4.60E-04	4.60E-04	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	4.60E-04	N/A	1.70E+00 (C)	N/A	N/A	No	BSL

Table E.2-2
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant, SWMU 41 Area B - Surface Soil

Scenario Timeframe: Current/ Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	75-25-2	Tribromomethane	1.20E-03	1.20E-03	mg/kg	41SB6A	1/8	5.00E-03 - 5.00E-03	1.20E-03	N/A	6.10E+01 (C)	N/A	N/A	No	BSL
	75-69-4	Trichlorofluoromethane	1.70E-04	5.20E-04	mg/kg	41SC20A	3/8	5.00E-03 - 5.00E-03	5.20E-04	N/A	8.00E+01 (N)	N/A	N/A	No	BSL
	1330-20-7	Xylenes (total)	5.40E-04	1.90E-03	mg/kg	41SP2soil	7/8	5.00E-03 - 5.00E-03	1.90E-03	N/A	6.00E+01 (N)	N/A	N/A	No	BSL
	7429-90-5	Aluminum	1.44E+04	2.72E+04	mg/kg	41SB7A	8/8	N/A	2.72E+04	N/A	7.70E+03 (N)	N/A	N/A	Yes	ASL
	7440-36-0	Antimony	4.70E-01	7.00E-01	mg/kg	41SB8A	8/8	N/A	7.00E-01	N/A	3.10E+00 (N)	N/A	N/A	No	BSL
	7440-38-2	Arsenic	1.40E+01	2.30E+01	mg/kg	41SB11A	8/8	N/A	2.30E+01	N/A	3.90E-01 (C)	N/A	N/A	Yes	ASL
	7440-39-3	Barium	5.80E+01	2.81E+02	mg/kg	41SP2soil	8/8	N/A	2.81E+02	N/A	1.50E+03 (N)	N/A	N/A	No	BSL
	7440-41-7	Beryllium	9.70E-02	9.70E-01	mg/kg	41SB9A	8/8	N/A	9.70E-01	N/A	1.60E+01 (N)	N/A	N/A	No	BSL
	7440-43-9	Cadmium	1.60E+00	3.50E+00	mg/kg	41SP2soil	8/8	N/A	3.50E+00	N/A	7.00E+00 (N)	N/A	N/A	No	BSL
	7440-70-2	Calcium	2.84E+04	1.54E+05	mg/kg	41SB11A	8/8	N/A	1.54E+05	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-47-3	Chromium	1.20E+01	2.30E+01	mg/kg	41SB7A	8/8	N/A	2.30E+01	N/A	2.80E+02 (C)	N/A	N/A	No	BSL
	7440-48-4	Cobalt	7.20E+00	1.20E+01	mg/kg	41SP2soil	8/8	N/A	1.20E+01	N/A	2.30E+00 (N)	N/A	N/A	Yes	ASL
	7440-50-8	Copper	3.10E+01	5.70E+01	mg/kg	41SB9A	8/8	N/A	5.70E+01	N/A	3.10E+02 (N)	N/A	N/A	No	BSL
	7439-89-6	Iron	2.95E+04	4.75E+04	mg/kg	41SB7A	8/8	N/A	4.75E+04	N/A	5.50E+03 (N)	N/A	N/A	Yes	ASL
	7439-92-1	Lead	3.30E+01	7.50E+01	mg/kg	41SP2soil	8/8	N/A	7.50E+01	N/A	4.00E+02 (N)	N/A	N/A	No	BSL
	7439-95-4	Magnesium	2.09E+04	5.80E+04	mg/kg	41SB11A	8/8	N/A	5.80E+04	N/A	N/A	1.00E+06	RDA	No	BSL
	7439-96-5	Manganese	9.12E+02	2.34E+03	mg/kg	41SP2soil	8/8	N/A	2.34E+03	N/A	1.80E+02 (N)	N/A	N/A	Yes	ASL
	7439-97-6	Mercury (Inorganic)	3.60E-02	2.40E-01	mg/kg	41SB6A	8/8	N/A	2.40E-01	N/A	2.30E+00 (N)	N/A	N/A	No	BSL
	7440-02-0	Nickel	1.60E+01	2.60E+01	mg/kg	41SB7A	8/8	N/A	2.60E+01	N/A	1.50E+02 (N)	N/A	N/A	No	BSL
	7440-09-7	Potassium	5.46E+02	1.44E+03	mg/kg	41SP2soil	8/8	N/A	1.44E+03	N/A	N/A	1.00E+06	RDA	No	BSL
	7782-49-2	Selenium	5.00E-01	9.20E-01	mg/kg	41SB7A	8/8	N/A	9.20E-01	N/A	3.90E+01 (N)	N/A	N/A	No	BSL
	7440-22-4	Silver	6.40E-02	2.20E-01	mg/kg	41SC20A	8/8	N/A	2.20E-01	N/A	3.90E+01 (N)	N/A	N/A	No	BSL
	7440-23-5	Sodium	8.60E+01	3.73E+03	mg/kg	41SP2soil	8/8	N/A	3.73E+03	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-28-0	Thallium	9.20E-02	2.70E-01	mg/kg	41SB6A	6/8	5.00E-01 - 5.00E-01	2.70E-01	N/A	5.10E-01 (N)	N/A	N/A	No	BSL
	7440-62-2	Vanadium (9)	2.60E+01	4.70E+01	mg/kg	41SB6A	8/8	N/A	4.70E+01	N/A	3.90E+01 (N)	N/A	N/A	Yes	ASL
	7440-66-6	Zinc	1.10E+02	2.34E+02	mg/kg	41SP2soil	8/8	N/A	2.34E+02	N/A	2.30E+03 (N)	N/A	N/A	No	BSL
	57-12-5	Total Cyanide	4.00E-02	3.70E-01	mg/kg	41SP2soil	8/8	N/A	3.70E-01	N/A	1.60E+02 (N)	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for residential soil from USEPA Regional Screening Level Table (April 2009) and are based on a risk level of 1.0E-06 and a hazard index of 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes Selection Reason: Toxicity Information Available (TX)
Above Screening Levels (ASL)

Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value for 1,4-dichlorobenzene was used as a surrogate (VDEQ, 2009).

(6) The screening value for endosulfan was used as a surrogate.

(7) The screening value for endrin was used as a surrogate.

(8) The screening value for pyrene was used as a surrogate.

(9) The screening value for vanadium and compounds was used as a surrogate.

Definitions: N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Table E.2-3
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
Surface Soil	95-94-3	1,2,4,5-Tetrachlorobenzene			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+00 (N)	No
	99-35-4	1,3,5-Trinitrobenzene			mg/kg		0/8	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.20E+02 (N)	No
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	N/A	6.10E-01 (N)	No
	118-96-7	2,4,6-Trinitrotoluene			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	N/A	3.60E+00 (N)	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	N/A	1.50E+01 (N)	No
	88-72-2	2-Nitrotoluene			mg/kg		0/8	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.90E+00 (C)	No
	99-08-1	3-Nitrotoluene			mg/kg		0/8	1.00E+00 - 1.00E+00	1.00E+00	N/A	1.20E+02 (N)	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	N/A	1.50E+01 (N)	No
	99-99-0	4-Nitrotoluene			mg/kg		0/8	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.40E+01 (N)	No
	1912-24-9	Atrazine			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	2.10E+00 (C)	No
	92-52-4	Biphenyl			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.90E+02 (N)	No
	105-60-2	Caprolactam			mg/kg		0/8	3.30E-01 - 3.30E-01	3.30E-01	N/A	3.10E+03 (N)	No
	74-97-5	Chlorobromomethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	121-82-4	Cyclonite			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	N/A	5.50E+00 (C)	No
	75-71-8	Dichlorodifluoromethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.90E+01 (N)	No
	76-13-1	Freon 113			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.30E+03 (N)	No
	2691-41-0	HMX			mg/kg		0/8	1.00E+00 - 1.00E+00	1.00E+00	N/A	3.80E+02 (N)	No
	55-63-0	Nitroglycerin			mg/kg		0/8	1.00E+01 - 1.00E+01	1.00E+01	N/A	6.10E-01 (N)	Yes
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/8	1.00E+01 - 1.00E+01	1.00E+01	N/A	N/A	NTX
	479-45-8	Tetryl			mg/kg		0/8	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.40E+01 (N)	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E+01 (N)	No
	93-76-5	2,4,5-T			mg/kg		0/3	5.00E-02 - 5.00E-02	5.00E-02	N/A	6.10E+01 (N)	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/3	5.00E-02 - 5.00E-02	5.00E-02	N/A	4.90E+01 (N)	No
	94-75-7	2,4-D			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	N/A	6.90E+01 (N)	No
	94-82-6	2,4-DB			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	N/A	4.90E+01 (N)	No
	72-54-8	4,4'-DDD			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	2.00E+00 (C)	No
	72-55-9	4,4'-DDE			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	1.40E+00 (C)	No
	50-29-3	4,4-DDT			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	1.70E+00 (C)	No
	309-00-2	Aldrin			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	2.90E-02 (C)	No
	319-84-6	alpha-BHC			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	7.70E-02 (C)	No
	319-85-7	beta-BHC			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	2.70E-01 (C)	No
	75-99-0	Dalapon			mg/kg		0/3	2.00E-01 - 3.40E-01	3.40E-01	N/A	1.80E+02 (N)	No
	319-86-8	delta-BHC			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	5.20E-01 (C)	No
	1918-00-9	Dicamba			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	N/A	1.80E+02 (N)	No
	120-36-5	Dichloroprop			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	N/A	N/A	NTX

Table E.2-3
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	60-57-1	Dieldrin			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	3.00E-02 (C)	No
	959-98-8	Endosulfan I			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	3.70E+01 (N)	No
	1031-07-8	Endosulfan sulfate (5)			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	3.70E+01 (N)	No
	72-20-8	Endrin			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	1.80E+00 (N)	No
	58-89-9	gamma-BHC (Lindane)			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	5.20E-01 (C)	No
	1024-57-3	Heptachlor epoxide			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	N/A	5.30E-02 (C)	No
	94-74-6	MCPA			mg/kg		0/3	2.00E+01 - 2.00E+01	2.00E+01	N/A	3.10E+00 (N)	Yes
	93-65-2	MCPP			mg/kg		0/3	2.00E+01 - 2.00E+01	2.00E+01	N/A	6.10E+00 (N)	Yes
	8001-35-2	Toxaphene			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	4.40E-01 (C)	No
	12674-11-2	Aroclor 1016			mg/kg		0/3	6.60E-02 - 6.60E-02	6.60E-02	N/A	3.90E-01 (N)	No
	11104-28-2	Aroclor 1221			mg/kg		0/3	6.60E-02 - 6.60E-02	6.60E-02	N/A	1.70E-01 (C)	No
	11141-16-5	Aroclor 1232			mg/kg		0/3	6.60E-02 - 6.60E-02	6.60E-02	N/A	1.70E-01 (C)	No
	53469-21-9	Aroclor 1242			mg/kg		0/3	3.30E-02 - 3.30E-02	3.30E-02	N/A	2.20E-01 (C)	No
	12672-29-6	Aroclor 1248			mg/kg		0/3	3.30E-02 - 3.30E-02	3.30E-02	N/A	2.20E-01 (C)	No
	11096-82-5	Aroclor 1260			mg/kg		0/3	6.60E-02 - 6.60E-02	6.60E-02	N/A	2.20E-01 (C)	No
	131-11-3	Dimethylphthalate			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	95-95-4	2,4,5-Trichlorophenol			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+02 (N)	No
	88-06-2	2,4,6-Trichlorophenol			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+00 (N)	No
	120-83-2	2,4-Dichlorophenol			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+01 (N)	No
	105-67-9	2,4-Dimethylphenol			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.20E+02 (N)	No
	51-28-5	2,4-Dinitrophenol			mg/kg		0/8	3.30E-01 - 3.30E-01	3.30E-01	N/A	1.20E+01 (N)	No
	121-14-2	2,4-Dinitrotoluene (6)			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	N/A	7.10E-01 (C)	No
	606-20-2	2,6-Dinitrotoluene (6)			mg/kg		0/8	1.00E+00 - 1.00E+00	1.00E+00	N/A	7.10E-01 (C)	Yes
	91-58-7	2-Chloronaphthalene			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.30E+02 (N)	No
	95-57-8	2-Chlorophenol			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.90E+01 (N)	No
	91-57-6	2-Methylnaphthalene			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.10E+01 (N)	No
	88-74-4	2-Nitroaniline			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	N/A	6.10E+00 (N)	No
	91-94-1	3,3'-Dichlorobenzidine			mg/kg		0/8	5.50E-01 - 1.00E+00	1.00E+00	N/A	1.10E+00 (C)	No
	99-09-2	3-Nitroaniline			mg/kg		0/8	1.70E-01 - 2.25E-01	2.25E-01	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/8	2.10E-01 - 2.25E-01	2.25E-01	N/A	6.10E-01 (N)	No
	100-01-6	4-Nitroaniline			mg/kg		0/8	1.70E-01 - 2.25E-01	2.25E-01	N/A	2.40E+01 (C)	No
	100-02-7	4-Nitrophenol			mg/kg		0/8	3.30E-01 - 3.30E-01	3.30E-01	N/A	N/A	NTX
	83-32-9	Acenaphthene			mg/kg		0/8	1.00E-01 - 1.00E-01	1.00E-01	N/A	3.40E+02 (N)	No

Table E.2-3
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	208-96-8	Acenaphthylene (7)			mg/kg		0/8	2.10E-01 - 2.10E-01	2.10E-01	N/A	1.70E+02 (N)	No
	98-86-2	Acetophenone			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+02 (N)	No
	120-12-7	Anthracene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.70E+03 (N)	No
	100-52-7	Benzaldehyde			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+02 (N)	No
	56-55-3	Benzo(a)anthracene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E-01 (C)	No
	50-32-8	Benzo(a)pyrene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E-02 (C)	Yes
	205-99-2	Benzo(b)fluoranthene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E-01 (C)	No
	191-24-2	Benzo(g,h,i)perylene (7)			mg/kg		0/8	6.00E-02 - 6.00E-02	6.00E-02	N/A	1.70E+02 (N)	No
	207-08-9	Benzo(k)fluoranthene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E+00 (C)	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+01 (N)	No
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.90E-01 (C)	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.50E+00 (C)	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	2.60E+02 (C)	No
	86-74-8	Carbazole			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	218-01-9	Chrysene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E+01 (C)	No
	117-84-0	Di-n-octyl phthalate			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E-02 (C)	Yes
	132-64-9	Dibenzofuran			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	86-73-7	Fluorene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	N/A	2.30E+02 (N)	No
	118-74-1	Hexachlorobenzene			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.00E-01 (C)	No
	87-68-3	Hexachlorobutadiene			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+00 (N)	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.70E+01 (N)	No
	67-72-1	Hexachloroethane			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+00 (N)	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E-01 (C)	No
	78-59-1	Isophorone			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	5.10E+02 (C)	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.90E-02 (C)	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	9.90E+01 (C)	No
	91-20-3	Naphthalene			mg/kg		0/8	1.00E-01 - 1.00E-01	1.00E-01	N/A	3.90E+00 (C)	No
	98-95-3	Nitrobenzene			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	N/A	4.40E+00 (C)	No
	95-48-7	o-Cresol			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.10E+02 (N)	No
	106-47-8	p-Chloroaniline			mg/kg		0/8	1.70E-01 - 2.25E-01	2.25E-01	N/A	2.40E+00 (C)	No
	106-44-5	p-Cresol			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.10E+01 (N)	No
	87-86-5	Pentachlorophenol			mg/kg		0/8	3.30E-01 - 3.30E-01	3.30E-01	N/A	3.00E+00 (C)	No
	108-95-2	Phenol			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+03 (N)	No
	71-55-6	1,1,1-Trichloroethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	9.00E+02 (N)	No

Table E.2-3
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E+00 (C)	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.40E+00 (C)	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.50E+01 (N)	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	9.30E-01 (C)	No
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	75-27-4	Bromodichloromethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.80E-01 (C)	No
	56-23-5	Carbon tetrachloride			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.50E-01 (C)	No
	75-00-3	Chloroethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.50E+03 (N)	No
	74-87-3	Chloromethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.20E+01 (N)	No
	127-18-4	Tetrachloroethene			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	5.70E-01 (C)	No
	79-01-6	Trichloroethene			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.80E+00 (C)	No
	67-66-3	Trichloromethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.00E-01 (C)	No
	75-01-4	Vinyl Chloride			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	N/A	6.00E-02 (C)	No

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for residential soil from USEPA Regional Screening Level Table (April 2009) and are based on a risk level of 1.0E-06 and a hazard index of 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes
Selection Reason:
Infrequent Detection but Associated Historically (HIST)
Toxicity Information Available (TX)
Above Screening Levels (ASL)
No Toxicity Information (NTX)
Deletion Reason:
Infrequent Detection (<= 5%, IFD)
Background Levels (BKG)
Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value is based on endosulfan.

(6) The screening value is based on dinitrotoluene mixtures.

(7) The screening value is based on pyrene as a surrogate.

Definitions:
N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Table E.2-4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant, SWMU 41 Area B - Total Soil

Scenario Timeframe: Current/ Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	N/A	2,3,7,8-TCDD-TE	2.50E-07	5.86E-06	mg/kg	41SB10B	5/5	N/A	5.86E-06	N/A	4.50E-06 (C)	N/A	N/A	Yes	ASL
Total Soil	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.93E-06	3.15E-05	mg/kg	41SB10B	3/5	5.31E-06 - 7.09E-06	3.15E-05	N/A	N/A	N/A	N/A	No	TEQ
	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	3.10E-06	9.85E-05	mg/kg	41SB10B	5/5	N/A	9.85E-05	N/A	N/A	N/A	N/A	No	TEQ
	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.78E-06	1.78E-06	mg/kg	41SB10B	1/5	5.31E-06 - 9.70E-06	1.78E-06	N/A	N/A	N/A	N/A	No	TEQ
	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	2.94E-07	2.01E-06	mg/kg	41SB10B	2/5	5.31E-06 - 9.70E-06	2.01E-06	N/A	N/A	N/A	N/A	No	TEQ
	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.53E-06	2.67E-06	mg/kg	41SC20B	2/5	5.31E-06 - 7.50E-06	2.67E-06	N/A	N/A	N/A	N/A	No	TEQ
	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	2.52E-07	1.41E-06	mg/kg	41SB10B	3/5	5.31E-06 - 7.09E-06	1.41E-06	N/A	N/A	N/A	N/A	No	TEQ
	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	3.71E-06	3.71E-06	mg/kg	41SB10B	1/5	5.31E-06 - 9.70E-06	3.71E-06	N/A	N/A	N/A	N/A	No	TEQ
	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.05E-06	3.91E-06	mg/kg	41SB10B	5/5	N/A	3.91E-06	N/A	N/A	N/A	N/A	No	TEQ
	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	2.58E-07	9.84E-07	mg/kg	41SB10B	2/5	5.31E-06 - 9.70E-06	9.84E-07	N/A	N/A	N/A	N/A	No	TEQ
	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	8.82E-07	8.82E-07	mg/kg	41SB10B	1/5	5.31E-06 - 9.70E-06	8.82E-07	N/A	N/A	N/A	N/A	No	TEQ
	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	3.22E-07	4.14E-06	mg/kg	41SB10B	3/5	1.06E-06 - 1.42E-06	4.14E-06	N/A	N/A	N/A	N/A	No	TEQ
	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	1.51E-06	1.51E-06	mg/kg	41SB10B	1/5	5.31E-06 - 9.70E-06	1.51E-06	N/A	N/A	N/A	N/A	No	TEQ
	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	1.29E-06	1.29E-06	mg/kg	41SB10B	1/5	5.31E-06 - 9.70E-06	1.29E-06	N/A	N/A	N/A	N/A	No	TEQ
	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.68E-07	2.20E-07	mg/kg	41SB10B	2/5	1.06E-06 - 1.94E-06	2.20E-07	N/A	N/A	N/A	N/A	Yes	TEQ
	3268-87-9	Octachlorodibenzodioxin	2.45E-04	3.93E-03	mg/kg	41SB10B	5/5	N/A	3.93E-03	N/A	N/A	N/A	N/A	No	TEQ
	39001-02-0	Octachlorodibenzofuran	2.29E-06	8.88E-05	mg/kg	41SB10B	3/5	1.06E-05 - 1.42E-05	8.88E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 05	Total Heptachlorodibenzofuran	3.06E-06	9.92E-05	mg/kg	41SB10B	3/5	5.31E-06 - 7.09E-06	9.92E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 04	Total Heptachlorodibenzo-p-dioxin	5.75E-06	1.72E-04	mg/kg	41SB10B	5/5	N/A	1.72E-04	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 07	Total Hexachlorodibenzofuran	2.26E-06	4.08E-05	mg/kg	41SB10B	3/5	5.31E-06 - 7.09E-06	4.08E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 06	Total Hexachlorodibenzo-p-dioxin	3.09E-06	2.53E-05	mg/kg	41SB10B	5/5	N/A	2.53E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 09	Total Pentachlorodibenzofuran	1.33E-06	1.38E-05	mg/kg	41SB10B	3/5	5.31E-06 - 7.09E-06	1.38E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 08	Total Pentachlorodibenzo-p-dioxin	7.14E-07	2.62E-06	mg/kg	41SB10B	2/5	5.31E-06 - 9.66E-06	2.62E-06	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 11	Total Tetrachlorodibenzofuran	9.48E-07	2.05E-05	mg/kg	41SB10B	3/5	1.06E-06 - 1.42E-06	2.05E-05	N/A	N/A	N/A	N/A	No	TEQ
	Shaw 10	Total Tetrachlorodibenzo-p-dioxin	1.68E-07	2.20E-07	mg/kg	41SB10B	2/5	1.06E-06 - 1.93E-06	2.20E-07	N/A	N/A	N/A	N/A	No	TEQ
	79-34-5	1,1,2,2-Tetrachloroethane	5.80E-03	5.80E-03	mg/kg	41SB6A	1/18	5.00E-03 - 8.30E-02	5.80E-03	N/A	5.90E-01 (C)	N/A	N/A	No	BSL
	87-61-6	1,2,3-Trichlorobenzene	4.00E-04	3.80E-03	mg/kg	41SB8A	10/18	5.00E-03 - 5.65E-02	3.80E-03	N/A	8.70E+00 (N)	N/A	N/A	No	BSL
	120-82-1	1,2,4-Trichlorobenzene	3.00E-04	2.50E-01	mg/kg	41SC20B	8/18	5.00E-03 - 5.00E-03	2.50E-01	N/A	8.70E+00 (N)	N/A	N/A	No	BSL
	96-12-8	1,2-Dibromo-3-chloropropane	6.90E-03	9.40E-03	mg/kg	41SB6A	2/18	1.00E-02 - 8.30E-02	9.40E-03	N/A	5.60E-03 (C)	N/A	N/A	Yes	ASL
	106-93-4	1,2-Dibromoethane	9.60E-04	9.60E-04	mg/kg	41SB6A	1/18	5.00E-03 - 5.00E-03	9.60E-04	N/A	3.40E-02 (C)	N/A	N/A	No	BSL
	95-50-1	1,2-Dichlorobenzene	7.00E-04	2.83E-02 J	mg/kg	41SC20B	2/18	5.00E-03 - 5.00E-03	2.83E-02	N/A	2.00E+02 (N)	N/A	N/A	No	BSL
	107-06-2	1,2-Dichloroethane	5.70E-04	5.70E-04	mg/kg	41SB6A	1/18	5.00E-03 - 5.00E-03	5.70E-04	N/A	4.50E-01 (C)	N/A	N/A	No	BSL
	541-73-1	1,3-Dichlorobenzene (5)	3.65E-03 J	3.40E-01	mg/kg	41SC20B	4/18	5.00E-03 - 5.00E-03	3.40E-01	N/A	2.60E+00 (C)	N/A	N/A	No	BSL
	106-46-7	1,4-Dichlorobenzene	2.60E-04 J	2.93E-02 J	mg/kg	41SC20B	3/18	5.00E-03 - 5.00E-03	2.93E-02	N/A	2.60E+00 (C)	N/A	N/A	No	BSL
	78-93-3	2-Butanone	2.90E-03	4.00E-02	mg/kg	41SC20A	18/18	N/A	4.00E-02	N/A	2.80E+03 (N)	N/A	N/A	No	BSL
	591-78-6	2-Hexanone	1.00E-02	1.00E-02	mg/kg	41SC6A	1/18	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	N/A	N/A	Yes	NTX
	91-57-6	2-Methylnaphthalene	1.60E-02	1.60E-02	mg/kg	41SB6B	1/18	1.70E-01 - 1.70E-01	1.60E-02	N/A	3.10E+01 (N)	N/A	N/A	No	BSL
	108-10-1	4-Methyl-2-pentanone	7.70E-03	7.70E-03	mg/kg	41SB6A	1/18	1.00E-02 - 1.00E-02	7.70E-03	N/A	5.30E+02 (N)	N/A	N/A	No	BSL
	83-32-9	Acenaphthene	2.00E-02	2.00E-02	mg/kg	41SB8B	1/18	1.00E-01 - 1.00E-01	2.00E-02	N/A	3.40E+02 (N)	N/A	N/A	No	BSL
	67-64-1	Acetone	2.80E-02	1.20E-01	mg/kg	41SB6B	14/18	6.00E-02 - 6.00E-02	1.20E-01	N/A	6.10E+03 (N)	N/A	N/A	No	BSL
	5103-71-9	alpha-Chlordane	3.80E-03	3.80E-03	mg/kg	41SB10A	1/4	2.00E-02 - 2.00E-02	3.80E-03	N/A	1.60E+00 (C)	N/A	N/A	No	BSL
	120-12-7	Anthracene	1.30E-03	5.90E-03 J	mg/kg	41SC20B	2/18	2.10E-02 - 2.10E-02	5.90E-03	N/A	1.70E+03 (N)	N/A	N/A	No	BSL
	11097-69-1	Aroclor 1254	4.10E-02	4.10E-02	mg/kg	41SB10A	1/4	3.30E-02 - 6.60E-02	4.10E-02	N/A	1.10E-01 (N)	N/A	N/A	No	BSL
	71-43-2	Benzene	2.60E-04	1.20E-02	mg/kg	41SB10C	17/18	5.00E-03 - 5.00E-03	1.20E-02	N/A	1.10E+00 (C)	N/A	N/A	No	BSL
	56-55-3	Benzo(a)anthracene	3.90E-02	3.90E-02	mg/kg	41SB8B	1/18	2.10E-02 - 2.10E-02	3.90E-02	N/A	1.50E-01 (C)	N/A	N/A	No	BSL
	50-32-8	Benzo(a)pyrene	1.30E-02	1.30E-02	mg/kg	41SB8B	1/18	2.10E-02 - 2.10E-02	1.30E-02	N/A	1.50E-02 (C)	N/A	N/A	No	BSL
	205-99-2	Benzo(b)fluoranthene	1.60E-02	1.60E-02	mg/kg	41SB8B	1/18	2.10E-02 - 2.10E-02	1.60E-02	N/A	1.50E-01 (C)	N/A	N/A	No	BSL

Table E.2-4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant, SWMU 41 Area B - Total Soil

Scenario Timeframe: Current/ Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	191-24-2	Benzo(g,h,i)perylene (6)	2.50E-02	2.50E-02	mg/kg	41SB8B	1/18	6.00E-02 - 6.00E-02	2.50E-02	N/A	1.70E+02 (N)	N/A	N/A	No	BSL
	207-08-9	Benzo(k)fluoranthene	8.40E-03	8.40E-03	mg/kg	41SB8B	1/18	2.10E-02 - 2.10E-02	8.40E-03	N/A	1.50E+00 (C)	N/A	N/A	No	BSL
	117-81-7	bis(2-Ethylhexyl) phthalate	1.00E-02	4.60E-01	mg/kg	41SB10B	18/18	N/A	4.60E-01	N/A	3.50E+01 (C)	N/A	N/A	No	BSL
	74-83-9	Bromomethane	1.50E-03	2.10E-03	mg/kg	41SB10B	11/18	5.00E-03 - 5.00E-03	2.10E-03	N/A	7.90E-01 (N)	N/A	N/A	No	BSL
	75-15-0	Carbon disulfide	9.60E-04	1.70E-02	mg/kg	41SB8B	15/18	5.00E-03 - 5.00E-03	1.70E-02	N/A	6.70E+01 (N)	N/A	N/A	No	BSL
	108-90-7	Chlorobenzene	2.80E-04	2.80E-04	mg/kg	41SB6A	1/18	5.00E-03 - 5.00E-03	2.80E-04	N/A	3.10E+01 (N)	N/A	N/A	No	BSL
	218-01-9	Chrysene	1.40E-02	1.40E-02	mg/kg	41SB8B	1/18	2.10E-02 - 2.10E-02	1.40E-02	N/A	1.50E+01 (C)	N/A	N/A	No	BSL
	156-59-2	cis-1,2-Dichloroethene	7.80E-04	7.80E-04	mg/kg	41SC20A	1/18	5.00E-03 - 5.00E-03	7.80E-04	N/A	7.80E+01 (N)	N/A	N/A	No	BSL
	10061-01-5	cis-1,3-Dichloropropene	3.20E-04	3.20E-04	mg/kg	41SB6A	1/18	5.00E-03 - 5.00E-03	3.20E-04	N/A	1.70E+00 (C)	N/A	N/A	No	BSL
	110-82-7	Cyclohexane	6.50E-04	2.30E-02	mg/kg	41SB10C	9/18	1.00E-02 - 1.00E-02	2.30E-02	N/A	7.20E+02 (N)	N/A	N/A	No	BSL
	124-48-1	Dibromochloromethane	5.50E-04	5.50E-04	mg/kg	41SB6A	1/18	5.00E-03 - 5.00E-03	5.50E-04	N/A	7.00E-01 (C)	N/A	N/A	No	BSL
	84-66-2	Diethyl phthalate	1.30E-02	4.95E-02 J	mg/kg	41SB9C	6/18	1.70E-01 - 1.70E-01	4.95E-02	N/A	4.90E+03 (N)	N/A	N/A	No	BSL
	84-74-2	Di-n-butyl phthalate	1.90E-02	4.00E-01	mg/kg	41SB6A	18/18	N/A	4.00E-01	N/A	6.10E+02 (N)	N/A	N/A	No	BSL
	33213-65-9	Endosulfan II (7)	4.20E-04	4.40E-04	mg/kg	41SP2soil	2/4	2.00E-02 - 2.00E-02	4.40E-04	N/A	3.70E+01 (N)	N/A	N/A	No	BSL
	7421-93-4	Endrin aldehyde (8)	6.00E-04	6.90E-04	mg/kg	41SP2soil	2/4	2.00E-02 - 2.00E-02	6.90E-04	N/A	1.80E+00 (N)	N/A	N/A	No	BSL
	53494-70-5	Endrin ketone (8)	8.60E-04	8.60E-04	mg/kg	41SP2soil	1/4	2.00E-02 - 2.00E-02	8.60E-04	N/A	1.80E+00 (N)	N/A	N/A	No	BSL
	100-41-4	Ethylbenzene	1.50E-04	1.70E-03	mg/kg	41SB10C	5/18	5.00E-03 - 5.00E-03	1.70E-03	N/A	5.70E+00 (C)	N/A	N/A	No	BSL
	206-44-0	Fluoranthene	5.00E-03	3.30E-02	mg/kg	41SB8B	4/18	2.10E-02 - 2.10E-02	3.30E-02	N/A	2.30E+02 (N)	N/A	N/A	No	BSL
	86-73-7	Fluorene	6.80E-03 J	6.80E-03 J	mg/kg	41SC20B	1/18	2.10E-02 - 2.10E-02	6.80E-03	N/A	2.30E+02 (N)	N/A	N/A	No	BSL
	5103-74-2	gamma-Chlordane	8.75E-04	2.10E-03	mg/kg	41SB10A	2/4	2.00E-02 - 2.00E-02	2.10E-03	N/A	1.60E+00 (C)	N/A	N/A	No	BSL
	76-44-8	Heptachlor	5.26E-03	5.26E-03	mg/kg	41SB7A	1/4	2.00E-02 - 2.00E-02	5.26E-03	N/A	1.10E-01 (C)	N/A	N/A	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	1.30E-02	1.30E-02	mg/kg	41SB8B	1/18	2.10E-02 - 2.10E-02	1.30E-02	N/A	1.50E-01 (C)	N/A	N/A	No	BSL
	98-82-8	Isopropylbenzene	2.30E-04	1.45E-03	mg/kg	41SC20B	3/18	5.00E-03 - 5.00E-03	1.45E-03	N/A	2.20E+02 (N)	N/A	N/A	No	BSL
	72-43-5	Methoxychlor	1.10E-03	1.10E-03	mg/kg	41SB10A	1/4	2.00E-02 - 2.25E-02	1.10E-03	N/A	3.10E+01 (N)	N/A	N/A	No	BSL
	79-20-9	Methyl Acetate	5.50E-04	5.00E-03	mg/kg	41SB6A	6/18	1.00E-02 - 1.00E-02	5.00E-03	N/A	7.80E+03 (N)	N/A	N/A	No	BSL
	1634-04-4	Methyl tert-butyl ether	5.80E-04	5.80E-04	mg/kg	41SB6A	1/18	5.00E-03 - 5.00E-03	5.80E-04	N/A	3.90E+01 (C)	N/A	N/A	No	BSL
	108-87-2	Methylcyclohexane	4.20E-04	3.70E-02	mg/kg	41SB10C	13/18	1.00E-02 - 1.00E-02	3.70E-02	N/A	N/A	N/A	N/A	Yes	NTX
	75-09-2	Methylene chloride	9.80E-04	4.70E-03	mg/kg	41SP2soil	7/18	5.00E-03 - 5.00E-03	4.70E-03	N/A	1.10E+01 (C)	N/A	N/A	No	BSL
	59-50-7	p-Chloro-m-cresol	1.00E-02	2.00E-02	mg/kg	41SB9A	3/18	1.70E-01 - 1.70E-01	2.00E-02	N/A	N/A	N/A	N/A	Yes	NTX
	85-01-8	Phenanthrene (6)	1.70E-03	1.20E-02	mg/kg	41SB8B	5/18	2.10E-02 - 2.10E-02	1.20E-02	N/A	1.70E+02 (N)	N/A	N/A	No	BSL
	129-00-0	Pyrene	3.20E-03	2.10E-02	mg/kg	41SB8B	4/18	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.70E+02 (N)	N/A	N/A	No	BSL
	100-42-5	Styrene	2.70E-03	2.70E-03	mg/kg	41SB6A	1/18	5.00E-03 - 5.00E-03	2.70E-03	N/A	6.50E+02 (N)	N/A	N/A	No	BSL
	127-18-4	Tetrachloroethene	5.10E-04	5.10E-04	mg/kg	41SB10B	1/18	5.00E-03 - 5.00E-03	5.10E-04	N/A	5.70E-01 (C)	N/A	N/A	No	BSL
	108-88-3	Toluene	2.30E-04	5.80E-02	mg/kg	41SB9B	16/18	5.00E-03 - 5.00E-03	5.80E-02	N/A	5.00E+02 (N)	N/A	N/A	No	BSL
	10061-02-6	trans-1,3-Dichloropropene	4.60E-04	4.60E-04	mg/kg	41SB6A	1/18	5.00E-03 - 5.00E-03	4.60E-04	N/A	1.70E+00 (C)	N/A	N/A	No	BSL
	75-25-2	Tribromomethane	1.20E-03	1.20E-03	mg/kg	41SB6A	1/18	5.00E-03 - 5.00E-03	1.20E-03	N/A	6.10E+01 (C)	N/A	N/A	No	BSL
	79-01-6	Trichloroethene	1.36E-03	4.30E-03	mg/kg	41SB9B	4/18	5.00E-03 - 5.00E-03	4.30E-03	N/A	2.80E+00 (C)	N/A	N/A	No	BSL
	75-69-4	Trichlorofluoromethane	1.70E-04	1.49E-03	mg/kg	41SC20B	8/18	5.00E-03 - 5.00E-03	1.49E-03	N/A	8.00E+01 (N)	N/A	N/A	No	BSL
	1330-20-7	Xylenes (total)	5.10E-04	6.30E-03	mg/kg	41SB10C	12/18	5.00E-03 - 5.00E-03	6.30E-03	N/A	6.00E+01 (N)	N/A	N/A	No	BSL
	7429-90-5	Aluminum	2.77E+03	4.24E+04	mg/kg	41SB7B	18/18	N/A	4.24E+04	N/A	7.70E+03 (N)	N/A	N/A	Yes	ASL
	7440-36-0	Antimony	1.10E-01	1.30E+00	mg/kg	41SB10B	18/18	N/A	1.30E+00	N/A	3.10E+00 (N)	N/A	N/A	No	BSL
	7440-38-2	Arsenic	3.20E+00	3.20E+01	mg/kg	41SB9B	18/18	N/A	3.20E+01	N/A	3.90E-01 (C)	N/A	N/A	Yes	ASL
	7440-39-3	Barium	3.50E+01	3.67E+02 J	mg/kg	41SC20B	18/18	N/A	3.67E+02	N/A	1.50E+03 (N)	N/A	N/A	No	BSL
	7440-41-7	Beryllium	5.70E-02	1.35E+00	mg/kg	41SB9C	18/18	N/A	1.35E+00	N/A	1.60E+01 (N)	N/A	N/A	No	BSL
	7440-43-9	Cadmium	6.00E-01	3.50E+00	mg/kg	41SC20A	18/18	N/A	3.50E+00	N/A	7.00E+00 (N)	N/A	N/A	No	BSL
	7440-70-2	Calcium	7.51E+02	1.85E+05	mg/kg	41SB10C	18/18	N/A	1.85E+05	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-47-3	Chromium	1.20E+01	3.00E+01	mg/kg	41SC20C	17/18	5.00E+00 - 5.00E+00	3.00E+01	N/A	2.80E+02 (C)	N/A	N/A	No	BSL

Table E.2-4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant, SWMU 41 Area B - Total Soil

Scenario Timeframe: Current/ Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	7440-48-4	Cobalt	5.80E+00	2.00E+01	mg/kg	41SB8B	18/18	N/A	2.00E+01	N/A	2.30E+00 (N)	N/A	N/A	Yes	ASL
	7440-50-8	Copper	1.20E+01	6.60E+01	mg/kg	41SB10B	18/18	N/A	6.60E+01	N/A	3.10E+02 (N)	N/A	N/A	No	BSL
	7439-89-6	Iron	1.25E+04	6.62E+04	mg/kg	41SB7B	18/18	N/A	6.62E+04	N/A	5.50E+03 (N)	N/A	N/A	Yes	ASL
	7439-92-1	Lead	2.10E+01	1.43E+02	mg/kg	41SB8B	18/18	N/A	1.43E+02	N/A	4.00E+02 (N)	N/A	N/A	No	BSL
	7439-95-4	Magnesium	1.97E+03	1.07E+05	mg/kg	41SB10C	18/18	N/A	1.07E+05	N/A	N/A	1.00E+06	RDA	No	BSL
	7439-96-5	Manganese	9.90E+01	2.91E+03	mg/kg	41SC20B	18/18	N/A	2.91E+03	N/A	1.80E+02 (N)	N/A	N/A	Yes	ASL
	7439-97-6	Mercury (Inorganic)	3.60E-02	6.50E-01	mg/kg	41SB6B	18/18	N/A	6.50E-01	N/A	2.30E+00 (N)	N/A	N/A	No	BSL
	7440-02-0	Nickel	8.40E+00	2.75E+01	mg/kg	41SB9C	18/18	N/A	2.75E+01	N/A	1.50E+02 (N)	N/A	N/A	No	BSL
	7440-09-7	Potassium	1.98E+02	3.50E+03	mg/kg	41SB9C	18/18	N/A	3.50E+03	N/A	N/A	1.00E+06	RDA	No	BSL
	7782-49-2	Selenium	4.20E-01	9.60E-01	mg/kg	41SB10C	18/18	N/A	9.60E-01	N/A	3.90E+01 (N)	N/A	N/A	No	BSL
	7440-22-4	Silver	5.00E-02	3.25E-01 J	mg/kg	41SC20B	18/18	N/A	3.25E-01	N/A	3.90E+01 (N)	N/A	N/A	No	BSL
	7440-23-5	Sodium	8.60E+01	2.42E+04	mg/kg	41SB10B	18/18	N/A	2.42E+04	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-28-0	Thallium	9.20E-02	3.25E-01	mg/kg	41SB9C	16/18	5.00E-01 - 5.00E-01	3.25E-01	N/A	5.10E-01 (N)	N/A	N/A	No	BSL
	7440-62-2	Vanadium (9)	1.60E+01	7.00E+01	mg/kg	41SB7B	18/18	N/A	7.00E+01	N/A	3.90E+01 (N)	N/A	N/A	Yes	ASL
	7440-66-6	Zinc	8.10E+01	3.80E+02	mg/kg	41SB10B	18/18	N/A	3.80E+02	N/A	2.30E+03 (N)	N/A	N/A	No	BSL
	57-12-5	Total Cyanide	4.00E-02	4.90E+00	mg/kg	41SB10B	18/18	N/A	4.90E+00	N/A	1.60E+02 (N)	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for residential soil from USEPA Regional Screening Level Table (April 2009) and are based on a risk level of 1.0E-06 and a hazard index of 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes Selection Reason: Toxicity Information Available (TX)
Above Screening Levels (ASL)

Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value for 1,4-dichlorobenzene was used as a surrogate (VDEQ, 2009).

(6) The screening value for pyrene was used as a surrogate.

(7) The screening value for endosulfan was used as a surrogate.

(8) The screening value for endrin was used as a surrogate.

(9) The screening value for vanadium and compounds was used as a surrogate.

Definitions: N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Table E.2-5
Summary of Screening for Non-Detected Chemicals
Current/Future - Total Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
Total Soil	95-94-3	1,2,4,5-Tetrachlorobenzene			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+00 (N)	No
	99-35-4	1,3,5-Trinitrobenzene			mg/kg		0/18	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.20E+02 (N)	No
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/18	5.00E-01 - 5.00E-01	5.00E-01	N/A	6.10E-01 (N)	No
	118-96-7	2,4,6-Trinitrotoluene			mg/kg		0/18	5.00E-01 - 5.00E-01	5.00E-01	N/A	3.60E+00 (N)	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/18	5.00E-01 - 5.00E-01	5.00E-01	N/A	1.50E+01 (N)	No
	88-72-2	2-Nitrotoluene			mg/kg		0/18	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.90E+00 (C)	No
	99-08-1	3-Nitrotoluene			mg/kg		0/18	1.00E+00 - 1.00E+00	1.00E+00	N/A	1.20E+02 (N)	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/18	5.00E-01 - 5.00E-01	5.00E-01	N/A	1.50E+01 (N)	No
	99-99-0	4-Nitrotoluene			mg/kg		0/18	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.40E+01 (N)	No
	1912-24-9	Atrazine			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	2.10E+00 (C)	No
	92-52-4	Biphenyl			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.90E+02 (N)	No
	105-60-2	Caprolactam			mg/kg		0/18	3.30E-01 - 3.30E-01	3.30E-01	N/A	3.10E+03 (N)	No
	74-97-5	Chlorobromomethane			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	121-82-4	Cyclonite			mg/kg		0/18	5.00E-01 - 5.00E-01	5.00E-01	N/A	5.50E+00 (C)	No
	75-71-8	Dichlorodifluoromethane			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.90E+01 (N)	No
	76-13-1	Freon 113			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.30E+03 (N)	No
	2691-41-0	HMX			mg/kg		0/18	1.00E+00 - 1.00E+00	1.00E+00	N/A	3.80E+02 (N)	No
	55-63-0	Nitroglycerin			mg/kg		0/18	1.00E+01 - 1.00E+01	1.00E+01	N/A	6.10E-01 (N)	Yes
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/18	1.00E+01 - 1.00E+01	1.00E+01	N/A	N/A	NTX
	479-45-8	Tetryl			mg/kg		0/18	1.00E+00 - 1.00E+00	1.00E+00	N/A	2.40E+01 (N)	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E+01 (N)	No
	93-76-5	2,4,5-T			mg/kg		0/4	5.00E-02 - 5.00E-02	5.00E-02	N/A	6.10E+01 (N)	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/4	5.00E-02 - 5.00E-02	5.00E-02	N/A	4.90E+01 (N)	No
	94-75-7	2,4-D			mg/kg		0/4	2.00E-01 - 2.00E-01	2.00E-01	N/A	6.90E+01 (N)	No
	94-82-6	2,4-DB			mg/kg		0/4	2.00E-01 - 2.00E-01	2.00E-01	N/A	4.90E+01 (N)	No
	72-54-8	4,4'-DDD			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	2.00E+00 (C)	No
	72-55-9	4,4'-DDE			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	1.40E+00 (C)	No
	50-29-3	4,4-DDT			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	1.70E+00 (C)	No
	309-00-2	Aldrin			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	2.90E-02 (C)	No
	319-84-6	alpha-BHC			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	7.70E-02 (C)	No
	319-85-7	beta-BHC			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	2.70E-01 (C)	No
	75-99-0	Dalapon			mg/kg		0/4	2.00E-01 - 4.00E-01	4.00E-01	N/A	1.80E+02 (N)	No
	319-86-8	delta-BHC			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	5.20E-01 (C)	No

Table E.2-5
Summary of Screening for Non-Detected Chemicals
Current/Future - Total Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	1918-00-9	Dicamba			mg/kg		0/4	2.00E-01 - 2.00E-01	2.00E-01	N/A	1.80E+02 (N)	No
	120-36-5	Dichloroprop			mg/kg		0/4	2.00E-01 - 2.00E-01	2.00E-01	N/A	N/A	NTX
	60-57-1	Dieldrin			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	3.00E-02 (C)	No
	959-98-8	Endosulfan I			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	3.70E+01 (N)	No
	1031-07-8	Endosulfan sulfate (5)			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	3.70E+01 (N)	No
	72-20-8	Endrin			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	1.80E+00 (N)	No
	58-89-9	gamma-BHC (Lindane)			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	5.20E-01 (C)	No
	1024-57-3	Heptachlor epoxide			mg/kg		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	5.30E-02 (C)	No
	94-74-6	MCPA			mg/kg		0/4	2.00E+01 - 2.00E+01	2.00E+01	N/A	3.10E+00 (N)	Yes
	93-65-2	MCPP			mg/kg		0/4	2.00E+01 - 2.00E+01	2.00E+01	N/A	6.10E+00 (N)	Yes
	8001-35-2	Toxaphene			mg/kg		0/4	1.70E-01 - 2.60E-01	2.60E-01	N/A	4.40E-01 (C)	No
	12674-11-2	Aroclor 1016			mg/kg		0/4	6.60E-02 - 6.60E-02	6.60E-02	N/A	3.90E-01 (N)	No
	11104-28-2	Aroclor 1221			mg/kg		0/4	6.60E-02 - 6.60E-02	6.60E-02	N/A	1.70E-01 (C)	No
	11141-16-5	Aroclor 1232			mg/kg		0/4	6.60E-02 - 6.60E-02	6.60E-02	N/A	1.70E-01 (C)	No
	53469-21-9	Aroclor 1242			mg/kg		0/4	3.30E-02 - 3.30E-02	3.30E-02	N/A	2.20E-01 (C)	No
	12672-29-6	Aroclor 1248			mg/kg		0/4	3.30E-02 - 3.30E-02	3.30E-02	N/A	2.20E-01 (C)	No
	11096-82-5	Aroclor 1260			mg/kg		0/4	6.60E-02 - 6.60E-02	6.60E-02	N/A	2.20E-01 (C)	No
	131-11-3	Dimethylphthalate			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	95-95-4	2,4,5-Trichlorophenol			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+02 (N)	No
	88-06-2	2,4,6-Trichlorophenol			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+00 (N)	No
	120-83-2	2,4-Dichlorophenol			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+01 (N)	No
	105-67-9	2,4-Dimethylphenol			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.20E+02 (N)	No
	51-28-5	2,4-Dinitrophenol			mg/kg		0/18	3.30E-01 - 3.30E-01	3.30E-01	N/A	1.20E+01 (N)	No
	121-14-2	2,4-Dinitrotoluene (6)			mg/kg		0/18	5.00E-01 - 5.00E-01	5.00E-01	N/A	7.10E-01 (C)	No
	606-20-2	2,6-Dinitrotoluene (6)			mg/kg		0/18	1.00E+00 - 1.00E+00	1.00E+00	N/A	7.10E-01 (C)	Yes
	91-58-7	2-Chloronaphthalene			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.30E+02 (N)	No
	95-57-8	2-Chlorophenol			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.90E+01 (N)	No
	88-74-4	2-Nitroaniline			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/kg		0/4	2.00E-01 - 2.00E-01	2.00E-01	N/A	6.10E+00 (N)	No
	91-94-1	3,3'-Dichlorobenzidine			mg/kg		0/18	5.50E-01 - 1.00E+00	1.00E+00	N/A	1.10E+00 (C)	No
	99-09-2	3-Nitroaniline			mg/kg		0/18	1.70E-01 - 2.25E-01	2.25E-01	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/18	2.10E-01 - 2.25E-01	2.25E-01	N/A	6.10E-01 (N)	No

Table E.2-5
Summary of Screening for Non-Detected Chemicals
Current/Future - Total Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	100-01-6	4-Nitroaniline			mg/kg		0/18	1.70E-01 - 2.25E-01	2.25E-01	N/A	2.40E+01 (C)	No
	100-02-7	4-Nitrophenol			mg/kg		0/18	3.30E-01 - 3.30E-01	3.30E-01	N/A	N/A	NTX
	208-96-8	Acenaphthylene (7)			mg/kg		0/18	2.10E-01 - 2.10E-01	2.10E-01	N/A	1.70E+02 (N)	No
	98-86-2	Acetophenone			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+02 (N)	No
	100-52-7	Benzaldehyde			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+02 (N)	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+01 (N)	No
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.90E-01 (C)	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.50E+00 (C)	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	2.60E+02 (C)	No
	86-74-8	Carbazole			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	117-84-0	Di-n-octyl phthalate			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/kg		0/18	2.10E-02 - 2.10E-02	2.10E-02	N/A	1.50E-02 (C)	Yes
	132-64-9	Dibenzofuran			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	118-74-1	Hexachlorobenzene			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.00E-01 (C)	No
	87-68-3	Hexachlorobutadiene			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+00 (N)	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.70E+01 (N)	No
	67-72-1	Hexachloroethane			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.10E+00 (N)	No
	78-59-1	Isophorone			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	5.10E+02 (C)	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	6.90E-02 (C)	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	9.90E+01 (C)	No
	91-20-3	Naphthalene			mg/kg		0/18	1.00E-01 - 1.00E-01	1.00E-01	N/A	3.90E+00 (C)	No
	98-95-3	Nitrobenzene			mg/kg		0/18	5.00E-01 - 5.00E-01	5.00E-01	N/A	4.40E+00 (C)	No
	95-48-7	o-Cresol			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.10E+02 (N)	No
	106-47-8	p-Chloroaniline			mg/kg		0/18	1.70E-01 - 2.25E-01	2.25E-01	N/A	2.40E+00 (C)	No
	106-44-5	p-Cresol			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.10E+01 (N)	No
	87-86-5	Pentachlorophenol			mg/kg		0/18	3.30E-01 - 3.30E-01	3.30E-01	N/A	3.00E+00 (C)	No
	108-95-2	Phenol			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+03 (N)	No
	71-55-6	1,1,1-Trichloroethane			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	9.00E+02 (N)	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E+00 (C)	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.40E+00 (C)	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.50E+01 (N)	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	9.30E-01 (C)	No
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX

Table E.2-5
Summary of Screening for Non-Detected Chemicals
Current/Future - Total Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/18	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	NTX
	75-27-4	Bromodichloromethane			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.80E-01 (C)	No
	56-23-5	Carbon tetrachloride			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.50E-01 (C)	No
	75-00-3	Chloroethane			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.50E+03 (N)	No
	74-87-3	Chloromethane			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.20E+01 (N)	No
	67-66-3	Trichloromethane			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.00E-01 (C)	No
	75-01-4	Vinyl Chloride			mg/kg		0/18	5.00E-03 - 5.00E-03	5.00E-03	N/A	6.00E-02 (C)	No

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for residential soil from USEPA Regional Screening Level Table (April 2009) and
are based on a risk level of 1.0E-06 and a hazard index of 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes
Selection Reason:
Infrequent Detection but Associated Historically (HIST)
Toxicity Information Available (TX)
Above Screening Levels (ASL)
No Toxicity Information (NTX)
Deletion Reason:
Infrequent Detection (<= 5%, IFD)
Background Levels (BKG)
Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value is based on endosulfan.

(6) The screening value is based on dinitrotoluene mixtures.

(7) The screening value is based on pyrene as a surrogate.

Definitions: N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Table E.2-6
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant, SWMU 41 Area B - Sediment

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
Sediment	N/A	2,3,7,8-TCDD-TE	1.18E-06	1.18E-06	mg/kg	41SD11	1/1	N/A	1.18E-06	N/A	4.50E-05 (C)	N/A	N/A	No	BSL
	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.20E-06 B	4.20E-06 B	mg/kg	41SD11	1/1	N/A	4.20E-06	N/A	N/A	N/A	N/A	No	TEQ
	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	2.79E-05	2.79E-05	mg/kg	41SD11	1/1	N/A	2.79E-05	N/A	N/A	N/A	N/A	No	TEQ
	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.61E-07 J	3.61E-07 J	mg/kg	41SD11	1/1	N/A	3.61E-07	N/A	N/A	N/A	N/A	No	TEQ
	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	8.01E-07 B	8.01E-07 B	mg/kg	41SD11	1/1	N/A	8.01E-07	N/A	N/A	N/A	N/A	No	TEQ
	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	2.14E-07 J	2.14E-07 J	mg/kg	41SD11	1/1	N/A	2.14E-07	N/A	N/A	N/A	N/A	No	TEQ
	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	2.97E-07 J	2.97E-07 J	mg/kg	41SD11	1/1	N/A	2.97E-07	N/A	N/A	N/A	N/A	No	TEQ
	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	5.37E-07 J	5.37E-07 J	mg/kg	41SD11	1/1	N/A	5.37E-07	N/A	N/A	N/A	N/A	No	TEQ
	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.27E-06 J	1.27E-06 J	mg/kg	41SD11	1/1	N/A	1.27E-06	N/A	N/A	N/A	N/A	No	TEQ
	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	2.35E-07 J	2.35E-07 J	mg/kg	41SD11	1/1	N/A	2.35E-07	N/A	N/A	N/A	N/A	No	TEQ
	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	3.42E-07 J	3.42E-07 J	mg/kg	41SD11	1/1	N/A	3.42E-07	N/A	N/A	N/A	N/A	No	TEQ
	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	3.56E-07 J	3.56E-07 J	mg/kg	41SD11	1/1	N/A	3.56E-07	N/A	N/A	N/A	N/A	No	TEQ
	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	4.92E-07 B	4.92E-07 B	mg/kg	41SD11	1/1	N/A	4.92E-07	N/A	N/A	N/A	N/A	No	TEQ
	3268-87-9	Octachlorodibenzodioxin	1.71E-03	1.71E-03	mg/kg	41SD11	1/1	N/A	1.71E-03	N/A	N/A	N/A	N/A	No	TEQ
	39001-02-0	Octachlorodibenzofuran	1.12E-05 B	1.12E-05 B	mg/kg	41SD11	1/1	N/A	1.12E-05	N/A	N/A	N/A	N/A	No	TEQ
	N/A	Total Heptachlorodibenzofuran	1.05E-05	1.05E-05	mg/kg	41SD11	1/1	N/A	1.05E-05	N/A	N/A	N/A	N/A	No	TEQ
	N/A	Total Heptachlorodibenzo-p-dioxin	6.59E-05	6.59E-05	mg/kg	41SD11	1/1	N/A	6.59E-05	N/A	N/A	N/A	N/A	No	TEQ
	N/A	Total Hexachlorodibenzofuran	5.08E-06 J	5.08E-06 J	mg/kg	41SD11	1/1	N/A	5.08E-06	N/A	N/A	N/A	N/A	No	TEQ
	N/A	Total Hexachlorodibenzo-p-dioxin	8.65E-06	8.65E-06	mg/kg	41SD11	1/1	N/A	8.65E-06	N/A	N/A	N/A	N/A	No	TEQ
	N/A	Total Pentachlorodibenzofuran	3.10E-06 J	3.10E-06 J	mg/kg	41SD11	1/1	N/A	3.10E-06	N/A	N/A	N/A	N/A	No	TEQ
	N/A	Total Pentachlorodibenzo-p-dioxin	2.68E-07	2.68E-07	mg/kg	41SD11	1/1	N/A	2.68E-07	N/A	N/A	N/A	N/A	No	TEQ
	N/A	Total Tetrachlorodibenzofuran	2.55E-06 J	2.55E-06 J	mg/kg	41SD11	1/1	N/A	2.55E-06	N/A	N/A	N/A	N/A	No	TEQ
	78-93-3	2-Butanone	1.10E-02	2.70E-02	mg/kg	41SD4	3/4	2.80E-02 - 2.80E-02	2.70E-02	N/A	2.80E+04 N	N/A	N/A	No	BSL
	50-29-3	4,4'-DDT	6.62E-03	6.62E-03	mg/kg	41SD3	1/4	2.00E-02 - 3.90E-02	6.62E-03	N/A	1.70E+01 C	N/A	N/A	No	BSL
	11097-69-1	Aroclor 1254	1.75E-02	9.02E-02	mg/kg	41SD11	2/4	6.60E-02 - 6.60E-02	9.02E-02	N/A	1.10E+00 C	N/A	N/A	No	BSL
	71-43-2	Benzene	2.00E-04	2.45E-04	mg/kg	41SD3	2/4	5.00E-03 - 5.60E-03	2.45E-04	N/A	1.10E+01 C	N/A	N/A	No	BSL
	117-81-7	bis(2-Ethylhexyl) phthalate	2.20E-02	4.65E-02	mg/kg	41SD3	3/4	3.80E-01 - 3.80E-01	4.65E-02	N/A	3.50E+02 C	N/A	N/A	No	BSL
	85-68-7	Butyl benzyl phthalate	4.95E-02	4.95E-02	mg/kg	41SD3	1/4	1.70E-01 - 3.80E-01	4.95E-02	N/A	2.60E+03 C	N/A	N/A	No	BSL
	75-15-0	Carbon disulfide	5.65E-03	5.65E-03	mg/kg	41SD3	1/4	5.00E-03 - 5.60E-03	5.65E-03	N/A	6.70E+02 N	N/A	N/A	No	BSL
	67-66-3	Chloroform	1.80E-03 J	1.80E-03 J	mg/kg	41SD3	2/4	5.00E-03 - 5.60E-03	1.80E-03	N/A	3.00E+00 C	N/A	N/A	No	BSL
	84-74-2	Di-n-butyl phthalate	4.40E-02	1.43E-01	mg/kg	41SD3	3/4	3.80E-01 - 3.80E-01	1.43E-01	N/A	6.10E+03 N	N/A	N/A	No	BSL
	7421-93-4	Endrin aldehyde (5)	1.74E-03	6.10E-03	mg/kg	41SD3	2/4	1.90E-02 - 2.00E-02	6.10E-03	N/A	1.80E+01 N	N/A	N/A	No	BSL
	75-09-2	Methylene chloride	4.20E-03	5.75E-03	mg/kg	41SD3	3/4	1.10E-02 - 1.10E-02	5.75E-03	N/A	1.10E+02 C	N/A	N/A	No	BSL
	85-01-8	Phenanthrene (6)	1.60E-03	1.60E-03	mg/kg	41SD4	1/4	2.10E-02 - 3.10E-01	1.60E-03	N/A	1.70E+03 N	N/A	N/A	No	BSL
	108-88-3	Toluene	6.16E-03	6.16E-03	mg/kg	41SD3	1/4	5.00E-03 - 5.60E-03	6.16E-03	N/A	5.00E+03 N	N/A	N/A	No	BSL
	57-12-5	Total Cyanide	8.50E-02	2.00E+00	mg/kg	41SD2	3/3	N/A	2.00E+00	N/A	1.60E+03 N	N/A	N/A	No	BSL
	79-01-6	Trichloroethene	1.66E-03 J	1.66E-03 J	mg/kg	41SD3	1/4	5.00E-03 - 5.60E-03	1.66E-03	N/A	2.80E+01 C	N/A	N/A	No	BSL
	7429-90-5	Aluminum	1.43E+04	1.59E+04	mg/kg	41SD2	4/4	N/A	1.59E+04	N/A	7.70E+04 N	N/A	N/A	No	BSL
	7440-36-0	Antimony	2.30E-01	3.60E-01	mg/kg	41SD2	3/3	N/A	3.60E-01	N/A	3.10E+01 N	N/A	N/A	No	BSL
	7440-38-2	Arsenic	1.30E+01	1.66E+01	mg/kg	41SD11	4/4	N/A	1.66E+01	N/A	3.90E+00 C	N/A	N/A	Yes	ASL
	7440-39-3	Barium	1.46E+02	2.19E+02	mg/kg	41SD11	4/4	N/A	2.19E+02	N/A	1.50E+04 N	N/A	N/A	No	BSL
	7440-41-7	Beryllium	6.40E-01	1.00E+00	mg/kg	41SD11	4/4	N/A	1.00E+00	N/A	1.60E+02 N	N/A	N/A	No	BSL

Table E.2-6
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant, SWMU 41 Area B - Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
Sediment	7440-43-9	Cadmium	1.70E+00	2.50E+00	mg/kg	41SD4	3/4	5.60E-02 - 5.60E-02	2.50E+00	N/A	7.00E+01 N	N/A	N/A	No	BSL
	7440-70-2	Calcium	9.33E+03	3.52E+04	mg/kg	41SD4	4/4	N/A	3.52E+04	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-47-3	Chromium	2.04E+01	3.50E+01	mg/kg	41SD3	4/4	N/A	3.50E+01	N/A	2.80E+03 C	N/A	N/A	No	BSL
	7440-48-4	Cobalt	1.34E+01	2.00E+01	mg/kg	41SD2	4/4	N/A	2.00E+01	N/A	2.30E+01 N	N/A	N/A	No	BSL
	7440-50-8	Copper	2.80E+01	3.84E+01	mg/kg	41SD11	4/4	N/A	3.84E+01	N/A	3.10E+03 N	N/A	N/A	No	BSL
	7439-89-6	Iron	2.59E+04	4.28E+04	mg/kg	41SD4	4/4	N/A	4.28E+04	N/A	5.50E+04 N	N/A	N/A	No	BSL
	7439-92-1	Lead	2.60E+01	5.93E+01	mg/kg	41SD11	4/4	N/A	5.93E+01	N/A	4.00E+02 N	N/A	N/A	No	BSL
	7439-95-4	Magnesium	6.84E+03	1.90E+04	mg/kg	41SD4	4/4	N/A	1.90E+04	N/A	N/A	1.00E+06	RDA	No	BSL
	7439-96-5	Manganese	1.57E+03	2.80E+03	mg/kg	41SD11	4/4	N/A	2.80E+03	N/A	1.80E+03 N	N/A	N/A	Yes	ASL
	7439-97-6	Mercury (7)	3.25E-02	3.70E-02	mg/kg	41SD2	3/3	N/A	3.70E-02	N/A	7.80E+00 N	N/A	N/A	No	BSL
	7440-02-0	Nickel	1.34E+01	2.20E+01	mg/kg	41SD3	4/4	N/A	2.20E+01	N/A	1.50E+03 N	N/A	N/A	No	BSL
	7440-09-7	Potassium	1.66E+03	1.88E+03	mg/kg	41SD2	3/3	N/A	1.88E+03	N/A	N/A	1.00E+06	RDA	No	BSL
	7782-49-2	Selenium	4.85E-01	5.40E+00 K	mg/kg	41SD11	4/4	N/A	5.40E+00	N/A	3.90E+02 N	N/A	N/A	No	BSL
	7440-22-4	Silver	1.00E-01	1.10E-01	mg/kg	41SD2	3/4	5.10E-02 - 5.10E-02	1.10E-01	N/A	3.90E+02 N	N/A	N/A	No	BSL
	7440-23-5	Sodium	5.10E+01	2.15E+03	mg/kg	41SD11	4/4	N/A	2.15E+03	N/A	N/A	1.00E+06	N/A	No	BSL
	7440-28-0	Thallium	1.10E-01	1.30E-01	mg/kg	41SD4	3/3	N/A	1.30E-01	N/A	5.10E+00 N	N/A	N/A	No	BSL
	7440-62-2	Vanadium (8)	2.90E+01	3.90E+01	mg/kg	41SD4	4/4	N/A	3.90E+01	N/A	3.90E+02 N	N/A	N/A	No	BSL
	7440-66-6	Zinc	9.60E+01	1.55E+02	mg/kg	41SD4	4/4	N/A	1.55E+02	N/A	2.30E+04 N	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for residential soil from USEPA Regional Screening Level Table (April 2009) and are based on a risk level of 1.0E-06 and a hazard index of 0.1, then adjusted by a factor of 10 for sediment exposures.
See text for derivation of Nutrient RDAs.

(4) Rationale Codes

Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- No Toxicity Information (NTX)

Deletion Reason:
- Infrequent Detection (<= 5%, IFD)
- Background Levels (BKG)
- Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value for endrin was used as a surrogate.

(6) The screening value for pyrene was used as a surrogate.

(7) The screening value for methylmercury was used for sediment.

(8) The screening value for vanadium and compounds was used.

Definitions:
- N/A = Not Applicable or Not Available
- SQL = Sample Quantitation Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
- MCL = Federal Maximum Contaminant Level
- SMCL = Secondary Maximum Contaminant Level
- J, K = Estimated Value
- C = Carcinogenic
- N = Non-Carcinogenic
- RDA = Recommended Daily Allowance

Table E.2-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Above Screening Value (Y/N)
Sediment	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran			mg/kg		0/1	5.94E-07- 5.94E-07	5.94E-07	N/A	N/A	NTX
	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin			mg/kg		0/1	5.94E-07- 5.94E-07	5.94E-07	N/A	N/A	NTX
	90-12-0	1-Methylnaphthalene			mg/kg		0/1	3.10E-01 - 3.10E-01	3.10E-01	N/A	2.20E+02 (C)	No
	ICF14A-AA-I	3&4-Methylphenol			mg/kg		0/1	1.90E-01 - 1.90E-01	1.90E-01	N/A	3.10E+02 (N)	No
	100-51-6	Benzyl alcohol			mg/kg		0/1	1.90E-01 - 1.90E-01	1.90E-01	N/A	3.10E+04 (N)	No
	ICF87	m+p-Xylenes			mg/kg		0/1	1.10E-02 - 1.10E-02	1.10E-02	N/A	6.00E+02 (N)	No
	95-47-6	o-Xylene			mg/kg		0/1	5.60E-03 - 5.60E-03	5.60E-03	N/A	5.30E+03 (N)	No
	Shaw 10	Total Tetrachlorodibenzo-p-dioxin			mg/kg		0/1	1.81E-07 - 1.81E-07	1.81E-07	N/A	N/A	NTX
	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin			mg/kg		0/1	1.81E-07 - 1.81E-07	1.81E-07	N/A	4.50E-05 (C)	No
	65-85-0	Benzoic Acid			mg/kg		0/1	9.50E-01 - 9.50E-01	9.50E-01	N/A	2.40E+05 (N)	No
	87-61-6	1,2,3-Trichlorobenzene			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	8.70E+01 (N)	No
	95-94-3	1,2,4,5-Tetrachlorobenzene			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.80E+01 (N)	No
	96-12-8	1,2-Dibromo-3-chloropropane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	N/A	5.60E-02 (C)	No
	106-93-4	1,2-Dibromoethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.40E-01 (C)	No
	1912-24-9	Atrazine			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	2.10E+01 (C)	No
	92-52-4	Biphenyl			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.90E+03 (N)	No
	105-60-2	Caprolactam			mg/kg		0/3	3.30E-01 - 3.30E-01	3.30E-01	N/A	3.10E+04 (N)	No
	74-97-5	Chlorobromomethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	110-82-7	Cyclohexane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	N/A	7.20E+03 (N)	No
	75-71-8	Dichlorodifluoromethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.90E+02 (N)	No
	76-13-1	Freon 113			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.30E+04 (N)	No
	98-82-8	Isopropylbenzene			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.20E+03 (N)	No
	79-20-9	Methyl Acetate			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	N/A	7.80E+04 (N)	No
	1634-04-4	Methyl tert-butyl ether			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.90E+02 (C)	No
	108-87-2	Methylcyclohexane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	75-69-4	Trichlorofluoromethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	8.00E+02 (N)	No
	98-86-2	Acetophenone			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+03 (N)	No
	100-52-7	Benzaldehyde			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.80E+03 (N)	No
	106-44-5	p-Cresol			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	N/A	3.10E+02 (N)	No
	1330-20-7	Xylenes (total)			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	6.00E+02 (N)	No
	99-35-4	1,3,5-Trinitrobenzene			mg/kg		0/4	2.10E-01 - 1.00E+00	1.00E+00	N/A	2.20E+03 (N)	No
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/4	2.10E-01 - 5.00E-01	5.00E-01	N/A	6.10E+00 (N)	No
	118-96-7	2,4,6-Trinitrotoluene			mg/kg		0/4	2.10E-01 - 5.00E-01	5.00E-01	N/A	3.60E+01 (N)	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/4	2.10E-01 - 5.00E-01	5.00E-01	N/A	1.50E+02 (N)	No
	88-72-2	2-Nitrotoluene			mg/kg		0/4	2.10E-01 - 1.00E+00	1.00E+00	N/A	2.90E+01 (C)	No
	99-08-1	3-Nitrotoluene			mg/kg		0/4	2.10E-01 - 1.00E+00	1.00E+00	N/A	1.20E+03 (N)	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/4	2.10E-01 - 5.00E-01	5.00E-01	N/A	1.50E+02 (N)	No
	99-99-0	4-Nitrotoluene			mg/kg		0/4	2.10E-01 - 1.00E+00	1.00E+00	N/A	2.40E+02 (N)	No
	156-59-2	cis-1,2-Dichloroethene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	7.80E+02 (N)	No

Table E.2-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Above Screening Value (Y/N)
	121-82-4	Cyclonite			mg/kg		0/4	2.10E-01 - 5.00E-01	5.00E-01	N/A	5.50E+01 (C)	No
	2691-41-0	HMX			mg/kg		0/4	2.10E-01 - 1.00E+00	1.00E+00	N/A	3.80E+03 (N)	No
	55-63-0	Nitroglycerin			mg/kg		0/4	1.60E+00 - 1.00E+01	1.00E+01	N/A	6.10E+00 (N)	Yes
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/4	1.60E+00 - 1.00E+01	1.00E+01	N/A	N/A	NTX
	479-45-8	Tetryl			mg/kg		0/4	4.10E-01 - 1.00E+00	1.00E+00	N/A	2.40E+02 (N)	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	1.10E+02 (N)	No
	93-76-5	2,4,5-T			mg/kg		0/4	7.70E-03 - 5.00E-02	5.00E-02	N/A	6.10E+02 (N)	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/4	1.50E-02 - 5.00E-02	5.00E-02	N/A	4.90E+02 (N)	No
	94-75-7	2,4-D			mg/kg		0/4	3.80E-02 - 2.00E-01	2.00E-01	N/A	6.90E+02 (N)	No
	94-82-6	2,4-DB			mg/kg		0/4	7.70E-02 - 2.00E-01	2.00E-01	N/A	4.90E+02 (N)	No
	72-54-8	4,4'-DDD			mg/kg		0/4	1.90E-02 - 2.00E-02	2.00E-02	N/A	2.00E+01 (C)	No
	72-55-9	4,4'-DDE			mg/kg		0/4	1.90E-02 - 2.00E-02	2.00E-02	N/A	1.40E+01 (C)	No
	309-00-2	Aldrin			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	N/A	2.90E-01 (C)	No
	319-84-6	alpha-BHC			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	N/A	7.70E-01 (C)	No
	5103-71-9	alpha-Chlordane (5)			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	N/A	1.60E+01 (C)	No
	319-85-7	beta-BHC			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	N/A	2.70E+00 (C)	No
	75-99-0	Dalapon			mg/kg		0/4	3.80E-02 - 3.80E-01	3.80E-01	N/A	1.80E+03 (N)	No
	319-86-8	delta-BHC			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	N/A	5.20E+00 (C)	No
	1918-00-9	Dicamba			mg/kg		0/4	7.70E-03 - 2.00E-01	2.00E-01	N/A	1.80E+03 (N)	No
	120-36-5	Dichloroprop			mg/kg		0/4	3.80E-02 - 2.00E-01	2.00E-01	N/A	N/A	NTX
	60-57-1	Dieldrin			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	N/A	3.00E-01 (C)	No
	959-98-8	Endosulfan I			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	N/A	3.70E+02 (N)	No
	33213-65-9	Endosulfan II (6)			mg/kg		0/4	1.90E-02 - 2.00E-02	2.00E-02	N/A	3.70E+02 (N)	No
	1031-07-8	Endosulfan sulfate (6)			mg/kg		0/4	1.90E-02 - 2.00E-02	2.00E-02	N/A	3.70E+02 (N)	No
	72-20-8	Endrin			mg/kg		0/4	1.90E-02 - 2.00E-02	2.00E-02	N/A	1.80E+01 (N)	No
	53494-70-5	Endrin ketone (7)			mg/kg		0/4	1.90E-02 - 2.00E-02	2.00E-02	N/A	1.80E+01 (N)	No
	58-89-9	gamma-BHC (Lindane)			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	N/A	5.20E+00 (C)	No
	5103-74-2	gamma-Chlordane			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	N/A	1.60E+01 (C)	No
	76-44-8	Heptachlor			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	N/A	1.10E+00 (C)	No
	1024-57-3	Heptachlor epoxide			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	N/A	5.30E-01 (C)	No
	94-74-6	MCPA			mg/kg		0/4	1.90E-01 - 2.00E+01	2.00E+01	N/A	3.10E+01 (N)	No
	93-65-2	MCPP			mg/kg		0/4	1.90E-01 - 2.00E+01	2.00E+01	N/A	6.10E+01 (N)	No
	72-43-5	Methoxychlor			mg/kg		0/4	2.00E-02 - 3.90E-02	3.90E-02	N/A	3.10E+02 (N)	No
	8001-35-2	Toxaphene			mg/kg		0/4	1.70E-01 - 4.80E-01	4.80E-01	N/A	4.40E+00 (C)	No
	12674-11-2	Aroclor 1016			mg/kg		0/4	1.90E-02 - 6.60E-02	6.60E-02	N/A	3.90E+00 (N)	No
	11104-28-2	Aroclor 1221			mg/kg		0/4	1.90E-02 - 6.60E-02	6.60E-02	N/A	1.70E+00 (C)	No
	11141-16-5	Aroclor 1232			mg/kg		0/4	1.90E-02 - 6.60E-02	6.60E-02	N/A	1.70E+00 (C)	No
	53469-21-9	Aroclor 1242			mg/kg		0/4	1.90E-02 - 3.30E-02	3.30E-02	N/A	2.20E+00 (C)	No
	12672-29-6	Aroclor 1248			mg/kg		0/4	1.90E-02 - 3.30E-02	3.30E-02	N/A	2.20E+00 (C)	No

Table E.2-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Above Screening Value (Y/N)
	11096-82-5	Aroclor 1260			mg/kg		0/4	1.90E-02 - 6.60E-02	6.60E-02	N/A	2.20E+00 (C)	No
	131-11-3	Dimethylphthalate			mg/kg		0/4	1.70E-01 - 3.80E-01	3.80E-01	N/A	N/A	NTX
	120-82-1	1,2,4-Trichlorobenzene			mg/kg		0/4	5.00E-03 - 1.90E-01	1.90E-01	N/A	8.70E+01 (N)	No
	95-50-1	1,2-Dichlorobenzene			mg/kg		0/4	5.00E-03 - 1.90E-01	1.90E-01	N/A	2.00E+03 (N)	No
	541-73-1	1,3-Dichlorobenzene			mg/kg		0/4	5.00E-03 - 1.90E-01	1.90E-01	N/A	N/A	NTX
	106-46-7	1,4-Dichlorobenzene			mg/kg		0/4	5.00E-03 - 1.90E-01	1.90E-01	N/A	2.60E+01 (C)	No
	95-95-4	2,4,5-Trichlorophenol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	6.10E+03 (N)	No
	88-06-2	2,4,6-Trichlorophenol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	6.10E+01 (N)	No
	120-83-2	2,4-Dichlorophenol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	1.80E+02 (N)	No
	105-67-9	2,4-Dimethylphenol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	1.20E+03 (N)	No
	51-28-5	2,4-Dinitrophenol			mg/kg		0/4	3.30E-01 - 9.50E-01	9.50E-01	N/A	1.20E+02 (N)	No
	121-14-2	2,4-Dinitrotoluene (8)			mg/kg		0/4	2.10E-01 - 5.00E-01	5.00E-01	N/A	7.10E+00 (C)	No
	606-20-2	2,6-Dinitrotoluene (8)			mg/kg		0/4	2.10E-01 - 1.00E+00	1.00E+00	N/A	7.10E+00 (C)	No
	91-58-7	2-Chloronaphthalene			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	6.30E+03 (N)	No
	95-57-8	2-Chlorophenol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	3.90E+02 (N)	No
	91-57-6	2-Methylnaphthalene			mg/kg		0/4	1.70E-01 - 3.10E-01	3.10E-01	N/A	3.10E+02 (N)	No
	88-74-4	2-Nitroaniline			mg/kg		0/4	1.70E-01 - 3.80E-01	3.80E-01	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	N/A	NTX
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/kg		0/4	7.70E-03 - 2.00E-01	2.00E-01	N/A	6.10E+01 (N)	No
	91-94-1	3,3'-Dichlorobenzidine			mg/kg		0/4	3.80E-01 - 1.00E+00	1.00E+00	N/A	1.10E+01 (C)	No
	99-09-2	3-Nitroaniline			mg/kg		0/4	2.25E-01 - 3.80E-01	3.80E-01	N/A	NA	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/4	2.25E-01 - 3.80E-01	3.80E-01	N/A	6.10E+00 (N)	No
	100-01-6	4-Nitroaniline			mg/kg		0/4	2.25E-01 - 3.80E-01	3.80E-01	N/A	2.40E+02 (C)	No
	100-02-7	4-Nitrophenol			mg/kg		0/4	3.30E-01 - 9.50E-01	9.50E-01	N/A	N/A	NTX
	83-32-9	Acenaphthene			mg/kg		0/4	1.00E-01 - 3.10E-01	3.10E-01	N/A	3.40E+03 (N)	No
	208-96-8	Acenaphthylene (9)			mg/kg		0/4	2.10E-01 - 3.10E-01	3.10E-01	N/A	1.70E+03 (N)	No
	120-12-7	Anthracene			mg/kg		0/4	2.10E-02 - 3.10E-01	3.10E-01	N/A	1.70E+04 (N)	No
	56-55-3	Benzo(a)anthracene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	N/A	1.50E+00 (C)	No
	50-32-8	Benzo(a)pyrene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	N/A	1.50E-01 (C)	No
	205-99-2	Benzo(b)fluoranthene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	N/A	1.50E+00 (C)	No
	191-24-2	Benzo(g,h,i)perylene (9)			mg/kg		0/4	6.00E-02 - 6.10E-02	6.10E-02	N/A	1.70E+03 (N)	No
	207-08-9	Benzo(k)fluoranthene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	N/A	1.50E+01 (C)	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	1.80E+02 (N)	No
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	1.90E+00 (C)	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	3.50E+01 (C)	No
	86-74-8	Carbazole			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	N/A	NTX
	218-01-9	Chrysene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	N/A	1.50E+02 (C)	No
	53-70-3	Dibenz(a,h)anthracene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	N/A	1.50E-01 (C)	No
	132-64-9	Dibenzofuran			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	N/A	NTX

Table E.2-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Above Screening Value (Y/N)
	84-66-2	Diethyl phthalate			mg/kg		0/4	1.70E-01 - 3.80E-01	3.80E-01	N/A	4.90E+04 (N)	No
	117-84-0	Di-n-octyl phthalate			mg/kg		0/4	1.70E-01 - 3.80E-01	3.80E-01	N/A	N/A	NTX
	206-44-0	Fluoranthene			mg/kg		0/4	2.10E-02 - 3.10E-01	3.10E-01	N/A	2.30E+03 (N)	No
	86-73-7	Fluorene			mg/kg		0/4	2.10E-02 - 3.10E-01	3.10E-01	N/A	2.30E+03 (N)	No
	118-74-1	Hexachlorobenzene			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	3.00E+00 (C)	No
	87-68-3	Hexachlorobutadiene			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	6.10E+01 (N)	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	3.70E+02 (N)	No
	67-72-1	Hexachloroethane			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	6.10E+01 (N)	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	N/A	1.50E+00 (C)	No
	78-59-1	Isophorone			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	5.10E+03 (C)	No
	91-20-3	Naphthalene			mg/kg		0/4	1.00E-01 - 3.10E-01	3.10E-01	N/A	3.90E+01 (C)	No
	98-95-3	Nitrobenzene			mg/kg		0/4	2.10E-01 - 5.00E-01	5.00E-01	N/A	4.40E+01 (C)	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	6.90E-01 (C)	No
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	9.90E+02 (C)	No
	95-48-7	o-Cresol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	3.10E+03 (N)	No
	106-47-8	p-Chloroaniline			mg/kg		0/4	2.25E-01 - 3.80E-01	3.80E-01	N/A	2.40E+01 (C)	No
	59-50-7	p-Chloro-m-cresol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	N/A	NTX
	87-86-5	Pentachlorophenol			mg/kg		0/4	3.30E-01 - 9.50E-01	9.50E-01	N/A	3.00E+01 (C)	No
	108-95-2	Phenol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	1.80E+04 (N)	No
	129-00-0	Pyrene			mg/kg		0/4	2.10E-02 - 3.10E-01	3.10E-01	N/A	1.70E+03 (N)	No
	71-55-6	1,1,1-Trichloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	9.00E+03 (N)	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	5.90E+00 (C)	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	1.10E+01 (C)	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	3.40E+01 (C)	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	2.50E+02 (N)	No
	107-06-2	1,2-Dichloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	4.50E+00 (C)	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	9.30E+00 (C)	No
	591-78-6	2-Hexanone			mg/kg		0/4	1.00E-02 - 2.80E-02	2.80E-02	N/A	N/A	NTX
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/4	1.00E-02 - 2.80E-02	2.80E-02	N/A	5.30E+03 (N)	No
	67-64-1	Acetone			mg/kg		0/4	5.60E-02 - 6.00E-02	6.00E-02	N/A	6.10E+04 (N)	No
	75-27-4	Bromodichloromethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	2.80E+00 (C)	No
	74-83-9	Bromomethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	7.90E+00 (N)	No
	56-23-5	Carbon tetrachloride			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	2.50E+00 (C)	No
	108-90-7	Chlorobenzene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	3.10E+02 (N)	No
	75-00-3	Chloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	1.50E+04 (N)	No
	74-87-3	Chloromethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	1.20E+02 (N)	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	1.70E+01 (C)	No

Table E.2-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Above Screening Value (Y/N)
	124-48-1	Dibromochloromethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	7.00E+00 (C)	No
	100-41-4	Ethylbenzene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	5.70E+01 (C)	No
	100-42-5	Styrene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	6.50E+03 (N)	No
	127-18-4	Tetrachloroethene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	5.70E+00 (C)	No
	10061-02-6	trans-1,3-Dichloropropene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	1.70E+01 (C)	No
	75-25-2	Tribromomethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	6.10E+02 (C)	No
	75-01-4	Vinyl Chloride			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	6.00E-01 (C)	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	N/A	2.50E+02 (N)	No

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for residential soil from USEPA Regional Screening Level Table (April 2009) and
are based on a risk level of 1.0E-06 and a hazard index of 0.1, then adjusted by a factor of 10 for sediment exposures.
See text for derivation of Nutrient RDAs.

(4) Rationale Codes

Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- No Toxicity Information (NTX)

Deletion Reason:
- Infrequent Detection (<= 5%, IFD)
- Background Levels (BKG)
- Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value is based on chlordane.

(6) The screening value is based on endosulfan.

(7) The screening value is based on endrin.

(8) The screening value is based on dinitrotoluene mixtures.

(9) The screening value is based on pyrene as a surrogate.

Definitions:
- N/A = Not Applicable or Not Available
- SQL = Sample Quantitation Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
- MCL = Federal Maximum Contaminant Level
- SMCL = Secondary Maximum Contaminant Level
- J = Estimated Value
- C = Carcinogenic
- N = Non-Carcinogenic
- RDA = Recommended Daily Allowance

Table E.2-8
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant, SWMU 41 Area B - Surface Water

Scenario Timeframe: Current/ Future

Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	84-66-2	Diethyl phthalate	2.10E-04	3.20E-04	mg/l	41SW2	3/4	5.00E-03 - 5.00E-03	3.20E-04	N/A	2.90E+01 N	N/A	N/A	No	BSL
	67-66-3	Trichloromethane	3.00E-04	5.90E-04	mg/l	41SW2	3/4	1.00E-03 - 1.00E-03	5.90E-04	N/A	1.90E-03 C	N/A	N/A	No	BSL
	7429-90-5	Aluminum	1.10E-01	9.27E+00	mg/l	41SP2	4/4	N/A	9.27E+00	N/A	3.70E+01 N	N/A	N/A	No	BSL
	7440-38-2	Arsenic	2.20E-04	7.10E-03	mg/l	41SP2	3/4	1.00E-03 - 1.00E-03	7.10E-03	N/A	4.50E-04 C	N/A	N/A	Yes	ASL
	7440-39-3	Barium	6.00E-02	2.30E-01	mg/l	41SP2	4/4	N/A	2.30E-01	N/A	7.30E+00 N	N/A	N/A	No	BSL
	7440-41-7	Beryllium	6.00E-04	6.00E-04	mg/l	41SP2	1/4	4.00E-03 - 4.00E-03	6.00E-04	N/A	7.30E-02 N	N/A	N/A	No	BSL
	7440-43-9	Cadmium	3.00E-04	3.00E-04	mg/l	41SP2	1/4	5.00E-04 - 5.00E-04	3.00E-04	N/A	1.80E-02 N	N/A	N/A	No	BSL
	7440-70-2	Calcium	4.90E+01	8.90E+01	mg/l	41SP2	4/4	N/A	8.90E+01	N/A	N/A	5.00E+02	RDA	No	BSL
	7440-47-3	Chromium	7.00E-04	9.40E-03	mg/l	41SP2	4/4	N/A	9.40E-03	N/A	1.10E-01 N	N/A	N/A	No	BSL
	7440-50-8	Copper	1.90E-02	1.90E-02	mg/l	41SP2	1/4	2.00E-02 - 2.00E-02	1.90E-02	N/A	1.50E+00 N	N/A	N/A	No	BSL
	7439-89-6	Iron	2.30E-01	1.04E+01	mg/l	41SP2	4/4	N/A	1.04E+01	N/A	2.60E+01 N	N/A	N/A	No	BSL
	7439-92-1	Lead	3.00E-04	2.90E-02	mg/l	41SP2	4/4	N/A	2.90E-02	N/A	N/A	1.50E-02	TAL	Yes	ASL
	7439-95-4	Magnesium	3.00E+01	3.20E+01	mg/l	41SP2	4/4	N/A	3.20E+01	N/A	N/A	1.75E+02	RDA	No	BSL
	7439-96-5	Manganese	2.00E-02	4.10E-01	mg/l	41SP2	4/4	N/A	4.10E-01	N/A	8.80E-01 N	N/A	N/A	No	BSL
	7440-02-0	Nickel	1.00E-02	1.00E-02	mg/l	41SP2	1/4	1.00E-03 - 1.00E-03	1.00E-02	N/A	7.30E-01 N	N/A	N/A	No	BSL
	7440-09-7	Potassium	1.10E+00	1.60E+00	mg/l	41SW3	4/4	N/A	1.60E+00	N/A	N/A	1.00E+03	RDA	No	BSL
	7782-49-2	Selenium	4.00E-04	4.00E-04	mg/l	41SP2	1/4	2.00E-03 - 2.00E-03	4.00E-04	N/A	1.80E-01N	N/A	N/A	No	BSL
	7440-23-5	Sodium	4.30E+00	1.30E+01	mg/l	41SP2	4/4	N/A	1.30E+01	N/A	N/A	2.00E+01	RDA	No	BSL
	7440-28-0	Thallium	9.00E-05	9.00E-05	mg/l	41SP2	1/4	1.00E-03 - 1.00E-03	9.00E-05	N/A	2.40E-03 N	N/A	N/A	No	BSL
	7440-62-2	Vanadium	1.70E-02	1.70E-02	mg/l	41SP2	1/4	2.50E-02 - 2.50E-02	1.70E-02	N/A	1.80 E-01 N	N/A	N/A	No	BSL
	7440-66-6	Zinc	7.50E-02	7.50E-02	mg/l	41SP2	1/4	2.00E-02 - 2.00E-02	7.50E-02	N/A	1.10E+01 N	N/A	N/A	No	BSL
	57-12-5	Total Cyanide	2.00E-03	2.00E-03	mg/l	41SW4	4/4	N/A	2.00E-03	N/A	7.30E-01 N	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for tap water from USEPA Regional Screening Level Table (April 2009) and are based on a risk level of 1.0E-06 and a hazard index of 0.1, then adjusted by a factor of 10 for surface water exposures.
See text for derivation of Nutrient RDAs.

(4) Rationale Codes Selection Reason:
Toxicity Information Available (TX)
Above Screening Levels (ASL)
No Toxicity Information (NTX)
Break Down Product (BDP)

Deletion Reason:
Infrequent Detection (<= 5%, IFD)
Background Levels (BKG)
Below Screening and/or ARAR/TBC Level (BSL)

Definitions:
N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance
TAL = Treatment Action Level

Table E.2-9
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	87-61-6	1,2,3-Trichlorobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	8.20E-03 (N)	No
Surface Water	95-94-3	1,2,4,5-Tetrachlorobenzene			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E-02 (N)	No
	96-12-8	1,2-Dibromo-3-chloropropane			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.20E-06 (C)	Yes
	106-93-4	1,2-Dibromoethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	6.50E-05 (C)	Yes
	99-35-4	1,3,5-Trinitrobenzene			mg/l		0/4	6.50E-04 - 6.50E-04	6.50E-04	N/A	1.10E+00 (N)	No
	99-65-0	1,3-Dinitrobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.70E-03 (N)	No
	118-96-7	2,4,6-Trinitrotoluene			mg/l		0/4	6.50E-04 - 6.50E-04	6.50E-04	N/A	1.80E-02 (N)	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	7.30E-02 (N)	No
	88-72-2	2-Nitrotoluene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.10E-03 (C)	No
	99-08-1	3-Nitrotoluene			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	7.30E-01 (N)	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	7.30E-02 (N)	No
	99-99-0	4-Nitrotoluene			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	4.20E-02 (C)	No
	1912-24-9	Atrazine			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.90E-03 (C)	Yes
	92-52-4	Biphenyl			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.80E+00 (N)	No
	105-60-2	Caprolactam			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.80E+01 (N)	No
	74-97-5	Chlorobromomethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	N/A	NTX
	156-59-2	cis-1,2-Dichloroethene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.70E-01 (N)	No
	110-82-7	Cyclohexane			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.30E+01 (N)	No
	121-82-4	Cyclonite			mg/l		0/4	6.50E-04 - 6.50E-04	6.50E-04	N/A	6.10E-03 (C)	No
	75-71-8	Dichlorodifluoromethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.90E-01 (N)	No
	76-13-1	Freon 113			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	5.90E+01 (N)	No
	2691-41-0	HMX			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.80E+00 (N)	No
	98-82-8	Isopropylbenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	6.80E-01 (N)	No
	79-20-9	Methyl Acetate			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	N/A	3.70E+01 (N)	No
	1634-04-4	Methyl tert-butyl ether			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.20E-01 (C)	No
	108-87-2	Methylcyclohexane			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	55-63-0	Nitroglycerin			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.70E-03 (N)	Yes
	78-11-5	Pentaerythritol tetranitrate			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	14797-73-0	Perchlorate			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.60E-02 (N)	No
	479-45-8	Tetryl			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.50E-01 (N)	No
	156-60-5	trans-1,2-Dichloroethene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.10E-01 (N)	No
	75-69-4	Trichlorofluoromethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.30E+00 (N)	No
	7440-36-0	Antimony			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.50E-02 (N)	No
	7440-48-4	Cobalt			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	N/A	1.10E-02 (N)	No
	7439-97-6	Mercury (5)			mg/l		0/4	4.00E-04 - 4.00E-04	4.00E-04	N/A	1.10E-02 (N)	No
	7440-22-4	Silver			mg/l		0/4	5.00E-04 - 5.00E-04	5.00E-04	N/A	1.80E-01 (N)	No
	131-11-3	Dimethylphthalate			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	120-82-1	1,2,4-Trichlorobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	8.20E-03 (N)	No

Table E.2-9
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	95-50-1	1,2-Dichlorobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.70E-01 (N)	No
	541-73-1	1,3-Dichlorobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	N/A	NTX
	106-46-7	1,4-Dichlorobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	4.30E-03 (C)	No
	95-95-4	2,4,5-Trichlorophenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.70E+00 (N)	No
	88-06-2	2,4,6-Trichlorophenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.70E-02 (N)	No
	120-83-2	2,4-Dichlorophenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E-01 (N)	No
	105-67-9	2,4-Dimethylphenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	7.30E-01 (N)	No
	51-28-5	2,4-Dinitrophenol			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	N/A	7.30E-02 (N)	No
	121-14-2	2,4-Dinitrotoluene (6)			mg/l		0/4	6.50E-04 - 6.50E-04	6.50E-04	N/A	9.90E-04 (C)	No
	606-20-2	2,6-Dinitrotoluene (6)			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.90E-04 (C)	Yes
	91-58-7	2-Chloronaphthalene			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.90E+00 (N)	No
	95-57-8	2-Chlorophenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.80E-01 (N)	No
	91-57-6	2-Methylnaphthalene			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.50E-01 (N)	No
	88-74-4	2-Nitroaniline			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	91-94-1	3,3'-Dichlorobenzidine			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	N/A	1.50E-03 (C)	Yes
	99-09-2	3-Nitroaniline			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.70E-03 (N)	Yes
	100-01-6	4-Nitroaniline			mg/l		0/4	6.00E-03 - 6.00E-03	6.00E-03	N/A	3.40E-02 (C)	No
	100-02-7	4-Nitrophenol			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	83-32-9	Acenaphthene			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	N/A	2.20E+00 (N)	No
	208-96-8	Acenaphthylene (7)			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	N/A	1.10E+00 (N)	No
	98-86-2	Acetophenone			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.70E+00 (N)	No
	120-12-7	Anthracene			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	N/A	1.10E+01 (N)	No
	100-52-7	Benzaldehyde			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.70E+00 (N)	No
	56-55-3	Benzo(a)anthracene			mg/l		0/4	6.20E-05 - 6.20E-05	6.20E-05	N/A	2.90E-04 (C)	No
	50-32-8	Benzo(a)pyrene			mg/l		0/4	6.20E-05 - 6.20E-05	6.20E-05	N/A	2.90E-05 (C)	Yes
	205-99-2	Benzo(b)fluoranthene			mg/l		0/4	9.00E-05 - 9.00E-05	9.00E-05	N/A	2.90E-04 (C)	No
	191-24-2	Benzo(g,h,i)perylene (7)			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	N/A	1.10E+00 (N)	No
	207-08-9	Benzo(k)fluoranthene			mg/l		0/4	1.20E-04 - 1.20E-04	1.20E-04	N/A	2.90E-03 (C)	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E-01 (N)	No
	111-44-4	bis(2-Chloroethyl)ether			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.20E-04 (C)	Yes
	108-60-1	bis(2-Chloroisopropyl)ether			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.20E-03 (C)	Yes
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.80E-02 (C)	No
	85-68-7	Butyl benzyl phthalate			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.50E-01 (C)	No
	86-74-8	Carbazole			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	218-01-9	Chrysene			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	N/A	2.90E-02 (C)	No
	84-74-2	Di-n-butyl phthalate			mg/l		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	3.70E+00 (N)	No

Table E.2-9
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	117-84-0	Di-n-octyl phthalate			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/l		0/4	2.40E-04 - 2.40E-04	2.40E-04	N/A	2.90E-05 (C)	Yes
	132-64-9	Dibenzofuran			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	206-44-0	Fluoranthene			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	N/A	1.50E+00 (N)	No
	86-73-7	Fluorene			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	N/A	1.50E+00 (N)	No
	118-74-1	Hexachlorobenzene			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.20E-04 (C)	Yes
	87-68-3	Hexachlorobutadiene			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	8.60E-03 (C)	No
	77-47-4	Hexachlorocyclopentadiene			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.20E-01 (N)	No
	67-72-1	Hexachloroethane			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.70E-02 (N)	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/l		0/4	6.20E-05 - 6.20E-05	6.20E-05	N/A	2.90E-04 (C)	No
	78-59-1	Isophorone			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	7.10E-01 (C)	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	9.60E-05 (C)	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.40E-01 (C)	No
	91-20-3	Naphthalene			mg/l		0/4	6.20E-04 - 6.20E-04	6.20E-04	N/A	1.40E-03 (C)	No
	98-95-3	Nitrobenzene			mg/l		0/4	6.50E-04 - 6.50E-04	6.50E-04	N/A	1.20E-03 (N)	No
	95-48-7	o-Cresol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.80E+00 (N)	No
	59-50-7	p-Chloro-m-cresol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	106-47-8	p-Chloroaniline			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	3.40E-03 (C)	Yes
	106-44-5	p-Cresol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.80E-01 (N)	No
	87-86-5	Pentachlorophenol			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	N/A	5.60E-03 (C)	Yes
	85-01-8	Phenanthrene (7)			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	N/A	1.10E+00 (N)	No
	108-95-2	Phenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	1.10E+01 (N)	No
	129-00-0	Pyrene			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	N/A	1.10E+00 (N)	No
	71-55-6	1,1,1-Trichloroethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.10E+00 (N)	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	6.70E-04 (C)	Yes
	79-00-5	1,1,2-Trichloroethane			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	2.40E-03 (C)	No
	75-34-3	1,1-Dichloroethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.40E-02 (C)	No
	75-35-4	1,1-Dichloroethene			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	3.40E-01 (N)	No
	107-06-2	1,2-Dichloroethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.50E-03 (C)	No
	78-87-5	1,2-Dichloropropane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.90E-03 (C)	No
	78-93-3	2-Butanone			mg/l		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	7.10E+00 (N)	No
	591-78-6	2-Hexanone			mg/l		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	N/A	NTX
	101-55-3	4-Bromophenyl phenylether			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/l		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	2.00E+00 (N)	No
	67-64-1	Acetone			mg/l		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	2.20E+01 (N)	No
	71-43-2	Benzene			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	4.10E-03 (C)	No
	75-27-4	Bromodichloromethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.20E-03 (C)	No

Table E.2-9
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	74-83-9	Bromomethane			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	8.70E-03 (N)	No
	75-15-0	Carbon disulfide			mg/l		0/4	2.00E-02 - 2.00E-02	2.00E-02	N/A	1.00E+00 (N)	No
	56-23-5	Carbon tetrachloride			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.00E-03 (C)	No
	108-90-7	Chlorobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.10E-02 (N)	No
	75-00-3	Chloroethane			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	2.10E+01 (N)	No
	74-87-3	Chloromethane			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.90E-01 (N)	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	4.30E-03 (C)	No
	124-48-1	Dibromochloromethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.50E-03 (C)	No
	100-41-4	Ethylbenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.50E-02 (C)	No
	75-09-2	Methylene chloride			mg/l		0/4	4.00E-03 - 4.00E-03	4.00E-03	N/A	4.80E-02 (C)	No
	100-42-5	Styrene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.60E+00 (N)	No
	127-18-4	Tetrachloroethene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.10E-03 (C)	No
	108-88-3	Toluene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.30E+00 (N)	No
	10061-02-6	trans-1,3-Dichloropropene			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	4.30E-03 (C)	No
	75-25-2	Tribromomethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	8.50E-02 (C)	No
	79-01-6	Trichloroethene			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.70E-02 (C)	No
	75-01-4	Vinyl Chloride			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.60E-04 (C)	Yes
	1330-20-7	Xylenes (total)			mg/l		0/4	3.00E-03 - 3.00E-03	3.00E-03	N/A	2.00E-01 (N)	No

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for tap water from USEPA Regional Screening Level Table (April 2009) and
are based on a risk level of 1.0E-06 and a hazard index of 0.1, then adjusted by a factor of 10 for surface water exposures.
See text for derivation of Nutrient RDAs.

(4) Rationale Codes Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- No Toxicity Information (NTX)

Deletion Reason:
- Infrequent Detection (<= 5%, IFD)
- Background Levels (BKG)
- Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value is based on inorganic mercury.

(6) The screening value is based on dinitrotoluene mixtures.

(7) The screening value is based on pyrene as a surrogate.

Definitions:
- N/A = Not Applicable or Not Available
- SQL = Sample Quantitation Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
- MCL = Federal Maximum Contaminant Level
- SMCL = Secondary Maximum Contaminant Level
- J = Estimated Value
- C = Carcinogenic
- N = Non-Carcinogenic
- RDA = Recommended Daily Allowance

Table E.2-10
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Radford Army Ammunition Plant, SWMU 41 Area B - Groundwater

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
	14797-73-0	Perchlorate	2.94E-04 J	2.50E-03 J	mg/L	41MW2	3/3	N/A	2.50E-03	N/A	2.60E-03 N	N/A	N/A	No	BSL
Groundwater	127-18-4	Tetrachloroethene	3.50E-04 J	1.70E-03	mg/L	41MW2	3/3	N/A	1.70E-03	N/A	1.10E-04 C	N/A	N/A	Yes	ASL
	108-88-3	Toluene	3.00E-04 L	3.00E-04 L	mg/L	41MW2	1/3	1.00E-03 - 1.00E-03	3.00E-04	N/A	2.30E-01 N	N/A	N/A	No	BSL
	7440-38-2	Arsenic	5.00E-03 J	7.90E-03 J	mg/L	41MW2	2/3	3.70E-03 - 3.70E-03	7.90E-03	N/A	4.50E-05 C	N/A	N/A	Yes	ASL
	7440-39-3	Barium	1.00E-02 J	2.95E-02 J	mg/L	41MW1	3/3	N/A	2.95E-02	N/A	7.30E-01 N	N/A	N/A	No	BSL
	7440-70-2	Calcium	6.97E+01	1.21E+02	mg/L	41MW2	3/3	N/A	1.21E+02	N/A	N/A	5.00E+02	RDA	No	BSL
	7440-47-3	Chromium	2.90E-03 J	1.08E-02	mg/L	41MW1	3/3	N/A	1.08E-02	N/A	1.10E-02 N	N/A	N/A	No	BSL
	7440-48-4	Cobalt	7.00E-03 J	7.00E-03 J	mg/L	41MW2	1/3	1.00E-03 - 1.00E-03	7.00E-03	N/A	1.10E-03 N	N/A	N/A	Yes	ASL
	7440-50-8	Copper	7.10E-03 J	9.90E-03 J	mg/L	41MW2	2/3	1.20E-03 - 1.20E-03	9.90E-03	N/A	1.50E-01 N	N/A	N/A	No	BSL
	7439-95-4	Magnesium	6.15E+01	1.15E+02	mg/L	41MW2	3/3	N/A	1.15E+02	N/A	N/A	1.75E+02	RDA	No	BSL
	7439-96-5	Manganese	4.20E-03 J	4.71E-02	mg/L	41MW1	3/3	N/A	4.71E-02	N/A	8.80E-02 N	N/A	N/A	No	BSL
	7440-02-0	Nickel	2.50E-03 J	6.20E-03 J	mg/L	41MW1	3/3	N/A	6.20E-03	N/A	7.30E-02 N	N/A	N/A	No	BSL
	7440-09-7	Potassium	1.06E+01 K	1.06E+01 K	mg/L	41MW3	1/3	3.90E+00 - 8.57E+00	1.06E+01	N/A	N/A	1.00E+03	RDA	No	BSL
	7440-23-5	Sodium	1.10E+02	3.03E+03	mg/L	41MW2	3/3	N/A	3.03E+03	N/A	N/A	2.00E+01	RDA	Yes	ASL
	7440-62-2	Vanadium	1.30E-03 J	2.00E-03 J	mg/L	41MW2	2/3	1.10E-03 - 1.10E-03	2.00E-03	N/A	1.80E-02 N	N/A	N/A	No	BSL
	7440-66-6	Zinc	9.50E-03 J	1.45E-02 J	mg/L	41MW3	3/3	N/A	1.45E-02	N/A	1.10E+00 N	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for tap water from USEPA Regional Screening Level Table (April 2009) and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
See text for derivation of Nutrient RDAs.

(4) Rationale Codes Selection Reason:
Toxicity Information Available (TX)
Above Screening Levels (ASL)
No Toxicity Information (NTX)
Elevated Detected Concentration (EDC)

Deletion Reason:
Infrequent Detection (<= 5%, IFD)
Background Levels (BKG)
Below Screening and/or ARAR/TBC Level (BSL)

Definitions:
N/A = Not Applicable or Not Available
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J, K = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Table E.2-11
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
Groundwater	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	99-35-4	1,3,5-Trinitrobenzene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	1.10E-01 (N)	No
	99-65-0	1,3-Dinitrobenzene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	3.70E-04 (N)	No
	90-12-0	1-Methylnaphthalene			mg/l		0/3	9.60E-04 - 1.00E-03	1.00E-03	N/A	2.30E-03 (C)	No
	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran			mg/l		0/3	2.47E-09 - 4.24E-09	4.24E-09	N/A	N/A	NTX
	118-96-7	2,4,6-Trinitrotoluene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	1.80E-03 (N)	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	7.30E-03 (N)	No
	88-72-2	2-Nitrotoluene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	3.10E-04 (C)	No
	ICF14A-AA-I	3&4-Methylphenol			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	1.80E-02 (N)	No
	99-08-1	3-Nitrotoluene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	7.30E-02 (N)	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	7.30E-03 (N)	No
	99-99-0	4-Nitrotoluene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	4.20E-03 (C)	No
	100-51-6	Benzyl alcohol			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	1.80E+00 (N)	No
	156-59-2	cis-1,2-Dichloroethene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.70E-02 (N)	No
	121-82-4	Cyclonite			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	6.10E-04 (C)	No
	2691-41-0	HMX			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	1.80E-01 (N)	No
	ICF87	m+p-Xylenes			mg/l		0/3	2.00E-03 - 2.00E-03	2.00E-03	N/A	2.00E-02 (N)	No
	55-63-0	Nitroglycerin			mg/l		0/3	1.90E-03 - 2.00E-03	2.00E-03	N/A	3.70E-04 (N)	Yes
	95-47-6	o-Xylene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.40E-01 (N)	No
	78-11-5	Pentaerythritol tetranitrate			mg/l		0/3	1.90E-03 - 2.00E-03	2.00E-03	N/A	N/A	NTX
	479-45-8	Tetryl			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	1.50E-02 (N)	No
	Shaw 05	Total Heptachlorodibenzofuran			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	Shaw 04	Total Heptachlorodibenzo-p-dioxin			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	Shaw 07	Total Hexachlorodibenzofuran			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	Shaw 06	Total Hexachlorodibenzo-p-dioxin			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	Shaw 09	Total Pentachlorodibenzofuran			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	Shaw 08	Total Pentachlorodibenzo-p-dioxin			mg/l		0/3	2.96E-09 - 5.08E-09	5.08E-09	N/A	N/A	NTX
	Shaw 11	Total Tetrachlorodibenzofuran			mg/l		0/3	2.47E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	Shaw 10	Total Tetrachlorodibenzo-p-dioxin			mg/l		0/3	2.81E-09 - 4.86E-09	4.86E-09	N/A	N/A	NTX
	156-60-5	trans-1,2-Dichloroethene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.10E-02 (N)	No
	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX
	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran			mg/l		0/3	4.79E-09 - 5.10E-09	5.10E-09	N/A	N/A	NTX

Table E.2-11
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin			mg/l		0/3	2.81E-09 - 4.86E-09	4.86E-09	N/A	5.20E-10 (C)	Yes
	3268-87-9	Octachlorodibenzodioxin			mg/l		0/3	9.59E-09 - 1.02E-08	1.02E-08	N/A	N/A	NTX
	39001-02-0	Octachlorodibenzofuran			mg/l		0/3	9.59E-09 - 1.02E-08	1.02E-08	N/A	N/A	NTX
	7429-90-5	Aluminum			mg/l		0/3	7.90E-02 - 7.90E-02	7.90E-02	N/A	3.70E+00 (N)	No
	7440-36-0	Antimony			mg/l		0/3	3.30E-03 - 3.30E-03	3.30E-03	N/A	1.50E-03 (N)	Yes
	7440-41-7	Beryllium			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	7.30E-03 (N)	No
	7440-43-9	Cadmium			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.80E-03 (N)	No
	7439-89-6	Iron			mg/l		0/3	3.80E-01 - 6.00E-01	6.00E-01	N/A	2.60E+00 (N)	No
	7439-92-1	Lead (5)			mg/l		0/3	3.10E-03 - 4.50E-03	4.50E-03	N/A	1.50E-02 (N)	No
	7439-97-6	Mercury (6)			mg/l		0/3	1.10E-04 - 1.10E-04	1.10E-04	N/A	1.10E-03 (N)	No
	7782-49-2	Selenium			mg/l		0/3	4.00E-03 - 2.00E-02	2.00E-02	N/A	1.80E-02 (N)	Yes
	7440-22-4	Silver			mg/l		0/3	7.70E-04 - 7.70E-04	7.70E-04	N/A	1.80E-02 (N)	No
	7440-28-0	Thallium			mg/l		0/3	6.50E-03 - 6.50E-03	6.50E-03	N/A	2.40E-04 (N)	Yes
	93-76-5	2,4,5-T			mg/l		0/3	2.00E-04 - 2.00E-04	2.00E-04	N/A	3.70E-02 (N)	No
	93-72-1	2,4,5-TP (Silvex)			mg/l		0/3	2.00E-04 - 2.00E-04	2.00E-04	N/A	2.90E-02 (N)	No
	94-75-7	2,4-D			mg/l		0/3	1.50E-03 - 1.50E-03	1.50E-03	N/A	3.70E-02 (N)	No
	94-82-6	2,4-DB			mg/l		0/3	2.00E-03 - 2.00E-03	2.00E-03	N/A	2.90E-02 (N)	No
	72-54-8	4,4'-DDD			mg/l		0/3	9.70E-05 - 1.30E-04	1.30E-04	N/A	2.80E-04 (C)	No
	72-55-9	4,4'-DDE			mg/l		0/3	9.70E-05 - 1.30E-04	1.30E-04	N/A	2.00E-04 (C)	No
	50-29-3	4,4'-DDT			mg/l		0/3	9.70E-05 - 1.30E-04	1.30E-04	N/A	2.00E-04 (C)	No
	309-00-2	Aldrin			mg/l		0/3	4.90E-05 - 6.30E-05	6.30E-05	N/A	4.00E-06 (C)	Yes
	319-84-6	alpha-BHC			mg/l		0/3	4.90E-05 - 6.30E-05	6.30E-05	N/A	1.10E-05 (C)	Yes
	5103-71-9	alpha-Chlordane			mg/l		0/3	4.90E-05 - 6.30E-05	6.30E-05	N/A	1.90E-04 (C)	No
	319-85-7	beta-BHC			mg/l		0/3	4.90E-05 - 6.30E-05	6.30E-05	N/A	3.70E-05 (C)	Yes
	75-99-0	Dalapon			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.10E-01 (N)	No
	319-86-8	delta-BHC			mg/l		0/3	4.90E-05 - 6.30E-05	6.30E-05	N/A	6.10E-05 (C)	Yes
	1918-00-9	Dicamba			mg/l		0/3	2.00E-04 - 2.00E-04	2.00E-04	N/A	1.10E-01 (N)	No
	120-36-5	Dichloroprop			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	N/A	NTX
	60-57-1	Dieldrin			mg/l		0/3	4.90E-05 - 6.30E-05	6.30E-05	N/A	4.20E-06 (C)	Yes
	959-98-8	Endosulfan I			mg/l		0/3	4.90E-05 - 6.30E-05	6.30E-05	N/A	2.20E-02 (N)	No
	33213-65-9	Endosulfan II (7)			mg/l		0/3	9.70E-05 - 1.30E-04	1.30E-04	N/A	2.20E-02 (N)	No
	1031-07-8	Endosulfan sulfate (7)			mg/l		0/3	9.70E-05 - 1.30E-04	1.30E-04	N/A	2.20E-02 (N)	No
	72-20-8	Endrin			mg/l		0/3	9.70E-05 - 1.30E-04	1.30E-04	N/A	1.10E-03 (N)	No
	7421-93-4	Endrin aldehyde (8)			mg/l		0/3	9.70E-05 - 1.30E-04	1.30E-04	N/A	1.10E-03 (N)	No
	53494-70-5	Endrin ketone (8)			mg/l		0/3	9.70E-05 - 1.30E-04	1.30E-04	N/A	1.10E-03 (N)	No
	58-89-9	gamma-BHC (Lindane)			mg/l		0/3	4.90E-05 - 6.30E-05	6.30E-05	N/A	6.10E-05 (C)	Yes
	5103-74-2	gamma-Chlordane (9)			mg/l		0/3	4.90E-05 - 6.30E-05	6.30E-05	N/A	1.90E-04 (C)	No
	76-44-8	Heptachlor			mg/l		0/3	4.90E-05 - 6.30E-05	6.30E-05	N/A	1.50E-05 (C)	Yes
	1024-57-3	Heptachlor epoxide			mg/l		0/3	4.90E-05 - 6.30E-05	6.30E-05	N/A	7.40E-06 (C)	Yes
	94-74-6	MCPA			mg/l		0/3	5.00E-02 - 5.00E-02	5.00E-02	N/A	1.80E-03 (N)	Yes
	93-65-2	MCPP			mg/l		0/3	5.00E-02 - 5.00E-02	5.00E-02	N/A	3.70E-03 (N)	Yes
	72-43-5	Methoxychlor			mg/l		0/3	9.70E-05 - 1.30E-04	1.30E-04	N/A	1.80E-02 (N)	No

Table E.2-11
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	8001-35-2	Toxaphene			mg/l		0/3	2.40E-03 - 3.10E-03	3.10E-03	N/A	6.10E-05 (C)	Yes
	12674-11-2	Aroclor 1016			mg/l		0/3	4.90E-04 - 6.30E-04	6.30E-04	N/A	2.60E-04 (N)	Yes
	11104-28-2	Aroclor 1221			mg/l		0/3	4.90E-04 - 6.30E-04	6.30E-04	N/A	6.80E-06 (C)	Yes
	11141-16-5	Aroclor 1232			mg/l		0/3	4.90E-04 - 6.30E-04	6.30E-04	N/A	6.80E-06 (C)	Yes
	53469-21-9	Aroclor 1242			mg/l		0/3	4.90E-04 - 6.30E-04	6.30E-04	N/A	3.40E-05 (C)	Yes
	12672-29-6	Aroclor 1248			mg/l		0/3	4.90E-04 - 6.30E-04	6.30E-04	N/A	3.40E-05 (C)	Yes
	11097-69-1	Aroclor 1254			mg/l		0/3	4.90E-04 - 6.30E-04	6.30E-04	N/A	3.40E-05 (C)	Yes
	11096-82-5	Aroclor 1260			mg/l		0/3	4.90E-04 - 6.30E-04	6.30E-04	N/A	3.40E-05 (C)	Yes
	131-11-3	Dimethylphthalate			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	N/A	NTX
	120-82-1	1,2,4-Trichlorobenzene			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	8.20E-04 (N)	Yes
	95-50-1	1,2-Dichlorobenzene			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	3.70E-02 (N)	No
	541-73-1	1,3-Dichlorobenzene			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	N/A	NTX
	106-46-7	1,4-Dichlorobenzene			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	4.30E-04 (C)	Yes
	95-95-4	2,4,5-Trichlorophenol			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	3.70E-01 (N)	No
	88-06-2	2,4,6-Trichlorophenol			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	3.70E-03 (N)	Yes
	120-83-2	2,4-Dichlorophenol			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	1.10E-02 (N)	No
	105-67-9	2,4-Dimethylphenol			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	7.30E-02 (N)	No
	51-28-5	2,4-Dinitrophenol			mg/l		0/3	2.40E-02 - 2.60E-02	2.60E-02	N/A	7.30E-03 (N)	Yes
	121-14-2	2,4-Dinitrotoluene (10)			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	9.90E-05 (C)	Yes
	606-20-2	2,6-Dinitrotoluene (10)			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	9.90E-05 (C)	Yes
	91-58-7	2-Chloronaphthalene			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	2.90E-01 (N)	No
	95-57-8	2-Chlorophenol			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	1.80E-02 (N)	No
	91-57-6	2-Methylnaphthalene			mg/l		0/3	9.60E-04 - 1.00E-03	1.00E-03	N/A	1.50E-02 (N)	No
	88-74-4	2-Nitroaniline			mg/l		0/3	9.60E-03 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	N/A	NTX
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/l		0/3	2.00E-04 - 2.00E-04	2.00E-04	N/A	3.70E-03 (N)	No
	91-94-1	3,3'-Dichlorobenzidine			mg/l		0/3	9.60E-03 - 1.00E-02	1.00E-02	N/A	1.50E-04 (C)	Yes
	99-09-2	3-Nitroaniline			mg/l		0/3	9.60E-03 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/l		0/3	9.60E-03 - 1.00E-02	1.00E-02	N/A	3.70E-04 (N)	Yes
	100-01-6	4-Nitroaniline			mg/l		0/3	9.60E-03 - 1.00E-02	1.00E-02	N/A	3.40E-03 (C)	Yes
	100-02-7	4-Nitrophenol			mg/l		0/3	2.40E-02 - 2.60E-02	2.60E-02	N/A	N/A	NTX
	83-32-9	Acenaphthene			mg/l		0/3	9.60E-04 - 1.00E-03	1.00E-03	N/A	2.20E-01 (N)	No
	208-96-8	Acenaphthylene (11)			mg/l		0/3	9.60E-04 - 1.00E-03	1.00E-03	N/A	1.10E-01 (N)	No
	120-12-7	Anthracene			mg/l		0/3	9.60E-04 - 1.00E-03	1.00E-03	N/A	1.10E+00 (N)	No
	56-55-3	Benzo(a)anthracene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	2.90E-05 (C)	Yes
	50-32-8	Benzo(a)pyrene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	2.90E-06 (C)	Yes
	205-99-2	Benzo(b)fluoranthene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	2.90E-05 (C)	Yes
	191-24-2	Benzo(g,h,i)perylene (11)			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	1.10E-01 (N)	No
	207-08-9	Benzo(k)fluoranthene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	2.90E-04 (C)	No
	65-85-0	Benzoic Acid			mg/l		0/3	2.40E-02 - 2.60E-02	2.60E-02	N/A	1.50E+01 (N)	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	1.10E-02 (N)	No
	111-44-4	bis(2-Chloroethyl)ether			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	1.20E-05 (C)	Yes

Table E.2-11
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	108-60-1	bis(2-Chloroisopropyl)ether			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	3.20E-04 (C)	Yes
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	4.80E-03 (C)	Yes
	85-68-7	Butyl benzyl phthalate			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	3.50E-02 (C)	No
	86-74-8	Carbazole			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	N/A	NTX
	218-01-9	Chrysene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	2.90E-03 (C)	No
	53-70-3	Dibenz(a,h)anthracene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	2.90E-06 (C)	Yes
	132-64-9	Dibenzofuran			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	N/A	NTX
	84-66-2	Diethyl phthalate			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	2.90E+00 (N)	No
	84-74-2	Di-n-butyl phthalate			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	3.70E-01 (N)	No
	117-84-0	Di-n-octyl phthalate			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	N/A	NTX
	206-44-0	Fluoranthene			mg/l		0/3	9.60E-04 - 1.00E-03	1.00E-03	N/A	1.50E-01 (N)	No
	86-73-7	Fluorene			mg/l		0/3	9.60E-04 - 1.00E-03	1.00E-03	N/A	1.50E-01 (N)	No
	118-74-1	Hexachlorobenzene			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	4.20E-05 (C)	Yes
	87-68-3	Hexachlorobutadiene			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	8.60E-04 (C)	Yes
	77-47-4	Hexachlorocyclopentadiene			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	2.20E-02 (N)	No
	67-72-1	Hexachloroethane			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	3.70E-03 (N)	Yes
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	2.90E-05 (C)	Yes
	78-59-1	Isophorone			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	7.10E-02 (C)	No
	91-20-3	Naphthalene			mg/l		0/3	9.60E-04 - 1.00E-03	1.00E-03	N/A	1.40E-04 (C)	Yes
	98-95-3	Nitrobenzene			mg/l		0/3	1.90E-04 - 2.00E-04	2.00E-04	N/A	1.20E-04 (N)	Yes
	621-64-7	n-Nitroso-di-n-propylamine			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	9.60E-06 (C)	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	1.40E-02 (C)	No
	95-48-7	o-Cresol			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	1.80E-01 (N)	No
	106-47-8	p-Chloroaniline			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	3.40E-04 (C)	Yes
	59-50-7	p-Chloro-m-cresol			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	N/A	NTX
	85-01-8	Phenanthrene (11)			mg/l		0/3	9.60E-04 - 1.00E-03	1.00E-03	N/A	1.10E-01 (N)	No
	108-95-2	Phenol			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	1.10E+00 (N)	No
	129-00-0	Pyrene			mg/l		0/3	9.60E-04 - 1.00E-03	1.00E-03	N/A	1.10E-01 (N)	No
	71-55-6	1,1,1-Trichloroethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.10E-01 (N)	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	6.70E-05 (C)	Yes
	79-00-5	1,1,2-Trichloroethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.40E-04 (C)	Yes
	75-34-3	1,1-Dichloroethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.40E-03 (C)	No
	75-35-4	1,1-Dichloroethene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.40E-02 (N)	No
	107-06-2	1,2-Dichloroethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.50E-04 (C)	Yes
	78-87-5	1,2-Dichloropropane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.90E-04 (C)	Yes
	78-93-3	2-Butanone			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	7.10E-01 (N)	No
	591-78-6	2-Hexanone			mg/l		0/3	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	101-55-3	4-Bromophenyl phenylether			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/l		0/3	4.80E-03 - 5.10E-03	5.10E-03	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	2.00E-01 (N)	No
	67-64-1	Acetone			mg/l		0/3	2.50E-02 - 2.50E-02	2.50E-02	N/A	2.20E+00 (N)	No
	71-43-2	Benzene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	4.10E-04 (C)	Yes

Table E.2-11
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Max ND greater than Screening Value? (Y/N)
	75-27-4	Bromodichloromethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.20E-04 (C)	Yes
	74-83-9	Bromomethane			mg/l		0/3	2.00E-03 - 2.00E-03	2.00E-03	N/A	8.70E-04 (N)	Yes
	75-15-0	Carbon disulfide			mg/l		0/3	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.00E-01 (N)	No
	56-23-5	Carbon tetrachloride			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.00E-04 (C)	Yes
	108-90-7	Chlorobenzene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.10E-02 (N)	No
	75-00-3	Chloroethane			mg/l		0/3	2.00E-03 - 2.00E-03	2.00E-03	N/A	2.10E+00 (N)	No
	67-66-3	Chloroform			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.90E-04 (C)	Yes
	74-87-3	Chloromethane			mg/l		0/3	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.90E-02 (N)	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	4.30E-04 (C)	Yes
	124-48-1	Dibromochloromethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.50E-04 (C)	Yes
	100-41-4	Ethylbenzene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.50E-03 (C)	No
	75-09-2	Methylene chloride			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.80E-03 (C)	Yes
	100-42-5	Styrene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.60E-01 (N)	No
	10061-02-6	trans-1,3-Dichloropropene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	4.30E-04 (C)	Yes
	75-25-2	Tribromomethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	8.50E-03 (C)	No
	79-01-6	Trichloroethene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.70E-03 (C)	No
	75-01-4	Vinyl Chloride			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.60E-05 (C)	Yes
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	4.30E-04 (C)	Yes
	87-86-5	Pentachlorophenol			mg/l		0/3	5.00E-05 - 2.60E-02	2.60E-02	N/A	5.60E-04 (C)	Yes

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening level values for tap water from USEPA Regional Screening Level Table (April 2009) and
are based on a risk level of 1.0E-06 and a hazard index of 0.1.
See text for derivation of Nutrient RDAs.

(4) Rationale Codes
Selection Reason:
Infrequent Detection but Associated Historically (HIST)
Toxicity Information Available (TX)
Above Screening Levels (ASL)
No Toxicity Information (NTX)
Deletion Reason:
Infrequent Detection (<= 5%, IFD)
Background Levels (BKG)
Below Screening and/or ARAR/TBC Level (BSL)

(5) The screening value is based on the action level for lead in drinking water.

(6) The screening value for inorganic mercury was used.

(7) The screening value is based on endosulfan.

(8) The screening value is based on endrin.

(9) The screening value is based on chlordane.

(10) The screening value is based on dinitrotoluene mixtures.

(11) The screening value is based on pyrene as a surrogate.

Definitions: N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Table E.2-12
Medium-Specific Exposure Point Concentration Summary for SWMU 41 Area B - Surface Soil

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean of Detects	Multiple Detection Limits? (Yes/No) [1]	95% UCL (Distribution) [2]	Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic [3]	Rationale [4]
Surface Soil	1,2-Dibromo-3-chloropropane[5]	mg/kg	9.40E-03	N/A	7.10E-03 (NP)	9.40E-03	7.10E-03	mg/kg	95% UCL-Bst	Test (8)
	2-Hexanone[5]	mg/kg	1.00E-02	N/A	7.63E-03 (NP)	1.00E-02	7.63E-03	mg/kg	95% UCL-Bst	Test (8)
	Methylcyclohexane	mg/kg	1.60E-03	No	2.38E-03 (N)	3.20E-03	2.38E-03	mg/kg	95% KM-t	Test (4)
	p-Chloro-m-cresol[5]	mg/kg	2.00E-02	N/A	1.10E-01 (NP)	2.00E-02	2.00E-02	mg/kg	Max	Test (2)
	Aluminum	mg/kg	2.04E+04	No	2.34E+04 (N)	2.72E+04	2.34E+04	mg/kg	95% Student's-t	Test (4)
	Arsenic	mg/kg	1.94E+01	No	2.18E+01 (N)	2.30E+01	2.18E+01	mg/kg	95% Student's-t	Test (4)
	Cobalt	mg/kg	9.53E+00	No	1.12E+01 (G)	1.20E+01	1.12E+01	mg/kg	95% Approx. Gamma	Test (6)
	Iron	mg/kg	3.68E+04	No	4.06E+04 (N)	4.75E+04	4.06E+04	mg/kg	95% Student's-t	Test (4)
	Manganese	mg/kg	1.36E+03	No	1.67E+03 (N)	2.34E+03	1.67E+03	mg/kg	95% Student's-t	Test (4)
	Vanadium	mg/kg	3.67E+01	No	4.23E+01 (N)	4.70E+01	4.23E+01	mg/kg	95% Student's-t	Test (4)

Notes:

N/A = Not applicable

[1] ProUCL software (version 4.0, USEPA, 2007) recommends use of Kaplan-Meier method if there are multiple detection limits.

[2] Statistical Distribution and 95% UCL as determined by ProUCL (unless otherwise noted): (G) the data were determined to follow gamma distribution; (L) the data were determined to follow lognormal distribution; (NP) the data were determined to be non-parametric; (N) the data were determined to be normally distributed.

[3] Statistic: Maximum Detected Value (Max); 95% KM Chebyshev (95% KM-Cheby); 97.5% KM Chebyshev (97.5% KM-Cheby); 99% KM Chebyshev (99% KM-Cheby); 95% KM Percentile Bootstrap (95% KM-% Btstrp); 95% KM-t (95% KM-t); 95% KM-BCA (95% KM-BCA); 95% H-UCL (95% H-UCL); 95% Chebyshev -Mean, SD- UCL (95% Cheby, Mean, SD); 97.5% Chebyshev -Mean, SD- UCL (97.5% Cheby, Mean, SD); 99% Chebyshev -Mean, SD- UCL (99% Cheby, Mean, SD); 95% UCL of Log-transformed Data (95% UCL-T) 95% Student's-t (95% Student's-t); 95% Modified-t (95% Modified-t); 95% UCL based on bootstrap statistic (95% UCL-Bst); 95% Approximate Gamma UCL (95% Approx. Gamma); 95% KM Chebyshev-MVUE (95% KM-Cheby-MVUE).

[4] Unless otherwise noted (see footnote 5), ProUCL EPC selection rationale based on, detection limit values, distribution, standard deviation, and sample size (see ProUCL output in appendix for further details):

Test (1): Kaplan-Meier method recommended by ProUCL due to multiple detection limits.
Test (2): 95% UCL exceeds maximum detected concentration, therefore, maximum concentration used for EPC.
Test (3): Shapiro-Wilk W test, Kolmogorov-Smirnov (K-S), and Anderson-Darling (A-D) tests, indicate data follow nonparametric distribution.
Test (4): Shapiro-Wilk W test indicates data are normally distributed.
Test (5): Shapiro-Wilk W test indicates data are log-normally distributed.
Test (6): Kolmogorov-Smirnov (K-S) and/or Anderson-Darling (A-D) tests indicate data follow gamma distribution.
Test (7): Sample size is less than or equal to 5, therefore, maximum concentration used for EPC.
Test (8): 95% UCL estimated by a non-Pro-UCL bootstrap method.

[5] Infrequent detection resulted in ProUCL modeling error for this constituent, therefore the distribution was assumed to be non-parametric and the UCL was determined using a non-ProUCL bootstrap method with random numbers for NDs (see text

Table E.2-13
Medium-Specific Exposure Point Concentration Summary for SWMU 41 Area B - Total Soil

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Total Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean of Detects	Multiple Detection Limits? (Yes/No) [1]	95% UCL (Distribution) [2]	Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic [3]	Rationale [4]
Total Soil	2,3,7,8-TCDD-TE	mg/kg	1.89E-06	N/A	N/A	5.86E-06	5.86E-06	mg/kg	Max	Test (7)
	1,2-Dibromo-3-chloropropane[5]	mg/kg	8.15E-03	N/A	9.74E-03 (NP)	9.40E-03	9.40E-03	mg/kg	Max	Test (2)
	2-Hexanone[5]	mg/kg	1.00E-02	N/A	6.46E-03 (NP)	1.00E-02	6.46E-03	mg/kg	95% UCL-Bst	Test (8)
	Methylcyclohexane	mg/kg	4.74E-03	No	1.65E-02 (L)	3.70E-02	1.65E-02	mg/kg	97.5% KM-Cheby	Test (5)
	p-Chloro-m-cresol	mg/kg	1.37E-02	No	2.00E-02 (N)	2.00E-02	2.00E-02	mg/kg	95% KM-% Btstrp	Test (4)
	Aluminum	mg/kg	2.30E+04	No	2.67E+04 (N)	4.24E+04	2.67E+04	mg/kg	95% Student's-t	Test (4)
	Arsenic	mg/kg	1.85E+01	No	2.17E+01 (N)	3.20E+01	2.17E+01	mg/kg	95% Student's-t	Test (4)
	Cobalt	mg/kg	1.16E+01	No	1.32E+01 (N)	2.00E+01	1.32E+01	mg/kg	95% Student's-t	Test (4)
	Iron	mg/kg	3.76E+04	No	4.27E+04 (N)	6.62E+04	4.27E+04	mg/kg	95% Student's-t	Test (4)
	Manganese	mg/kg	1.19E+03	No	1.46E+03 (N)	2.91E+03	1.46E+03	mg/kg	95% Student's-t	Test (4)
	Vanadium	mg/kg	4.28E+01	No	4.85E+01 (N)	7.00E+01	4.85E+01	mg/kg	95% Student's-t	Test (4)

Notes:

N/A = Not applicable

[1] ProUCL software (version 4.0, USEPA, 2007) recommends use of Kaplan-Meier method if there are multiple detection limits.

[2] Statistical Distribution and 95% UCL as determined by ProUCL (unless otherwise noted): (G) the data were determined to follow gamma distribution; (L) the data were determined to follow lognormal distribution; (NP) the data were determined to be non-parametric; (N) the data were determined to be normally distributed.

[3] Statistic: Maximum Detected Value (Max); 95% KM Chebyshev (95% KM-Cheby); 97.5% KM Chebyshev (97.5% KM-Cheby); 99% KM Chebyshev (99% KM-Cheby); 95% KM Percentile Bootstrap (95% KM-% Btstrp); 95% KM-t (95% KM-t); 95% KM-BCA (95% KM-BCA); 95% H-UCL (95% H-UCL); 95% Chebyshev -Mean, SD- UCL (95% Cheby, Mean, SD); 97.5% Chebyshev -Mean, SD- UCL (97.5% Cheby, Mean, SD); 99% Chebyshev -Mean, SD- UCL (99% Cheby, Mean, SD); 95% UCL of Log-transformed Data (95% UCL-T) 95% Student's-t (95% Student's-t); 95% Modified-t (95% Modified-t); 95% UCL based on bootstrap statistic (95% UCL-Bst); 95% Approximate Gamma UCL (95% Approx. Gamma); 95% KM Chebyshev-MVUE (95% KM-Cheby-MVUE).

[4] Unless otherwise noted (see footnote 5), ProUCL EPC selection rationale based on, detection limit values, distribution, standard deviation, and sample size (see ProUCL output in appendix for further details):

Test (1): Kaplan-Meier method recommended by ProUCL due to multiple detection limits.
Test (2): 95% UCL exceeds maximum detected concentration, therefore, maximum concentration used for EPC.
Test (3): Shapiro-Wilk W test, Kolmogorov-Smirnov (K-S), and Anderson-Darling (A-D) tests, indicate data follow nonparametric distribution.
Test (4): Shapiro-Wilk W test indicates data are normally distributed.
Test (5): Shapiro-Wilk W test indicates data are log-normally distributed.
Test (6): Kolmogorov-Smirnov (K-S) and/or Anderson-Darling (A-D) tests indicate data follow gamma distribution.
Test (7): Sample size is less than or equal to 5, therefore, maximum concentration used for EPC.
Test (8): 95% UCL estimated by a non-Pro-UCL bootstrap method.

[5] Infrequent detection resulted in ProUCL modeling error for this constituent, therefore the distribution was assumed to be non-parametric and the UCL was determined using a non-ProUCL bootstrap method with random numbers for NDs (see text for details).

Table E.2-14
Medium-Specific Exposure Point Concentration Summary for SWMU 41 Area B - Sediment

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean of Detects	Multiple Detection Limits? (Yes/No) [1]	95% UCL (Distribution) [2]	Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic [3]	Rationale [4]
Sediment	Arsenic	mg/kg	1.50E+01	N/A	N/A	1.66E+01	1.66E+01	mg/kg	Max	Test (7)
	Manganese	mg/kg	2.14E+03	N/A	N/A	2.80E+03	2.80E+03	mg/kg	Max	Test (7)

Notes:

N/A = Not applicable

[1] ProUCL software (version 4.0, USEPA, 2007) recommends use of Kaplan-Meier method if there are multiple detection limits.

[2] Statistical Distribution and 95% UCL as determined by ProUCL (unless otherwise noted): (G) the data were determined to follow gamma distribution; (L) the data were determined to follow lognormal distribution; (NP) the data were determined to be non-parametric; (N) the data were determined to be normally distributed.

[3] Statistic: Maximum Detected Value (Max); 95% KM Chebyshev (95% KM-Cheby); 97.5% KM Chebyshev (97.5% KM-Cheby); 99% KM Chebyshev (99% KM-Cheby); 95% KM Percentile Bootstrap (95% KM-% Btstrp); 95% KM-t (95% KM-t); 95% KM-BCA (95% KM-BCA); 95% H-UCL (95% H-UCL); 95% Chebyshev -Mean, SD- UCL (95% Cheby, Mean, SD); 97.5% Chebyshev -Mean, SD- UCL (97.5% Cheby, Mean, SD); 99% Chebyshev -Mean, SD- UCL (99% Cheby, Mean, SD); 95% UCL of Log-transformed Data (95% UCL-T) 95% Student's-t (95% Student's-t); 95% Modified-t (95% Modified-t); 95% UCL based on bootstrap statistic (95% UCL-Bst); 95% Approximate Gamma UCL (95% Approx. Gamma); 95% KM Chebyshev-MVUE (95% KM-Cheby-MVUE).

[4] Unless otherwise noted (see footnote 5), ProUCL EPC selection rationale based on, detection limit values, distribution, standard deviation, and sample size (see ProUCL output in appendix for further details):

Test (1): Kaplan-Meier method recommended by ProUCL due to multiple detection limits.
Test (2): The 95% UCL exceeds the maximum detected concentration, therefore, maximum concentration used for EPC.
Test (3): Shapiro-Wilk W test, Kolmogorov-Smirnov (K-S), and Anderson-Darling (A-D) tests, indicate data follow nonparametric distribution.
Test (4): Shapiro-Wilk W test indicates data are normally distributed.
Test (5): Shapiro-Wilk W test indicates data are log-normally distributed.
Test (6): Kolmogorov-Smirnov (K-S) and/or Anderson-Darling (A-D) tests indicate data follow gamma distribution.
Test (7): Sample size is less than or equal to 5, therefore, maximum concentration used for EPC.
Test (8): 95% UCL estimated by a non-Pro-UCL bootstrap method.

Table E.2-15
Medium-Specific Exposure Point Concentration Summary for SWMU 41 B - Surface Water

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean of Detects	Multiple Detection Limits? (Yes/No) [1]	95% UCL (Distribution) [2]	Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic [3]	Rationale [4]
Surface Water	Arsenic	mg/L	2.52E-03	N/A	N/A	7.10E-03	7.10E-03	mg/L	Max	Test (7)
	Lead	mg/L	7.58E-03	N/A	N/A	2.90E-02	2.90E-02	mg/L	Max	Test (7)

Notes:

N/A = Not applicable

[1] ProUCL software (version 4.0, USEPA, 2007) recommends use of Kaplan-Meier method if there are multiple detection limits.

[2] Statistical Distribution and 95% UCL as determined by ProUCL (unless otherwise noted): (G) the data were determined to follow gamma distribution; (L) the data were determined to follow lognormal distribution; (NP) the data were determined to be non-parametric; (N) the data were determined to be normally distributed.

[3] Statistic: Maximum Detected Value (Max); 95% KM Chebyshev (95% KM-Cheby); 97.5% KM Chebyshev (97.5% KM-Cheby); 99% KM Chebyshev (99% KM-Cheby); 95% KM Percentile Bootstrap (95% KM-% Btstrp); 95% KM-t (95% KM-t); 95% KM-BCA (95% KM-BCA); 95% H-UCL (95% H-UCL); 95% Chebyshev -Mean, SD- UCL (95% Cheby, Mean, SD); 97.5% Chebyshev -Mean, SD- UCL (97.5% Cheby, Mean, SD); 99% Chebyshev -Mean, SD- UCL (99% Cheby, Mean, SD); 95% UCL of Log-transformed Data (95% UCL-T) 95% Student's-t (95% Student's-t); 95% Modified-t (95% Modified-t); 95% UCL based on bootstrap statistic (95% UCL-Bst); 95% Approximate Gamma UCL (95% Approx. Gamma); 95% KM Chebyshev-MVUE (95% KM-Cheby-MVUE).

[4] Unless otherwise noted (see footnote 5), ProUCL EPC selection rationale based on, detection limit values, distribution, standard deviation, and sample size (see ProUCL output in appendix for further details):

Test (1): Kaplan-Meier method recommended by ProUCL due to multiple detection limits.
Test (2): The 95% UCL exceeds the maximum detected concentration, therefore, maximum concentration used for EPC.
Test (3): Shapiro-Wilk W test, Kolmogorov-Smirnov (K-S), and Anderson-Darling (A-D) tests, indicate data follow nonparametric distribution.
Test (4): Shapiro-Wilk W test indicates data are normally distributed.
Test (5): Shapiro-Wilk W test indicates data are log-normally distributed.
Test (6): Kolmogorov-Smirnov (K-S) and/or Anderson-Darling (A-D) tests indicate data follow gamma distribution.
Test (7): Sample size is less than or equal to 5, therefore, maximum concentration used for EPC.
Test (8): 95% UCL estimated by a non-Pro-UCL bootstrap method.

Table E.2-16
Medium-Specific Exposure Point Concentration Summary for SWMU 41 B - Groundwater

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean of Detects	Multiple Detection Limits? (Yes/No) [1]	95% UCL (Distribution) [2]	Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic [3]	Rationale [4]
Groundwater	Tetrachloroethene	mg/L	9.50E-04	N/A	N/A	1.70E-03	1.70E-03	mg/L	Max	Test (7)
	Arsenic	mg/L	6.45E-03	N/A	N/A	7.90E-03	7.90E-03	mg/L	Max	Test (7)
	Cobalt	mg/L	7.00E-03	N/A	N/A	7.00E-03	7.00E-03	mg/L	Max	Test (7)
	Sodium	mg/L	1.30E+03	N/A	N/A	3.03E+03	3.03E+03	mg/L	Max	Test (7)

Notes:

N/A = Not applicable

[1] ProUCL software (version 4.0, USEPA, 2007) recommends use of Kaplan-Meier method if there are multiple detection limits.

[2] Statistical Distribution and 95% UCL as determined by ProUCL (unless otherwise noted): (G) the data were determined to follow gamma distribution; (L) the data were determined to follow lognormal distribution; (NP) the data were determined to be non-parametric; (N) the data were determined to be normally distributed.

[3] Statistic: Maximum Detected Value (Max); 95% KM Chebyshev (95% KM-Cheby); 97.5% KM Chebyshev (97.5% KM-Cheby); 99% KM Chebyshev (99% KM-Cheby); 95% KM Percentile Bootstrap (95% KM-% Btstrp); 95% KM-t (95% KM-t); 95% KM-BCA (95% KM-BCA); 95% H-UCL (95% H-UCL); 95% Chebyshev -Mean, SD- UCL (95% Cheby, Mean, SD); 97.5% Chebyshev -Mean, SD- UCL (97.5% Cheby, Mean, SD); 99% Chebyshev -Mean, SD- UCL (99% Cheby, Mean, SD); 95% UCL of Log-transformed Data (95% UCL-T) 95% Student's-t (95% Student's-t); 95% Modified-t (95% Modified-t); 95% UCL based on bootstrap statistic (95% UCL-Bst); 95% Approximate Gamma UCL (95% Approx. Gamma); 95% KM Chebyshev-MVUE (95% KM-Cheby-MVUE).

[4] Unless otherwise noted (see footnote 5), ProUCL EPC selection rationale based on, detection limit values, distribution, standard deviation, and sample size (see ProUCL output in appendix for further details):

Test (1): Kaplan-Meier method recommended by ProUCL due to multiple detection limits.
Test (2): The 95% UCL exceeds the maximum detected concentration, therefore, maximum concentration used for EPC.
Test (3): Shapiro-Wilk W test, Kolmogorov-Smirnov (K-S), and Anderson-Darling (A-D) tests, indicate data follow nonparametric distribution.
Test (4): Shapiro-Wilk W test indicates data are normally distributed.
Test (5): Shapiro-Wilk W test indicates data are log-normally distributed.
Test (6): Kolmogorov-Smirnov (K-S) and/or Anderson-Darling (A-D) tests indicate data follow gamma distribution.
Test (7): Sample size is less than or equal to 5, therefore, maximum concentration used for EPC.
Test (8): 95% UCL estimated by a non-Pro-UCL bootstrap method.

Table E.2-17
Values Used for Daily Intake Calculations - Current/Future Exposures to Surface Soil
SWMU 41B

Scenario Timeframe:	Current/Future
Medium:	Surface Soil
Exposure Medium:	Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Maintenance Worker	Adult	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	100	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	50	days/year	(1)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
Dermal Absorption	Maintenance Worker	Adult	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 1997, 2002	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(2)	--	USEPA, 1995, 2003	$[(L)ADD_{int}]$ (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (3)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	50	days/year	(1)	$\frac{CS \times SSAF \times DABS \times SA \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	

(1) Best professional judgement. Based on site maintenance/inspection activities conducted 1day/week and assuming 2 weeks on vacation.
(2) Dermal absorption factors are presented in **Table E.2.29**.
(3) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, and forearms are exposed to surface soil.

USEPA, 1995: Assessing Dermal Exposure from Soil Hazardous Waste Management Division. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
USEPA, 2003: Updated Dermal Exposure Assessment Guidance. Office of Superfund Programs, Region III, Philadelphia, PA.

Table E.2-18
Values Used for Daily Intake Calculations - Future Exposures to Total Soil
SWMU 41B

Scenario Timeframe:	Future
Medium:	Total Soil
Exposure Medium:	Total Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Maintenance Worker	Adult	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	100	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	50	days/year	(1)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Excavation Worker	Adult	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	330	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	125	days/year	USEPA, 2002	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	1	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	1	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Resident	Adult	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	100	mg/day	USEPA, 1991a	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	350	days/year	USEPA, 1991a	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration (Cancer)	30	years	USEPA, 1991a	
				ED_c	Exposure Duration (Non-Cancer)	24	years	USEPA, 1991b	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
		Child	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	200	mg/day	USEPA, 1991a	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	350	days/year	USEPA, 1991a	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	6	years	USEPA, 1991a	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	15	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
Dermal Absorption	Maintenance Worker	Adult	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 1997, 2001	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(2)	--	USEPA, 1995, 2003	$[(L)ADD_{int}]$ (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (3)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	50	days/year	(1)	$\frac{CS \times SSAF \times DABS \times SA \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	

Table E.2-18
Values Used for Daily Intake Calculations - Future Exposures to Total Soil
SWMU 41B

Scenario Timeframe:	Future
Medium:	Total Soil
Exposure Medium:	Total Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal Absorption (con't)	Excavation Worker	Adult	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	USEPA, 2002	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(2)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (3)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	125	days/year	USEPA, 2002	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	1	years	USEPA, 2002	BW x AT x CF2
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	1	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Resident	Adult	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	USEPA, 1997, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(2)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700 (4)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	350	days/year	USEPA, 1991a	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	30	years	USEPA, 1991a	BW x AT x CF2
				ED$_c$	Exposure Duration	24	years	USEPA, 1991b	
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
		Child	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 1997, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(2)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800 (5)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	350	days/year	USEPA, 1991a	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	6	years	USEPA, 1991a	BW x AT x CF2
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	15	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	

(1) Best professional judgement. Based on site maintenance/inspection activities conducted 1day/week and assuming 2 weeks on vacation.
(2) Dermal absorption factors are presented in **Table E.2-29.**
(3) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, and forearms are exposed to soil.
(4) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, forearms, and lower legs are exposed to soil.
(5) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, forearms, lower legs, and feet are exposed to soil.

USEPA, 1991a: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.
USEPA, 1991b: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). OSWER 9285.7-01B.
USEPA, 1995: Assessing Dermal Exposure from Soil. Hazardous Waste Management Division. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.
USEPA, 2003: Updated Dermal Exposure Assessment Guidance. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
USEPA, 2004: Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final.

Table E.2-19
Values Used for Daily Intake Calculations - Current/Future Exposures to Surface Soil - Air
SWMU 41B

Scenario Timeframe:	Current/Future
Medium:	Surface Soil
Exposure Medium:	Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Particulates)	Maintenance Worker	Adult	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	50	days/year	USEPA, 2002	Intake concentration (mg/m^3) =
				ED	Exposure Duration	25	years	USEPA, 2002	CA*FI*EF*ED
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	AT
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	
Inhalation (Volatiles)	Maintenance Worker	Adult	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	50	days/year	USEPA, 2002	Intake concentration (mg/m^3) =
				ED	Exposure Duration	25	years	USEPA, 2002	CA*FI*EF*ED
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	AT
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	

(1) Chemical concentration for particulates in air (mg/m^3) = Concentration in soil (mg/kg) x 1/PEF (kg/m^3).
Chemical concentration of volatiles in air (mg/m^3) = Concentration in soil (mg/kg) x 1/VF (kg/m^3).

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table E.2-20
Values Used for Daily Intake Calculations - Future Exposures to Total Soil - Air
SWMU 41B

Scenario Timeframe:	Future
Medium:	Total Soil
Exposure Medium:	Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Particulates and Volatiles)	Maintenance Worker	Adult	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	Intake concentration (mg/m^3) = $\frac{CA*FI*EF*ED}{AT}$
				FI	Fraction Inhaled	1	unitless	--	
				EF	Exposure Frequency	50	days/year	USEPA, 2002	
				ED	Exposure Duration	25	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	
	Excavation Worker	Adult	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	Intake concentration (mg/m^3) = $\frac{CA*FI*EF*ED}{AT}$
				FI	Fraction Inhaled	1	unitless	--	
				EF	Exposure Frequency	125	days/year	USEPA, 2002	
				ED	Exposure Duration	1	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	365	days	Based on ED	
	Resident	Adult	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	Intake concentration (mg/m^3) = $\frac{CA*FI*EF*ED}{AT}$
				FI	Fraction Inhaled	1	unitless	--	
				EF	Exposure Frequency	350	days/year	Site Specific/Judgement	
				ED_c	Exposure Duration (Cancer)	24	years	USEPA, 2002 (2)	
				ED	Exposure Duration (Noncancer)	30	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	Reference	
				AT-N	Averaging Time (Non-Cancer)	10,950	days	Based on ED (3)	
		Child	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	Intake concentration (mg/m^3) = $\frac{CA*FI*EF*ED}{AT}$
				FI	Fraction Inhaled	1	unitless	--	
				EF	Exposure Frequency	350	days/year	Site Specific/Judgement	
				ED	Exposure Duration	6	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	--	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	Based on ED	

(1) Chemical concentration for particulates in air (mg/m^3) = Concentration in soil (mg/kg) x 1/PEF (kg/m^3).
Chemical concentration of volatiles in air (mg/m^3) = Concentration in soil (mg/kg) x 1/VF (kg/m^3).
(2) For carcinogens, risks for adults and children are averaged over a lifetime of 70 years (USEPA, 2002)
(3) AT for chronic exposures = 30 years x 365 days/year.

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table E.2-21
Values Used for Daily Intake Calculations - Future Exposures to Surface and Total Soil
SWMU 41B

Scenario Timeframe:	Future
Medium:	Surface and Total Soil
Exposure Medium:	Surface and Total Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker (outdoor)	Adult	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Soil	100	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	225	days/year	USEPA, 2002	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
Dermal Absorption	Industrial Worker (outdoor)	Adult	SWMU 41B	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 1997, 2002	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(1)	--	USEPA, 1995, 2003	$[(L)ADD_{int}]$ (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (2)	cm^2	USEPA, 1997, 2004	
				EF	Exposure Frequency	225	days/year	USEPA, 2002	$\frac{CS \times SSAF \times DABS \times SA \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	

(1) Dermal absorption factors are presented in **Table E.2-29.**
(2) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, and forearms are exposed to surface soil.

USEPA, 1995: Assessing Dermal Exposure from Soil Hazardous Waste Management Division. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
USEPA, 2003: Updated Dermal Exposure Assessment Guidance. Office of Superfund Programs, Region III, Philadelphia, PA.
USEPA, 2004: Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final.

Table E.2-22
Values Used for Daily Intake Calculations - Future Exposures to Surface and Total Soil - Air
SWMU 41B

Scenario Timeframe:	Future
Medium:	Surface and Total Soil
Exposure Medium:	Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Particulates and Volatiles)	Industrial Worker (Outdoor)	Adult	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	Intake concentration (mg/m3) = $\frac{CA*FI*EF*ED}{AT}$
				FI	Fraction Inhaled	1	unitless	--	
				EF	Exposure Frequency	225	days/year	USEPA, 2002	
				ED	Exposure Duration	25	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	

(1) Chemical concentration for particulates in air (mg/m^3) = Concentration in soil (mg/kg) x 1/PEF (kg/m^3).
Chemical concentration of volatiles in air (mg/m^3) = Concentration in soil (mg/kg) x 1/VF (kg/m^3).

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table E.2-23
Values Used for Daily Intake Calculations - Current/Future Exposures to Groundwater, Inhalation
SWMU 41B

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Maintenance Worker	Adult	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	50	days/year	USEPA, 2002	Intake concentration (mg/m^3) =
				ED	Exposure Duration	25	years	USEPA, 2002	$\frac{CA*FI*EF*ED}{AT}$
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	

(1) Ambient air concentrations were modeled by a volatilization model (ASTM, 1995). A discussion of the model is provided in **Table E.2-40.**

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table E.2-24
Values Used for Daily Intake Calculations - Future Exposures to Groundwater
SWMU 41B

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker (Outdoor and Indoor)	Adult	SWMU 41B	CW	Chemical Concentration in Groundwater	See site-specific EPC tables	µg/l	See site-specific EPC tables	
				IR-W	Ingestion Rate of Groundwater	1	liters/day	USEPA, 1991a	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	225	days/year	USEPA, 2002	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^3$	mg/µg	---	$\frac{CW \times IR\text{-}W \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Resident (On-site and Off-site)	Adult	SWMU 41B	CW	Chemical Concentration in Groundwater	See site-specific EPC tables	µg/l	See site-specific EPC tables	
				IR-W	Ingestion Rate of Groundwater	2	liters/day	USEPA, 1991a, 2003	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	30	years	USEPA, 1991a, 2003	
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b	
				CF1	Conversion Factor 1	$1/10^3$	mg/µg	---	$\frac{CW \times IR\text{-}W \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 1991a, 2003	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a, 2003	
				CF2	Conversion Factor 2	365	days/year	---	
		Child	SWMU 41B	CW	Chemical Concentration in Groundwater	See site-specific EPC tables	µg/l	See site-specific EPC tables	
				IR-W	Ingestion Rate of Groundwater	1	liters/day	USEPA, 2003	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	6	years	USEPA, 1991a, 2003	
				CF1	Conversion Factor 1	$1/10^3$	mg/µg	---	$\frac{CW \times IR\text{-}W \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	15	kg	USEPA, 1991a, 2003	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a, 2003	
				CF2	Conversion Factor 2	365	days/year	---	
Dermal Absorption	Resident (On-site and Off-site)	Adult	SWMU 41B	DA	Dose Absorbed per Unit Area per Event	--	mg/cm^2-event	(1)	
				SA	Skin Surface Area Available for Contact	18,000	cm^2	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	events/day	USEPA, 2004	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003	
				ED	Exposure Duration	30	years	USEPA, 1991a, 2003	
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b, 2003	$\frac{DA \times SA \times EV \times EF \times ED}{BW \times AT \times CF1}$
				BW	Body Weight	70	kg	USEPA, 1991a, 2003	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a, 2003	
				CF1	Conversion Factor 1	365	days/year	---	
		Child	SWMU 41B	DA	Dose Absorbed per Unit Area per Event	--	mg/cm^2-event	(2)	
				SA	Skin Surface Area Available for Contact	6,600	cm^2	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	events/day	USEPA, 2004	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003	
				ED	Exposure Duration	6	years	USEPA, 1991a, 2003	$\frac{DA \times SA \times EV \times EF \times ED}{BW \times AT \times CF1}$
				BW	Body Weight	15	kg	USEPA, 1991a, 2003	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a, 2003	
				CF1	Conversion Factor 1	365	days/year	---	

(1) Value is derived using worksheets for calculating dermal exposures in aqueous media (USEPA, 2001) and assuming an exposure time of 30 minutes (ET = 0.50 hr; USEPA, 2004).

(2) Value is derived using worksheets for calculating dermal exposures in aqueous media (USEPA, 2001) and assuming an exposure time of 60 minutes (ET = 1.0 hr; USEPA, 2004).

USEPA, 1991a: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.
USEPA, 1991b: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). OSWER 9285.7-01B.
USEPA, 2001: Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media and Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media; Versions dated April, 2001. (http://www.epa.gov/oswer/riskassessment/ragse/index.htm)
USEPA, 2003: EPA Region 3 Risk-Based Concentration Table: Technical Background Information, Region 3, Philadelphia, PA.
USEPA, 2004: Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final.

Table E.2-24
Values Used for Daily Intake Calculations - Future Exposures to Groundwater
SWMU 41B

USEPA, 2005: EPA Region 3 web site - http://www.epa.gov/reg3hwmd/risk/human/index.htm.

Table E.2-25
Values Used for Daily Intake Calculations - Future Exposures to Groundwater, Inhalation
SWMU 41B

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Industrial Worker (Outdoor and Indoor)	Adult	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1, 2)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	225	days/year	USEPA, 2002	Intake concentration (mg/m^3) =
				ED	Exposure Duration	25	years	USEPA, 2002	$\frac{CA*FI*EF*ED}{AT}$
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	Based on ED	
	Excavation Worker	Adult	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(3)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	125	days/year	(4)	Intake concentration (mg/m^3) =
				ED	Exposure Duration	1	years	(4)	$\frac{CA*FI*EF*ED}{AT}$
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	365	days	Based on ED	
	Resident (On-site and Off-site)	Adult	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(2, 5)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	350	days/year	USEPA, 2002	Intake concentration (mg/m^3) =
				ED	Exposure Duration (Non-Cancer)	30	years	USEPA, 2002	$\frac{CA*FI*EF*ED}{AT}$
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	10,950	days	Based on ED	
		Child	SWMU 41B	CA	Chemical Concentration in Air	Chemical Specific	mg/m^3	(1)	
				FI	Fraction Inhaled	1.00	unitless	--	
				EF	Exposure Frequency	350	days/year	USEPA, 2002	Intake concentration (mg/m^3) =
				ED	Exposure Duration	6	years	USEPA, 2002	$\frac{CA*FI*EF*ED}{AT}$
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	Based on ED	

(1) Ambient air concentrations were modeled by a volatilization model (ASTM, 1995). A discussion of the model is provided in **Table E.2-40.**
(2) Indoor air concentrations were modeled using the Johnson and Ettinger (1991) model. Assumptions for the model are presented in **Table E.2-41.**
(3) Trench air concentrations were modeled by the Trench Model (VDEQ, 2007). A discussion of the model is provided in **Table E.2-42.**
(4) The excavation scenario is based on a worker working on an excavation project for 125 days/year for 1 year. The excavation worker is assumed to be exposed to groundwater for 4 hrs a day (VDEQ, 20(
(5) Shower room air concentrations were modeled using the Foster and Chrostowski (1987) Shower Inhalation Model. Modeled concentrations were calculated in **Table E.2-43** using data from site-specific EPC tables.

American Society for Testing and Materials (ASTM). 1995. Standard Guide for Risk-Based Corrective Action at Petroleum Release Sites. ASTM Committee E-50 on Environmental Assessment, Report No. E1739-95. West Conshohocken, Pennsylvania.
Foster, S.A. and P.C. Chrostowski. 1987. Inhalation Exposures to Volatile Organic Contaminants in the Shower. In the proceedings of the 80th Annual Meeting of the Air Pollution Control Association (APCA), June 21-26, New York.
Johnson, P.C. and Ettinger, R.A. 1991: Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Buildings. Environmental Science & Technology. 25:1445-1452.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening for Superfund Sites. OSWER 9355.4-24.

Table E.2-26
Values Used for Daily Intake Calculations
Future Exposures to Home Grown Produce for Residents
SWMU 41B

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Home Grown Produce

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident (On-site and Off-site)	Adult	SWMU 41B	CV	Chemical Concentration in Produce	(1)	mg/kg	(1)	
				ABS	Chemical-Specific	(1)	unitless	(1)	
				IR-P	Ingestion Rate of Produce	18.6 (3)	g/d	USEPA, 1997	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	30	years	USEPA, 1991a, 2003	
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b	
				CF1	Conversion Factor 1	$1/10^3$	mg/µg	---	$\frac{CV \times ABS \times IR\text{-}P \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 1991a, 2003	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a, 2003	
				CF2	Conversion Factor 2	365	days/year	---	
		Child	SWMU 41B	CV	Chemical Concentration in Produce	(1)	mg/kg	(1)	
				ABS	Chemical-Specific	(1)	unitless	(2)	
				IR-P	Ingestion Rate of Produce	18.6 (3)	g/d	USEPA, 1997	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	350	days/year	USEPA, 1991a, 2003	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	6	years	USEPA, 1991a, 2003	
				CF1	Conversion Factor 1	$1/10^3$	mg/µg	---	$\frac{CV \times ABS \times IR\text{-}P \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	15	kg	USEPA, 1991a, 2003	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a, 2003	
				CF2	Conversion Factor 2	365	days/year	---	

(1) Concentration of COPCs in homegrown vegetables/fruits were modeled as shown in **Table E.2-45**.
(2) Value includes 7.5 g/d of vegetables and 11.1 g/d of fruit. The ingestion rate is based on 95th percentile values for home grown food intake (Table 1-2; USEPA, 1997).

USEPA, 1991a: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.
USEPA, 1991b: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). OSWER 9285.7-01B.
USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.
USEPA 2003: EPA Region 3 Risk-Based Concentration Table: Technical Background Information, Region 3, Philadelphia, PA.

Table E.2-27
Values Used for Daily Intake Calculations - Future Exposures to Sediment
SWMU 41B

Scenario Timeframe:	Future
Medium:	Sediment
Exposure Medium:	Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Maintenance Worker	Adult	SWMU 41B	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Sediment	100	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	50	days/year	(1)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Industrial Worker (Outdoor)	Adult	SWMU 41B	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Sediment	100	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	225	days/year	USEPA, 2002	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Excavation Worker	Adult	SWMU 41B	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Sediment	330	mg/day	USEPA, 2002	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	125	days/year	USEPA, 2002	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	1	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	1	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Resident	Adult	SWMU 41B (wading)	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Sediment	100	mg/day	USEPA, 1991a	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	40	days/year	(2)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	30	years	USEPA, 1991a	
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	70	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
		Child	SWMU 41B (wading)	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				IR-S	Ingestion Rate of Sediment	200	mg/day	USEPA, 1991a	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	40	days/year	(2)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	6	years	USEPA, 1991a	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	$\frac{CS \times IR\text{-}S \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				BW	Body Weight	15	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
Dermal Absorption	Maintenance Worker	Adult	SWMU 41B	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.6 (4)	mg/cm^2-day	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(3)	--	USEPA, 1995, 2003	$[(L)ADD_{int}]$ (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (5)	cm^2	USEPA, 1997, 2002	
				EF	Exposure Frequency	50	days/year	(1)	$\frac{CS \times SSAF \times DABS \times SA \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				ED	Exposure Duration	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	$1/10^6$	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	

Table E.2-27
Values Used for Daily Intake Calculations - Future Exposures to Sediment
SWMU 41B

Scenario Timeframe:	Future
Medium:	Sediment
Exposure Medium:	Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal Absorption (cont.)	Industrial Worker (Outdoor)	Adult	SWMU 41B	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.6 (4)	mg/cm^2-day	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(3)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (5)	cm^2	USEPA, 1997, 2004	
				EF	Exposure Frequency	225	days/year	USEPA, 2002	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	25	years	USEPA, 2002	BW x AT x CF2
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Excavation Worker	Adult	SWMU 41B	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.6 (4)	mg/cm^2-day	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(3)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300 (5)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	125	days/year	USEPA, 2002	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	1	years	USEPA, 2002	BW x AT x CF2
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 2002	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	1	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Resident	Adult	SWMU 41B (wading)	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(3)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700 (6)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	40	days/year	(2)	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	30	years	USEPA, 1991a	BW x AT x CF2
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b	
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	70	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	
		Child	SWMU 41B (wading)	CS	Chemical Concentration in Sediment	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	USEPA, 2004	Internal (Lifetime) Average Daily Dose
				DABS	Dermal Absorption Factor (Solid)	(3)	--	USEPA, 1995, 2003	[(L)ADD$_{int}$] (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800 (6)	cm^2	USEPA, 1997	
				EF	Exposure Frequency	40	days/year	(2)	CS x SSAF x DABS x SA x EF x ED x CF1
				ED	Exposure Duration	6	years	USEPA, 1991a	BW x AT x CF2
				CF1	Conversion Factor 1	1/10^6	kg/mg	---	
				BW	Body Weight	15	kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a	
				CF2	Conversion Factor 2	365	days/year	---	

(1) Best professional judgement. Based on site maintenance/inspection activities conducted 1 day/week and assuming 2 weeks on vacation. Assumed sediment exposures were similar to soil exposures.

(2) The exposure frequency is based on best professional judgment that the time an adult resident would spend wading would be similar to the time spent gardening or doing yard work, approximately 40 events/year (USEPA, 1992, 1997). For the child resident, it is assumed that a child under 6 years of age would be accompanied by an adult while wading.

(3) Dermal absorption factors are presented in **Table E.2-29**.

(4) Value based on activities associated with wet soil (e.g., pipe layers).

(5) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, and forearms are exposed to sediment.

(6) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, face, hands, forearms, lower legs, and feet are exposed to sediment.

USEPA, 1991a: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.

USEPA, 1991b: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). OSWER 9285.7-01B.

USEPA, 1992: Dermal Exposure Assessment: Principles and Applications. Office of Research and Development. EPA/600/8-91/011B.

USEPA, 1995: Assessing Dermal Exposure from Soil Hazardous Waste Management Division. Office of Superfund Programs, Region III, Philadelphia, PA.

USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2003: Updated Dermal Exposure Assessment Guidance. Office of Superfund Programs, Region III, Philadelphia, PA.

USEPA, 2004: Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final.

Table E.2-28
Values Used for Daily Intake Calculations - Future Exposures to Surface Water
SWMU 41B

Scenario Timeframe:	Future
Medium:	Surface Water
Exposure Medium:	Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal Absorption	Maintenance Worker	Adult	SWMU 41B (Wading)	DA	Dose Absorbed Per Unit Area per Event	(1)	mg/cm^2-event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	3,300 (2)	cm^2	USEPA, 1997	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	events/day	(1)	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	50	days/year	(3)	
				ED	Exposure Duration	25	years	EPA, 2002	DA x SA x EV x EF x ED
				BW	Body Weight	70	kg	EPA, 2002	BW x AT x CF1
				AT-C	Averaging Time (Cancer)	70	years	EPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	EPA, 2002	
				CF1	Conversion Factor 1	365	days/year	---	
	Industrial Worker (Outdoor)	Adult	SWMU 41B (Wading)	DA	Dose Absorbed Per Unit Area per Event	(1)	mg/cm^2-event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	3,300 (2)	cm^2	USEPA, 1997, 2004	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	events/day	(1)	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	225	days/year	USEPA, 2002	
				ED	Exposure Duration	25	years	USEPA, 2002	DA x SA x EV x EF x ED
				BW	Body Weight	70	kg	USEPA, 2002	BW x AT x CF1
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	25	years	USEPA, 2002	
				CF1	Conversion Factor 1	365	days/year	---	
	Excavation Worker	Adult	SWMU 41B (Wading)	DA	Dose Absorbed Per Unit Area per Event	(1)	mg/cm^2-event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	3,300 (2)	cm^2	USEPA, 1997	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	events/day	(1)	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	125	days/year	USEPA, 2002	
				ED	Exposure Duration	1	years	USEPA, 2002	DA x SA x EV x EF x ED
				BW	Body Weight	70	kg	USEPA, 2002	BW x AT x CF1
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	1	years	USEPA, 2002	
				CF1	Conversion Factor 1	365	days/year	---	
	Resident	Adult	SWMU 41B (Wading)	DA	Dose Absorbed Per Unit Area per Event	(1)	mg/cm^2-event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	5,700(4)	cm^2	USEPA, 1997	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	evants/day	(1)	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	40	days/year	(5)	
				ED	Exposure Duration	30	years	USEPA, 1991a	
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b	DA x SA x EV x EF x ED
				BW	Body Weight	70	kg	USEPA, 1991a	BW x AT x CF1
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	30	years	USEPA, 1991a	
				CF1	Conversion Factor 1	365	days/year	---	
		Child	SWMU 41B (Wading)	DA	Dose Absorbed Per Unit Area per Event	(1)	mg/cm^2-event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	1,900 (4)	cm^2	USEPA, 1997	Internal (Lifetime) Average Daily Dose
				EV	Event Frequency	1	events/day	(1)	$[(L)ADD_{int}]$ (mg/kg-day) =
				EF	Exposure Frequency	40	days/year	(5)	
				ED	Exposure Duration	6	years	(6)	DA x SA x EV x EF x ED
				BW	Body Weight	15	kg	USEPA, 1991a	BW x AT x CF1
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a	
				CF1	Conversion Factor 1	365	days/year	---	

(1) Value calculated using the surface water concentrations and the worksheet for calculating chemicals in aqueous media (USEPA, 2001) based on an exposure time of 1 hour (ET = 1 hour/day).
(2) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that head, hands, and forearms are exposed to surface water; the worker's legs and feet would be protected by boots.
(3) Best professional judgement. Based on site maintenance/inspection activities conducted 1 day/week and assuming 2 weeks on vacation.
(4) Value derived from data presented in USEPA (1997), averaging across gender and age. It is assumed that hands, forearms, lower legs, and feet are exposed to surface water while wading.
(5) The exposure frequency is based on best professional judgment that the time an adult resident would spend wading would be similar to the time spent gardening or doing yard work, approximately 40 events/year (USEPA, 1992, 1997). For the child resident, it is assumed that a child under 6 years of age would be accompanied by an adult while wading.
(6) The exposure duration was based on the age range evaluated (i.e., 0 to 6 years of age).

USEPA, 1991a: Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.
USEPA, 1991b: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). OSWER 9285.7-01B.
USEPA, 1992: Dermal Exposure Assessment: Principles and Applications. Office of Research and Development. EPA/600/8-91/011B.
USEPA, 1997: Exposure Factors Handbook, Volume I. EPA/600/P-95/002Fa.
USEPA, 2001: Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media; Versions dated April, 2001. (http://www.epa.gov/oswer/riskassessment/ragse/index.htm)
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table E.2-28
Values Used for Daily Intake Calculations - Future Exposures to Surface Water
SWMU 41B

Scenario Timeframe:	Future
Medium:	Surface Water
Exposure Medium:	Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

USEPA, 2004: Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) EPA/540/R/99/005

Table E.2-29
Dermal Absorption Fractions and Physical/Chemical Properties for Soil - SWMU 41B
Radford Army Ammunition Plant, Radford, Virginia

Analyte	CAS NO.	ABS_d [a] (m^3/kg)	D_i (cm^2/s)	D_w (cm^2/s)	K_{oc} (cm^3/g)	K_d (cm^3/g)	H (unitless)	D_A (cm^2/s)
Aluminum	7429-90-5	1.0E-02						
Arsenic	7440-38-2	3.0E-02						
Cobalt	7440-48-4	1.0E-02						
Iron	7439-89-6	1.0E-02						
Manganese	7439-96-5	1.0E-02						
Vanadium	7440-62-2	1.0E-02						
1,2-Dibromo-3-chloropropane	96-12-8		3.20E-02	8.90E-06	1.31E+02	7.85E-01	6.00E-03	
2-Hexanone	591-78-6							
Methylcyclohexane [b]	108-87-2		7.30E-02	8.20E-06	1.49E+02	8.94E-01	7.40E+01	

CAS No. = Chemical Abstract Service No.
ABS_d = Dermal Absorption Factor
VF = Volatilization Factor
D_A = Apparent Diffusivity
m^3/kg = cubic meters per kilogram
cm^2/s = centimeter squared per second

[a] ABS_d values are taken from Exhibit 3-4, Risk Assessment Guidance for Superfund (RAGS), Volume 1, Human Health Evaluation and Manual, Part E; Supplemental Guidance for Dermal Risk Assessment, July 2004, and Region III Technical Guidance, Assessing Dermal Exposure in Soil, December 1995, unless otherwise noted.

[b] Hexane values used as surrogate values for this analyte.

Table E.2-30
PEF Calculation - Commercial/Industrial Worker
Radford Army Ammunition Plant - SWMU 41B

Site Name: Radford SWMU 41B

Calculation of Site-Specific Commercial/Industrial Worker PEF:
This value can be applied to workers as well as residents unless site area is greater than 0.5 acres.
Equation 4-5 from USEPA, 2002

$$PEF = \frac{Q}{C_{wind}} \times \frac{3{,}600 \text{ sec/hr}}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

Variable	Value	Units	Description
Q/C_{wind} =	50.68	g/m^2-s per kg/m^3	Calculated below
V =	**0.5**	unitless	fraction of vegetative cover
U_m =	**3.5**	m/s	mean annual windspeed
U_t =	**11.32**	m/s	equivalent threshold value of windspeed at 7 m
F(x) =	**0.194**	unitless	function dependent on U_m/U_t derived using Cowherd et al., 1985

Q/C_{wind} can be used for any source size from 0.5 acres to 500 acres using the equation and look up tables in Appendix D, Exhibit D-2. Source of 0.5 acres is the size of a typical exposure unit.

PEF = 1.77E+09 m^3/kg

From Exhibit D-2 from USEPA 2002:

$$Q/C_{wind} = A \times \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	9.9253		Site-specific value
B =	18.6636		Site-specific value
C =	211.8862		Site-specific value
A_s =	**1.08**	acres	**Contaminated site area**

Q/C_{wind} = 50.68 g/m^2-s/kg/m^3

Table E.2-31
PEF Calculation - Construction Worker
Radford Army Ammunition Plant - SWMU 41B

Site Name: **Radford SWMU 41B**

Calculation of Site-Specific Construction Worker PEF:

$$PEF_{sc} = Q / C_{sr} \; x \; \frac{1}{F_D} \; x \left[\frac{T \; x \; A_R}{556 \; x \; (W/3)^{0.4} \; x \; \frac{365 \; day/yr - p)}{365 \; day/yr} \; x \; \sum VKT} \right]$$

Variable	Value	Units	Description
Q/C_{sr} =	**20.22**	g/m^2-s per kg/m^3	**calculated below**
Duration of construction =	**6**	months	
	25	weeks	
	125	days	assuming 5 days per week
t_c =	1,000	hours	assuming 8 hour days
	60,000	min	
T =	3,600,000	sec	
F_D =	0.185		dispersion correction factor
Surface area of site =	**1.08**	acres	**Site-specific**
Surface area of site =	4,370.8	m^2	
Length of side of area configured as a square =	66.1	m	equal to the square root of the area of the site
L_R =	217	ft	of area configured as a square
W_R =	20	ft	width of roadway segment - default
A_R =	403.0	m^2	surface area of contaminated roadway segment
W =	**6**	tons	mean vehicle weight - default, assuming 2, 2-ton cars and 2, 10-ton trucks
p =	**119**	days/yr	Number of days/yr with at least 0.01 inches of precipitation - value for Radford Area from Exhibit 5-2
Number of vehicles on site =	**2**	cars	value based on assumptions for W
	2	truck	
VKT =	16.5	km	sum of vehicle km traveled during exposure duration - assuming each vehicles travels road once per day and 5 days/week for total time

Variables in **BOLD** are site-specific and should be entered for each site

PEF_{sc} = 1.94E+07 m^3/kg

$$Q / C_{sr} = A \; x \; \exp \left[\frac{(\ln A_s - B)^2}{C} \right]$$

Variable	Value	Units	Description
A_s =	**1.08**	acres	Site specific area
A =	12.9351		default constant
B =	5.7383		default constant
C =	71.7711		default constant

Q/C_{sr} = 20.22 g/m^2-s per kg/m^3

Table E.2-32
PEF Calculation - Residents
Radford Army Ammunition Plant - SWMU 41B

Site Name: Radford SWMU 41B

Calculation of Site-Specific Residential PEF:
A separate PEF for residents must be calculated if the site in question is greater than 0.5 acres in size.
This residential PEF is based on a 0.5 acre residential site.
Equation 4-5 from USEPA, 2002

$$PEF = \frac{Q}{C_{wind}} \; x \; \frac{3{,}600 \text{ sec/hr}}{0.036 \; x \; (1-V) \; x \; (U_m/U_t)^3 \; x \; F(x)}$$

Variable	Value	Units	Description
Q/C_{wind} =	58.17	g/m^2-s per kg/m^3	Calculated below
V =	**0.5**	unitless	fraction of vegetative cover
U_m =	**3.5**	m/s	mean annual windspeed
U_t =	**11.32**	m/s	equivalent threshold value of windspeed at 7 m
F(x) =	**0.194**	unitless	function dependent on U_m/U_t derived using Cowherd et al., 1985

Q/C_{wind} can be used for any source size from 0.5 acres to 500 acres using the equation and look up tables in Appendix D, Exhibit D-2. Source of 0.5 acres is the size of a typical exposure unit.

PEF_R = 2.03E+09 m^3/kg

From Exhibit D-2 from USEPA 2002:

$$Q/C_{wind} = A \; x \; \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	9.9253		Site-specific value
B =	18.6636		Site-specific value
C =	211.8862		Site-specific value
A_s =	0.5	acres	**Residential exposure**

Q/C_{wind} = 58.17 g/m^2-s/kg/m^3

Summary of VF Values
Maintenance Worker
Radford Army Ammunition Plant - SWMU 41B

Site: Radford SWMU 41B
Receptor: Maintenance Worker

Chemical of Concern	VF, m^3/kg
2-Hexanone	N/A
Methylcyclohexane	8.68E+02
1,2-Dibromo-3-Chloropropane	3.55E+04

Summary of VF Values
Industrial Worker
Radford Army Ammunition Plant - SWMU 41B

Site: Radford SWMU 41B
Receptor: Industrial Worker

Chemical of Concern	VF, m^3/kg
2-Hexanone	N/A
Methylcyclohexane	8.68E+02
1,2-Dibromo-3-Chloropropane	3.55E+04

Summary of VF values
Construction Worker
Radford Army Ammunition Plant - SWMU 41B

Site: Radford SWMU 41B
Receptor: Construction Worker

Chemical of Concern	VF, m^3/kg
2-Hexanone	N/A
Methylcyclohexane	5.50E+01
1,2-Dibromo-3-Chloropropane	2.23E+03

Summary of VF Values
Adult Resident
Radford Army Ammunition Plant - SWMU 41B

Site: Radford SWMU 41B
Receptor: Adult Resident

Chemical of Concern	VF, m^3/kg
2-Hexanone	N/A
Methylcyclohexane	9.76E+02
1,2-Dibromo-3-Chloropropane	4.00E+04

Summary of VF values
Child Resident
Radford Army Ammunition Plant - SWMU 41B

Site: Radford SWMU 41B
Receptor: Child Resident

Chemical of Concern	VF, m^3/kg
2-Hexanone	N/A
Methylcyclohexane	4.88E+02
1,2-Dibromo-3-Chloropropane	2.00E+04

Table E.2-33
VF Calculation - Maintenance Worker
Radford Army Ammunition Plant - SWMU 41B

Site Name: Radford SWMU 41B

D_A values calculated using the following equation and values from the Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites. OSWER 9355.4-24. USEPA, 2002. Equation 4-8 from USEPA, 2002.
This equation is chemical-specific.

$$D_A = \frac{[((\theta_a^{10/3} x D_i x H) + (\theta_w^{10/3} x D_w))/n^2]}{((\rho_b x K_d) + \theta_w + (\theta_a x H))}$$

Chemical name:

Variable	Value	Units	Description
θ_{a} =	0.28	L_{air}/L_{soil}	default
θ_w =	0.15	L_{water}/L_{soil}	default
D_i =		cm^2/s	**chemical-specific from VF table**
D_w =		cm^2/s	**chemical-specific from VF table**
H		unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =		cm^3/g	**chemical-specific from VF table**
K_{oc} =		cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = cm^2/s

VF (soil only) values for commercial/industrial worker, adult resident and child resident were calculated using the following equations from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. USEPA, 2002. Equation 4-8 from USEPA, 2002

$$VF = \frac{Q}{C_{vol}} \; x \; \frac{(3.14 x D_A x T)^{1/2} x CF}{2 x \rho_b x D_A}$$

Variable	Value	Units	Description
Q/C_{vol} =	71.94	$(g/m^2\text{-}s)/kg/m^3$	calculated below
D_A =		cm^2/s	chemical specific - calculated above
T =	**788,400,000**	seconds	**Receptor-specific exposure interval (T= 25 yrs*365 days/yr*24hr/day*60 min/hr*60 sec/min)**
CF =	1.00E-04	m^2/cm^2	default
ρ_b =	1.5	g/cm^3	default

VF = m^3/kg

From Exhibit D-3 from USEPA 2002:

$$Q / C_{vol} = A \; x \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	14.1901		Site-specific value - see tab D-3 for values
B =	18.5634		Site-specific value - see tab D-3 for values
C =	210.5281		Site-specific value - see tab D-3 for values
A_s =	**1.08**	acres	Contaminated site area

Q/C_{vol} = 71.94 g/m^2-s/kg/m^3

Table E.2-34
VF Calculation - Industrial Worker
Radford Army Ammunition Plant - SWMU 41B

Site Name: Radford SWMU 41B

D_A values calculated using the following equation and values from the Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites. OSWER 9355.4-24. USEPA, 2002.
Equation 4-8 from USEPA, 2002.
This equation is chemical-specific.

$$D_A = \frac{[((\theta_a^{10/3} x D_i x H) + (\theta_w^{10/3} x D_w))/n^2]}{((\rho_b x K_d) + \theta_w + (\theta_a x H))}$$

Chemical name:

Variable	Value	Units	Description
θ_a =	0.28	L_{air}/L_{soil}	default
θ_w =	0.15	L_{water}/L_{soil}	default
D_i =		cm^2/s	**chemical-specific from VF table**
D_w =		cm^2/s	**chemical-specific from VF table**
H		unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =		cm^3/g	**chemical-specific from VF table**
K_{oc} =		cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = cm^2/s

VF (soil only) values for commercial/industrial worker, adult resident and child resident were calculated using the following equations from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. USEPA, 2002. Equation 4-8 from USEPA, 2002

$$VF = \frac{Q}{C_{vol}} \; x \; \frac{(3.14 x D_A x T)^{1/2} x CF}{2 x \rho_b x D_A}$$

Variable	Value	Units	Description
Q/C_{vol} =	71.94	$(g/m^2\text{-}s)/kg/m^3$	calculated below
D_A =		cm^2/s	chemical specific - calculated above
T =	**788,400,000**	seconds	**Receptor-specific exposure interval (T= 25 yrs*365 days/yr*24hr/day*60 min/hr*60 sec/min)**
CF =	1.00E-04	m^2/cm^2	default
ρ_b =	1.5	g/cm^3	default

VF = m^3/kg

From Exhibit D-3 from USEPA 2002:

$$Q/C_{vol} = A \; x \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	14.1901		Site-specific value - see tab D-3 for values
B =	18.5634		Site-specific value - see tab D-3 for values
C =	210.5281		Site-specific value - see tab D-3 for values
A_s =	**1.08**	acres	Contaminated site area

Q/C_{vol} = 71.94 $g/m^2\text{-}s/kg/m^3$

Table E.2-35
VF Calculation - Construction Worker
Radford Army Ammunition Plant - SWMU 41B

Site Name: Radford SWMU 41B

D_A values calculated using the following equation and values from the Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites. OSWER 9355.4-24. USEPA, 2002. Equation 4-8 from USEPA, 2002.

$$D_A = \frac{[((\theta_a^{10/3} x D_i x H) + (\theta_w^{10/3} x D_w))/n^2]}{((\rho_b x K_d) + \theta_w + (\theta_a x H))}$$

Chemical name:

Variable	Value	Units	Description
θ_a =	0.28	L_{air}/L_{soil}	default
θ_w =	0.15	L_{water}/L_{soil}	default
D_i =		cm^2/s	**chemical-specific from VF table**
D_w =		cm^2/s	**chemical-specific from VF table**
H =		unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =		cm^3/g	**chemical-specific from VF table**
K_{oc} =		cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = cm^2/s

This equation is chemical-specific. Bold variables - information is required for each chemical

VF (soil only) values for construction worker were calculated using the following equations from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. USEPA, 2002. Equation 5-14 from USEPA, 2002

$$VF_{sc} = \frac{(3.14 x D_A x T)^{1/2} x CF}{2 x \rho_b x D_A} \; x \; \frac{Q}{C_{sa}} \; x \; \frac{1}{F_D}$$

Variable	Value	Units	Description
Q/C_{sa} =	12.37	g/m^2-s/kg/m^3	calculated below
F_D =	0.185	unitless	default
D_A =		cm^2/s	**chemical specific - calculated above**
T =	**3,600,000**	**seconds**	Receptor-specific exposure interval (example: T= 1 yr*125 days/yr*8 hr/day*60 min/hr*60 sec/min)
CF =	1.00E-04	m^2/cm^2	default conversion factor
ρ_b =	1.5	g/cm^3	default

VF_{sc} = m^3/kg

Equation 5-15 from USEPA, 2002:

$$Q/C_{sa} = A \; x \exp\left[\frac{(\ln A_c - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	2.4538		default constant
B =	17.566		default constant
C =	189.0426		default constant
A_c =	**1.08**	acres	**site-specific**

A_c is site specific - area should change for each site

Q/C_{sa} = 12.37 g/m^2-s/kg/m^3

Table E.2-36
VF Calculation - Adult Resident
Radford Army Ammunition Plant - SWMU 41B

Site Name: Radford SWMU 41B

D_A values calculated using the following equation and values from the Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites. OSWER 9355.4-24. USEPA, 2002.
Equation 4-8 from USEPA, 2002.
This equation is chemical-specific.

$$D_A = \frac{[((\theta_a^{10/3} x D_i x H) + (\theta_w^{10/3} x D_w))/n^2]}{((\rho_b x K_d) + \theta_w + (\theta_a x H))}$$

Chemical name:

Variable	Value	Units	Description
θ_a =	0.28	L_{air}/L_{soil}	default
θ_w =	0.15	L_{water}/L_{soil}	default
D_i =		cm^2/s	**chemical-specific from VF table**
D_w =		cm^2/s	**chemical-specific from VF table**
H		unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =		cm^3/g	**chemical-specific from VF table**
K_{oc} =		cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = cm^2/s

VF (soil only) values for commercial/industrial worker, adult resident and child resident were calculated using the following equations from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. USEPA, 2002. Equation 4-8 from USEPA, 2002

$$VF = \frac{Q}{C_{vol}} \; x \; \frac{(3.14 x D_A x T)^{1/2} x CF}{2 x \rho_b x D_A}$$

Variable	Value	Units	Description
Q/C_{vol} =	82.59	g/m^2-s)/kg/m^3	calculated below
D_A =		cm^2/s	chemical specific - calculated above
T =	**756,864,000**	seconds	**Receptor-specific exposure interval (T= 24 yrs*365 days/yr*24hr/day*60 min/hr*60 sec/min)**
CF =	1.00E-04	m^2/cm^2	default
ρ_b =	1.5	g/cm^3	default

VF = m^3/kg

From Exhibit D-3 from USEPA 2002:

$$Q/C_{vol} = A \; x \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	14.1901		Site-specific value - see tab D-3 for values
B =	18.5634		Site-specific value - see tab D-3 for values
C =	210.5281		Site-specific value - see tab D-3 for values
A_s =	0.5	acres	Residential exposure

Q/C_{vol} = 82.59 g/m^2-s/kg/m^3

Table E.2-37
VF Calculation - Child Resident
Radford Army Ammunition Plant - SWMU 41B

Site Name: Radford SWMU 41B

D_A values calculated using the following equation and values from the Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites. OSWER 9355.4-24. USEPA, 2002.
Equation 4-8 from USEPA, 2002.
This equation is chemical-specific.

$$D_A = \frac{[((\theta_a^{10/3} x D_i x H) + (\theta_w^{10/3} x D_w))/n^2]}{((\rho_b x K_d) + \theta_w + (\theta_a x H))}$$

Chemical name:

Variable	Value	Units	Description
θ_a =	0.28	L_{air}/L_{soil}	default
θ_w =	0.15	L_{water}/L_{soil}	default
D_i =		cm^2/s	**chemical-specific from VF table**
D_w =		cm^2/s	**chemical-specific from VF table**
H		unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =		cm^3/g	**chemical-specific from VF table**
K_{oc} =		cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = cm^2/s

VF (soil only) values for commercial/industrial worker, adult resident and child resident were calculated using the following equations from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. USEPA, 2002.

$$VF = \frac{Q}{C_{vol}} \; x \; \frac{(3.14 x D_A x T)^{1/2} x CF}{2 x \rho_b x D_A}$$

Variable	Value	Units	Description
Q/C_{vol} =	82.59	g/m^2-s)/kg/m^3	calculated below
D_A =		cm^2/s	chemical specific - calculated above
T =	**189,216,000**	seconds	**Receptor-specific exposure interval (T= 6 yrs*365 days/yr*24hr/day*60 min/hr*60 sec/min)**
CF =	1.00E-04	m^2/cm^2	default
ρ_b =	1.5	g/cm^3	default

VF = m^3/kg

From Exhibit D-3 from USEPA 2002:

$$Q/C_{vol} = A \; x \exp\left[\frac{(\ln A_s - B)^2}{C}\right]$$

Variable	Value	Units	Description
A =	14.1901		Site-specific value - see tab D-3 for values
B =	18.5634		Site-specific value - see tab D-3 for values
C =	210.5281		Site-specific value - see tab D-3 for values
A_s =	0.5	acres	Residential exposure

Q/C_{vol} = 82.59 g/m^2-s/kg/m^3

Table E.2-38
Parameter Values Used for Surface Water - SWMU 41B

Dermal Absorption - Chemicals of Potential Concern (COPC) in Surface Water

COPC	CAS No.	FA	Kp (cm/hr)	tau_{event} (hr)	B	t* (hr)	COPC Assessed?
Inorganics							
Arsenic	7440-38-2		1.0E-03				Yes (1)
Lead (2)	7439-92-1		1.0E-03				Yes (1)

(1) Because ingestion of surface water is considered to be minimal, no dermal/ drinking water ratio is calculated. Dermal exposure is assessed as the primary exposure pathway.

(2) COPC was added to the USEPA spreadsheet. The default value of 1.0E-03 cm/hr was assumed for the Kp value.

USEPA, 2001. Parameter values are taken from Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media; version dated April, 2001. (http://www.epa.gov/oswer/riskassessment/ragse/index.htm)

USEPA, 2004. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final.

Table E.2-39
Parameter Values Used for Groundwater - SWMU 41B

Dermal Absorption - Chemicals of Potential Concern (COPC) in Groundwater

COPC	CAS No.	FA	Kp (cm/hr)	tau_{event} (hr)	B	t* (hr)	COPC Assessed?
Organics							
Tetrachloroethene (1)	127-18-4	1.0	3.3E-02	0.91	0.20	2.18	Yes
Inorganics							
Arsenic	7440-38-2		1.0E-03				No
Cobalt (2)	7440-48-4		1.0E-03				No
Sodium (2)	7440-23-5		1.0E-03				No

(1) COPC is a halogenated compound. The K_p correlation based on molecular weight of the hydrocarbon will tend to under estimate the permeability coefficient (USEPA, 2004).

(2) COPC was added to the USEPA spreadsheet. The default value of 1.0E-03 cm/hr was assumed for the Kp value.

USEPA, 2001. Parameter values are taken from Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media and Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media; versions dated April, 2001. (http://www.epa.gov/oswer/riskassessment/ragse/index.htm)

USEPA, 2004. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final.

Table E.2-40
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - SWMU 41B

$$VF_{wamb} = (H\ /1 + (U_a d_{air} L_{GW}\ / WD_{effws}))\ X\ 10^3 L/m^3$$

Where:

VF_{wamb} (mg/m^3 air per mg/L water) =	calculated	Volatilization factor
H (cm^3-water per cm^3-air) =	chemical-specific	Henry's Law Constant
U_a (cm/sec) =	353	Wind speed above ground surface (NOAA, 2007)
d_{air} (cm) =	200	Ambient air mixing zone height (ASTM, 1995)
L_{GW} (cm) =	1,646	Depth to groundwater (site specific; average depth measured in August 2007)
W (cm) =	6,069	Width of source area parallel to wind flow direction (site-specific; measured from GIS mapping)
D_{effws} (cm^2/sec) =	calculated	Effective diffusion coefficient between groundwater and soil surface

$$D_{effws} = \left(h_{cap} + h_v\right)\left[\frac{h_{cap}}{D_{effcap}} + \frac{h_v}{D_{effs}}\right]^{-1}$$

Where:

D_{effws} (cm^2/sec) =	calculated	Effective diffusion coefficient between groundwater and soil surface
h_{cap} (cm) =	31	Thickness of capillary fringe (estimated to be low because groundwater is found in bedrock)
h_v (cm) =	1,615	Thickness of vadose zone (estimated as depth to water minus thickness of capillary fringe)
D_{effcap} (cm^2/sec) =	calculated	Effective diffusion coefficient through capillary fringe
D_{effs} (cm^2/sec) =	calculated	Effective diffusion coefficient in soil based on vapor phase concentration

Table E.2-40
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - SWMU 41B

$$D_{effcap} = D^{air} \frac{\theta_{acap}^{3.33}}{\theta_T^2} + D^{wat} \frac{1}{H} \frac{\theta_{wcap}^{3.33}}{\theta_T^2}$$

Where:

D_{effcap} (cm^2/sec) =	calculated	Effective diffusion coefficient through capillary fringe
D_{air} (cm^2/sec) =	chemical-specific	Diffusion coefficient in air
D_{wat} (cm^2/sec) =	chemical-specific	Diffusion coefficient in water
θ_{acap} (cm^3-air/cm^3-soil)	0.0375	Volumetric air content in capillary fringe soils
θ_{wcap} (cm^3-water/cm^3-soil)	0.338	Volumetric water content in capillary fringe soils
θ_T (cm^3/cm^3-soil)	0.375	Total soil porosity (based on value used in the Johnson & Ettinger model for consistency)

$$D_{effs} = D^{air} \frac{\theta_{as}^{3.33}}{\theta_T^2} + D^{wat} \frac{1}{H} \frac{\theta_{ws}^{3.33}}{\theta_T^2}$$

Where:

D_{effs} (cm^2/sec) =	calculated	Effective diffusion coefficient in soil based on vapor phase concentration
D_{air} (cm^2/sec) =	chemical-specific	Diffusion coefficient in air
D_{wat} (cm^2/sec) =	chemical-specific	Diffusion coefficient in water
θ_{as} (cm^3-air/cm^3-soil)	0.321	Volumetric air content in vadose zone soils
θ_{ws} (cm^3-water/cm^3-soil)	0.054	Volumetric water content in vadose zone soils (based on value used in Johnson & Ettinger model for consistency)
H (cm^3-water per cm^3-air) =	chemical-specific	Henry's Law Constant
θ_T (cm^3/cm^3-soil)	0.375	Total soil porosity (based on value used in Johnson & Ettinger model for consistency)

Table E.2-40
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - SWMU 41B

The concentration of the COPC in the ambient air is calculated using the following equation:

$$C_{air} = C_{GW} \times VF_{wamb}$$

Where:

C_{air} (mg/m^3) =	calculated	Concentration of chemical in ambient air
C_{GW} (mg/L) =	site-specific	Maximum detected concentration of chemical in groundwater
VF_{wamb} (mg/m^3 air per mg/L water) =	calculated	Volatilization factor

References:

American Society for Testing and Materials (ASTM), 1995. Standard Guide for Risk-Based Corrective Action at Petroleum Release Sites. ASTM Committee E-50 on Environmental Assessment. Report No. E1739-95. West Conshohocken, Pennsylvania.

National Oceanic and Atmospheric Administration (NOAA), 2007. Comprehensive Climatic Data for the United States through 2006. National Climatic Data Center, Asheville, North Carolina.

Table E.2-41
Groundwater Inhalation Indoor Air Concentration Summary - SWMU 41B
Radford Army Ammunition Plant, Radford, Virginia

Chemicals of Potential Concern in Groundwater and Indoor Air

Analyte	CAS No.	Cw ug/L	Ca mg/m^3
Organics			
Tetrachloroethene	127-18-4	1.70E+00	3.08E-04

Notes:
Indoor air concentrations modeled using Johnson and Ettinger Model
Model output provided in **Appendix E.6**

Non-default model inputs (based on site-specific data):

Average soil temperature (T_s) is set at 51°F or 11°C, based on the average temperature of soil for the vicinity of SWMU 41B.

Depth below grade to bottom of enclosed space floor (L_F) is set at the default value of 200 cm because building construction is likely to include a basement

Depth below grade to water table (L_{wt}) is set at 1,158 cm (38 ft), conservatively based on the shallowest depth of groundwater measured at SWMU 41B.

The soil type in the vadose zone was modeled as sand (S). Sand was selected as the soil type to conservatively represent clayey gravel and fractured bedrock found at SWMU 41B.

The thickness and properties of the capillary zone are based on values in the "lookup" table for the S soil type.

The vadose zone soil total porosity is set at 0.375, based on the "lookup" soil parameter in the model for sand.

The vadose zone soil water-filled porosity is set at 0.054 cm^3/cm^3, based on the "lookup" soil parameter in the model for sand.

The vadose zone soil dry bulk density (pb) is set at the "lookup" soil parameter of 1.66 g/cm^3 for sand in the model.

The calculated concentration of each COPC in building air ($C_{building}$) served as the EPC in the intake calculations for inhalation.

Table E.2-42
Groundwater Inhalation -Excavation Worker - Trench Gas Concentration Calculations - SWMU 41B

Analyte	CAS No.	C_w ug/L	H_i atm-m^3/mole	D_{air} cm^2/sec	VF L/min^3	C_a mg/m^3
Tetrachloroethene	127-18-4	1.70E+00	1.84E-02	5.00E-02	3.57E-02	6.07E-05

NA = Not Applicable.
NV = No Value.

Exposure point calculations calculated using trench model for construction worker/ utility worker in a trench where average depth to groundwater is greater than 15 feet (VDEQ,2007).

$$VF = \frac{(H_i \times D_{air} \times AC_{vad}^{3.33} \times A \times F \times 10^{-3} \times 10^{4} \times 3600)}{(R \times T \times L_d \times ACH \times V \times Por_{vad}^{2})}$$

where:

Parameters	Value	
H_i (atm-m^3/mol) =	chemical-specific	Henry's Law constant for contaminant
D_{air} (cm^2/s) =	chemical-specific	Diffusion coefficient in air
AC_{vad} (cm^3/cm^3) =	0.321	Volumetric air content in vadose zone soil
A (m^2) =	2.22	Area of trench (default)
F (unitless) =	1	Fraction of floor through which contaminant can enter
R (atm-m^3/mole-°K) =	$8.2x10^{-5}$	ideal gas constant
T (°K) =	284	Average system absolute temperature
L_d (cm) =	701	Distance between trench bottom and groundwater (site-specific)
ACH (h^{-1}) =	2	Air changes per hour
V (m^3) =	10.14	Volume of trench (length x width x depth)
Por_{vad} (cm^3/cm^3) =	0.375	Total soil porosity in vadose zone (default)
Conversion Factor (L/cm^3) =	0.001	
Conversion Factor (cm^2/m^2) =	10,000	
Conversion Factor (s/hr) =	3,600	

$$C_a = C_w \times VF \times 0.001$$

C_a (µg/m^3) =	chemical-specific	Concentration in trench air
C_w (µg/L) =	chemical-specific	Concentration in groundwater
VF (L/min^3) =	chemical-specific	Volatilization factor
Conversion Factor (mg/µg) =	0.001	

Table E.2-43
Groundwater Inhalation Shower Air Concentration Calculations - SWMU 41B

Analyte	CAS No.	Cw mg/L	MW g/mole	H atm-m^3/mole	k_l cm/hr	k_g cm/hr	K_L cm/hr	K_{aL} cm/hr	C_{wd} mg/L	S mg/m^3-min	Ca mg/m^3
Organics											
Tetrachloroethene	127-18-4	1.70E-03	1.66E+02	1.84E-02	1.03E+01	9.88E+02	1.02E+01	1.37E+01	1.84E-04	1.53E-04	2.40E-03

NA = Not Applicable.

Variable	Equations:	
k_l (cm/hr) =	$20 \times (44/MW)^{0.5}$	Liquid-film transfer coefficient
k_g (cm/hr) =	$3000 \times (18/MW)^{0.5}$	Gas-film transfer coefficient
K_L (cm/hr) =	$(1/k_l + (R \times T/H^* k_g))^{-1}$	overall mass transfer coefficient
K_{aL} (cm/hr) =	$K_L \times ((T \times \mu_s/T_s \times \mu_l)^{-0.5}$	overall mass transfer coefficient adjusted to shower water temperature
C_{wd} (mg/L) =	$C_w \times (1-\exp(-K_{aL} \times t_s/60 \times d)$	VOC concentration leaving shower droplet after time t_s
S (mg/m^3-min) =	$C_{wd} \times FR/SV$	VOC generation rate
C_a (mg/m^3) =	$\left[\frac{S}{R_a \times t}\right] \times \left[D_s + \frac{e^{(-Ra \times t)}}{R_a} - \frac{e^{R_a(D_s - t)}}{R_a}\right]$	VOC concentration in shower air

Constants:	Value	
R (atm-m^3/mole-K) =	8.2×10^{-5}	Gas constant
T (K) =	293	Room Temperature
T_s (K) =	318	Water Temperature
μ_s (centapoise) =	0.596	Water viscosity at Ts
μ_l (centapoise) =	1.002	Water viscosity at T
t_s (sec) =	0.5	Shower droplet drop time
d (mm) =	1	Droplet diameter
FR (L/min) =	10	Shower flow rate
SV (m^3) =	12	Shower room air volume
R_a (per min) =	0.01667	Air exchange rate
D_s (min) =	30	Shower Duration
t (min) =	60	Total time in shower room

Table E.2-44
Summary of Groundwater-to-Air Exposure Point Concentrations
SWMU 41B

Chemical of Potential Concern (COPC)	Ground Water Concentration (mg/L)	ASTM Model Ambient Air Concentration (mg/m^3)	J & E Vapor Intrusion Model Building Air Concentration (mg/m^3)	Trench Model Trench Air Concentration (mg/m^3)	F & C Model Shower Room Air Concentration (mg/m^3)
Tetrachloroethylene	1.70E-03	2.86E-08	3.08E-04	6.07E-05	2.40E-03

NA = Not Applicable; COPC is not defined as a volatile.
NV = Chemical-specific parameters are not available for this COPC.

Table E.2-45
Calculation of Homegrown Produce Concentrations from Groundwater - SWMU 41B

Analyte	CAS No.	Concentration in Groundwater (mg/L)	CV_w Concentration in Fruits/Vegetables (mg/kg)
Arsenic	7440-38-2	7.90E-03	8.60E-04

The transfer of COPCs in groundwater to vegetables by watering a garden was calculated using two equations based on "exposed produce" developed by Baes et al. (1984).

$$CV_w = WR \times R \times \frac{1-e^{-kt}}{Y \times K}$$

where:

Parameters	Value	
CV_w (mg/kg) =	chemical-specific	Constituent concentration in the vegetables/fruits
WR (mg/m^2-year) =	calculated	Watering rate
R (unitless) =	0.0319	Interception fraction for exposed vegetables/fruits
K (yr^{-1}) =	18	plant surface degradation rate constant for COPC wash-off
t (year) =	0.5	length of growing season (based on 184 frost-free days)
Y (kg/m^2) =	1.5	Vegetation yield

$$WR = C_w \times I \times F$$

where:

Parameters	Value	
WR (mg/m^2-year)	chemical-specific	Watering rate
C_w (mg/L) =	chemical-specific	Constituent concentration in groundwater
I (L/event)	0.5	Watering intensity
F (events/year) =	184	Watering frequency (once each day assumed for a 6-month growing season from May through October)

Table E.2-46
Cancer Toxicity Data - Oral/Dermal

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (2)		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source	Date (3) (MM/DD/YY)
Organics								
p-Chloro-m-cresol (4)	N/A	N/A	N/A	N/A	N/A	C	IRIS	11/3/09:8/1/91
1,2-Dibromo-3-chloropropane	8.0E-01	$(mg/kg\text{-}day)^{-1}$	100%	8.0E-01	$(mg/kg\text{-}day)^{-1}$	B2	PPRTV; EPA, 2009; VDEQ, 2009	11/3/09:4/15/09
2-Hexanone	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11/3/09:4/15/09
Methylcyclohexane (5)	N/A	N/A	N/A	N/A	N/A	Inadequate	IRIS	11/3/09:12/23/05
TCDD TE	1.3E+05	$(mg/kg\text{-}day)^{-1}$	100%	1.3E+05	$(mg/kg\text{-}day)^{-1}$	B2	EPA, 2009	11/3/09:4/15/09
Tetrachloroethene	5.4E-01	$(mg/kg\text{-}day)^{-1}$	100%	5.4E-01	$(mg/kg\text{-}day)^{-1}$	C	EPA, 2009; VDEQ, 2009	11/3/09:4/15/09
Inorganics								
Aluminum	N/A	N/A	N/A	N/A	N/A	N/A	EPA, 2009	11/3/09:4/15/09
Arsenic	1.5E+00	$(mg/kg\text{-}day)^{-1}$	100%	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	11/3/09:4/10/98
Cobalt	N/A	N/A	N/A	N/A	N/A	N/A	EPA, 2009	11/3/09:4/15/09
Iron	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11/3/09:4/15/09
Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	N/A	N/A	N/A	N/A	N/A	D	IRIS	11/3/09:12/1/96
Sodium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium	N/A	N/A	N/A	N/A	N/A	N/A	EPA, 2009	11/3/09:4/15/09

(1) Source: Risk Assessment Guidance for Fuperfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Section 4.2 and Exhibit 4-1.
(2) The equation for deriving the adjusted dermal cancer slope factors are presented in the text.
(3) For IRIS values, the date IRIS was searched and the date of the most recent review are provided. For HEAST values, the date of HEAST is provided.
(4) 3-Methylphenol was used as a surrogate for this COPC.
(5) n-Hexane was used as a surrogate for this COPC.

Definitions:
N/A = Not Available
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment
PPRTV = Provisional Peer-Reviewed Toxicity Values
EPA, 2009 = Regional Screening Values, April, 2009
VDEQ, 2009 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.2, Cancer Toxicity Data, July 8, 2009.

EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

Table E.2-47
Non-Cancer Toxicity Data - Oral/Dermal

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral to Dermal Efficiency for Dermal (1)	Absorbed RfD for Dermal (2)		Primary Target Organ(s)	Combined Uncertainty/ Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Dates of RfD (3): (MM/DD/YY)
Organics										
p-Chloro-m-cresol (4)	Chronic	5.0.E-02	mg/kg-day	100%	5.0E-02	mg/kg-day	Nervous System	1,000	IRIS	11/3/09:9/1/90
1,2-Dibromo-3-chloropropane	Chronic	2.0E-04	mg/kg-day	100%	2.0E-04	mg/kg-day	N/A	N/A	PPRTV; EPA, 2009; VDEQ, 2009	11/3/09:4/15/09
2-Hexanone	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11/3/09:4/15/09
Methylcyclohexane (5)	Chronic	6.0E-02	mg/kg-day	100%	6.0E-02	mg/kg-day	Nervous System	10,000	HEAST	1997
TCDD TE	Chronic	1.0E-09	mg/kg-day	100%	1.0E-09	mg/kg-day	Developmental nervous system	N/A	EPA, 2009; ATSDR	11/3/09:12/08
Tetrachloroethene	Chronic	1.0E-02	mg/kg-day	100%	1.0E-02	mg/kg-day	Liver	1,000	IRIS	11/3/09: 3/1/88
Inorganics										
Aluminum	Chronic	1.0E+00	mg/kg-day	100%	1.0E+00	mg/kg-day	Developmental nervous system	N/A	PPRTV; EPA, 2009; VDEQ, 2009	11/3/09:4/15/09
Arsenic	Chronic	3.0E-04	mg/kg-day	100%	3.0E-04	mg/kg-day	Skin, Vascular System	3	IRIS	11/3/09:2/1/93
Cobalt	Chronic	3.0E-04	mg/kg-day	100%	3.0E-04	mg/kg-day	N/A	N/A	PPRTV; EPA, 2009	11/3/09:4/15/09
Iron	Chronic	7.0E-01	mg/kg-day	100%	7.0E-01	mg/kg-day	Blood, Liver, GI Tract	N/A	PPRTV; EPA, 2009; VDEQ, 2009	11/3/09:4/15/09
Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese (non-food)	Chronic	2.4E-02	mg/kg-day	4%	9.6E-04	mg/kg-day	CNS	1	IRIS	11/3/09:5/1/96
Sodium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium (6)	Chronic	5.0E-03	mg/kg-day	2.6%	1.3E-04	mg/kg-day	Kidney	N/A	EPA, 2009; VDEQ, 2009; NCEA	11/3/09:4/15/09

(1) Source: Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Section 4.2 and Exhibit 4-1.
(2) The equation used to derive the adjusted dermal RfD is presented in the text.
(3) For IRIS values, the date IRIS was searched and the date of the most recent review are provided. For HEAST values, the date of HEAST is provided.
(4) The toxicity value for 3-Methylphenol was used as a surrogate for this COPC.
(5) The toxicity value for n-Hexane was used as a surrogate for this COPC.
(6) The toxicity value for Vanadium was based on Vanadium and Compounds.

Definitions:
N/A = Not Available
ATSDR = Agency for Toxic Substances Disease Registry
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment
PPRTV = Provisional Peer-Reviewed Toxicity Values
EPA, 2009 = Regional Screening Values, April, 2009.
VDEQ, 2009 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.1, Non-Cancer Toxicity Data, July 8, 2009.

Table E.2-48
Cancer Toxicity Data - Inhalation

Chemical of Potential Concern	Unit Risk		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation CSF	
	Value	Units		Source	Date (1) (MM/DD/YY)
Organics					
p-Chloro-m-cresol (2)	N/A	N/A	N/A	IRIS	11/3/09: 8/1/91
1,2-Dibromo-3-chloropropane	6.0E-03	$(ug/m^3)^{-1}$	B2	PPRTV; EPA, 2009; VDEQ, 2009	11/3/09:4/15/09
2-Hexanone	N/A	N/A	N/A	N/A	N/A
Methylcyclohexane (3)	N/A	N/A	Inadequate	IRIS	11/3/09:12/23/05
TCDD TE	3.80E+01	$(ug/m^3)^{-1}$	B2	EPA, 2009	11/3/09:4/15/09
Tetrachloroethene	5.90E-06	$(ug/m^3)^{-1}$	C	EPA, 2009; VDEQ, 2009	11/3/09:4/15/09
Inorganics					
Aluminum	N/A	N/A	N/A	N/A	11/3/09:4/15/09
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	A	IRIS	11/3/09:4/10/98
Cobalt	9.0E-03	$(ug/m^3)^{-1}$	N/A	PPRTV; EPA, 2009	11/3/09:4/15/09
Iron	N/A	N/A	N/A	EPA, 2009	11/3/09:4/15/09
Lead	N/A	N/A	N/A	N/A	N/A
Manganese	N/A	N/A	D	IRIS	11/3/09:12/1/96
Sodium	N/A	N/A	N/A	N/A	N/A
Vanadium (4)	N/A	N/A	N/A	EPA, 2009	11/3/09:4/15/09

(1) For IRIS values, the date IRIS was searched and the date of the most recent review are provided.
For HEAST values, the date of HEAST is provided.
(2) 3-Methylphenol was used as a surrogate for this COPC.
(3) n-Hexane was used as a surrogate for this COPC.
(4) Value for Vanadium and compounds was used.

Definitions:
N/A = Not Available
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment
PPRTV = Provisional Peer-Reviewed Toxicity Values
EPA, 2009 = Regional Screening Values, April, 2009.
VDEQ, 2009 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.2, Cancer Toxicity Data, July 8, 2009.

EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

Table E.2-49
Non-Cancer Toxicity Data - Inhalation

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Primary Target Organ (s)	Combined Uncertainty/ Modifying Factors	RfC:Target Organ(s)	
		Value	Units			Source(s) (2)	Dates of RfD: (MM/DD/YY)
Organics							
p-Chloro-m-cresol (3)	N/A	N/A	N/A	N/A	N/A	IRIS	11/3/09:4/1/92
1,2-Dibromo-3-chloropropane	Chronic	2.0E-04	mg/m^3	Reproductive System	1,000	IRIS	11/3/09:10/1/91
2-Hexanone	N/A	N/A	N/A	N/A	N/A	EPA, 2009	11/3/09:4/15/09
Methylcyclohexane (4)	Chronic	7.0E-01	mg/m^3	Nervous System	300	IRIS	11/3/09:12/23/05
TCDD TE	Chronic	4.0E-08	mg/m^3	Liver, Reproductive System, Endocrine System, Respiratory System, Blood, Development		EPA, 2009; Cal EPA, OEHHA	11/3/09: 12/08
Tetrachloroethene	Chronic	2.7E-01	mg/m^3	CNS	N/A	EPA, 2009; VDEQ, 2009; ATSDR	11/3/09:6/08
Inorganics							
Aluminum	Chronic	5.0E-03	mg/m^3	N/A	N/A	EPA, 2009; VDEQ, 2009; PPRTV	11/3/09:4/15/09
Arsenic	Chronic	1.5E-05	mg/m^3	Developmental, Cardiovascular, Nervous System	N/A	EPA, 2009; VDEQ, 2009; CalEPA	11/3/09:6/08
Cobalt	Chronic	6.0E-06	mg/m^3	N/A	N/A	PPRTV; EPA, 2009	11/3/09:4/15/09
Iron	N/A	N/A	N/A	N/A	N/A	EPA, 2009	11/3/09:4/15/09
Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	Chronic	5.0E-05	mg/m^3	CNS	1,000	IRIS	11/3/09:12/1/93
Sodium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium (5)	N/A	N/A	N/A	N/A	N/A	EPA, 2009	11/3/09:4/15/09

(1) The adjusted inhalation RfD was derived from the RfC value assuming a 70 kg adult inhales 20 m^3/day as follows: RfD = RfC * (20 m^3/day / 70 kg).
(2) For NCEA values, the date of the article provided by NCEA is provided.
For IRIS values, the date IRIS was searched and the date of the most recent review are provided.
For HEAST values, the date of HEAST is provided.
(3) 3-Methylphenol was used as a surrogate for this COPC.
(4) n-Hexane was used as a surrogate for this COPC.
(5) Value for Vanadium and compounds was used.

Definitions: N/A = Not Available
ATSDR = Agency for Toxic Substances Disease Registry
Cal EPA = California Environmental Protection Agency
OEHAA - Office of Environmental Health Hazard Assessment
IRIS = Integrated Risk Information System
NCEA = National Center for Environmental Assessment
HEAST = Health Effects Assessment Tables
PPRTV = Provisional Peer-Reviewed Toxicity Values
EPA, 2009 - Regional Screening Valules, April, 2009.
VDEQ, 2009 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.1, Non-Cancer Toxicity Data, July 8, 2009.

Table E.2-50
Calculation of Cancer Risks
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Surface Soil	Surface Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	5.0E-10	mg/kg-day	8.0E-01	$(mg/kg\text{-}day)^{-1}$	4.0E-10
				2-Hexanone	7.63E-03	mg/kg	5.3E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Methylcyclohexane	2.38E-03	mg/kg	1.7E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	1.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Aluminum	2.34E+04	mg/kg	1.6E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	2.18E+01	mg/kg	1.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-06
				Cobalt	1.12E+01	mg/kg	7.8E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.06E+04	mg/kg	2.8E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.67E+03	mg/kg	1.2E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.23E+01	mg/kg	3.0E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								2.3E-06
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	9.8E-11	mg/kg-day	8.0E-01	$(mg/kg\text{-}day)^{-1}$	7.9E-11
				2-Hexanone	7.63E-03	mg/kg	1.1E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Methylcyclohexane	2.38E-03	mg/kg	3.3E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	9.2E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Aluminum	2.34E+04	mg/kg	1.1E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	2.18E+01	mg/kg	3.0E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.5E-07
				Cobalt	1.12E+01	mg/kg	5.2E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.06E+04	mg/kg	1.9E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.67E+03	mg/kg	7.7E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.23E+01	mg/kg	2.0E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								4.5E-07
		Exposure Point Total									2.7E-06
	Exposure Media Total										2.7E-06
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.13E-11	mg/m^3	5.5E-13	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Inorganics							
				Aluminum	1.32E-05	mg/m^3	6.5E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	1.23E-08	mg/m^3	6.0E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	2.6E-09
				Cobalt	6.33E-09	mg/m^3	3.1E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	2.8E-09
				Iron	2.29E-05	mg/m^3	1.1E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	9.44E-07	mg/m^3	4.6E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.39E-08	mg/m^3	1.2E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								5.4E-09
		Exposure Point Total									5.4E-09
	Exposure Media Total										5.4E-09
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	2.00E-07	mg/m^3	9.8E-09	mg/m^3	6.0E+00	$(mg/m^3)^{-1}$	5.9E-08
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Methylcyclohexane	2.74E-06	mg/m^3	1.3E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								5.9E-08
		Exposure Point Total									5.9E-08
	Exposure Media Total										5.9E-08
Surface Soil Total											2.8E-06

Table E.2-50
Calculation of Cancer Risks
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	1.2E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-06
				Manganese	2.80E+03	mg/kg	2.0E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.7E-06
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	6.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-06
				Manganese	2.80E+03	mg/kg	3.9E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.0E-06
		Exposure Point Total									2.8E-06
	Exposure Media Total										2.8E-06
Sediment Total											2.8E-06
Surface Water	Surface Water	SWMU 41B	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	1.6E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-08
				Lead	2.90E+01	µg/L	6.7E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								2.5E-08
		Exposure Point Total									2.5E-08
	Exposure Media Total										2.5E-08
Surface Water Total											2.5E-08
Groundwater	Air	SWMU 41B	**Inhalation**	**Organics**							
			(Ambient Air)	Tetrachloroethene	2.68E-08	mg/m^3	1.3E-09	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	7.7E-12
			Exp. Route Total								7.7E-12
		Exposure Point Total									7.7E-12
	Exposure Media Total										7.7E-12
Groundwater Total											7.7E-12
										Total of Receptor Risks Across All Media	5.6E-06

N/A = Not Applicable.

Table E.2-51
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	1.4E-09	mg/kg-day	2.0E-04	mg/kg-day	6.9E-06
				2-Hexanone	7.63E-03	mg/kg	1.5E-09	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	2.38E-03	mg/kg	4.7E-10	mg/kg-day	6.0E-02	mg/kg-day	7.8E-09
				p-Chloro-m-cresol	2.00E-02	mg/kg	3.9E-09	mg/kg-day	5.0E-02	mg/kg-day	7.8E-08
				Inorganics							
				Aluminum	2.34E+04	mg/kg	4.6E-03	mg/kg-day	1.0E+00	mg/kg-day	4.6E-03
				Arsenic	2.18E+01	mg/kg	4.3E-06	mg/kg-day	3.0E-04	mg/kg-day	1.4E-02
				Cobalt	1.12E+01	mg/kg	2.2E-06	mg/kg-day	3.0E-04	mg/kg-day	7.3E-03
				Iron	4.06E+04	mg/kg	7.9E-03	mg/kg-day	7.0E-01	mg/kg-day	1.1E-02
				Manganese	1.67E+03	mg/kg	3.3E-04	mg/kg-day	2.4E-02	mg/kg-day	1.4E-02
				Vanadium	4.23E+01	mg/kg	8.3E-06	mg/kg-day	5.0E-03	mg/kg-day	1.7E-03
			Exp. Route Total								5.3E-02
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	2.8E-10	mg/kg-day	2.0E-04	mg/kg-day	1.4E-06
				2-Hexanone	7.63E-03	mg/kg	3.0E-10	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	2.38E-03	mg/kg	9.2E-11	mg/kg-day	6.0E-02	mg/kg-day	1.5E-09
				p-Chloro-m-cresol	2.00E-02	mg/kg	2.6E-09	mg/kg-day	5.0E-02	mg/kg-day	5.2E-08
				Inorganics							
				Aluminum	2.34E+04	mg/kg	3.0E-04	mg/kg-day	1.0E+00	mg/kg-day	3.0E-04
				Arsenic	2.18E+01	mg/kg	8.4E-07	mg/kg-day	3.0E-04	mg/kg-day	2.8E-03
				Cobalt	1.12E+01	mg/kg	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	4.8E-04
				Iron	4.06E+04	mg/kg	5.2E-04	mg/kg-day	7.0E-01	mg/kg-day	7.5E-04
				Manganese	1.67E+03	mg/kg	2.2E-05	mg/kg-day	9.6E-04	mg/kg-day	2.2E-02
				Vanadium	4.23E+01	mg/kg	5.5E-07	mg/kg-day	1.3E-04	mg/kg-day	4.2E-03
			Exp. Route Total								3.1E-02
		Exposure Point Total									8.4E-02
	Exposure Media Total										8.4E-02
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.13E-11	mg/m^3	1.5E-12	mg/m^3	N/A	(mg/m^3)	---
				Inorganics							
				Aluminum	1.32E-05	mg/m^3	1.8E-06	mg/m^3	5.0E-03	(mg/m^3)	3.6E-04
				Arsenic	1.23E-08	mg/m^3	1.7E-09	mg/m^3	1.5E-05	(mg/m^3)	1.1E-04
				Cobalt	6.33E-09	mg/m^3	8.7E-10	mg/m^3	6.0E-06	(mg/m^3)	1.4E-04
				Iron	2.29E-05	mg/m^3	3.1E-06	mg/m^3	N/A	(mg/m^3)	---
				Manganese	9.44E-07	mg/m^3	1.3E-07	mg/m^3	5.0E-05	(mg/m^3)	2.6E-03
				Vanadium	2.39E-08	mg/m^3	3.3E-09	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								3.2E-03
		Exposure Point Total									3.2E-03
	Exposure Media Total										3.2E-03
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	2.00E-07	mg/m^3	2.7E-08	mg/m^3	2.0E-04	(mg/m^3)	1.4E-04
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	(mg/m^3)	---
				Methylcyclohexane	2.74E-06	mg/m^3	3.8E-07	mg/m^3	7.0E-01	(mg/m^3)	5.4E-07
			Exp. Route Total								1.4E-04
		Exposure Point Total									1.4E-04
	Exposure Media Total										1.4E-04
Surface Soil Total											8.7E-02

Table E.2-51
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	3.2E-06	mg/kg-day	3.0E-04	mg/kg-day	1.1E-02
				Manganese	2.80E+03	mg/kg	5.5E-04	mg/kg-day	2.4E-02	mg/kg-day	2.3E-02
			Exp. Route Total								3.4E-02
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	1.9E-06	mg/kg-day	3.0E-04	mg/kg-day	6.4E-03
				Manganese	2.80E+03	mg/kg	1.1E-04	mg/kg-day	9.6E-04	mg/kg-day	1.1E-01
			Exp. Route Total								1.2E-01
		Exposure Point Total									1.5E-01
	Exposure Media Total										1.5E-01
Sediment Total											1.5E-01
Surface Water	Surface Water	SWMU 41B	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	4.6E-08	mg/kg-day	3.0E-04	mg/kg-day	1.5E-04
				Lead	2.90E+01	µg/L	1.9E-07	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								1.5E-04
		Exposure Point Total									1.5E-04
	Exposure Media Total										1.5E-04
Surface Water Total											1.5E-04
Groundwater	Air	SWMU 41B	**Inhalation** (Ambient Air)	**Organics** Tetrachloroethene	2.86E-08	mg/m^3	3.9E-09	mg/m^3	2.7E-01	(mg/m^3)	1.5E-08
			Exp. Route Total								1.5E-08
		Exposure Point Total									1.5E-08
	Exposure Media Total										1.5E-08
Groundwater Total											1.5E-08
										Total of Receptor Hazards Across All Media	2.4E-01

N/A = Not Applicable.

Table E.2-52
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Total Soil	Total Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	6.6E-10	mg/kg-day	8.0E-01	$(mg/kg-day)^{-1}$	5.3E-10
				2-Hexanone	6.46E-03	mg/kg	4.5E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Methylcyclohexane	1.65E-02	mg/kg	1.2E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	1.4E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	5.86E-06	mg/kg	4.1E-13	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	5.3E-08
				Inorganics							
				Aluminum	2.67E+04	mg/kg	1.9E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	2.17E+01	mg/kg	1.5E-06	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	2.3E-06
				Cobalt	1.32E+01	mg/kg	9.2E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.27E+04	mg/kg	3.0E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.46E+03	mg/kg	1.0E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.85E+01	mg/kg	3.4E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								2.3E-06
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.3E-10	mg/kg-day	8.0E-01	$(mg/kg-day)^{-1}$	1.0E-10
				2-Hexanone	6.46E-03	mg/kg	8.9E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Methylcyclohexane	1.65E-02	mg/kg	2.3E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	9.2E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	5.86E-06	mg/kg	8.1E-14	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	1.1E-08
				Inorganics							
				Aluminum	2.67E+04	mg/kg	1.2E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	2.17E+01	mg/kg	3.0E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	4.5E-07
				Cobalt	1.32E+01	mg/kg	6.1E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.27E+04	mg/kg	2.0E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.46E+03	mg/kg	6.7E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.85E+01	mg/kg	2.2E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								4.6E-07
		Exposure Point Total									2.8E-06
	Exposure Media Total										2.8E-06
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.13E-11	mg/m^3	5.5E-13	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				TCDD TE	3.31E-15	mg/m^3	1.6E-16	mg/m^3	3.8E+04	$(mg/m^3)^{-1}$	6.2E-12
				Inorganics							
				Aluminum	1.51E-05	mg/m^3	7.4E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	1.23E-08	mg/m^3	6.0E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	2.6E-09
				Cobalt	7.46E-09	mg/m^3	3.6E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	3.3E-09
				Iron	2.41E-05	mg/m^3	1.2E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	8.25E-07	mg/m^3	4.0E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.74E-08	mg/m^3	1.3E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								5.9E-09
		Exposure Point Total									5.9E-09
	Exposure Media Total										5.9E-09
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	2.65E-07	mg/m^3	1.3E-08	mg/m^3	6.0E+00	$(mg/m^3)^{-1}$	7.8E-08
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Methylcyclohexane	1.90E-05	mg/m^3	9.3E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								7.8E-08
		Exposure Point Total									7.8E-08
	Exposure Media Total										7.8E-08
Total Soil Total											2.9E-06

Table E.2-52
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Surface Soil	Surface Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	5.0E-10	mg/kg-day	8.0E-01	$(mg/kg-day)^{-1}$	4.0E-10
				2-Hexanone	7.63E-03	mg/kg	5.3E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Methylcyclohexane	2.38E-03	mg/kg	1.7E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	1.4E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Inorganics							
				Aluminum	2.34E+04	mg/kg	1.6E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	2.18E+01	mg/kg	1.5E-06	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	2.3E-06
				Cobalt	1.12E+01	mg/kg	7.8E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.06E+04	mg/kg	2.8E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.67E+03	mg/kg	1.2E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.23E+01	mg/kg	3.0E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								2.3E-06
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	9.8E-11	mg/kg-day	8.0E-01	$(mg/kg-day)^{-1}$	7.9E-11
				2-Hexanone	7.63E-03	mg/kg	1.1E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Methylcyclohexane	2.38E-03	mg/kg	3.3E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	9.2E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Inorganics							
				Aluminum	2.34E+04	mg/kg	1.1E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	2.18E+01	mg/kg	3.0E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	4.5E-07
				Cobalt	1.12E+01	mg/kg	5.2E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.06E+04	mg/kg	1.9E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.67E+03	mg/kg	7.7E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.23E+01	mg/kg	2.0E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								4.5E-07
		Exposure Point Total									2.7E-06
	Exposure Media Total										2.7E-06
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.13E-11	mg/m^3	5.5E-13	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Inorganics							
				Aluminum	1.32E-05	mg/m^3	6.5E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	1.23E-08	mg/m^3	6.0E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	2.6E-09
				Cobalt	6.33E-09	mg/m^3	3.1E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	2.8E-09
				Iron	2.29E-05	mg/m^3	1.1E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	9.44E-07	mg/m^3	4.6E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.39E-08	mg/m^3	1.2E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								5.4E-09
		Exposure Point Total									5.4E-09
	Exposure Media Total										5.4E-09
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	2.00E-07	mg/m^3	7.9E-14	mg/m^3	6.0E+00	$(mg/m^3)^{-1}$	4.7E-13
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Methylcyclohexane	2.74E-06	mg/m^3	4.4E-11	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								4.7E-13
		Exposure Point Total									4.7E-13
	Exposure Media Total										4.7E-13
Surface Soil Total											2.7E-06

Table E.2-52
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	1.2E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-06
				Manganese	2.80E+03	mg/kg	2.0E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.7E-06
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	6.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-06
				Manganese	2.80E+03	mg/kg	3.9E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.0E-06
		Exposure Point Total									2.8E-06
	Exposure Media Total										2.8E-06
Sediment Total											2.8E-06
Surface Water	Surface Water	SWMU 41B	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	1.6E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-08
				Lead	2.90E+01	µg/L	6.7E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								2.5E-08
		Exposure Point Total									2.5E-08
	Exposure Media Total										2.5E-08
Surface Water Total											2.5E-08
Groundwater	Air	SWMU 41B	**Inhalation**	**Organics**							
			(Ambient Air)	Tetrachloroethene	2.86E-08	mg/m^3	1.4E-09	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	8.3E-12
			Exp. Route Total								8.3E-12
		Exposure Point Total									8.3E-12
	Exposure Media Total										8.3E-12
Groundwater Total											8.3E-12
										Total of Receptor Risks Across All Media	5.7E-06

N/A = Not Applicable.

Since total soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this data grouping.

Table E.2-53
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Total Soil	Total Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.8E-09	mg/kg-day	2.0E-04	mg/kg-day	9.2E-06
				2-Hexanone	6.46E-03	mg/kg	1.3E-09	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	1.65E-02	mg/kg	3.2E-09	mg/kg-day	6.0E-02	mg/kg-day	5.4E-08
				p-Chloro-m-cresol	2.00E-02	mg/kg	3.9E-09	mg/kg-day	5.0E-02	mg/kg-day	7.8E-08
				TCDD TE	5.86E-06	mg/kg	1.1E-12	mg/kg-day	1.0E-09	mg/kg-day	1.1E-03
				Inorganics							
				Aluminum	2.67E+04	mg/kg	5.2E-03	mg/kg-day	1.0E+00	mg/kg-day	5.2E-03
				Arsenic	2.17E+01	mg/kg	4.2E-06	mg/kg-day	3.0E-04	mg/kg-day	1.4E-02
				Cobalt	1.32E+01	mg/kg	2.6E-06	mg/kg-day	3.0E-04	mg/kg-day	8.6E-03
				Iron	4.27E+04	mg/kg	8.4E-03	mg/kg-day	7.0E-01	mg/kg-day	1.2E-02
				Manganese	1.46E+03	mg/kg	2.9E-04	mg/kg-day	2.4E-02	mg/kg-day	1.2E-02
				Vanadium	4.85E+01	mg/kg	9.5E-06	mg/kg-day	5.0E-03	mg/kg-day	1.9E-03
			Exp. Route Total								5.5E-02
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	3.6E-10	mg/kg-day	2.0E-04	mg/kg-day	1.8E-06
				2-Hexanone	6.46E-03	mg/kg	2.5E-10	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	1.65E-02	mg/kg	6.4E-10	mg/kg-day	6.0E-02	mg/kg-day	1.1E-08
				p-Chloro-m-cresol	2.00E-02	mg/kg	2.6E-09	mg/kg-day	5.0E-02	mg/kg-day	5.2E-08
				TCDD TE	5.86E-06	mg/kg	2.3E-13	mg/kg-day	1.0E-09	mg/kg-day	2.3E-04
				Inorganics							
				Aluminum	2.67E+04	mg/kg	3.4E-04	mg/kg-day	1.0E+00	mg/kg-day	3.4E-04
				Arsenic	2.17E+01	mg/kg	8.4E-07	mg/kg-day	3.0E-04	mg/kg-day	2.8E-03
				Cobalt	1.32E+01	mg/kg	1.7E-07	mg/kg-day	3.0E-04	mg/kg-day	5.7E-04
				Iron	4.27E+04	mg/kg	5.5E-04	mg/kg-day	7.0E-01	mg/kg-day	7.9E-04
				Manganese	1.46E+03	mg/kg	1.9E-05	mg/kg-day	9.6E-04	mg/kg-day	2.0E-02
				Vanadium	4.85E+01	mg/kg	6.3E-07	mg/kg-day	1.3E-04	mg/kg-day	4.8E-03
			Exp. Route Total								2.9E-02
		Exposure Point Total									8.4E-02
	Exposure Media Total										8.4E-02
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.13E-11	mg/m^3	1.5E-12	mg/m^3	N/A	(mg/m^3)	---
				TCDD TE	3.31E-15	mg/m^3	4.5E-16	mg/m^3	4.0E-08	(mg/m^3)	1.1E-08
				Inorganics							
				Aluminum	1.51E-05	mg/m^3	2.1E-06	mg/m^3	5.0E-03	(mg/m^3)	4.1E-04
				Arsenic	1.23E-08	mg/m^3	1.7E-09	mg/m^3	1.5E-05	(mg/m^3)	1.1E-04
				Cobalt	7.46E-09	mg/m^3	1.0E-09	mg/m^3	6.0E-06	(mg/m^3)	1.7E-04
				Iron	2.41E-05	mg/m^3	3.3E-06	mg/m^3	N/A	(mg/m^3)	---
				Manganese	8.25E-07	mg/m^3	1.1E-07	mg/m^3	5.0E-05	(mg/m^3)	2.3E-03
				Vanadium	2.74E-08	mg/m^3	3.8E-09	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								3.0E-03
		Exposure Point Total									3.0E-03
	Exposure Media Total										3.0E-03
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	2.65E-07	mg/m^3	3.6E-08	mg/m^3	2.0E-04	(mg/m^3)	1.8E-04
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	(mg/m^3)	---
				Methylcyclohexane	1.90E-05	mg/m^3	2.6E-06	mg/m^3	7.0E-01	(mg/m^3)	3.7E-06
			Exp. Route Total								1.9E-04
		Exposure Point Total									1.9E-04
	Exposure Media Total										1.9E-04
Total Soil Total											8.7E-02

Table E.2-53
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Surface Soil	Surface Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	1.4E-09	mg/kg-day	2.0E-04	mg/kg-day	6.9E-06
				2-Hexanone	7.63E-03	mg/kg	1.5E-09	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	2.38E-03	mg/kg	4.7E-10	mg/kg-day	6.0E-02	mg/kg-day	7.8E-09
				p-Chloro-m-cresol	2.00E-02	mg/kg	3.9E-09	mg/kg-day	5.0E-02	mg/kg-day	7.8E-08
				Inorganics							
				Aluminum	2.34E+04	mg/kg	4.6E-03	mg/kg-day	1.0E+00	mg/kg-day	4.6E-03
				Arsenic	2.18E+01	mg/kg	4.3E-06	mg/kg-day	3.0E-04	mg/kg-day	1.4E-02
				Cobalt	1.12E+01	mg/kg	2.2E-06	mg/kg-day	3.0E-04	mg/kg-day	7.3E-03
				Iron	4.06E+04	mg/kg	7.9E-03	mg/kg-day	7.0E-01	mg/kg-day	1.1E-02
				Manganese	1.67E+03	mg/kg	3.3E-04	mg/kg-day	2.4E-02	mg/kg-day	1.4E-02
				Vanadium	4.23E+01	mg/kg	8.3E-06	mg/kg-day	5.0E-03	mg/kg-day	1.7E-03
			Exp. Route Total								5.3E-02
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	2.8E-10	mg/kg-day	2.0E-04	mg/kg-day	1.4E-06
				2-Hexanone	7.63E-03	mg/kg	3.0E-10	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	2.38E-03	mg/kg	9.2E-11	mg/kg-day	6.0E-02	mg/kg-day	1.5E-09
				p-Chloro-m-cresol	2.00E-02	mg/kg	2.6E-09	mg/kg-day	5.0E-02	mg/kg-day	5.2E-08
				Inorganics							
				Aluminum	2.34E+04	mg/kg	3.0E-04	mg/kg-day	1.0E+00	mg/kg-day	3.0E-04
				Arsenic	2.18E+01	mg/kg	8.4E-07	mg/kg-day	3.0E-04	mg/kg-day	2.8E-03
				Cobalt	1.12E+01	mg/kg	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	4.8E-04
				Iron	4.06E+04	mg/kg	5.2E-04	mg/kg-day	7.0E-01	mg/kg-day	7.5E-04
				Manganese	1.67E+03	mg/kg	2.2E-05	mg/kg-day	9.6E-04	mg/kg-day	2.2E-02
				Vanadium	4.23E+01	mg/kg	5.5E-07	mg/kg-day	1.3E-04	mg/kg-day	4.2E-03
			Exp. Route Total								3.1E-02
		Exposure Point Total									8.4E-02
	Exposure Media Total										8.4E-02
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.13E-11	mg/m^3	1.5E-12	mg/m^3	N/A	(mg/m^3)	---
				Inorganics							
				Aluminum	1.32E-05	mg/m^3	1.8E-06	mg/m^3	5.0E-03	(mg/m^3)	3.6E-04
				Arsenic	1.23E-08	mg/m^3	1.7E-09	mg/m^3	1.5E-05	(mg/m^3)	1.1E-04
				Cobalt	6.33E-09	mg/m^3	8.7E-10	mg/m^3	6.0E-06	(mg/m^3)	1.4E-04
				Iron	2.29E-05	mg/m^3	3.1E-06	mg/m^3	N/A	(mg/m^3)	---
				Manganese	9.44E-07	mg/m^3	1.3E-07	mg/m^3	5.0E-05	(mg/m^3)	2.6E-03
				Vanadium	2.39E-08	mg/m^3	3.3E-09	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								3.2E-03
		Exposure Point Total									3.2E-03
	Exposure Media Total										3.2E-03
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	2.00E-07	mg/m^3	2.7E-08	mg/m^3	2.0E-04	(mg/m^3)	1.4E-04
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	(mg/m^3)	---
				Methylcyclohexane	2.74E-06	mg/m^3	3.8E-07	mg/m^3	7.0E-01	(mg/m^3)	5.4E-07
			Exp. Route Total								1.4E-04
		Exposure Point Total									1.4E-04
	Exposure Media Total										1.4E-04
Surface Soil Total											8.7E-02

Table E.2-53
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	3.2E-06	mg/kg-day	3.0E-04	mg/kg-day	1.1E-02
				Manganese	2.80E+03	mg/kg	5.5E-04	mg/kg-day	2.4E-02	mg/kg-day	2.3E-02
			Exp. Route Total								3.4E-02
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	1.9E-06	mg/kg-day	3.0E-04	mg/kg-day	6.4E-03
				Manganese	2.80E+03	mg/kg	1.1E-04	mg/kg-day	9.6E-04	mg/kg-day	1.1E-01
			Exp. Route Total								1.2E-01
		Exposure Point Total									1.5E-01
	Exposure Media Total										1.5E-01
Sediment Total											1.5E-01
Surface Water	Surface Water	SWMU 41B	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	4.6E-08	mg/kg-day	3.0E-04	mg/kg-day	1.5E-04
				Lead	2.90E+01	µg/L	1.9E-07	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								1.5E-04
		Exposure Point Total									1.5E-04
	Exposure Media Total										1.5E-04
Surface Water Total											1.5E-04
Groundwater	Air	SWMU 41B	**Inhalation** (Ambient Air)	**Organics** Tetrachloroethene	2.86E-08	mg/m^3	3.9E-09	mg/m^3	2.7E-01	(mg/m^3)	1.5E-08
			Exp. Route Total								1.5E-08
		Exposure Point Total									1.5E-08
	Exposure Media Total										1.5E-08
Groundwater Total											1.5E-08
										Total of Receptor Hazards Across All Media	2.4E-01

N/A = Not Applicable.

Since total soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this data grouping.

Table E.2-54
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Total Soil	Total Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	3.0E-09	mg/kg-day	8.0E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-09
				2-Hexanone	6.46E-03	mg/kg	2.0E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Methylcyclohexane	1.65E-02	mg/kg	5.2E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	6.3E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	5.86E-06	mg/kg	1.8E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	2.4E-07
				Inorganics							
				Aluminum	2.67E+04	mg/kg	8.4E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	2.17E+01	mg/kg	6.8E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-05
				Cobalt	1.32E+01	mg/kg	4.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.27E+04	mg/kg	1.3E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.46E+03	mg/kg	4.6E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.85E+01	mg/kg	1.5E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.0E-05
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	5.9E-10	mg/kg-day	8.0E-01	$(mg/kg\text{-}day)^{-1}$	4.7E-10
				2-Hexanone	6.46E-03	mg/kg	4.0E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Methylcyclohexane	1.65E-02	mg/kg	1.0E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	4.2E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	5.86E-06	mg/kg	3.6E-13	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	4.7E-08
				Inorganics							
				Aluminum	2.67E+04	mg/kg	5.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	2.17E+01	mg/kg	1.4E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-06
				Cobalt	1.32E+01	mg/kg	2.7E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.27E+04	mg/kg	8.9E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.46E+03	mg/kg	3.0E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.85E+01	mg/kg	1.0E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								2.1E-06
		Exposure Point Total									1.3E-05
	Exposure Media Total										1.3E-05
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.13E-11	mg/m^3	2.5E-12	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				TCDD TE	3.31E-15	mg/m^3	7.3E-16	mg/m^3	3.8E+04	$(mg/m^3)^{-1}$	2.8E-11
				Inorganics							
				Aluminum	1.51E-05	mg/m^3	3.3E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	1.23E-08	mg/m^3	2.7E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	1.2E-08
				Cobalt	7.46E-09	mg/m^3	1.6E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	1.5E-08
				Iron	2.41E-05	mg/m^3	5.3E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	8.25E-07	mg/m^3	1.8E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.74E-08	mg/m^3	6.0E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								2.6E-08
		Exposure Point Total									2.6E-08
	Exposure Media Total										2.6E-08
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	2.65E-07	mg/m^3	5.8E-08	mg/m^3	6.0E+00	$(mg/m^3)^{-1}$	3.5E-07
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Methylcyclohexane	1.90E-05	mg/m^3	4.2E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								3.5E-07
		Exposure Point Total									3.5E-07
	Exposure Media Total										3.5E-07
Total Soil Total											1.3E-05

Table E.2-54
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Surface Soil	Surface Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	2.2E-09	mg/kg-day	8.0E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-09
				2-Hexanone	7.63E-03	mg/kg	2.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Methylcyclohexane	2.38E-03	mg/kg	7.5E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	6.3E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Aluminum	2.34E+04	mg/kg	7.4E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	2.18E+01	mg/kg	6.9E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-05
				Cobalt	1.12E+01	mg/kg	3.5E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.06E+04	mg/kg	1.3E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.67E+03	mg/kg	5.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.23E+01	mg/kg	1.3E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.0E-05
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	4.4E-10	mg/kg-day	8.0E-01	$(mg/kg\text{-}day)^{-1}$	3.5E-10
				2-Hexanone	7.63E-03	mg/kg	4.8E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Methylcyclohexane	2.38E-03	mg/kg	1.5E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	4.2E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Inorganics							
				Aluminum	2.34E+04	mg/kg	4.9E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	2.18E+01	mg/kg	1.4E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-06
				Cobalt	1.12E+01	mg/kg	2.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	4.06E+04	mg/kg	8.4E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	1.67E+03	mg/kg	3.5E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.23E+01	mg/kg	8.8E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								2.0E-06
		Exposure Point Total									1.2E-05
	Exposure Media Total										1.2E-05
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.13E-11	mg/m^3	2.5E-12	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Inorganics							
				Aluminum	1.32E-05	mg/m^3	2.9E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	1.23E-08	mg/m^3	2.7E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	1.2E-08
				Cobalt	6.33E-09	mg/m^3	1.4E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	1.3E-08
				Iron	2.29E-05	mg/m^3	5.0E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	9.44E-07	mg/m^3	2.1E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.39E-08	mg/m^3	5.3E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								2.4E-08
		Exposure Point Total									2.4E-08
	Exposure Media Total										2.4E-08
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	2.00E-07	mg/m^3	4.4E-08	mg/m^3	6.0E+00	$(mg/m^3)^{-1}$	2.6E-07
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Methylcyclohexane	2.74E-06	mg/m^3	6.0E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								2.6E-07
		Exposure Point Total									2.6E-07
	Exposure Media Total										2.6E-07
Surface Soil Total											1.3E-05

Table E.2-54
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	5.2E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.8E-06
				Manganese	2.80E+03	mg/kg	8.8E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								7.8E-06
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	3.1E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.7E-06
				Manganese	2.80E+03	mg/kg	1.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								4.7E-06
		Exposure Point Total									1.2E-05
	Exposure Media Total										1.2E-05
Sediment Total											1.2E-05
Surface Water	Surface Water	SWMU 41B	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	7.4E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-07
				Lead	2.90E+01	µg/L	3.0E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.1E-07
		Exposure Point Total									1.1E-07
	Exposure Media Total										1.1E-07
Surface Water Total											1.1E-07
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	5.3E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-06
				Inorganics							
				Arsenic	7.90E+00	µg/L	2.5E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-05
				Cobalt	7.00E+00	µg/L	2.2E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Sodium	3.03E+06	µg/L	9.5E+00	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								4.0E-05
		Exposure Point Total									4.0E-05
	Exposure Media Total										4.0E-05
	Air	SWMU 41B	**Inhalation** (Ambient Air)	**Organics** Tetrachloroethene	2.86E-08	mg/m^3	6.3E-09	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	3.7E-11
			Exp. Route Total								3.7E-11
		Exposure Point Total									3.7E-11
	Exposure Media Total										3.7E-11
	Air	SWMU 41B	**Inhalation** (Indoor Air)	**Organics** Tetrachloroethene	3.08E-04	mg/m^3	6.8E-05	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	4.0E-07
			Exp. Route Total								4.0E-07
		Exposure Point Total									4.0E-07
	Exposure Media Total										4.0E-07
Groundwater Total											4.1E-05
										Total of Receptor Risks Across All Media	6.6E-05

N/A = Not Applicable.

Since indoor air represents the more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.

Since total soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this data grouping.

Table E.2-55
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Total Soil	Total Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	8.3E-09	mg/kg-day	2.0E-04	mg/kg-day	4.1E-05
				2-Hexanone	6.46E-03	mg/kg	5.7E-09	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	1.65E-02	mg/kg	1.5E-08	mg/kg-day	6.0E-02	mg/kg-day	2.4E-07
				p-Chloro-m-cresol	2.00E-02	mg/kg	1.8E-08	mg/kg-day	5.0E-02	mg/kg-day	3.5E-07
				TCDD TE	5.86E-06	mg/kg	5.2E-12	mg/kg-day	1.0E-09	mg/kg-day	5.2E-03
				Inorganics							
				Aluminum	2.67E+04	mg/kg	2.4E-02	mg/kg-day	1.0E+00	mg/kg-day	2.4E-02
				Arsenic	2.17E+01	mg/kg	1.9E-05	mg/kg-day	3.0E-04	mg/kg-day	6.4E-02
				Cobalt	1.32E+01	mg/kg	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	3.9E-02
				Iron	4.27E+04	mg/kg	3.8E-02	mg/kg-day	7.0E-01	mg/kg-day	5.4E-02
				Manganese	1.46E+03	mg/kg	1.3E-03	mg/kg-day	2.4E-02	mg/kg-day	5.4E-02
				Vanadium	4.85E+01	mg/kg	4.3E-05	mg/kg-day	5.0E-03	mg/kg-day	8.5E-03
			Exp. Route Total								2.5E-01
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.6E-09	mg/kg-day	2.0E-04	mg/kg-day	8.2E-06
				2-Hexanone	6.46E-03	mg/kg	1.1E-09	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	1.65E-02	mg/kg	2.9E-09	mg/kg-day	6.0E-02	mg/kg-day	4.8E-08
				p-Chloro-m-cresol	2.00E-02	mg/kg	1.2E-08	mg/kg-day	5.0E-02	mg/kg-day	2.3E-07
				TCDD TE	5.86E-06	mg/kg	1.0E-12	mg/kg-day	1.0E-09	mg/kg-day	1.0E-03
				Inorganics							
				Aluminum	2.67E+04	mg/kg	1.6E-03	mg/kg-day	1.0E+00	mg/kg-day	1.6E-03
				Arsenic	2.17E+01	mg/kg	3.8E-06	mg/kg-day	3.0E-04	mg/kg-day	1.3E-02
				Cobalt	1.32E+01	mg/kg	7.7E-07	mg/kg-day	3.0E-04	mg/kg-day	2.6E-03
				Iron	4.27E+04	mg/kg	2.5E-03	mg/kg-day	7.0E-01	mg/kg-day	3.5E-03
				Manganese	1.46E+03	mg/kg	8.5E-05	mg/kg-day	9.6E-04	mg/kg-day	8.8E-02
				Vanadium	4.85E+01	mg/kg	2.8E-06	mg/kg-day	1.3E-04	mg/kg-day	2.2E-02
			Exp. Route Total								1.3E-01
		Exposure Point Total									3.8E-01
	Exposure Media Total										3.8E-01
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.13E-11	mg/m^3	7.0E-12	mg/m^3	N/A	(mg/m^3)	---
				TCDD TE	3.31E-15	mg/m^3	2.0E-15	mg/m^3	4.0E-08	(mg/m^3)	5.1E-08
				Inorganics							
				Aluminum	1.51E-05	mg/m^3	9.3E-06	mg/m^3	5.0E-03	(mg/m^3)	1.9E-03
				Arsenic	1.23E-08	mg/m^3	7.6E-09	mg/m^3	1.5E-05	(mg/m^3)	5.0E-04
				Cobalt	7.46E-09	mg/m^3	4.6E-09	mg/m^3	6.0E-06	(mg/m^3)	7.7E-04
				Iron	2.41E-05	mg/m^3	1.5E-05	mg/m^3	N/A	(mg/m^3)	---
				Manganese	8.25E-07	mg/m^3	5.1E-07	mg/m^3	5.0E-05	(mg/m^3)	1.0E-02
				Vanadium	2.74E-08	mg/m^3	1.7E-08	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								1.3E-02
		Exposure Point Total									1.3E-02
	Exposure Media Total										1.3E-02
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	2.65E-07	mg/m^3	1.6E-07	mg/m^3	2.0E-04	(mg/m^3)	8.2E-04
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	(mg/m^3)	---
				Methylcyclohexane	1.90E-05	mg/m^3	1.2E-05	mg/m^3	7.0E-01	(mg/m^3)	1.7E-05
			Exp. Route Total								8.3E-04
		Exposure Point Total									8.3E-04
	Exposure Media Total										8.3E-04
Total Soil Total											3.9E-01

Table E.2-55
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Surface Soil	Surface Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	6.3E-09	mg/kg-day	2.0E-04	mg/kg-day	3.1E-05
				2-Hexanone	7.63E-03	mg/kg	6.7E-09	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	2.38E-03	mg/kg	2.1E-09	mg/kg-day	6.0E-02	mg/kg-day	3.5E-08
				p-Chloro-m-cresol	2.00E-02	mg/kg	1.8E-08	mg/kg-day	5.0E-02	mg/kg-day	3.5E-07
				Inorganics							
				Aluminum	2.34E+04	mg/kg	2.1E-02	mg/kg-day	1.0E+00	mg/kg-day	2.1E-02
				Arsenic	2.18E+01	mg/kg	1.9E-05	mg/kg-day	3.0E-04	mg/kg-day	6.4E-02
				Cobalt	1.12E+01	mg/kg	9.9E-06	mg/kg-day	3.0E-04	mg/kg-day	3.3E-02
				Iron	4.06E+04	mg/kg	3.6E-02	mg/kg-day	7.0E-01	mg/kg-day	5.1E-02
				Manganese	1.67E+03	mg/kg	1.5E-03	mg/kg-day	2.4E-02	mg/kg-day	6.1E-02
				Vanadium	4.23E+01	mg/kg	3.7E-05	mg/kg-day	5.0E-03	mg/kg-day	7.5E-03
			Exp. Route Total								2.4E-01
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	7.10E-03	mg/kg	1.2E-09	mg/kg-day	2.0E-04	mg/kg-day	6.2E-06
				2-Hexanone	7.63E-03	mg/kg	1.3E-09	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	2.38E-03	mg/kg	4.1E-10	mg/kg-day	6.0E-02	mg/kg-day	6.9E-09
				p-Chloro-m-cresol	2.00E-02	mg/kg	1.2E-08	mg/kg-day	5.0E-02	mg/kg-day	2.3E-07
				Inorganics							
				Aluminum	2.34E+04	mg/kg	1.4E-03	mg/kg-day	1.0E+00	mg/kg-day	1.4E-03
				Arsenic	2.18E+01	mg/kg	3.8E-06	mg/kg-day	3.0E-04	mg/kg-day	1.3E-02
				Cobalt	1.12E+01	mg/kg	6.5E-07	mg/kg-day	3.0E-04	mg/kg-day	2.2E-03
				Iron	4.06E+04	mg/kg	2.4E-03	mg/kg-day	7.0E-01	mg/kg-day	3.4E-03
				Manganese	1.67E+03	mg/kg	9.7E-05	mg/kg-day	9.6E-04	mg/kg-day	1.0E-01
				Vanadium	4.23E+01	mg/kg	2.5E-06	mg/kg-day	1.3E-04	mg/kg-day	1.9E-02
			Exp. Route Total								1.4E-01
		Exposure Point Total									3.8E-01
	Exposure Media Total										3.8E-01
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.13E-11	mg/m^3	7.0E-12	mg/m^3	N/A	(mg/m^3)	---
				Inorganics							
				Aluminum	1.32E-05	mg/m^3	8.1E-06	mg/m^3	5.0E-03	(mg/m^3)	1.6E-03
				Arsenic	1.23E-08	mg/m^3	7.6E-09	mg/m^3	1.5E-05	(mg/m^3)	5.1E-04
				Cobalt	6.33E-09	mg/m^3	3.9E-09	mg/m^3	6.0E-06	(mg/m^3)	6.5E-04
				Iron	2.29E-05	mg/m^3	1.4E-05	mg/m^3	N/A	(mg/m^3)	---
				Manganese	9.44E-07	mg/m^3	5.8E-07	mg/m^3	5.0E-05	(mg/m^3)	1.2E-02
				Vanadium	2.39E-08	mg/m^3	1.5E-08	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								1.4E-02
		Exposure Point Total									1.4E-02
	Exposure Media Total										1.4E-02
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	2.00E-07	mg/m^3	1.2E-07	mg/m^3	2.0E-04	(mg/m^3)	6.2E-04
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	(mg/m^3)	---
				Methylcyclohexane	2.74E-06	mg/m^3	1.7E-06	mg/m^3	7.0E-01	(mg/m^3)	2.4E-06
			Exp. Route Total								6.2E-04
		Exposure Point Total									6.2E-04
	Exposure Media Total										6.2E-04
Surface Soil Total											3.9E-01

Table E.2-55
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	4.9E-02
				Manganese	2.80E+03	mg/kg	2.5E-03	mg/kg-day	2.4E-02	mg/kg-day	1.0E-01
			Exp. Route Total								1.5E-01
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	8.7E-06	mg/kg-day	3.0E-04	mg/kg-day	2.9E-02
				Manganese	2.80E+03	mg/kg	4.9E-04	mg/kg-day	9.6E-04	mg/kg-day	5.1E-01
			Exp. Route Total								5.4E-01
		Exposure Point Total									6.9E-01
	Exposure Media Total										6.9E-01
Sediment Total											6.9E-01
Surface Water	Surface Water	SWMU 41B	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	2.1E-07	mg/kg-day	3.0E-04	mg/kg-day	6.9E-04
				Lead	2.90E+01	µg/L	8.4E-07	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								6.9E-04
		Exposure Point Total									6.9E-04
	Exposure Media Total										6.9E-04
Surface Water Total											6.9E-04
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	1.5E-05	mg/kg-day	1.0E-02	mg/kg-day	1.5E-03
				Inorganics							
				Arsenic	7.90E+00	µg/L	7.0E-05	mg/kg-day	3.0E-04	mg/kg-day	2.3E-01
				Cobalt	7.00E+00	µg/L	6.2E-05	mg/kg-day	3.0E-04	mg/kg-day	2.1E-01
				Sodium	3.03E+06	µg/L	2.7E+01	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								4.4E-01
		Exposure Point Total									4.4E-01
	Exposure Media Total										4.4E-01
	Air	SWMU 41B	**Inhalation** (Ambient Air)	**Organics** Tetrachloroethene	2.86E-08	mg/m^3	1.8E-08	mg/m^3	2.7E-01	(mg/m^3)	6.5E-08
			Exp. Route Total								6.5E-08
		Exposure Point Total									6.5E-08
	Exposure Media Total										6.5E-08
	Air	SWMU 41B	**Inhalation** (Indoor Air)	**Organics** Tetrachloroethene	3.08E-04	mg/m^3	1.9E-04	mg/m^3	2.7E-01	(mg/m^3)	7.0E-04
			Exp. Route Total								7.0E-04
		Exposure Point Total									7.0E-04
	Exposure Media Total										7.0E-04
Groundwater Total											4.4E-01
										Total of Receptor Hazards Across All Media	1.5E+00

N/A = Not Applicable.

Since indoor air represents the more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.

Since total soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this data grouping.

Table E.2-56
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Excavation Worker

Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Total Soil	Total Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	2.2E-10	mg/kg-day	8.0E-01	$(mg/kg-day)^{-1}$	1.7E-10
				2-Hexanone	6.46E-03	mg/kg	1.5E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Methylcyclohexane	1.65E-02	mg/kg	3.8E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	4.6E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	5.86E-06	mg/kg	1.4E-13	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	1.8E-08
				Inorganics							
				Aluminum	2.67E+04	mg/kg	6.2E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	2.17E+01	mg/kg	5.0E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	7.5E-07
				Cobalt	1.32E+01	mg/kg	3.0E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.27E+04	mg/kg	9.8E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.46E+03	mg/kg	3.4E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.85E+01	mg/kg	1.1E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								7.7E-07
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	2.0E-11	mg/kg-day	8.0E-01	$(mg/kg-day)^{-1}$	1.6E-11
				2-Hexanone	6.46E-03	mg/kg	1.3E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Methylcyclohexane	1.65E-02	mg/kg	3.4E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	1.4E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	5.86E-06	mg/kg	1.2E-14	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	1.6E-09
				Inorganics							
				Aluminum	2.67E+04	mg/kg	1.8E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	2.17E+01	mg/kg	4.5E-08	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	6.8E-08
				Cobalt	1.32E+01	mg/kg	9.1E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.27E+04	mg/kg	3.0E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.46E+03	mg/kg	1.0E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.85E+01	mg/kg	3.4E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								6.9E-08
		Exposure Point Total									8.4E-07
	Exposure Media Total										8.4E-07
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.03E-09	mg/m^3	5.0E-12	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				TCDD TE	3.02E-13	mg/m^3	1.5E-15	mg/m^3	3.8E+04	$(mg/m^3)^{-1}$	5.6E-11
				Inorganics							
				Aluminum	1.38E-03	mg/m^3	6.7E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	1.12E-06	mg/m^3	5.5E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	2.4E-08
				Cobalt	6.80E-07	mg/m^3	3.3E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	3.0E-08
				Iron	2.20E-03	mg/m^3	1.1E-05	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	7.53E-05	mg/m^3	3.7E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.50E-06	mg/m^3	1.2E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								5.4E-08
		Exposure Point Total									5.4E-08
	Exposure Media Total										5.4E-08
Total Soil	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	4.22E-06	mg/m^3	2.1E-08	mg/m^3	6.0E+00	$(mg/m^3)^{-1}$	1.2E-07
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Methylcyclohexane	3.00E-04	mg/m^3	1.5E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								1.2E-07
		Exposure Point Total									1.2E-07
	Exposure Media Total										1.2E-07
Total Soil Total											1.0E-06

Table E.2-56
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Excavation Worker

Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	3.8E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-07
				Manganese	2.80E+03	mg/kg	6.5E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								5.7E-07
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	6.9E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-07
				Manganese	2.80E+03	mg/kg	3.9E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.0E-07
		Exposure Point Total									6.8E-07
	Exposure Media Total										6.8E-07
Sediment Total											6.8E-07
Surface Water	Surface Water	SWMU 41B	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	1.6E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-09
				Lead	2.90E+01	µg/L	6.7E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								2.5E-09
		Exposure Point Total									2.5E-09
	Exposure Media Total										2.5E-09
Surface Water Total											2.5E-09
Groundwater	Air	SWMU 41B	**Inhalation**	**Organics**							
			(Trench Air)	Tetrachloroethene	6.07E-05	mg/m^3	3.0E-07	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	1.8E-09
			Exp. Route Total								1.8E-09
		Exposure Point Total									1.8E-09
	Exposure Media Total										1.8E-09
Groundwater Total											1.8E-09
										Total of Receptor Risks Across All Media	1.7E-06

N/A = Not Applicable.

Table E.2-57
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Total Soil	Total Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.5E-08	mg/kg-day	2.0E-04	mg/kg-day	7.6E-05
				2-Hexanone	6.46E-03	mg/kg	1.0E-08	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	1.65E-02	mg/kg	2.7E-08	mg/kg-day	6.0E-02	mg/kg-day	4.4E-07
				p-Chloro-m-cresol	2.00E-02	mg/kg	3.2E-08	mg/kg-day	5.0E-02	mg/kg-day	6.5E-07
				TCDD TE	5.86E-06	mg/kg	9.5E-12	mg/kg-day	1.0E-09	mg/kg-day	9.5E-03
				Inorganics							
				Aluminum	2.67E+04	mg/kg	4.3E-02	mg/kg-day	1.0E+00	mg/kg-day	4.3E-02
				Arsenic	2.17E+01	mg/kg	3.5E-05	mg/kg-day	3.0E-04	mg/kg-day	1.2E-01
				Cobalt	1.32E+01	mg/kg	2.1E-05	mg/kg-day	3.0E-04	mg/kg-day	7.1E-02
				Iron	4.27E+04	mg/kg	6.9E-02	mg/kg-day	7.0E-01	mg/kg-day	9.8E-02
				Manganese	1.46E+03	mg/kg	2.4E-03	mg/kg-day	2.4E-02	mg/kg-day	9.8E-02
				Vanadium	4.85E+01	mg/kg	7.8E-05	mg/kg-day	5.0E-03	mg/kg-day	1.6E-02
			Exp. Route Total								4.5E-01
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.4E-09	mg/kg-day	2.0E-04	mg/kg-day	6.8E-06
				2-Hexanone	6.46E-03	mg/kg	9.4E-10	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	1.65E-02	mg/kg	2.4E-09	mg/kg-day	6.0E-02	mg/kg-day	4.0E-08
				p-Chloro-m-cresol	2.00E-02	mg/kg	9.7E-09	mg/kg-day	5.0E-02	mg/kg-day	1.9E-07
				TCDD TE	5.86E-06	mg/kg	8.5E-13	mg/kg-day	1.0E-09	mg/kg-day	8.5E-04
				Inorganics							
				Aluminum	2.67E+04	mg/kg	1.3E-03	mg/kg-day	1.0E+00	mg/kg-day	1.3E-03
				Arsenic	2.17E+01	mg/kg	3.2E-06	mg/kg-day	3.0E-04	mg/kg-day	1.1E-02
				Cobalt	1.32E+01	mg/kg	6.4E-07	mg/kg-day	3.0E-04	mg/kg-day	2.1E-03
				Iron	4.27E+04	mg/kg	2.1E-03	mg/kg-day	7.0E-01	mg/kg-day	3.0E-03
				Manganese	1.46E+03	mg/kg	7.1E-05	mg/kg-day	9.6E-04	mg/kg-day	7.4E-02
				Vanadium	4.85E+01	mg/kg	2.3E-06	mg/kg-day	1.3E-04	mg/kg-day	1.8E-02
			Exp. Route Total								1.1E-01
		Exposure Point Total									5.6E-01
	Exposure Media Total										5.6E-01
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	1.03E-09	mg/m^3	3.5E-10	mg/m^3	N/A	(mg/m^3)	---
				TCDD TE	3.02E-13	mg/m^3	1.0E-13	mg/m^3	4.0E-08	(mg/m^3)	2.6E-06
				Inorganics							
				Aluminum	1.38E-03	mg/m^3	4.7E-04	mg/m^3	5.0E-03	(mg/m^3)	9.4E-02
				Arsenic	1.12E-06	mg/m^3	3.8E-07	mg/m^3	1.5E-05	(mg/m^3)	2.6E-02
				Cobalt	6.80E-07	mg/m^3	2.3E-07	mg/m^3	6.0E-06	(mg/m^3)	3.9E-02
				Iron	2.20E-03	mg/m^3	7.5E-04	mg/m^3	N/A	(mg/m^3)	---
				Manganese	7.53E-05	mg/m^3	2.6E-05	mg/m^3	5.0E-05	(mg/m^3)	5.2E-01
				Vanadium	2.50E-06	mg/m^3	8.6E-07	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								6.7E-01
		Exposure Point Total									6.7E-01
	Exposure Media Total										6.7E-01
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	4.22E-06	mg/m^3	1.4E-06	mg/m^3	2.0E-04	(mg/m^3)	7.2E-03
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	(mg/m^3)	---
				Methylcyclohexane	3.00E-04	mg/m^3	1.0E-04	mg/m^3	7.0E-01	(mg/m^3)	1.5E-04
			Exp. Route Total								7.2E-03
		Exposure Point Total									7.2E-03
	Exposure Media Total										7.2E-03
Total Soil Total											1.2E+00

Table E.2-57
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	2.7E-05	mg/kg-day	3.0E-04	mg/kg-day	8.9E-02
				Manganese	2.80E+03	mg/kg	4.5E-03	mg/kg-day	2.4E-02	mg/kg-day	1.9E-01
			Exp. Route Total								2.8E-01
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	4.8E-06	mg/kg-day	3.0E-04	mg/kg-day	1.6E-02
				Manganese	2.80E+03	mg/kg	2.7E-04	mg/kg-day	9.6E-04	mg/kg-day	2.8E-01
			Exp. Route Total								3.0E-01
		Exposure Point Total									5.8E-01
	Exposure Media Total										5.8E-01
Sediment Total											5.8E-01
Surface Water	Surface Water	SWMU 41B	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	1.1E-07	mg/kg-day	3.0E-04	mg/kg-day	3.8E-04
				Lead	2.90E+01	µg/L	4.7E-07	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								3.8E-04
		Exposure Point Total									3.8E-04
	Exposure Media Total										3.8E-04
Surface Water Total											3.8E-04
Groundwater	Air	SWMU 41B	**Inhalation**	**Organics**							
			(Trench Air)	Tetrachloroethene	6.07E-05	mg/m^3	2.1E-05	mg/m^3	2.7E-01	(mg/m^3)	7.7E-05
			Exp. Route Total								7.7E-05
		Exposure Point Total									7.7E-05
	Exposure Media Total										7.7E-05
Groundwater Total											7.7E-05
										Total of Receptor Hazards Across All Media	1.8E+00

N/A = Not Applicable.

Table E.2-58
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Lifetime Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Total Soil	Total Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.5E-08	mg/kg-day	8.0E-01	$(mg/kg-day)^{-1}$	1.2E-08
				2-Hexanone	6.46E-03	mg/kg	1.0E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Methylcyclohexane	1.65E-02	mg/kg	2.6E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	3.1E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	5.86E-06	mg/kg	9.2E-12	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	1.2E-06
				Inorganics							
				Aluminum	2.67E+04	mg/kg	4.2E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	2.17E+01	mg/kg	3.4E-05	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	5.1E-05
				Cobalt	1.32E+01	mg/kg	2.1E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.27E+04	mg/kg	6.7E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.46E+03	mg/kg	2.3E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.85E+01	mg/kg	7.6E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								5.2E-05
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.4E-09	mg/kg-day	8.0E-01	$(mg/kg-day)^{-1}$	1.1E-09
				2-Hexanone	6.46E-03	mg/kg	9.6E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Methylcyclohexane	1.65E-02	mg/kg	2.4E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	9.9E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	5.86E-06	mg/kg	8.7E-13	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	1.1E-07
				Inorganics							
				Aluminum	2.67E+04	mg/kg	1.3E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	2.17E+01	mg/kg	3.2E-06	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	4.8E-06
				Cobalt	1.32E+01	mg/kg	6.5E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.27E+04	mg/kg	2.1E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.46E+03	mg/kg	7.2E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.85E+01	mg/kg	2.4E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								4.9E-06
		Exposure Point Total									5.7E-05
	Exposure Media Total										5.7E-05
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	9.86E-12	mg/m^3	4.1E-12	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				TCDD TE	2.89E-15	mg/m^3	1.2E-15	mg/m^3	3.8E+04	$(mg/m^3)^{-1}$	4.5E-11
				Inorganics							
				Aluminum	1.32E-05	mg/m^3	5.4E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	1.07E-08	mg/m^3	4.4E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	1.9E-08
				Cobalt	6.51E-09	mg/m^3	2.7E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	2.4E-08
				Iron	2.10E-05	mg/m^3	8.6E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	7.20E-07	mg/m^3	3.0E-07	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.39E-08	mg/m^3	9.8E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								4.3E-08
		Exposure Point Total									4.3E-08
	Exposure Media Total										4.3E-08
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	NC	mg/m^3	1.2E-07	mg/m^3	6.0E+00	$(mg/m^3)^{-1}$	7.0E-07
				2-Hexanone	NC	mg/m^3	N/A	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Methylcyclohexane	NC	mg/m^3	8.3E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								7.0E-07
		Exposure Point Total									7.0E-07
	Exposure Media Total										7.0E-07
Total Soil Total											5.8E-05

Table E.2-58
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Lifetime Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	3.0E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.5E-06
				Manganese	2.80E+03	mg/kg	5.0E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								4.5E-06
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	4.8E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.2E-07
				Manganese	2.80E+03	mg/kg	2.7E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								7.2E-07
		Exposure Point Total									5.2E-06
	Exposure Media Total										5.2E-06
Sediment Total											5.2E-06
Surface Water	Surface Water	SWMU 41B	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	3.0E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.5E-08
				Lead	2.90E+01	µg/L	1.2E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								4.5E-08
		Exposure Point Total									4.5E-08
	Exposure Media Total										4.5E-08
Surface Water Total											4.5E-08
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	2.5E-05	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-05
				Inorganics							
				Arsenic	7.90E+00	µg/L	1.2E-04	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-04
				Cobalt	7.00E+00	µg/L	1.0E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Sodium	3.03E+06	µg/L	4.5E+01	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.9E-04
			Dermal Absorption	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	1.5E-05	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	8.0E-06
				Inorganics							
				Arsenic	7.90E+00	µg/L	N/A	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	NV
				Cobalt	7.00E+00	µg/L	N/A	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	NV
			Exp. Route Total								8.0E-06
		Exposure Point Total									2.0E-04
	Exposure Media Total										2.0E-04

Table E.2-58
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Lifetime Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Air	SWMU 41B	**Inhalation** (Indoor Air)	**Organics** Tetrachloroethene	3.08E-04	mg/m^{-3}	1.3E-04	mg/m^{-3}	5.9E-03	$(mg/m^{-3})^{-1}$	7.5E-07
			Exp. Route Total								7.5E-07
		Exposure Point Total									7.5E-07
	Exposure Media Total										7.5E-07
			Inhalation (Shower Room)	**Organics** Tetrachloroethene	2.40E-03	mg/m^{-3}	7.9E-04	mg/m^{-3}	5.9E-03	$(mg/m^{-3})^{-1}$	4.7E-06
			Exp. Route Total								4.7E-06
		Exposure Point Total									4.7E-06
	Exposure Media Total										4.7E-06
	Home Grown Produce	SWMU 41B	**Ingestion**	**Inorganics** Arsenic	8.6E-04	mg/kg	1.6E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-07
			Exp. Route Total								2.4E-07
		Exposure Point Total									2.4E-07
	Exposure Media Total										2.4E-07
Groundwater Total											2.0E-04
										Total of Receptor Risks Across All Media	2.7E-04

N/A = Not Applicable.
NC = Not calculated. Intake for Lifetime Resident based on age-adjusted calculation.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-59
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Total Soil	Total Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.0E-08	mg/kg-day	8.0E-01	$(mg/kg-day)^{-1}$	8.2E-09
				2-Hexanone	6.46E-03	mg/kg	7.1E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Methylcyclohexane	1.65E-02	mg/kg	1.8E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	2.2E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	5.86E-06	mg/kg	6.4E-12	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	8.3E-07
				Inorganics							
				Aluminum	2.67E+04	mg/kg	2.9E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	2.17E+01	mg/kg	2.4E-05	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	3.6E-05
				Cobalt	1.32E+01	mg/kg	1.4E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.27E+04	mg/kg	4.7E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.46E+03	mg/kg	1.6E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.85E+01	mg/kg	5.3E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								3.7E-05
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	8.7E-10	mg/kg-day	8.0E-01	$(mg/kg-day)^{-1}$	6.9E-10
				2-Hexanone	6.46E-03	mg/kg	5.9E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Methylcyclohexane	1.65E-02	mg/kg	1.5E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	2.00E-02	mg/kg	6.1E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	5.86E-06	mg/kg	5.4E-13	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	7.0E-08
				Inorganics							
				Aluminum	2.67E+04	mg/kg	8.2E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	2.17E+01	mg/kg	2.0E-06	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	3.0E-06
				Cobalt	1.32E+01	mg/kg	4.1E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	4.27E+04	mg/kg	1.3E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	1.46E+03	mg/kg	4.5E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.85E+01	mg/kg	1.5E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								3.1E-06
		Exposure Point Total									4.0E-05
	Exposure Media Total										4.0E-05
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	9.86E-12	mg/m^3	8.1E-13	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				TCDD TE	2.89E-15	mg/m^3	2.4E-16	mg/m^3	3.8E+04	$(mg/m^3)^{-1}$	9.0E-12
				Inorganics							
				Aluminum	1.32E-05	mg/m^3	1.1E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Arsenic	1.07E-08	mg/m^3	8.8E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	3.8E-09
				Cobalt	6.51E-09	mg/m^3	5.3E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	4.8E-09
				Iron	2.10E-05	mg/m^3	1.7E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Manganese	7.20E-07	mg/m^3	5.9E-08	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Vanadium	2.39E-08	mg/m^3	2.0E-09	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								8.6E-09
		Exposure Point Total									8.6E-09
	Exposure Media Total										8.6E-09
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	4.70E-07	mg/m^3	3.9E-08	mg/m^3	6.0E+00	$(mg/m^3)^{-1}$	2.3E-07
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
				Methylcyclohexane	3.38E-05	mg/m^3	2.8E-06	mg/m^3	N/A	$(mg/m^3)^{-1}$	---
			Exp. Route Total								2.3E-07
		Exposure Point Total									2.3E-07
	Exposure Media Total										2.3E-07
Total Soil Total											4.0E-05

Table E.2-59
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	2.1E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-06
				Manganese	2.80E+03	mg/kg	3.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								3.1E-06
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	1.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-07
				Manganese	2.80E+03	mg/kg	9.8E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								2.6E-07
		Exposure Point Total									3.4E-06
	Exposure Media Total										3.4E-06
Sediment Total											3.4E-06
Surface Water	Surface Water	SWMU 41B	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	8.4E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-08
				Lead	2.90E+01	µg/L	3.5E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.3E-08
		Exposure Point Total									1.3E-08
	Exposure Media Total										1.3E-08
Surface Water Total											1.3E-08
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	9.3E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	5.0E-06
				Inorganics							
				Arsenic	7.90E+00	µg/L	4.3E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.5E-05
				Cobalt	7.00E+00	µg/L	3.8E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Sodium	3.03E+06	µg/L	1.7E+01	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								7.0E-05
			Dermal Absorption	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	5.4E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-06
				Inorganics							
				Arsenic	7.90E+00	µg/L	N/A	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	NV
				Cobalt	7.00E+00	µg/L	N/A	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	NV
			Exp. Route Total								2.9E-06
		Exposure Point Total									7.3E-05
	Exposure Media Total										7.3E-05

Table E.2-59
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Air	SWMU 41B	**Inhalation** (Indoor Air)	**Organics** Tetrachloroethene	3.08E-04	mg/m^3	2.5E-05	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	1.5E-07
			Exp. Route Total								1.5E-07
		Exposure Point Total									1.5E-07
	Exposure Media Total										1.5E-07
	Home Grown Produce	SWMU 41B	**Ingestion**	**Inorganics** Arsenic	8.6E-04	mg/kg	8.8E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-07
			Exp. Route Total								1.3E-07
		Exposure Point Total									1.3E-07
	Exposure Media Total										1.3E-07
Groundwater Total											7.3E-05
										Total of Receptor Risks Across All Media	1.2E-04

N/A = Not Applicable.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-60
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Adult Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Total Soil	Total Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.3E-08	mg/kg-day	2.0E-04	mg/kg-day	6.4E-05
				2-Hexanone	6.46E-03	mg/kg	8.8E-09	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	1.65E-02	mg/kg	2.3E-08	mg/kg-day	6.0E-02	mg/kg-day	3.8E-07
				p-Chloro-m-cresol	2.00E-02	mg/kg	2.7E-08	mg/kg-day	5.0E-02	mg/kg-day	5.5E-07
				TCDD TE	5.86E-06	mg/kg	8.0E-12	mg/kg-day	1.0E-09	mg/kg-day	8.0E-03
				Inorganics							
				Aluminum	2.67E+04	mg/kg	3.7E-02	mg/kg-day	1.0E+00	mg/kg-day	3.7E-02
				Arsenic	2.17E+01	mg/kg	3.0E-05	mg/kg-day	3.0E-04	mg/kg-day	9.9E-02
				Cobalt	1.32E+01	mg/kg	1.8E-05	mg/kg-day	3.0E-04	mg/kg-day	6.0E-02
				Iron	4.27E+04	mg/kg	5.8E-02	mg/kg-day	7.0E-01	mg/kg-day	8.4E-02
				Manganese	1.46E+03	mg/kg	2.0E-03	mg/kg-day	2.4E-02	mg/kg-day	8.3E-02
				Vanadium	4.85E+01	mg/kg	6.6E-05	mg/kg-day	5.0E-03	mg/kg-day	1.3E-02
			Exp. Route Total								3.8E-01
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.5E-09	mg/kg-day	2.0E-04	mg/kg-day	7.7E-06
				2-Hexanone	6.46E-03	mg/kg	1.1E-09	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	1.65E-02	mg/kg	2.7E-09	mg/kg-day	6.0E-02	mg/kg-day	4.5E-08
				p-Chloro-m-cresol	2.00E-02	mg/kg	1.1E-08	mg/kg-day	5.0E-02	mg/kg-day	2.2E-07
				TCDD TE	5.86E-06	mg/kg	9.6E-13	mg/kg-day	1.0E-09	mg/kg-day	9.6E-04
				Inorganics							
				Aluminum	2.67E+04	mg/kg	1.5E-03	mg/kg-day	1.0E+00	mg/kg-day	1.5E-03
				Arsenic	2.17E+01	mg/kg	3.6E-06	mg/kg-day	3.0E-04	mg/kg-day	1.2E-02
				Cobalt	1.32E+01	mg/kg	7.2E-07	mg/kg-day	3.0E-04	mg/kg-day	2.4E-03
				Iron	4.27E+04	mg/kg	2.3E-03	mg/kg-day	7.0E-01	mg/kg-day	3.3E-03
				Manganese	1.46E+03	mg/kg	8.0E-05	mg/kg-day	9.6E-04	mg/kg-day	8.3E-02
				Vanadium	4.85E+01	mg/kg	2.7E-06	mg/kg-day	1.3E-04	mg/kg-day	2.0E-02
			Exp. Route Total								1.2E-01
		Exposure Point Total									5.1E-01
	Exposure Media Total										5.1E-01
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	9.86E-12	mg/m^3	9.5E-12	mg/m^3	N/A	(mg/m^3)	---
				TCDD TE	2.89E-15	mg/m^3	2.8E-15	mg/m^3	4.0E-08	(mg/m^3)	6.9E-08
				Inorganics							
				Aluminum	1.32E-05	mg/m^3	1.3E-05	mg/m^3	5.0E-03	(mg/m^3)	2.5E-03
				Arsenic	1.07E-08	mg/m^3	1.0E-08	mg/m^3	1.5E-05	(mg/m^3)	6.8E-04
				Cobalt	6.51E-09	mg/m^3	6.2E-09	mg/m^3	6.0E-06	(mg/m^3)	1.0E-03
				Iron	2.10E-05	mg/m^3	2.0E-05	mg/m^3	N/A	(mg/m^3)	---
				Manganese	7.20E-07	mg/m^3	6.9E-07	mg/m^3	5.0E-05	(mg/m^3)	1.4E-02
				Vanadium	2.39E-08	mg/m^3	2.3E-08	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								1.8E-02
		Exposure Point Total									1.8E-02
	Exposure Media Total										1.8E-02
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	2.35E-07	mg/m^3	2.3E-07	mg/m^3	2.0E-04	(mg/m^3)	1.1E-03
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	(mg/m^3)	---
				Methylcyclohexane	1.69E-05	mg/m^3	1.6E-05	mg/m^3	7.0E-01	(mg/m^3)	2.3E-05
			Exp. Route Total								1.1E-03
		Exposure Point Total									1.1E-03
	Exposure Media Total										1.1E-03
Total Soil Total											5.3E-01

Table E.2-60
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Adult Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	2.1E-06	mg/kg-day	3.0E-04	mg/kg-day	6.9E-03
				Manganese	2.80E+03	mg/kg	3.5E-04	mg/kg-day	2.4E-02	mg/kg-day	1.5E-02
			Exp. Route Total								2.2E-02
			Dermal	**Organics**							
			Absorption	No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	7.1E-07	mg/kg-day	3.0E-04	mg/kg-day	2.4E-03
				Manganese	2.80E+03	mg/kg	4.0E-05	mg/kg-day	9.6E-04	mg/kg-day	4.2E-02
			Exp. Route Total								4.4E-02
		Exposure Point Total									6.6E-02
	Exposure Media Total										6.6E-02
Sediment Total											6.6E-02
Surface Water	Surface Water	SWMU 41B	**Dermal**	**Organics**							
			Absorption	No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	5.1E-08	mg/kg-day	3.0E-04	mg/kg-day	1.7E-04
				Lead	2.90E+01	µg/L	2.1E-07	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								1.7E-04
		Exposure Point Total									1.7E-04
	Exposure Media Total										1.7E-04
Surface Water Total											1.7E-04
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	4.7E-05	mg/kg-day	1.0E-02	mg/kg-day	4.7E-03
				Inorganics							
				Arsenic	7.90E+00	µg/L	2.2E-04	mg/kg-day	3.0E-04	mg/kg-day	7.2E-01
				Cobalt	7.00E+00	µg/L	1.9E-04	mg/kg-day	3.0E-04	mg/kg-day	6.4E-01
				Sodium	3.03E+06	µg/L	8.3E+01	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								1.4E+00
			Dermal	**Organics**							
			Absorption	Tetrachloroethene	1.70E+00	µg/L	2.7E-05	mg/kg-day	1.0E-02	mg/kg-day	2.7E-03
				Inorganics							
				Arsenic	7.90E+00	µg/L	N/A	mg/kg-day	3.0E-04	mg/kg-day	NV
				Cobalt	7.00E+00	µg/L	N/A	mg/kg-day	3.0E-04	mg/kg-day	NV
			Exp. Route Total								2.7E-03
		Exposure Point Total									1.4E+00
	Exposure Media Total										1.4E+00

Table E.2-60
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Adult Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Groundwater	Air	SWMU 41B	**Inhalation** (Indoor Air)	**Organics** Tetrachloroethene	3.08E-04	mg/m^3	3.0E-04	mg/m^3	2.7E-01	(mg/m^3)	1.1E-03
			Exp. Route Total								1.1E-03
		Exposure Point Total									1.1E-03
	Exposure Media Total										1.1E-03
			Inhalation (Shower Room)	**Organics** Tetrachloroethene	2.40E-03	mg/m^3	2.3E-03	mg/m^3	2.7E-01	(mg/m^3)	8.5E-03
			Exp. Route Total								8.5E-03
		Exposure Point Total									8.5E-03
	Exposure Media Total										8.5E-03
	Home Grown Produce	SWMU 41B	**Ingestion**	**Inorganics** Arsenic	8.6E-04	mg/kg	2.2E-07	mg/kg-day	3.0E-04	mg/kg-day	7.3E-04
			Exp. Route Total								7.3E-04
		Exposure Point Total									7.3E-04
	Exposure Media Total										7.3E-04
Groundwater Total											1.4E+00
										Total of Receptor Hazards Across All Media	2.0E+00

N/A = Not Applicable.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-61
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Total Soil	Total Soil	SWMU 41B	**Ingestion**	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.2E-07	mg/kg-day	2.0E-04	mg/kg-day	6.0E-04
				2-Hexanone	6.46E-03	mg/kg	8.3E-08	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	1.65E-02	mg/kg	2.1E-07	mg/kg-day	6.0E-02	mg/kg-day	3.5E-06
				p-Chloro-m-cresol	2.00E-02	mg/kg	2.6E-07	mg/kg-day	5.0E-02	mg/kg-day	5.1E-06
				TCDD TE	5.86E-06	mg/kg	7.5E-11	mg/kg-day	1.0E-09	mg/kg-day	7.5E-02
				Inorganics							
				Aluminum	2.67E+04	mg/kg	3.4E-01	mg/kg-day	1.0E+00	mg/kg-day	3.4E-01
				Arsenic	2.17E+01	mg/kg	2.8E-04	mg/kg-day	3.0E-04	mg/kg-day	9.2E-01
				Cobalt	1.32E+01	mg/kg	1.7E-04	mg/kg-day	3.0E-04	mg/kg-day	5.6E-01
				Iron	4.27E+04	mg/kg	5.5E-01	mg/kg-day	7.0E-01	mg/kg-day	7.8E-01
				Manganese	1.46E+03	mg/kg	1.9E-02	mg/kg-day	2.4E-02	mg/kg-day	7.8E-01
				Vanadium	4.85E+01	mg/kg	6.2E-04	mg/kg-day	5.0E-03	mg/kg-day	1.2E-01
			Exp. Route Total								3.6E+00
			Dermal Absorption	**Organics**							
				1,2-Dibromo-3-chloropropane	9.40E-03	mg/kg	1.0E-08	mg/kg-day	2.0E-04	mg/kg-day	5.0E-05
				2-Hexanone	6.46E-03	mg/kg	2.3E-08	mg/kg-day	N/A	mg/kg-day	---
				Methylcyclohexane	1.65E-02	mg/kg	5.9E-08	mg/kg-day	6.0E-02	mg/kg-day	9.8E-07
				p-Chloro-m-cresol	2.00E-02	mg/kg	7.2E-08	mg/kg-day	5.0E-02	mg/kg-day	1.4E-06
				TCDD TE	5.86E-06	mg/kg	6.3E-12	mg/kg-day	1.0E-09	mg/kg-day	6.3E-03
				Inorganics							
				Aluminum	2.67E+04	mg/kg	9.6E-03	mg/kg-day	1.0E+00	mg/kg-day	9.6E-03
				Arsenic	2.17E+01	mg/kg	2.3E-05	mg/kg-day	3.0E-04	mg/kg-day	7.8E-02
				Cobalt	1.32E+01	mg/kg	4.7E-06	mg/kg-day	3.0E-04	mg/kg-day	1.6E-02
				Iron	4.27E+04	mg/kg	1.5E-02	mg/kg-day	7.0E-01	mg/kg-day	2.2E-02
				Manganese	1.46E+03	mg/kg	5.2E-04	mg/kg-day	9.6E-04	mg/kg-day	5.4E-01
				Vanadium	4.85E+01	mg/kg	1.7E-05	mg/kg-day	1.3E-04	mg/kg-day	1.3E-01
			Exp. Route Total								8.1E-01
		Exposure Point Total									4.4E+00
	Exposure Media Total										4.4E+00
	Air (Particulates)	SWMU 41B	**Inhalation**	**Organics**							
				p-Chloro-m-cresol	9.86E-12	mg/m^3	9.5E-12	mg/m^3	N/A	(mg/m^3)	---
				TCDD TE	2.89E-15	mg/m^3	2.8E-15	mg/m^3	4.0E-08	(mg/m^3)	6.9E-08
				Inorganics							
				Aluminum	1.32E-05	mg/m^3	1.3E-05	mg/m^3	5.0E-03	(mg/m^3)	2.5E-03
				Arsenic	1.07E-08	mg/m^3	1.0E-08	mg/m^3	1.5E-05	(mg/m^3)	6.8E-04
				Cobalt	6.51E-09	mg/m^3	6.2E-09	mg/m^3	6.0E-06	(mg/m^3)	1.0E-03
				Iron	2.10E-05	mg/m^3	2.0E-05	mg/m^3	N/A	(mg/m^3)	---
				Manganese	7.20E-07	mg/m^3	6.9E-07	mg/m^3	5.0E-05	(mg/m^3)	1.4E-02
				Vanadium	2.39E-08	mg/m^3	2.3E-08	mg/m^3	N/A	(mg/m^3)	---
			Exp. Route Total								1.8E-02
		Exposure Point Total									1.8E-02
	Exposure Media Total										1.8E-02
	Air (Volatiles)	SWMU 41B	**Inhalation**	**Organics**							
				1,2-Dibromo-3-chloropropane	4.70E-07	mg/m^3	4.5E-07	mg/m^3	2.0E-04	(mg/m^3)	2.3E-03
				2-Hexanone	N/A	mg/m^3	N/A	mg/m^3	N/A	(mg/m^3)	---
				Methylcyclohexane	3.38E-05	mg/m^3	3.2E-05	mg/m^3	7.0E-01	(mg/m^3)	4.6E-05
			Exp. Route Total								2.3E-03
		Exposure Point Total									2.3E-03
	Exposure Media Total										2.3E-03
Total Soil Total											4.4E+00

Table E.2-61
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Sediment	Sediment	SWMU 41B	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	2.4E-05	mg/kg-day	3.0E-04	mg/kg-day	8.1E-02
				Manganese	2.80E+03	mg/kg	4.1E-03	mg/kg-day	2.4E-02	mg/kg-day	1.7E-01
			Exp. Route Total								2.5E-01
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	1.66E+01	mg/kg	2.0E-06	mg/kg-day	3.0E-04	mg/kg-day	6.8E-03
				Manganese	2.80E+03	mg/kg	1.1E-04	mg/kg-day	9.6E-04	mg/kg-day	1.2E-01
			Exp. Route Total								1.3E-01
		Exposure Point Total									3.8E-01
	Exposure Media Total										3.8E-01
Sediment Total											3.8E-01
Surface Water	Surface Water	SWMU 41B	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				Arsenic	7.10E+00	µg/L	9.9E-08	mg/kg-day	3.0E-04	mg/kg-day	3.3E-04
				Lead	2.90E+01	µg/L	4.0E-07	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								3.3E-04
		Exposure Point Total									3.3E-04
	Exposure Media Total										3.3E-04
Surface Water Total											3.3E-04
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	1.1E-04	mg/kg-day	1.0E-02	mg/kg-day	1.1E-02
				Inorganics							
				Arsenic	7.90E+00	µg/L	5.1E-04	mg/kg-day	3.0E-04	mg/kg-day	1.7E+00
				Cobalt	7.00E+00	µg/L	4.5E-04	mg/kg-day	3.0E-04	mg/kg-day	1.5E+00
				Sodium	3.03E+06	µg/L	1.9E+02	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								3.2E+00
			Dermal Absorption	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	6.3E-05	mg/kg-day	1.0E-02	mg/kg-day	6.3E-03
				Inorganics							
				Arsenic	7.90E+00	µg/L	N/A	mg/kg-day	3.0E-04	mg/kg-day	NV
				Cobalt	7.00E+00	µg/L	N/A	mg/kg-day	3.0E-04	mg/kg-day	NV
			Exp. Route Total								6.3E-03
		Exposure Point Total									3.2E+00
	Exposure Media Total										3.2E+00

Table E.2-61
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
	Air	SWMU 41B	**Inhalation** (Indoor Air)	**Organics** Tetrachloroethene	3.08E-04	mg/m^3	3.0E-04	mg/m^3	2.7E-01	(mg/m^3)	1.1E-03
			Exp. Route Total								1.1E-03
		Exposure Point Total									1.1E-03
	Exposure Media Total										1.1E-03
	Home Grown Produce	SWMU 41B	**Ingestion**	**Inorganics** Arsenic	8.6E-04	mg/kg	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	3.3E-03
			Exp. Route Total								3.3E-03
		Exposure Point Total									3.3E-03
	Exposure Media Total										3.3E-03
Groundwater Total											3.2E+00
										Total of Receptor Hazards Across All Media	7.99E+00

N/A = Not Applicable.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-62
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Air	SWMU 41B	**Inhalation** (Ambient Air)	**Organics** Tetrachloroethene	2.86E-08	mg/m^3	1.4E-09	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	8.3E-12
			Exp. Route Total								8.3E-12
		Exposure Point Total									8.3E-12
	Exposure Media Total										8.3E-12
Groundwater Total											8.3E-12
										Total of Receptor Risks Across All Media	8.3E-12

N/A = Not Applicable

Table E.2-63
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Groundwater	Air	SWMU 41B	**Inhalation** (Ambient Air)	**Organics** Tetrachloroethene	2.86E-08	mg/m^3	3.9E-09	mg/m^3	2.7E-01	(mg/m^3)	1.5E-08
			Exp. Route Total								1.5E-08
		Exposure Point Total									1.5E-08
	Exposure Media Total										1.5E-08
Groundwater Total											1.5E-08
										Total of Receptor Hazards Across All Media	1.5E-08

N/A = Not Applicable

Table E.2-64
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	5.3E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-06
				Inorganics							
				Arsenic	7.90E+00	µg/L	2.5E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-05
				Cobalt	7.00E+00	µg/L	2.2E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Sodium	3.03E+06	µg/L	9.5E+00	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								4.0E-05
		Exposure Point Total									4.0E-05
	Exposure Media Total										4.0E-05
	Air	SWMU 41B	**Inhalation**	**Organics**							
			(Ambient Air)	Tetrachloroethene	2.86E-08	mg/m^3	6.3E-09	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	3.7E-11
			Exp. Route Total								3.7E-11
		Exposure Point Total									3.7E-11
	Exposure Media Total										3.7E-11
	Air	SWMU 41B	**Inhalation**	**Organics**							
			(Indoor Air)	Tetrachloroethene	3.08E-04	mg/m^3	6.8E-05	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	4.0E-07
			Exp. Route Total								4.0E-07
		Exposure Point Total									4.0E-07
	Exposure Media Total										4.0E-07
Groundwater Total											4.1E-05
										Total of Receptor Risks Across All Media	4.1E-05

N/A = Not Applicable

Since indoor air represents the more highly contaminated portion of groundwater, total risk and hazar
estimates are conservatively based on this data grouping.

Table E.2-65
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	1.5E-05	mg/kg-day	1.0E-02	mg/kg-day	1.5E-03
				Inorganics							
				Arsenic	7.90E+00	µg/L	7.0E-05	mg/kg-day	3.0E-04	mg/kg-day	2.3E-01
				Cobalt	7.00E+00	µg/L	6.2E-05	mg/kg-day	3.0E-04	mg/kg-day	2.1E-01
				Sodium	3.03E+06	µg/L	2.7E+01	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								4.4E-01
		Exposure Point Total									4.4E-01
	Exposure Media Total										4.4E-01
	Air	SWMU 41B	**Inhalation**	**Organics**							
			(Ambient Air)	Tetrachloroethene	2.86E-08	mg/m^3	1.8E-08	mg/m^3	2.7E-01	(mg/m^3)	6.5E-08
			Exp. Route Total								6.5E-08
		Exposure Point Total									6.5E-08
	Exposure Media Total										6.5E-08
	Air	SWMU 41B	**Inhalation**	**Organics**							
			(Indoor Air)	Tetrachloroethene	3.08E-04	mg/m^3	1.9E-04	mg/m^3	2.7E-01	(mg/m^3)	7.0E-04
			Exp. Route Total								7.0E-04
		Exposure Point Total									7.0E-04
	Exposure Media Total										7.0E-04
Groundwater Total											4.4E-01
										Total of Receptor Hazards Across All Media	4.4E-01

N/A = Not Applicable

Since indoor air represents the higher hazard for the air pathway, total risk and hazard estimates are conservatively based on this data grouping.

Table E.2-66
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Air	SWMU 41B	**Inhalation**	**Organics**							
			(Trench Air)	Tetrachloroethene	6.07E-05	mg/m^3	3.0E-07	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	1.8E-09
			Exp. Route Total								1.8E-09
		Exposure Point Total									1.8E-09
	Exposure Media Total										1.8E-09
Groundwater Total											1.8E-09
										Total of Receptor Risks Across All Media	1.8E-09

N/A = Not Applicable

Table E.2-67
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	Hazard Quotient
Groundwater	Air	SWMU 41B	**Inhalation** (Trench Air)	**Organics** Tetrachloroethene	6.07E-05	mg/m^3	2.1E-05	mg/m^3	2.7E-01	$(mg/m^3)^{-1}$	7.7E-05
			Exp. Route Total								7.7E-05
		Exposure Point Total									7.7E-05
	Exposure Media Total										7.7E-05
Groundwater Total											7.7E-05
Total of Receptor Hazards Across All Media											7.7E-05

N/A = Not Applicable

Table E.2-68
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-site Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Off-site Lifetime Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	2.5E-05	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-05
				Inorganics							
				Arsenic	7.90E+00	µg/L	1.2E-04	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-04
				Cobalt	7.00E+00	µg/L	1.0E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Sodium	3.03E+06	µg/L	4.5E+01	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.9E-04
			Dermal Absorption	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	1.5E-05	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	8.0E-06
				Inorganics							
				Arsenic	7.90E+00	µg/L	N/A	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	NV
				Cobalt	7.00E+00	µg/L	N/A	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	NV
			Exp. Route Total								8.0E-06
		Exposure Point Total									2.0E-04
	Exposure Media Total										2.0E-04
	Air	SWMU 41B	**Inhalation** (Indoor Air)	**Organics** Tetrachloroethene	3.08E-04	mg/m^3	1.3E-04	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	7.5E-07
			Exp. Route Total								7.5E-07
		Exposure Point Total									7.5E-07
	Exposure Media Total										7.5E-07
	Air	SWMU 41B	**Inhalation** (Shower Room)	**Organics** Tetrachloroethene	2.40E-03	mg/m^3	7.9E-04	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	4.7E-06
			Exp. Route Total								4.7E-06
		Exposure Point Total									4.7E-06
	Exposure Media Total										4.7E-06
	Home Grown Produce	SWMU 41B	**Ingestion**	**Inorganics** Arsenic	8.6E-04	mg/kg	1.6E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-07
			Exp. Route Total								2.4E-07
		Exposure Point Total									2.4E-07
	Exposure Media Total										2.4E-07
Groundwater Total											2.0E-04
										Total of Receptor Risks Across All Media	2.0E-04

N/A = Not Applicable
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-69
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-site Adult Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	4.7E-05	mg/kg-day	1.0E-02	mg/kg-day	4.7E-03
				Inorganics							
				Arsenic	7.90E+00	µg/L	2.2E-04	mg/kg-day	3.0E-04	mg/kg-day	7.2E-01
				Cobalt	7.00E+00	µg/L	1.9E-04	mg/kg-day	3.0E-04	mg/kg-day	6.4E-01
				Sodium	3.03E+06	µg/L	8.3E+01	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								1.4E+00
			Dermal Absorption	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	2.7E-05	mg/kg-day	1.0E-02	mg/kg-day	2.7E-03
				Inorganics							
				Arsenic	7.90E+00	µg/L	N/A	mg/kg-day	3.0E-04	mg/kg-day	NV
				Cobalt	7.00E+00	µg/L	N/A	mg/kg-day	3.0E-04	mg/kg-day	NV
			Exp. Route Total								4.1E-02
		Exposure Point Total									1.4E+00
	Exposure Media Total										1.4E+00
	Air	SWMU 41B	**Inhalation** (Indoor Air)	**Organics** Tetrachloroethene	3.08E-04	mg/m^3	3.0E-04	mg/m^3	2.7E-01	(mg/m^3)	1.1E-03
			Exp. Route Total								1.1E-03
		Exposure Point Total									1.1E-03
	Exposure Media Total										1.1E-03
	Air	SWMU 41B	**Inhalation** (Shower Room)	**Organics** Tetrachloroethene	2.40E-03	mg/m^3	2.3E-03	mg/m^3	2.7E-01	(mg/m^3)	8.5E-03
			Exp. Route Total								8.5E-03
		Exposure Point Total									8.5E-03
	Exposure Media Total										8.5E-03
	Home Grown Produce	SWMU 41B	**Ingestion**	**Inorganics** Arsenic	8.6E-04	mg/kg	2.2E-07	mg/kg-day	3.0E-04	mg/kg-day	7.3E-04
			Exp. Route Total								7.3E-04
		Exposure Point Total									7.3E-04
	Exposure Media Total										7.3E-04
Groundwater Total											1.4E+00
										Total of Receptor Hazards Across All Media	1.4E+00

N/A = Not Applicable
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-70
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-site Child Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	9.3E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	5.0E-06
				Inorganics							
				Arsenic	7.90E+00	µg/L	4.3E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.5E-05
				Cobalt	7.00E+00	µg/L	3.8E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Sodium	3.03E+06	µg/L	1.7E+01	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								7.0E-05
			Dermal Absorption	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	5.4E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-06
				Inorganics							
				Arsenic	7.90E+00	µg/L	N/A	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	NV
				Cobalt	7.00E+00	µg/L	N/A	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	NV
			Exp. Route Total								2.9E-06
		Exposure Point Total									7.3E-05
	Exposure Media Total										7.3E-05
	Air	SWMU 41B	**Inhalation** (Indoor Air)	**Organics** Tetrachloroethene	3.08E-04	mg/m^3	2.5E-05	mg/m^3	5.9E-03	$(mg/m^3)^{-1}$	1.5E-07
			Exp. Route Total								1.5E-07
		Exposure Point Total									1.5E-07
	Exposure Media Total										1.5E-07
	Home Grown Produce	SWMU 41B	**Ingestion**	**Inorganics** Arsenic	8.6E-04	mg/kg	8.8E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-07
			Exp. Route Total								1.3E-07
		Exposure Point Total									1.3E-07
	Exposure Media Total										1.3E-07
Groundwater Total											7.3E-05
										Total of Receptor Risks Across All Media	7.3E-05

N/A = Not Applicable
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-71
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-site Child Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Groundwater	Groundwater	SWMU 41B	**Ingestion**	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	1.1E-04	mg/kg-day	1.0E-02	mg/kg-day	1.1E-02
				Inorganics							
				Arsenic	7.90E+00	µg/L	5.1E-04	mg/kg-day	3.0E-04	mg/kg-day	1.7E+00
				Cobalt	7.00E+00	µg/L	4.5E-04	mg/kg-day	3.0E-04	mg/kg-day	1.5E+00
				Sodium	3.03E+06	µg/L	1.9E+02	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								3.2E+00
			Dermal	**Organics**							
				Tetrachloroethene	1.70E+00	µg/L	6.3E-05	mg/kg-day	1.0E-02	mg/kg-day	6.3E-03
				Inorganics							
				Arsenic	7.90E+00	µg/L	0.0E+00	mg/kg-day	3.0E-04	mg/kg-day	NV
				Cobalt	7.00E+00	µg/L	0.0E+00	mg/kg-day	3.0E-04	mg/kg-day	NV
			Exp. Route Total								6.3E-03
		Exposure Point Total									3.2E+00
	Exposure Media Total										3.2E+00
	Air	SWMU 41B	**Inhalation**	**Organics**							
			(Indoor Air)	Tetrachloroethene	3.08E-04	mg/m^3	3.0E-04	mg/m^3	2.7E-01	(mg/m^3)	1.1E-03
			Exp. Route Total								1.1E-03
		Exposure Point Total									1.1E-03
	Exposure Media Total										1.1E-03
	Home Grown Produce	SWMU 41B	**Ingestion**	**Inorganics**							
				Arsenic	8.6E-04	mg/kg	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	3.3E-03
			Exp. Route Total								3.3E-03
		Exposure Point Total									3.3E-03
	Exposure Media Total										3.3E-03
Groundwater Total											3.2E+00
										Total of Receptor Hazards Across All Media	3.2E+00

N/A = Not Applicable
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-72
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Current - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 41B										
			1,2-Dibromo-3-chloropropane	4.0E-10		7.9E-11	4.8E-10	N/A	6.9E-06		1.4E-06	8.3E-06
			2-Hexanone	---		---	---	N/A	---		---	---
			Methylcyclohexane	---		---	---	Nervous System	7.8E-09		1.5E-09	9.3E-09
			p-Chloro-m-cresol	---		---	---	Nervous System	7.8E-08		5.2E-08	1.3E-07
			Aluminum	---		---	---	Developmental nervous system	4.6E-03		3.0E-04	4.9E-03
			Arsenic	2.3E-06		4.5E-07	2.7E-06	Skin, Vascular System	1.4E-02		2.8E-03	1.7E-02
			Cobalt	---		---	---	N/A	7.3E-03		4.8E-04	7.8E-03
			Iron	---		---	---	Blood, Liver, GI Irritation	1.1E-02		7.5E-04	1.2E-02
			Manganese	---		---	---	CNS	1.4E-02		2.2E-02	3.6E-02
			Vanadium	---		---	---	Kidney	1.7E-03		4.2E-03	5.9E-03
			Chemical Total	2.3E-06		4.5E-07	2.7E-06		0.053		0.031	0.084
		Exposure Point Total					2.7E-06					0.084
	Exposure Media Total						2.7E-06					0.084
	Air (Particulates and Volatiles)	SWMU 41B										
			1,2-Dibromo-3-chloropropane		5.9E-08		5.9E-08	Reproductive System		1.4E-04		1.4E-04
			2-Hexanone		---		---	N/A		---		---
			Methylcyclohexane		---		---	Nervous System		5.4E-07		5.4E-07
			p-Chloro-m-cresol		---		---	N/A		---		---
			Aluminum		---		---	N/A		3.6E-04		3.6E-04
			Arsenic		2.6E-09		2.6E-09	Developmental, Cardiovascular, Nervous System		1.1E-04		1.1E-04
			Cobalt		2.8E-09		2.8E-09	N/A		1.4E-04		1.4E-04
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		2.6E-03		2.6E-03
			Vanadium		---		---	N/A		---		---
			Chemical Total		6.4E-08		6.4E-08			0.0033		0.0033
		Exposure Point Total					6.4E-08					0.0033
	Exposure Media Total						6.4E-08					0.0033
Surface Soil Total							2.8E-06					0.087
Sediment	Sediment	SWMU 41B										
			Arsenic	1.7E-06		1.0E-06	2.8E-06	Skin, Vascular System	1.1E-02		6.4E-03	1.7.E-02
			Manganese	---		---	---	CNS	2.3E-02		1.1E-01	1.4.E-01
				1.7E-06		1.0E-06	2.8E-06		0.03		0.12	0.15
		Exposure Point Total					2.8E-06					0.15
	Exposure Media Total						2.8E-06					0.15
Sediment Total							2.8E-06					0.15

Table E.2-72
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Current - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface water	Surface water	SWMU 41B	Arsenic			2.5E-08	2.5E-08	Skin, Vascular System			1.5E-04	1.5.E-04
			Lead			---	---	N/A			---	---
			Chemical Total			2.5E-08	2.5E-08				1.5E-04	1.5.E-04
		Exposure Point Total					2.5E-08					1.5.E-04
	Exposure Media Total						2.5E-08					1.5.E-04
Surface water Total							2.5E-08					1.5E-04
Groundwater	Air (Ambient Air)	SWMU 41B	Tetrachloroethene		7.7E-12		7.7E-12	CNS		1.5E-08		1.5.E-08
			Chemical Total		7.7E-12		7.7E-12			1.5E-08		1.5.E-08
		Exposure Point Total					7.7E-12					1.5.E-08
	Exposure Media Total						7.7E-12					1.5.E-08
Groundwater Total							7.7E-12					1.5E-08
Receptor Total							5.6E-06					0.24

5.6E-06	Total Hazard Across All Media = 0.24

Total CNS HI Across All Media =	0.18
Total Skin HI Across All Media =	0.034
Total Vascular System HI Across All Media =	0.034
Total Blood HI Across All Media =	0.012
Total Liver HI Across All Media =	0.012
Total GI Irritation HI Across All Media =	0.012
Total Kidney HI Across All Media =	0.0059
Total Reproductive System HI Across All Media =	0.00014
Total Cardiovascular HI Across All Media =	0.00011
Total Developmental HI Across All Media =	0.00011

CNS = Central Nervous System.
GI = Gastrointestinal
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.

Table E.2-73
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU41B										
			1,2-Dibromo-3-chloropropane	4.0E-10		7.9E-11	4.8E-10	N/A	6.9E-06		1.4E-06	8.3E-06
			2-Hexanone	---		---	---	N/A	---		---	---
			Methylcyclohexane	---		---	---	Nervous System	7.8E-09		1.5E-09	9.3E-09
			p-Chloro-m-cresol	---		---	---	Nervous System	7.8E-08		5.2E-08	1.3E-07
			Aluminum	---		---	---	Developmental nervous system	4.6E-03		3.0E-04	4.9E-03
			Arsenic	2.3E-06		4.5E-07	2.7E-06	Skin, Vascular System	1.4E-02		2.8E-03	1.7E-02
			Cobalt	---		---	---	N/A	7.3E-03		4.8E-04	7.8E-03
			Iron	---		---	---	Blood, Liver, GI Irritation	1.1E-02		7.5E-04	1.2E-02
			Manganese	---		---	---	CNS	1.4E-02		2.2E-02	3.6E-02
			Vanadium	---		---	---	Kidney	1.7E-03		4.2E-03	5.9E-03
			Chemical Total	2.3E-06		4.5E-07	2.7E-06		0.053		0.031	0.084
		Exposure Point Total					2.7E-06					0.084
	Exposure Media Total						2.7E-06					0.084
	Air (Particulates and Volatiles)	SWMU 41B										
			1,2-Dibromo-3-chloropropane		4.7E-13		4.7E-13	Reproductive System		1.4E-04		1.4E-04
			2-Hexanone		---		---	N/A		---		---
			Methylcyclohexane		---		---	Nervous System		5.4E-07		5.4E-07
			p-Chloro-m-cresol		---		---	N/A		---		---
			Aluminum		---		---	N/A		3.6E-04		3.6E-04
			Arsenic		2.6E-09		2.6E-09	Developmental, Cardiovascular, Nervous System		1.1E-04		1.1E-04
			Cobalt		2.8E-09		2.8E-09	N/A		1.4E-04		1.4E-04
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		2.6E-03		2.6E-03
			Vanadium		---		---	N/A		---		---
			Chemical Total		5.4E-09		5.4E-09			0.0033		0.0033
		Exposure Point Total					5.4E-09					0.0033
	Exposure Media Total						5.4E-09					0.0033
Surface Soil Total							2.7E-06					0.087

Table E.2-73
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41B										
			1,2-Dibromo-3-chloropropane	5.3E-10		1.0E-10	6.3E-10	N/A	9.2E-06		1.8E-06	1.1E-05
			2-Hexanone	---		---	---	N/A	---		---	---
			Methylcyclohexane	---		---	---	Nervous System	5.4E-08		1.1E-08	6.4E-08
			p-Chloro-m-cresol	---		---	---	Nervous System	7.8E-08		5.2E-08	1.3E-07
			TCDD TE	5.3E-08		1.1E-08	6.4E-08	Developmental Nervous System	1.1E-03		2.3E-04	1.4E-03
			Aluminum	---		---	---	Developmental nervous system	5.2E-03		3.4E-04	5.6E-03
			Arsenic	2.3E-06		4.5E-07	2.7E-06	Skin, Vascular System	1.4E-02		2.8E-03	1.7E-02
			Cobalt	---		---	---	N/A	8.6E-03		5.7E-04	9.2E-03
			Iron	---		---	---	Blood, Liver, GI Irritation	1.2E-02		7.9E-04	1.3E-02
			Manganese	---		---	---	CNS	1.2E-02		2.0E-02	3.2E-02
			Vanadium	---		---	---	Kidney	1.9E-03		4.8E-03	6.7E-03
			Chemical Total	2.3E-06		4.6E-07	2.8E-06		0.055		0.029	0.084
		Exposure Point Total					2.8E-06					0.084
	Exposure Media Total						2.8E-06					0.084
	Air (Particulates and Volatiles)	SWMU 41B										
			1,2-Dibromo-3-chloropropane		7.8E-08		7.8E-08	Reproductive System		1.8E-04		1.8E-04
			2-Hexanone		---		---	N/A		---		---
			Methylcyclohexane		---		---	Nervous System		3.7E-06		3.7E-06
			p-Chloro-m-cresol		---		---	N/A		---		---
			TCDD TE		6.2E-12		6.2E-12	Liver, Reproductive System, Endocrine System, Respiratory System, Blood, Development		1.1E-08		1.1E-08
			Aluminum		---		---	N/A		4.1E-04		4.1E-04
			Arsenic		2.6E-09		2.6E-09	Developmental, Cardiovascular, Nervous System		1.1E-04		1.1E-04
			Cobalt		3.3E-09		3.3E-09	N/A		1.7E-04		1.7E-04
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		2.3E-03		2.3E-03
			Vanadium		---		---	N/A		---		---
			Chemical Total		8.4E-08		8.4E-08			0.0031		0.0031
		Exposure Point Total					8.4E-08					0.0031
	Exposure Media Total						8.4E-08					0.0031
Total Soil Total							2.9E-06					0.087

Table E.2-73
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 41B	Arsenic	1.7E-06		1.0E-06	2.8E-06	Skin, Vascular System	1.1E-02		6.4E-03	1.7.E-02
			Manganese	---		---	---	CNS	2.3E-02		1.1E-01	1.4.E-01
				1.7E-06		1.0E-06	2.8E-06		0.034		0.12	0.15
		Exposure Point Total					2.8E-06					0.15
	Exposure Media Total						2.8E-06					0.15
Sediment Total							2.8E-06					0.15
Surface water	Surface water	SWMU 41B	Arsenic			2.5E-08	2.5E-08	Skin, Vascular System			1.5E-04	1.5.E-04
			Lead			---	---	N/A			---	---
			Chemical Total			2.5E-08	2.5E-08				1.5E-04	1.5.E-04
		Exposure Point Total					2.5E-08					1.5.E-04
	Exposure Media Total						2.5E-08					1.5.E-04
Surface water Total							2.5E-08					0.00015
Groundwater	Air (Ambient Air)	SWMU 41B	Tetrachloroethene		8.3E-12		8.3E-12	CNS		1.5E-08		1.5.E-08
			Chemical Total		8.3E-12		8.3E-12			1.5E-08		1.5.E-08
		Exposure Point Total					8.3E-12					1.5.E-08
	Exposure Media Total						8.3E-12					1.5.E-08
Groundwater Total							8.3E-12					1.5E-08
Receptor Total[b]							5.7E-06					0.24

Total Risk Across All Media[b] = 5.7E-06

Total Hazard Across All Media[b] = 0.24

(b) Since total soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this soil data grouping.

CNS = Central nervous system.
GI = Gastrointestinal.
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.

Total CNS HI Across All Media =	0.18
Total Skin HI Across All Media =	0.034
Total Vascular System HI Across All Media =	0.034
Total Blood HI Across All Media =	0.013
Total Liver HI Across All Media =	0.013
Total GI Irritaion HI Across All Media =	0.013
Total Kidney HI Across All Media =	0.0067
Total Reproductive System HI Across All Media =	0.00018
Total Endocrine System HI Across All Media =	1.1E-08
Total Respiratory System HI Across All Media =	1.1E-08
Total Developmental HI Across All Media =	0.00011
Total Cardiovascular HI Across All Media =	0.00011

Table E.2-74
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 41B										
			1,2-Dibromo-3-chloropropane	1.8E-09		3.5E-10	2.1E-09	N/A	3.1E-05		6.2E-06	3.7E-05
			2-Hexanone	---		---	---	N/A	---		---	---
			Methylcyclohexane	---		---	---	Nervous System	3.5E-08		6.9E-09	4.2E-08
			p-Chloro-m-cresol	---		---	---	Nervous System	3.5E-07		2.3E-07	5.8E-07
			Aluminum	---		---	---	Developmental nervous system	2.1E-02		1.4E-03	2.2E-02
			Arsenic	1.0E-05		2.0E-06	1.2E-05	Skin, Vascular System	6.4E-02		1.3E-02	7.7E-02
			Cobalt	---		---	---	N/A	3.3E-02		2.2E-03	3.5E-02
			Iron	---		---	---	Blood, Liver, GI Irritation	5.1E-02		3.4E-03	5.4E-02
			Manganese	---		---	---	CNS	6.1E-02		1.0E-01	1.6E-01
			Vanadium	---		---	---	Kidney	7.5E-03		1.9E-02	2.6E-02
			Chemical Total	1.0E-05		2.0E-06	1.2E-05		0.24		0.14	0.38
		Exposure Point Total					1.2E-05					0.38
	Exposure Media Total						1.2E-05					0.38
	Air (Particulates and Volatiles)	SWMU 41B										
			1,2-Dibromo-3-chloropropane		2.6E-07		2.6E-07	N/A		6.2E-04		6.2E-04
			2-Hexanone		---		---	N/A		---		---
			Methylcyclohexane		---		---	Nervous System		2.4E-06		2.4E-06
			p-Chloro-m-cresol		---		---	Nervous System		---		---
			Aluminum		---		---	N/A		1.6E-03		1.6E-03
			Arsenic		1.2E-08		1.2E-08	Developmental, Cardiovascular, Nervous System		5.1E-04		5.1E-04
			Cobalt		1.3E-08		1.3E-08	N/A		6.5E-04		6.5E-04
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		1.2E-02		1.2E-02
			Vanadium		---		---	N/A		---		---
			Chemical Total		2.9E-07		2.9E-07			0.015		0.015
		Exposure Point Total					2.9E-07					0.015
	Exposure Media Total						2.9E-07					0.015
Surface Soil Total							1.3E-05					0.39

Table E.2-74
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41B										
			1,2-Dibromo-3-chloropropane	2.4E-09		4.7E-10	2.8E-09	N/A	4.1E-05		8.2E-06	5.0E-05
			2-Hexanone	---		---	---	N/A	---		---	---
			Methylcyclohexane	---		---	---	Nervous System	2.4E-07		4.8E-08	2.9E-07
			p-Chloro-m-cresol	---		---	---	Nervous System	3.5E-07		2.3E-07	5.8E-07
			TCDD TE	2.4E-07		4.7E-08	2.9E-07	Developmental Nervous System	5.2E-03		1.0E-03	6.2E-03
			Aluminum	---		---	---	Developmental nervous system	2.4E-02		1.6E-03	2.5E-02
			Arsenic	1.0E-05		2.0E-06	1.2E-05	Skin, Vascular System	6.4E-02		1.3E-02	7.6E-02
			Cobalt	---		---	---	N/A	3.9E-02		2.6E-03	4.1E-02
			Iron	---		---	---	Blood, Liver, GI Irritation	5.4E-02		3.5E-03	5.7E-02
			Manganese	---		---	---	CNS	5.4E-02		8.8E-02	1.4E-01
			Vanadium	---		---	---	Kidney	8.5E-03		2.2E-02	3.0E-02
			Chemical Total	1.0E-05		2.1E-06	1.3E-05		0.25		0.13	0.38
		Exposure Point Total					1.3E-05					0.38
	Exposure Media Total						1.3E-05					0.38
	Air (Particulates and Volatiles)	SWMU 41B										
			1,2-Dibromo-3-chloropropane		3.5E-07		3.5E-07	Reproductive System		8.2E-04		8.2E-04
			2-Hexanone		---		---	N/A		---		---
			Methylcyclohexane		---		---	Nervous System		1.7E-05		1.7E-05
			p-Chloro-m-cresol		---		---	N/A		---		---
			TCDD TE		2.8E-11		2.8E-11	Liver, Reproductive System, Endocrine System, Respiratory System, Blood, Development		5.1E-08		5.1E-08
			Aluminum		---		---	N/A		1.9E-03		1.9E-03
			Arsenic		1.2E-08		1.2E-08	Developmental, Cardiovascular, Nervous System		5.0E-04		5.0E-04
			Cobalt		1.5E-08		1.5E-08	N/A		7.7E-04		7.7E-04
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		1.0E-02		1.0E-02
			Vanadium		---		---	N/A		---		---
			Chemical Total		3.8E-07		3.8E-07			0.014		0.014
		Exposure Point Total					3.8E-07					0.014
	Exposure Media Total						3.8E-07					0.014
Total Soil Total							1.3E-05					0.39

Table E.2-74
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 41B	Arsenic	7.8E-06		4.7E-06	1.2E-05	Skin, Vascular System	4.9E-02		2.9E-02	7.8.E-02
			Manganese	---		---	---	CNS	1.0E-01		5.1E-01	6.1.E-01
				7.8E-06		4.7E-06	1.2E-05		0.15		0.54	0.69
		Exposure Point Total					1.2E-05					0.69
	Exposure Media Total						1.2E-05					0.69
Sediment Total							1.2E-05					0.69
Surface water	Surface water	SWMU 41B	Arsenic			1.1E-07	1.1E-07	Skin, Vascular System			6.9E-04	6.9.E-04
			Lead			---	---	N/A			---	---
			Chemical Total			1.1E-07	1.1E-07				6.9E-04	0.00069
		Exposure Point Total					1.1E-07					0.00069
	Exposure Media Total						1.1E-07					0.00069
Surface water Total							1.1E-07					0.00069
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	2.9E-06			2.9E-06	Liver	1.5E-03			1.5E-03
			Arsenic	3.7E-05			3.7E-05	Skin, Vascular System	2.3E-01			2.3E-01
			Cobalt	---			---	N/A	2.1E-01			2.1E-01
			Sodium	---			---	N/A	---			---
			Chemical Total	4.0E-05			4.0E-05		0.44			0.44
		Exposure Point Total					4.0E-05					0.44
	Exposure Media Total						4.0E-05					0.44
	Air (Ambient Air)	SWMU 41B	Tetrachloroethene		3.7E-11		3.7E-11	CNS		6.5E-08		6.5.E-08
			Chemical Total		3.7E-11		3.7E-11			6.5E-08		6.5E-08
		Exposure Point Total					3.7E-11					6.5E-08
	Exposure Media Total						3.7E-11					6.5E-08
	Air (Indoor Air)	SWMU 41B	Tetrachloroethene		4.0E-07		4.0E-07	CNS		7.0E-04		7.0.E-04
			Chemical Total		4.0E-07		4.0E-07			0.00070		0.00070
		Exposure Point Total					4.0E-07					0.00070
	Exposure Media Total						4.0E-07					0.00070
Groundwater Total							4.1E-05					0.44
Receptor Total[b]							6.6E-05					1.5

Total Risk Across All Media[a] = 6.6E-05

Total Hazard Across All Media[a] = 1.5

(a) Since total soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this soil data grouping.
Since indoor air represents the higher risk and hazards for the air pathway, total risk and hazard estimates are conservatively based on this data grouping.

CNS = Central nervous system.
GI = Gastrointestinal.
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.

Total CNS HI Across All Media =	0.80
Total Skin HI Across All Media =	0.39
Total Vascular System HI Across All Media =	0.39
Total Blood HI Across All Media =	0.057
Total Liver HI Across All Media =	0.057
Total GI Irritaion HI Across All Media =	0.057
Total Kidney HI Across All Media =	0.0302
Total Reproductive System HI Across All Media =	0.00082
Total Endocrine System HI Across All Media =	5.1E-08
Total Respiratory System HI Across All Media =	5.1E-08
Total Developmental HI Across All Media =	0.00050
Total Cardiovascular HI Across All Media =	0.00050

Table E.2-75
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41B										
			1,2-Dibromo-3-chloropropane	1.7E-10		1.6E-11	1.9E-10	N/A	7.6E-05		6.8E-06	8.3E-05
			2-Hexanone	---		---	---	N/A	---		---	---
			Methylcyclohexane	---		---	---	Nervous System	4.4E-07		4.0E-08	4.8E-07
			p-Chloro-m-cresol	---		---	---	Nervous System	6.5E-07		1.9E-07	8.4E-07
			TCDD TE	1.8E-08		1.6E-09	1.9E-08	Developmental Nervous System	9.5E-03		8.5E-04	1.0E-02
			Aluminum	---		---	---	Developmental nervous system	4.3E-02		1.3E-03	4.4E-02
			Arsenic	7.5E-07		6.8E-08	8.2E-07	Skin, Vascular System	1.2E-01		1.1E-02	1.3E-01
			Cobalt	---		---	---	N/A	7.1E-02		2.1E-03	7.3E-02
			Iron	---		---	---	Blood, Liver, GI Irritation	9.8E-02		3.0E-03	1.0E-01
			Manganese	---		---	---	CNS	9.8E-02		7.4E-02	1.7E-01
			Vanadium	---		---	---	Kidney	1.6E-02		1.8E-02	3.4E-02
			Chemical Total	7.7E-07		6.9E-08	8.4E-07		0.45		0.11	0.56
		Exposure Point Total					8.4E-07					0.56
	Exposure Media Total						8.4E-07					0.56
	Air (Particulates and Volatiles)	SWMU 41B										
			1,2-Dibromo-3-chloropropane		1.2E-07		1.2E-07	Reproductive System		7.2E-03		7.2E-03
			2-Hexanone		---		---	N/A		---		---
			Methylcyclohexane		---		---	Nervous System		1.5E-04		1.5E-04
			p-Chloro-m-cresol		---		---	N/A		---		---
			TCDD TE		5.6E-11		5.6E-11	Liver, Reproductive System, Endocrine System, Respiratory System, Blood, Development		2.6E-06		2.6E-06
			Aluminum		---		---	N/A		9.4E-02		9.4E-02
			Arsenic		2.4E-08		2.4E-08	Developmental, Cardiovascular, Nervous System		2.6E-02		2.6E-02
			Cobalt		3.0E-08		3.0E-08	N/A		3.9E-02		3.9E-02
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		5.2E-01		5.2E-01
			Vanadium		---		---	N/A		---		---
			Chemical Total		1.8E-07		1.8E-07			0.68		0.68
		Exposure Point Total					1.8E-07					0.68
	Exposure Media Total						1.8E-07					0.68
Total Soil Total							1.0E-06					1.2
Sediment	Sediment	SWMU 41B										
			Arsenic	5.7E-07		1.0E-07	6.8E-07	Skin, Vascular System	8.9E-02		1.6E-02	1.1.E-01
			Manganese	---		---	---	CNS	1.9E-01		2.8E-01	4.7.E-01
				5.7E-07		1.0E-07	6.8E-07		0.28		0.30	0.58
		Exposure Point Total					6.8E-07					0.58
	Exposure Media Total						6.8E-07					0.58
Sediment Total							6.8E-07					0.58

Table E.2-75
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface water	Surface water	SWMU 41B	Arsenic			2.5E-09	2.5E-09	Skin, Vascular System			3.8E-04	3.8.E-04
			Lead			---	---	N/A			---	---
			Chemical Total			2.5E-09	2.5E-09				3.8E-04	3.8.E-04
		Exposure Point Total					2.5E-09					0.00038
	Exposure Media Total						2.5E-09					0.00038
Surface water Total							2.5E-09					0.00038
Groundwater	Air (Trench Air)	SWMU 41B	Tetrachloroethene		1.8E-09		1.8E-09	CNS		7.7E-05		7.7.E-05
			Chemical Total		1.8E-09		1.8E-09			0.000077		0.000077
		Exposure Point Total					1.8E-09					0.000077
	Exposure Media Total						1.8E-09					0.000077
Groundwater Total							1.8E-09					0.000077
Receptor Total							1.7E-06					1.8

Total Risk Across All Media = 1.7E-06

Total Hazard Across All Media = 1.8

Total CNS HI Across All Media =	1.2
Total Skin HI Across All Media =	0.23
Total Vascular System HI Across All Media =	0.23
Total Blood HI Across All Media =	0.101
Total Liver HI Across All Media =	0.101
Total GI Irritaion HI Across All Media =	0.101
Total Kidney HI Across All Media =	0.034
Total Reproductive System HI Across All Media =	0.0072
Total Endocrine System HI Across All Media =	2.6E-06
Total Respiratory System HI Across All Media =	2.6E-06
Total Developmental HI Across All Media =	0.026
Total Cardiovascular HI Across All Media =	0.026

CNS = Central nervous system.
GI = Gastrointestinal.
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.

Table E.2-76
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal
Total Soil	Total Soil	SWMU 41B									
			1,2-Dibromo-3-chloropropane	1.2E-08		1.1E-09	1.3E-08	N/A	6.4E-05		7.7E-06
			2-Hexanone	---		---	---	N/A	---		---
			Methylcyclohexane	---		---	---	Nervous System	3.8E-07		4.5E-08
			p-Chloro-m-cresol	---		---	---	Nervous System	5.5E-07		2.2E-07
			TCDD TE	1.2E-06		1.1E-07	1.3E-06	Developmental Nervous System	8.0E-03		9.6E-04
			Aluminum	---		---	---	Developmental nervous system	3.7E-02		1.5E-03
			Arsenic	5.1E-05		4.8E-06	5.6E-05	Skin, Vascular System	9.9E-02		1.2E-02
			Cobalt	---		---	---	N/A	6.0E-02		2.4E-03
			Iron	---		---	---	Blood, Liver, GI Irritation	8.4E-02		3.3E-03
			Manganese	---		---	---	CNS	8.3E-02		8.3E-02
			Vanadium	---		---	---	Kidney	1.3E-02		2.0E-02
			Chemical Total	5.2E-05		4.9E-06	5.7E-05		0.38		0.12
		Exposure Point Total					5.7E-05				
	Exposure Media Total						5.7E-05				
	Air (Particulates and Volatiles)	SWMU 41B									
			1,2-Dibromo-3-chloropropane		7.0E-07		7.0E-07	Reproductive System		1.1E-03	
			2-Hexanone		---		---	N/A		---	
			Methylcyclohexane		---		---	Nervous System		2.3E-05	
			p-Chloro-m-cresol		---		---	N/A		---	
			TCDD TE		4.5E-11		4.5E-11	Liver, Reproductive System, Endocrine System, Respiratory System, Blood, Development		6.9E-08	
			Aluminum		---		---	N/A		2.5E-03	
			Arsenic		1.9E-08		1.9E-08	Developmental, Cardiovascular, Nervous System		6.8E-04	
			Cobalt		2.4E-08		2.4E-08	N/A		1.0E-03	
			Iron		---		---	N/A		---	
			Manganese		---		---	CNS		1.4E-02	
			Vanadium		---		---	N/A		---	
			Chemical Total		7.4E-07		7.4E-07			0.019	
		Exposure Point Total					7.4E-07				
	Exposure Media Total						7.4E-07				
Total Soil Total							5.8E-05				
Sediment	Sediment	SWMU 41B									
			Arsenic	4.5E-06		7.2E-07	5.2E-06	Skin, Vascular System	6.9E-03		2.4E-03
			Manganese	---		---	---	CNS	1.5E-02		4.2E-02
				4.5E-06		7.2E-07	5.2E-06		0.02		0.044
		Exposure Point Total					5.2E-06				
	Exposure Media Total						5.2E-06				
Sediment Total							5.2E-06				

Table E.2-76
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal
Surface water	Surface water	SWMU 41B	Arsenic			4.5E-08	4.5E-08	Skin, Vascular System			1.7E-04
			Lead			---	---	N/A			---
			Chemical Total			4.5E-08	4.5E-08				0.00017
		Exposure Point Total					4.5E-08				
	Exposure Media Total						4.5E-08				
Surface water Total							4.5E-08				
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	1.4E-05		8.0E-06	2.2E-05	Liver	4.7E-03		2.7E-03
			Arsenic	1.8E-04		NV	1.8E-04	Skin, Vascular System	7.2E-01		NV
			Cobalt	---		NV	---	N/A	6.4E-01		NV
			Sodium	---		N/A	---	N/A	---		N/A
			Chemical Total	1.9E-04		8.0E-06	2.0E-04		1.4		0.0027
		Exposure Point Total					2.0E-04				
	Exposure Media Total						2.0E-04				
	Air (Indoor Air)	SWMU 41B	Tetrachloroethene		7.5E-07		7.5E-07	CNS		1.1E-03	
			Chemical Total		7.5E-07		7.5E-07			0.0011	
		Exposure Point Total					7.5E-07				
	Exposure Media Total						7.5E-07				
	Air (Shower Room)	SWMU 41B	Tetrachloroethene		4.7E-06		4.7E-06	CNS		8.5E-03	
			Chemical Total		4.7E-06		4.7E-06			0.00852	
		Exposure Point Total					4.7E-06				
	Exposure Media Total						4.7E-06				

Table E.2-76
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal
Groundwater (con't)	Home Grown Produce	SWMU 41B	Arsenic	2.4E-07			2.4E-07	Skin, Vascular System	7.3E-04		
			Chemical Total	2.4E-07			2.4E-07		0.00073		
		Exposure Point Total					2.4E-07				
	Exposure Media Total						2.4E-07				
Groundwater Total							2.0E-04				
Receptor Total							2.7E-04				

Total Risk Across All Media= 2.7E-04

Total Hazard Across All Media =

Total CNS HI Across All Media =
Total Skin HI Across All Media =
Total Vascular System HI Across All Media =
Total Blood HI Across All Media =
Total Liver HI Across All Media =
Total GI Irritaion HI Across All Media =
Total Kidney HI Across All Media =
Total Reproductive System HI Across All Media =
Total Endocrine System HI Across All Media =
Total Respiratory System HI Across All Media =
Total Developmental HI Across All Media =
Total Cardiovascular HI Across All Media =

CNS = Central nervous system.
GI = Gastrointestinal.
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-76
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Exposure Routes Total
7.2E-05

4.2E-07
7.7E-07
9.0E-03
3.8E-02
1.1E-01
6.3E-02
8.7E-02
1.7E-01
3.4E-02
0.51
0.51
0.51
1.1E-03

2.3E-05

6.9E-08
2.5E-03
6.8E-04
1.0E-03

1.4E-02

0.019
0.019
0.019
0.53
9.3.E-03
5.6.E-02
0.07
0.07
0.07
0.07

Table E.2-76
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Exposure Routes Total
1.7.E-04 ---
0.00017
0.00017
0.00017
0.00017
7.4E-03 7.2E-01 6.4E-01 ---
1.4
1.4
1.4
1.1.E-03
0.0011
0.0011
0.0011
8.5E-03
0.00852
0.00852
0.00852

Table E.2-76
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Exposure Routes Total
7.3E-04
0.00073
0.00073
0.00073
1.4
2.0
2.0
0.29
0.84
0.84
0.087
0.094
0.087
0.034
0.0011
6.9E-08
6.9E-08
0.00068
0.00068

Table E.2-77
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41B										
			1,2-Dibromo-3-chloropropane	8.2E-09		6.9E-10	8.9E-09	N/A	6.0E-04		5.0E-05	6.5E-04
			2-Hexanone	---		---	---	N/A	---		---	---
			Methylcyclohexane	---		---	---	Nervous System	3.5E-06		9.8E-07	4.5E-06
			p-Chloro-m-cresol	---		---	---	Nervous System	5.1E-06		1.4E-06	6.5E-06
			TCDD TE	8.3E-07		7.0E-08	9.0E-07	Developmental Nervous System	7.5E-02		6.3E-03	8.1E-02
			Aluminum	---		---	---	Developmental nervous system	3.4E-01		9.6E-03	3.5E-01
			Arsenic	3.6E-05		3.0E-06	3.9E-05	Skin, Vascular System	9.2E-01		7.8E-02	1.0E+00
			Cobalt	---		---	---	N/A	5.6E-01		1.6E-02	5.8E-01
			Iron	---		---	---	Blood, Liver, GI Irritation	7.8E-01		2.2E-02	8.0E-01
			Manganese	---		---	---	CNS	7.8E-01		5.4E-01	1.3E+00
			Vanadium	---		---	---	Kidney	1.2E-01		1.3E-01	2.6E-01
			Chemical Total	3.7E-05		3.1E-06	4.0E-05		3.6		0.81	4.4
		Exposure Point Total					4.0E-05					4.4
	Exposure Media Total						4.0E-05					4.4
	Air (Particulates and Volatiles)	SWMU 41B										
			1,2-Dibromo-3-chloropropane		2.3E-07		2.3E-07	Reproductive System		2.3E-03		2.3E-03
			2-Hexanone		---		---	N/A		---		---
			Methylcyclohexane		---		---	Nervous System		4.6E-05		4.6E-05
			p-Chloro-m-cresol		---		---	N/A		---		---
			TCDD TE		9.0E-12		9.0E-12	Liver, Reproductive System, Endocrine System, Respiratory System, Blood, Development		6.9E-08		6.9E-08
			Aluminum		---		---	N/A		2.5E-03		2.5E-03
			Arsenic		3.8E-09		3.8E-09	Developmental, Cardiovascular, Nervous System		6.8E-04		6.8E-04
			Cobalt		4.8E-09		4.8E-09	N/A		1.0E-03		1.0E-03
			Iron		---		---	N/A		---		---
			Manganese		---		---	CNS		1.4E-02		1.4E-02
			Vanadium		---		---	N/A		---		---
			Chemical Total		2.4E-07		2.4E-07			0.020		0.020
		Exposure Point Total					2.4E-07					0.020
	Exposure Media Total						2.4E-07					0.020
Total Soil Total							4.0E-05					4.4
Sediment	Sediment	SWMU 41B										
			Arsenic	3.1E-06		2.6E-07	3.4E-06	Skin, Vascular System	8.1E-02		6.8E-03	8.8.E-02
			Manganese	---		---	---	CNS	1.7E-01		1.2E-01	2.9.E-01
				3.1E-06		2.6E-07	3.4E-06		0.3		0.13	0.38
		Exposure Point Total					3.4E-06					0.38
	Exposure Media Total						3.4E-06					0.38
Sediment Total							3.4E-06					0.38

Table E.2-77
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface water	Surface water	SWMU 41B	Arsenic			1.3E-08	1.3E-08	Skin, Vascular System			3.3E-04	3.3.E-04
			Lead			---	---	N/A			---	---
			Chemical Total			1.3E-08	1.3E-08				3.3E-04	0.00033
		Exposure Point Total					1.3E-08					0.00033
	Exposure Media Total						1.3E-08					0.00033
Surface water Total							1.3E-08					0.00033
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	5.0E-06		2.9E-06	8.0E-06	Liver	1.1E-02		6.3E-03	1.7E-02
			Arsenic	6.5E-05		NV	6.5E-05	Skin, Vascular System	1.7E+00		NV	1.7E+00
			Cobalt	---		NV	---	N/A	1.5E+00		NV	1.5E+00
			Sodium	---		N/A	---	N/A	---		N/A	---
			Chemical Total	7.0E-05		2.9E-06	7.3E-05		3.2		0.0063	3.2
		Exposure Point Total					7.3E-05					3.2
	Exposure Media Total						7.3E-05					3.2
	Air (Indoor Air)	SWMU 41B	Tetrachloroethene		1.5E-07		1.5E-07	CNS		1.1E-03		1.1.E-03
			Chemical Total		1.5E-07		1.5E-07			0.0011		0.0011
		Exposure Point Total					1.5E-07					0.0011
	Exposure Media Total						1.5E-07					0.0011
	Home Grown Produce	SWMU 41B	Arsenic	1.3E-07			1.3E-07	Skin, Vascular System	3.3E-03			3.3.E-03
			Chemical Total	1.3E-07			1.3E-07		0.0033			0.0033
		Exposure Point Total					1.3E-07					0.0033
	Exposure Media Total						1.3E-07					0.0033
Groundwater Total							7.3E-05					3.2
Receptor Total							1.2E-04					8.0

Total Risk Across All Media = 1.2E-04

Total Hazard Across All Media = 8.0

Total CNS HI Across All Media =	2.1
Total Skin HI Across All Media =	2.8
Total Vascular System HI Across All Media =	2.8
Total Blood HI Across All Media =	0.802
Total Liver HI Across All Media =	0.82
Total GI Irritaion HI Across All Media =	0.802
Total Kidney HI Across All Media =	0.26
Total Reproductive System HI Across All Media =	0.0023
Total Endocrine System HI Across All Media =	6.9E-08
Total Respiratory System HI Across All Media =	6.9E-08
Total Developmental HI Across All Media =	0.00068
Total Cardiovascular HI Across All Media =	0.00068

CNS = Central nervous system.
GI = Gastrointestinal.
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-77
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total

Table E.2-78
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air (Ambient Air)	SWMU 41B	Tetrachloroethene		8.3E-12		8.3E-12	CNS		1.5E-08		1.5E-08
			Chemical Total		8.3E-12		8.3E-12			1.5E-08		1.5E-08
		Exposure Point Total					8.3E-12					1.5E-08
	Exposure Media Total						8.3E-12					1.5E-08
Groundwater Total							8.3E-12					1.5E-08
Receptor Total[b]							8.3E-12					1.5E-08

Total Risk Across All Media = 8.3E-12

Total Hazard Across All Media = 1.5E-08

Total CNS HI Across All Media = 1.5E-08

CNS = Central Nervous System
N/A = Not Available

Table E.2-79
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	2.9E-06			2.9E-06	Liver	1.5E-03			1.5E-03
			Arsenic	3.7E-05			3.7E-05	Skin, Vascular System	2.3E-01			2.3E-01
			Cobalt	---			---	N/A	2.1E-01			2.1E-01
			Sodium	---			---	N/A	---			---
			Chemical Total	4.0E-05			4.0E-05		0.44			0.44
		Exposure Point Total					4.0E-05					0.44
	Exposure Media Total						4.0E-05					0.44
	Air (Ambient Air)	SWMU 41B	Tetrachloroethene		3.7E-11		3.7E-11	CNS		6.5E-08		6.5E-08
			Chemical Total		3.7E-11		3.7E-11			6.5E-08		6.5E-08
		Exposure Point Total					3.7E-11					6.5E-08
	Exposure Media Total						3.7E-11					6.5E-08
	Air (Indoor Air)	SWMU 41B	Tetrachloroethene		4.0E-07		4.0E-07	CNS		7.0E-04		7.0E-04
			Chemical Total		4.0E-07		4.0E-07			0.00070		0.00070
		Exposure Point Total					4.0E-07					0.00070
	Exposure Media Total						4.0E-07					0.00070
Groundwater Total							4.1E-05					0.44
Receptor Total[b]							4.1E-05					0.44

Total Risk Across All Media[a] = 4.1E-05

Total Hazard Across All Media[a] = 0.44

Total Liver HI Across All Media = 0.0015
Total Skin HI Across All Media = 0.23
Total Vascular System HI Across All Media = 0.23
Total CNS HI Across All Media = 0.00070

(a) Since indoor air represents the more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.

CNS = Central Nervous System
N/A = Not Available

Table E.2-80
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air (Trench Air)	SWMU 41B	Tetrachloroethene		1.8E-09		1.8E-09	CNS		7.7E-05		7.7.E-05
			Chemical Total		1.8E-09		1.8E-09			0.000077		0.000077
		Exposure Point Total					1.8E-09					0.000077
	Exposure Media Total						1.8E-09					0.000077
Groundwater Total							1.8E-09					0.000077
Receptor Total							1.8E-09					0.000077

Total Risk Across All Media = 1.8E-09

Total Hazard Across All Media = 0.000077

Total CNS HI Across All Media = 0.000077

CNS = Central Nervous System
N/A = Not Available

Table E.2-81
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-site Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	1.4E-05		8.0E-06	2.2E-05	Liver	4.7E-03		2.7E-03	7.4E-03
			Arsenic	1.8E-04		NV	1.8E-04	Skin, Vascular System	7.2E-01		NV	7.2E-01
			Cobalt	---		NV	---	N/A	6.4E-01		NV	6.4E-01
			Sodium	---		N/A	---	N/A	---		N/A	---
			Chemical Total	1.9E-04		8.0E-06	2.0E-04		1.4		0.0027	1.4
		Exposure Point Total					2.0E-04					1.4
	Exposure Media Total						2.0E-04					1.4
	Air (Indoor Air)	SWMU 41B	Tetrachloroethene		7.5E-07		7.5E-07	CNS		1.1E-03		1.1.E-03
			Chemical Total		7.5E-07		7.5E-07			0.0011		0.0011
		Exposure Point Total					7.5E-07					0.0011
	Exposure Media Total						7.5E-07					0.0011
	Air (Shower Room)	SWMU 41B	Tetrachloroethene		4.7E-06		4.7E-06	CNS		8.5E-03		8.5.E-03
			Chemical Total		4.7E-06		4.7E-06			0.0085		0.0085
		Exposure Point Total					4.7E-06					0.0085
	Exposure Media Total						4.7E-06					0.0085
	Home Grown Produce	SWMU 41B	Arsenic	2.4E-07			2.4E-07	Skin, Vascular System	7.3E-04			7.3E-04
			Chemical Total	2.4E-07			2.4E-07		0.00073			0.00073
		Exposure Point Total					2.4E-07					0.00073
	Exposure Media Total						2.4E-07					0.00073
Groundwater Total							2.0E-04					1.4
Receptor Total							2.0E-04					1.4

Total Risk Across All Media = 2.0E-04

Total Hazard Across All Media = 1.4

CNS = Central Nervous System
N/A = Not Available
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Total Liver HI Across All Media = 0.0074
Total Skin HI Across All Media = 0.72
Total Vascular System HI Across All Media = 0.72
Total CNS HI Across All Media = 0.0096

Table E.2-81
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-site Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total

Table E.2-82
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-site Child Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	5.0E-06		2.9E-06	8.0E-06	Liver	1.1E-02		6.3E-03	1.7E-02
			Arsenic	6.5E-05		NV	6.5E-05	Skin, Vascular System	1.7E+00		NV	1.7E+00
			Cobalt	---		NV	---	N/A	1.5E+00		NV	1.5E+00
			Sodium	---		N/A	---	N/A	---		N/A	---
			Chemical Total	7.0E-05		2.9E-06	7.3E-05		3.2		0.0063	3.2
		Exposure Point Total					7.3E-05					3.2
	Exposure Media Total						7.3E-05					3.2
	Air (Indoor Air)	SWMU 41B	Tetrachloroethene		1.5E-07		1.5E-07	CNS		1.1E-03		1.1.E-03
			Chemical Total		1.5E-07		1.5E-07			0.0011		0.0011
		Exposure Point Total					1.5E-07					0.0011
	Exposure Media Total						1.5E-07					0.0011
	Home Grown Produce	SWMU 41B	Arsenic	1.3E-07			1.3E-07	Skin, Vascular System	3.3E-03			3.3E-03
			Chemical Total	1.3E-07			1.3E-07		0.0033			0.0033
		Exposure Point Total					1.3E-07					0.0033
	Exposure Media Total						1.3E-07					0.0033
Groundwater Total							7.3E-05					3.2
Receptor Total							7.3E-05					3.2

Total Risk Across All Media = 7.3E-05

Total Hazard Across All Media = 3.2

CNS = Central Nervous System
N/A = Not Available
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Total Liver HI Across All Media =	0.017
Total Skin HI Across All Media =	1.7
Total Vascular System HI Across All Media =	1.7
Total CNS HI Across All Media =	0.0011

Table E.2-83
Risk Assessment Summary
Reasonable Maximum Exposure
Current - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 41B	Arsenic	2.3E-06		4.5E-07	2.7E-06					
			Chemical Total				2.7E-06					<1
		Exposure Point Total					2.7E-06					<1
	Exposure Media Total						2.7E-06					<1
	Air (Particulates and Volatiles)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Soil Total							2.7E-06					<1
Sediment	Sediment	SWMU 41B	Arsenic	1.7E-06		1.0E-06	2.8E-06					
			Chemical Total	1.7E-06		1.0E-06	2.8E-06					<1
		Exposure Point Total					2.8E-06					<1
	Exposure Media Total						2.8E-06					<1
Sediment Total							2.8E-06					<1
Surface Water	Surface Water	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Water Total							<1.0E-06					<1
Groundwater	Air (Ambient Air)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total												
Receptor Total							5.5E-06					<1

Total Risk Across All Media = 5.5E-06

Total Hazard Across All Media = <1

Table E.2-84
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 41B	Arsenic	2.3E-06		4.5E-07	2.7E-06					
			Chemical Total	2.3E-06		4.5E-07	2.7E-06					<1
		Exposure Point Total					2.7E-06					<1
	Exposure Media Total						2.7E-06					<1
	Air (Particulates and Volatiles)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Soil Total							2.7E-06					<1
Total Soil	Total Soil	SWMU 41B	Arsenic	2.3E-06		4.5E-07	2.7E-06					
			Chemical Total	2.3E-06		4.5E-07	2.7E-06					<1
		Exposure Point Total					2.7E-06					<1
	Exposure Media Total						2.7E-06					<1
	Air (Particulates and Volatiles)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
			Radionuclide Total									
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Total Soil Total							2.7E-06					<1

Table E.2-84
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	SWMU 41B	Arsenic	1.7E-06		1.0E-06	2.8E-06					
			Chemical Total	1.7E-06		1.0E-06	2.8E-06					<1
		Exposure Point Total					2.8E-06					<1
	Exposure Media Total						2.8E-06					<1
Sediment Total							2.8E-06					
Surface Water	Surface Water	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Water Total							<1.0E-06					
Groundwater	Air (Ambient Air)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							<1.0E-06					
Receptor Total[a]							5.5E-06					<1

Total Risk Across All Media[a] = 5.5E-06

Total Hazard Across All Media = <1

(a) Since total soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this soil data grouping.

Table E.2-85
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	SWMU 41B	Arsenic	1.0E-05		2.0E-06	1.2E-05					
			Chemical Total	1.0E-05		2.0E-06	1.2E-05					<1
		Exposure Point Total					1.2E-05					<1
	Exposure Media Total						1.2E-05					<1
	Air (Particulates and Volatiles)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Soil Total							1.2E-05					<1
Total Soil	Total Soil	SWMU 41B	Arsenic	1.0E-05		2.0E-06	1.2E-05					
			Chemical Total	1.0E-05		2.0E-06	1.2E-05					<1
		Exposure Point Total					1.2E-05					<1
	Exposure Media Total						1.2E-05					<1
	Air (Particulates and Volatiles)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Total Soil Total							1.2E-05					<1
Sediment	Sediment	SWMU 41B	Arsenic	7.8E-06		4.7E-06	1.2E-05					
			Chemical Total	7.8E-06		4.7E-06	1.2E-05					<1
		Exposure Point Total					1.2E-05					<1
	Exposure Media Total						1.2E-05					<1
Sediment Total							1.2E-05					<1

Table E.2-85
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Industrial Worker

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Water Total							<1.0E-06					<1
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	2.9E-06			2.9E-06					
			Arsenic	3.7E-05			3.7E-05					
			Chemical Total	4.0E-05			4.0E-05					<1
		Exposure Point Total					4.0E-05					<1
	Exposure Media Total						4.0E-05					<1
	Air (Ambient Air)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Air (Indoor Air)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							4.0E-05					<1
Receptor Total[a]							6.5E-05					1.5 (b)

Total Risk Across All Media = 6.5E-05

Total Hazard Across All Media = 1.5 (b)

(a) Since total soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this soil data grouping.
(b) Although no individual chemical or media type exposure exceeds 1.0, the total risk is equal to 1.5.

Table E.2-86
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal
Total Soil	Total Soil	SWMU 41B									
			Chemical Total				<1.0E-06				
		Exposure Point Total					<1.0E-06				
	Exposure Media Total						<1.0E-06				
	Air (Particulates and Volatiles)	SWMU 41B									
			Chemical Total				<1.0E-06				
		Exposure Point Total					<1.0E-06				
	Exposure Media Total						<1.0E-06				
Total Soil Total							1.0E-06 (a)				
Sediment	Sediment	SWMU 41B									
			Chemical Total				<1.0E-06				
		Exposure Point Total					<1.0E-06				
	Exposure Media Total						<1.0E-06				
Sediment Total											
Surface Water	Surface Water	SWMU 41B									
			Chemical Total				<1.0E-06				
		Exposure Point Total					<1.0E-06				
	Exposure Media Total						<1.0E-06				
Surface Water Total											
Groundwater	Air (Trench Air)	SWMU 41B									
			Chemical Total				<1.0E-06				
		Exposure Point Total					<1.0E-06				
	Exposure Media Total						<1.0E-06				
Groundwater Total											
Receptor Total							1.0E-06 (a)				

Total Risk Across All Media = 1.0E-06 (a)

Total Hazard Across All Media =

(a) Although no individual chemical or media type exposure exceeds 1.0E-06, the total risk is equal to 1.0E-06.
(b) Although no individual chemical or media type exposure exceeds 1.0, the total risk is equal to 1.2.

Table E.2-86
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Excavation Worker

Exposure Routes Total
<1
<1
<1
<1
<1
<1
1.2 (b)
<1
<1
<1
<1
<1
<1
<1
<1
<1
<1
<1
<1
1.2 (b)
1.2 (b)

Table E.2-87
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Lifetime Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal
Total Soil	Total Soil	SWMU 41B	TCDD TE	1.2E-06		1.1E-07	1.3E-06				
			Arsenic	5.1E-05		4.8E-06	5.6E-05				
			Chemical Total	5.2E-05		4.9E-06	5.7E-05				
		Exposure Point Total					5.7E-05				
	Exposure Media Total						5.7E-05				
	Air (Particulates and Volatiles)	SWMU 41B									
			Chemical Total				<1.0E-06				
		Exposure Point Total					<1.0E-06				
	Exposure Media Total						<1.0E-06				
Total Soil Total							5.7E-05				
Sediment	Sediment	SWMU 41B	Arsenic	4.5E-06		7.2E-07	5.2E-06				
			Chemical Total	4.5E-06		7.2E-07	5.2E-06				
		Exposure Point Total					5.2E-06				
	Exposure Media Total						5.2E-06				
Sediment Total							5.2E-06				
Surface Water	Surface Water	SWMU 41B									
			Chemical Total				<1.0E-06				
		Exposure Point Total					<1.0E-06				
	Exposure Media Total						<1.0E-06				
Surface Water Total							<1.0E-06				
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	1.4E-05		8.0E-06	2.2E-05		---		---
			Arsenic	1.8E-04		NV	1.8E-04		---		---
			Chemical Total	1.9E-04		8.0E-06	2.0E-04				
		Exposure Point Total					2.0E-04				
	Exposure Media Total						2.0E-04				
	Air (Indoor Air)	SWMU 41B									
			Chemical Total				<1.0E-06				
		Exposure Point Total					<1.0E-06				
	Exposure Media Total						<1.0E-06				

Table E.2-87
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Lifetime Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal
Groundwater (con't)	Air (Shower Room)	SWMU 41B	Tetrachloroethene		4.7E-06		4.7E-06				
			Chemical Total		4.7E-06		4.7E-06				
		Exposure Point Total					4.7E-06				
	Exposure Media Total						4.7E-06				
	Home Grown Produce	SWMU 41B									
			Chemical Total				<1.0E-06				
		Exposure Point Total					<1.0E-06				
	Exposure Media Total						<1.0E-06				
Groundwater Total							2.0E-04				
Receptor Total							2.6E-04				

Total Risk Across All Media = 2.6E-04

Total Hazard Across All Media =

(a) Although no individual chemical exceeds 1.0, the total hazard does equal 1.4.

N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-87
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Exposure Routes Total
<1
<1
<1
<1
<1
<1
<1
<1
<1
<1
<1
<1
<1
<1
<1
1.4 (a)
1.4 (a)
1.4 (a)
<1
<1
<1

Table E.2-87
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Exposure Routes Total
<1
<1
<1
<1
<1
<1
1.4 (a)
1.4 (a)
1.4 (a)

Table E.2-88
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Total Soil	Total Soil	SWMU 41B	Arsenic	3.6E-05		3.0E-06	3.9E-05	Skin, Vascular System	9.2E-01		7.8E-02	1.0
			Manganese	---		---	---	CNS	7.8E-01		5.4E-01	1.3
			Chemical Total	3.6E-05		3.0E-06	3.9E-05		1.7		0.6	2.3
		Exposure Point Total					3.9E-05					2.3
	Exposure Media Total						3.9E-05					2.3
	Air (Particulates and Volatiles)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Total Soil Total							3.9E-05					2.3
Sediment	Sediment	SWMU 41B	Arsenic	3.1E-06		2.6E-07	3.4E-06					
			Chemical Total	3.1E-06		2.6E-07	3.4E-06					<1
		Exposure Point Total					3.4E-06					<1
	Exposure Media Total						3.4E-06					<1
Sediment Total							3.4E-06					<1
Surface Water	Surface Water	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Water Total							<1.0E-06					<1
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	5.0E-06		2.9E-06	8.0E-06		---		---	---
			Arsenic	6.5E-05		NV	6.5E-05	Skin, Vascular Effects	1.7E+00		NV	1.7
			Cobalt	---		---	---	N/A	1.5E+00		NV	1.5
			Chemical Total	7.0E-05		2.9E-06	7.3E-05		3.2			3.2
		Exposure Point Total					7.3E-05					3.2
	Exposure Media Total						7.3E-05					3.2

Table E.2-88
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater (con't)	Air (Indoor Air)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Home Grown Produce	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							7.3E-05					3.2
Receptor Total							1.1E-04					5.5

Total Risk Across All Media = 1.1E-04

Total Hazard Across All Media = 5.5

Total Skin HI Across All Media = 2.7
Total Vascular Effects HI Across All Media = 2.7
Total CNS HI Across All Media = 1.3

CNS = Central nervous system.
GI = Gastrointestinal.
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-89
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air (Ambient Air)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total												
Receptor Total[a]							<1.0E-06					<1

Total Risk Across All Media = <1.0E-06

Total Hazard Across All Media = <1

Table E.2-90
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	2.9E-06			2.9E-06		---			---
			Arsenic	3.7E-05			3.7E-05		---			---
			Chemical Total	4.0E-05			4.0E-05					<1
		Exposure Point Total					4.0E-05					<1
	Exposure Media Total						4.0E-05					<1
	Air (Ambient Air)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Air (Indoor Air)	SWMU 41B	Tetrachloroethane		4.0E-07		4.0E-07					
			Chemical Total		4.0E-07		4.0E-07					<1
		Exposure Point Total					4.0E-07					<1
	Exposure Media Total						4.0E-07					<1
Groundwater Total							4.1E-05					<1
Receptor Total							4.1E-05					<1

Total Risk Across All Media = 4.1E-05

Total Hazard Across All Media = <1

N/A = Not Available

Table E.2-91
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal
Groundwater	Air (Trench Air)	SWMU 41B									
			Chemical Total				<1.0E-06				
		Exposure Point Total					<1.0E-06				
	Exposure Media Total						<1.0E-06				
Groundwater Total											
Receptor Total							<1.0E-06				

Total Risk Across All Media = <1.0E-06

Total Hazard Across All Media =

Table E.2-91
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Exposure Routes Total
<1
<1
<1
<1
<1
<1

Table E.2-92
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-site Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Off-site Lifetime Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	1.4E-05		8.0E-06	2.2E-05					
			Arsenic	1.8E-04		NV	1.8E-04					
			Chemical Total	1.9E-04		8.0E-06	2.0E-04					1.4 (a)
		Exposure Point Total					2.0E-04					1.4 (a)
	Exposure Media Total						2.0E-04					1.4 (a)
	Air (Indoor Air)	SWMU 41B										
			Chemical Total				<1					<1
		Exposure Point Total					<1					<1
	Exposure Media Total						<1					<1
	Air (Shower Room)	SWMU 41B	Tetrachloroethane		4.7E-06		4.7E-06					
			Chemical Total		4.7E-06		4.7E-06					<1
		Exposure Point Total					4.7E-06					<1
	Exposure Media Total						4.7E-06					<1
	Home Grown Produce	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							2.0E-04					1.4 (a)
Receptor Total							2.0E-04					1.4 (a)

Total Risk Across All Media = 2.0E-04

Total Hazard Across All Media = 1.4 (a)

(a) Although no individual chemical exceeds 1.0, the total exposure does equal 1.4.

CNS = Central Nervous System
GI = Gastrointestinal
NOAEL = No Observable Adverse Effects Level
N/A = Not Available
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Table E.2-93
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-site Child Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	SWMU 41B	Tetrachloroethene	5.0E-06		2.9E-06	8.0E-06		---		---	---
			Arsenic	6.5E-05		NV	6.5E-05	Skin, Vascular System	1.7E+00		NV	1.7
			Coablt	---		---	---	N/A	1.5E+00		NV	1.5
			Chemical Total	7.0E-05		2.9E-06	7.3E-05		3.2		0.0	3.2
		Exposure Point Total					7.3E-05					3.2
	Exposure Media Total						7.3E-05					3.2
	Air (Indoor Air)	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Home Grown Produce	SWMU 41B										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							7.3E-05					3.2
Receptor Total							7.3E-05					3.2

Total Risk Across All Media = 7.3E-05

Total Hazard Across All Media = 3.2

CNS = Central Nervous System
NOAEL = No Observable Adverse Effects Level
GI = Gastrointestinal
N/A = Not Available
NV = No dermal exposure value calculated. As per USEPA Dermal Exposure spreadsheet, this chemical is not assessed.

Total Skin HI Across All Media = 1.7
Total Vascular System HI Across All Media = 1.7

Appendix E-3

Calculations for 2,3,7,8-TCDD Equivalents

SWMU 41A and 41B

Area A Sample No.		HHRA Values	Units	SLERA Values	Units	Matrix	HHRA - Unit Adjusted Values (Use these values in ProUCL)		SLERA - Unit Adjusted Values (Use these values in ProUCL)		
41GW01	TCDD-TE	2.89E-02	pg/L			GW	2.89E-11	mg/L		mg/L	
41GW02	TCDD-TE	1.48E+01	pg/L			GW	1.48E-08	mg/L		mg/L	
41GW03	TCDD-TE	1.95E+03	pg/L			GW	1.95E-06	mg/L		mg/L	
41SB2B	TCDD-TE	8.69E+00	ng/kg			SB	8.69E-06	mg/kg		mg/kg	
41SB2C	**TCDD-TE**	**3.00E-01**	**ng/kg**			**SB**	**3.00E-07**	**mg/kg**		**mg/kg**	**Deep Sample**
41SB5B	TCDD-TE	1.52E+00	ng/kg			SB	1.52E-06	mg/kg		mg/kg	
41SB5C	**TCDD-TE**	**3.37E-01**	**ng/kg**			**SB**	**3.37E-07**	**mg/kg**		**mg/kg**	**Deep Sample**
41TP2B	TCDD-TE	3.39E+00	ng/kg			SB	3.39E-06	mg/kg		mg/kg	
41SD08	TCDD-TE	4.93E+00	ng/kg	6.12E+00	ng/kg	SD	4.93E-06	mg/kg	6.12E-06	mg/kg	
41SD09	TCDD-TE	2.31E+00	ng/kg	2.84E+00	ng/kg	SD	2.31E-06	mg/kg	2.84E-06	mg/kg	
41SD10	TCDD-TE	5.21E+00	ng/kg	6.28E+00	ng/kg	SD	5.21E-06	mg/kg	6.28E-06	mg/kg	
41SW08	TCDD-TE	6.57E-03	pg/L	6.57E-03	ng/kg	SW	6.57E-12	mg/L	6.57E-12	mg/L	
41SW09	TCDD-TE	1.43E+01	pg/L	1.89E+01	ng/kg	SW	1.43E-08	mg/L	1.89E-08	mg/L	
41SW10	TCDD-TE	1.85E-02	pg/L	1.85E-02	ng/kg	SW	1.85E-11	mg/L	1.85E-11	mg/L	

	Sample Count			HHRA - TCDD-TE		SLERA - TCDD-TE	
	3	Min	GW	2.89E-11	mg/L		
		Max	GW	1.95E-06	mg/L		
includes deep samples	**5**	**Min**	**SB**	**3.00E-07**	**mg/kg**		
		Max	**SB**	**8.69E-06**	**mg/kg**		
does not include deep samples	3	Min	SB	1.52E-06	mg/kg		
		Max	SB	8.69E-06	mg/kg		
	3	Min	SD	2.31E-06	mg/kg	2.84E-06	mg/kg
		Max	SD	5.21E-06	mg/kg	6.28E-06	mg/kg
	3	Min	SW	6.57E-12	mg/L	6.57E-12	mg/L
		Max	SW	1.43E-08	mg/L	1.89E-08	mg/L

Area B Sample No.		HHRA Values	Units	SLERA Values	Units	Matrix	HHRA - Unit Adjusted Values (Use these values in ProUCL)		SLERA - Unit Adjusted Values (Use these values in ProUCL)		
41MW1	TCDD-TE	0.00E+00	pg/L			GW	0.00E+00	mg/L		mg/L	
41MW2	TCDD-TE	0.00E+00	pg/L			GW	0.00E+00	mg/L		mg/L	
41MW3	TCDD-TE	0.00E+00	pg/L			GW	0.00E+00	mg/L		mg/L	
41SB10B	TCDD-TE	5.86E+00	ng/kg			SB	5.86E-06	mg/kg		mg/kg	
41SB10C	TCDD-TE	2.50E-01	ng/kg			SB	2.50E-07	mg/kg		mg/kg	
41SB7B	TCDD-TE	1.39E+00	ng/kg			SB	1.39E-06	mg/kg		mg/kg	
41SB7C	**TCDD-TE**	**7.20E-01**	**ng/kg**			**SB**	**7.20E-07**	**mg/kg**		**mg/kg**	**Deep Sample**
41SC20B	TCDD-TE	6.05E-01	ng/kg			SB	6.05E-07	mg/kg		mg/kg	
41SP2soil	TCDD-TE	1.35E+00	ng/kg			SB	1.35E-06	mg/kg		mg/kg	
41SD11	TCDD-TE	1.18E+00	ng/kg	1.44E+00	ng/kg	SD	1.18E-06	mg/kg	1.44E-06	mg/kg	

Avg of 41SC20B and 41SC20B_D6

	Sample Count			HHRA - TCDD-TE		SLERA - TCDD-TE	
	3	Min	GW	0.00E+00	mg/L		
		Max	GW	0.00E+00	mg/L		
includes deep samples	6	Min	SB	2.50E-07	mg/kg		
		Max	SB	5.86E-06	mg/kg		
does not include deep samples	5	Min	SB	2.50E-07	mg/kg		
		Max	SB	5.86E-06	mg/kg		
	1	Min	SD	1.18E-06	mg/kg	1.44E-06	mg/kg
		Max	SD	1.18E-06	mg/kg	1.44E-06	mg/kg

Appendix E-4

Exposure Point Concentrations ProUCl 4.0 Output - SWMU 41A

1				**General UCL Statistics for Data Sets with Non-Detects**								
2			**User Selected Options**									
3			From File	WorkSheet.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	**Lead (mg/kg)**											
10												
11						**General Statistics**							
12						Number of Valid Samples	13				Number of Unique Samples	12
13												
14						**Raw Statistics**					**Log-transformed Statistics**	
15						Minimum	33.5				Minimum of Log Data	3.512
16						Maximum	234				Maximum of Log Data	5.455
17						Mean	91.27				Mean of log Data	4.352
18						Median	82				SD of log Data	0.593
19						SD	56.15					
20						Coefficient of Variation	0.615					
21						Skewness	1.388					
22												
23						**Relevant UCL Statistics**						
24						**Normal Distribution Test**					**Lognormal Distribution Test**	
25						Shapiro Wilk Test Statistic	0.876				Shapiro Wilk Test Statistic	0.959
26						Shapiro Wilk Critical Value	0.866				Shapiro Wilk Critical Value	0.866
27						**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**	
28												
29						**Assuming Normal Distribution**					**Assuming Lognormal Distribution**	
30						95% Student's-t UCL	119				95% H-UCL	135.5
31						**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	158.7
32						95% Adjusted-CLT UCL	123.3				97.5% Chebyshev (MVUE) UCL	187.9
33						95% Modified-t UCL	120				99% Chebyshev (MVUE) UCL	245.4
34												
35						**Gamma Distribution Test**					**Data Distribution**	
36						k star (bias corrected)	2.545				**Data appear Normal at 5% Significance Level**	
37						Theta Star	35.86					
38						nu star	66.17					
39						Approximate Chi Square Value (.05)	48.45				**Nonparametric Statistics**	
40						Adjusted Level of Significance	0.0301				95% CLT UCL	116.9
41						Adjusted Chi Square Value	46.3				95% Jackknife UCL	119
42											95% Standard Bootstrap UCL	116.4
43						Anderson-Darling Test Statistic	0.252				95% Bootstrap-t UCL	131.1
44						Anderson-Darling 5% Critical Value	0.739				95% Hall's Bootstrap UCL	146.2
45						Kolmogorov-Smirnov Test Statistic	0.117				95% Percentile Bootstrap UCL	115.8
46						Kolmogorov-Smirnov 5% Critical Value	0.238				95% BCA Bootstrap UCL	122.9
47						**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	159.2
48											97.5% Chebyshev(Mean, Sd) UCL	188.5
49						**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	246.2
50						95% Approximate Gamma UCL	124.6					
51						95% Adjusted Gamma UCL	130.4					
52												
53						**Potential UCL to Use**					Use 95% Student's-t UCL	119

54												
55												
56	**Aluminum (mg/kg)**											
57												
58						**General Statistics**							
59					Number of Valid Samples	13			Number of Unique Samples	13		
60												
61				**Raw Statistics**					**Log-transformed Statistics**			
62					Minimum	18800			Minimum of Log Data	9.842		
63					Maximum	40600			Maximum of Log Data	10.61		
64					Mean	25408			Mean of log Data	10.12		
65					Median	24400			SD of log Data	0.213		
66					SD	5890						
67					Coefficient of Variation	0.232						
68					Skewness	1.471						
69												
70						**Relevant UCL Statistics**							
71				**Normal Distribution Test**					**Lognormal Distribution Test**			
72					Shapiro Wilk Test Statistic	0.886			Shapiro Wilk Test Statistic	0.949		
73					Shapiro Wilk Critical Value	0.866			Shapiro Wilk Critical Value	0.866		
74				**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**			
75												
76				**Assuming Normal Distribution**					**Assuming Lognormal Distribution**			
77					95% Student's-t UCL	28319			95% H-UCL	28465		
78				**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	31936		
79					95% Adjusted-CLT UCL	28807			97.5% Chebyshev (MVUE) UCL	34773		
80					95% Modified-t UCL	28430			99% Chebyshev (MVUE) UCL	40347		
81												
82				**Gamma Distribution Test**					**Data Distribution**			
83					k star (bias corrected)	17.67			**Data appear Normal at 5% Significance Level**			
84					Theta Star	1438						
85					nu star	459.3						
86					Approximate Chi Square Value (.05)	410.6			**Nonparametric Statistics**			
87					Adjusted Level of Significance	0.0301			95% CLT UCL	28095		
88					Adjusted Chi Square Value	404.1			95% Jackknife UCL	28319		
89									95% Standard Bootstrap UCL	27924		
90					Anderson-Darling Test Statistic	0.302			95% Bootstrap-t UCL	29317		
91					Anderson-Darling 5% Critical Value	0.733			95% Hall's Bootstrap UCL	30739		
92					Kolmogorov-Smirnov Test Statistic	0.128			95% Percentile Bootstrap UCL	28208		
93					Kolmogorov-Smirnov 5% Critical Value	0.236			95% BCA Bootstrap UCL	28777		
94				**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	32528		
95									97.5% Chebyshev(Mean, Sd) UCL	35609		
96				**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	41661		
97					95% Approximate Gamma UCL	28420						
98					95% Adjusted Gamma UCL	28882						
99												
100				**Potential UCL to Use**					Use 95% Student's-t UCL	28319		
101												
102												
103	**Antimony (mg/kg)**											
104												
105						**General Statistics**							
106					Number of Valid Samples	13			Number of Detected Data	11		

107					Number of Unique Samples	11					Number of Non-Detect Data	2
108											Percent Non-Detects	15.38%
109												
110	**Raw Statistics**						**Log-transformed Statistics**					
111					Minimum Detected	0.21					Minimum Detected	-1.561
112					Maximum Detected	1.5					Maximum Detected	0.405
113					Mean of Detected	0.486					Mean of Detected	-0.886
114					SD of Detected	0.363					SD of Detected	0.549
115					Minimum Non-Detect	7.14					Minimum Non-Detect	1.966
116					Maximum Non-Detect	7.14					Maximum Non-Detect	1.966
117												
118												
119	**UCL Statistics**											
120	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
121					Shapiro Wilk Test Statistic	0.683					Shapiro Wilk Test Statistic	0.906
122					5% Shapiro Wilk Critical Value	0.85					5% Shapiro Wilk Critical Value	0.85
123	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
124												
125	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
126					DL/2 Substitution Method						DL/2 Substitution Method	
127					Mean	0.96					Mean	-0.554
128					SD	1.205					SD	0.953
129					95% DL/2 (t) UCL	1.556					95% H-Stat (DL/2) UCL	1.943
130												
131					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
132	**MLE method failed to converge properly**										Mean in Log Scale	-0.886
133											SD in Log Scale	0.513
134											Mean in Original Scale	0.477
135											SD in Original Scale	0.335
136											95% Percentile Bootstrap UCL	0.647
137											95% BCA Bootstrap UCL	0.709
138												
139	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
140					k star (bias corrected)	2.383	**Data appear Gamma Distributed at 5% Significance Level**					
141					Theta Star	0.204						
142					nu star	52.43						
143												
144					A-D Test Statistic	0.688	**Nonparametric Statistics**					
145					5% A-D Critical Value	0.733					Kaplan-Meier (KM) Method	
146					K-S Test Statistic	0.733					Mean	0.486
147					5% K-S Critical Value	0.257					SD	0.346
148	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.109
149											95% KM (t) UCL	0.681
150	**Assuming Gamma Distribution**										95% KM (z) UCL	0.666
151					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.682
152					Minimum	0.21					95% KM (bootstrap t) UCL	0.964
153					Maximum	1.5					95% KM (BCA) UCL	0.685
154					Mean	0.489					95% KM (Percentile Bootstrap) UCL	0.67
155					Median	0.364					95% KM (Chebyshev) UCL	0.963
156					SD	0.337					97.5% KM (Chebyshev) UCL	1.169
157					k star	2.808					99% KM (Chebyshev) UCL	1.574
158					Theta star	0.174						
159					Nu star	73	**Potential UCLs to Use**					

160					AppChi2	54.32					95% KM (BCA) UCL	0.685
161					95% Gamma Approximate UCL	0.658						
162					95% Adjusted Gamma UCL	0.687						
163	**Note: DL/2 is not a recommended method.**											
164												
165												
166	**Arsenic (mg/kg)**											
167												
168	**General Statistics**											
169					Number of Valid Samples	13					Number of Unique Samples	12
170												
171	**Raw Statistics**						**Log-transformed Statistics**					
172					Minimum	4.3					Minimum of Log Data	1.459
173					Maximum	19					Maximum of Log Data	2.944
174					Mean	9.177					Mean of log Data	2.149
175					Median	8.1					SD of log Data	0.375
176					SD	3.744						
177					Coefficient of Variation	0.408						
178					Skewness	1.517						
179												
180	**Relevant UCL Statistics**											
181	**Normal Distribution Test**						**Lognormal Distribution Test**					
182					Shapiro Wilk Test Statistic	0.875					Shapiro Wilk Test Statistic	0.972
183					Shapiro Wilk Critical Value	0.866					Shapiro Wilk Critical Value	0.866
184	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
185												
186	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
187					95% Student's-t UCL	11.03					95% H-UCL	11.41
188	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	13.37
189					95% Adjusted-CLT UCL	11.35					97.5% Chebyshev (MVUE) UCL	15.2
190					95% Modified-t UCL	11.1					99% Chebyshev (MVUE) UCL	18.78
191												
192	**Gamma Distribution Test**						**Data Distribution**					
193					k star (bias corrected)	5.881	**Data appear Normal at 5% Significance Level**					
194					Theta Star	1.56						
195					nu star	152.9						
196					Approximate Chi Square Value (.05)	125.3	**Nonparametric Statistics**					
197					Adjusted Level of Significance	0.0301					95% CLT UCL	10.88
198					Adjusted Chi Square Value	121.8					95% Jackknife UCL	11.03
199											95% Standard Bootstrap UCL	10.85
200					Anderson-Darling Test Statistic	0.327					95% Bootstrap-t UCL	11.95
201					Anderson-Darling 5% Critical Value	0.735					95% Hall's Bootstrap UCL	13.78
202					Kolmogorov-Smirnov Test Statistic	0.187					95% Percentile Bootstrap UCL	10.88
203					Kolmogorov-Smirnov 5% Critical Value	0.237					95% BCA Bootstrap UCL	11.42
204	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	13.7
205											97.5% Chebyshev(Mean, Sd) UCL	15.66
206	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	19.51
207					95% Approximate Gamma UCL	11.2						
208					95% Adjusted Gamma UCL	11.52						
209												
210	**Potential UCL to Use**										Use 95% Student's-t UCL	11.03
211												
212												

213	**Barium (mg/kg)**											
214												
215						**General Statistics**						
216					Number of Valid Samples	13				Number of Unique Samples	13	
217												
218					**Raw Statistics**					**Log-transformed Statistics**		
219					Minimum	72				Minimum of Log Data	4.277	
220					Maximum	553				Maximum of Log Data	6.315	
221					Mean	194				Mean of log Data	5.032	
222					Median	124				SD of log Data	0.678	
223					SD	153.6						
224					Coefficient of Variation	0.792						
225					Skewness	1.481						
226												
227					**Relevant UCL Statistics**							
228					**Normal Distribution Test**					**Lognormal Distribution Test**		
229					Shapiro Wilk Test Statistic	0.77				Shapiro Wilk Test Statistic	0.881	
230					Shapiro Wilk Critical Value	0.866				Shapiro Wilk Critical Value	0.866	
231					**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
232												
233					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
234					95% Student's-t UCL	270				95% H-UCL	305.5	
235					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	350.7	
236					95% Adjusted-CLT UCL	282.8				97.5% Chebyshev (MVUE) UCL	420.7	
237					95% Modified-t UCL	272.9				99% Chebyshev (MVUE) UCL	558.2	
238												
239					**Gamma Distribution Test**					**Data Distribution**		
240					k star (bias corrected)	1.802				**Data appear Lognormal at 5% Significance Level**		
241					Theta Star	107.7						
242					nu star	46.84						
243					Approximate Chi Square Value (.05)	32.14				**Nonparametric Statistics**		
244					Adjusted Level of Significance	0.0301				95% CLT UCL	264.1	
245					Adjusted Chi Square Value	30.41				95% Jackknife UCL	270	
246										95% Standard Bootstrap UCL	260.1	
247					Anderson-Darling Test Statistic	0.926				95% Bootstrap-t UCL	306.5	
248					Anderson-Darling 5% Critical Value	0.742				95% Hall's Bootstrap UCL	275.3	
249					Kolmogorov-Smirnov Test Statistic	0.287				95% Percentile Bootstrap UCL	266.8	
250					Kolmogorov-Smirnov 5% Critical Value	0.239				95% BCA Bootstrap UCL	281.1	
251					**Data not Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	379.8	
252										97.5% Chebyshev(Mean, Sd) UCL	460.1	
253					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	618	
254					95% Approximate Gamma UCL	282.8						
255					95% Adjusted Gamma UCL	298.9						
256												
257					**Potential UCL to Use**					Use 95% H-UCL	305.5	
258												
259												
260	**Beryllium (mg/kg)**											
261												
262						**General Statistics**						
263					Number of Valid Samples	13				Number of Detected Data	11	
264					Number of Unique Samples	11				Number of Non-Detect Data	2	
265										Percent Non-Detects	15.38%	

Raw Statistics		
Minimum Detected	0.34	
Maximum Detected	1.8	
Mean of Detected	0.8	
SD of Detected	0.44	
Minimum Non-Detect	0.5	
Maximum Non-Detect	0.5	

Log-transformed Statistics	
Minimum Detected	-1.079
Maximum Detected	0.588
Mean of Detected	-0.345
SD of Detected	0.505
Minimum Non-Detect	-0.693
Maximum Non-Detect	-0.693

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.863
5% Shapiro Wilk Critical Value	0.85
Data appear Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	0.715
SD	0.451
95% DL/2 (t) UCL	0.938
Maximum Likelihood Estimate(MLE) Method	
Mean	0.552
SD	0.622
95% MLE (t) UCL	0.86
95% MLE (Tiku) UCL	0.917

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.958
5% Shapiro Wilk Critical Value	0.85
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-0.505
SD	0.605
95% H-Stat (DL/2) UCL	0.773
Log ROS Method	
Mean in Log Scale	-0.424
SD in Log Scale	0.503
Mean in Original Scale	0.742
SD in Original Scale	0.426
95% Percentile Bootstrap UCL	0.944
95% BCA Bootstrap UCL	0.987

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	3.173
Theta Star	0.252
nu star	69.8
A-D Test Statistic	0.375
5% A-D Critical Value	0.732
K-S Test Statistic	0.732
5% K-S Critical Value	0.256
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.34
Maximum	1.8
Mean	0.757
Median	0.677
SD	0.419
k star	3.378
Theta star	0.224
Nu star	87.82
AppChi2	67.22
95% Gamma Approximate UCL	0.989

Data Distribution Test with Detected Values Only	
Data appear Normal at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.744
SD	0.408
SE of Mean	0.119
95% KM (t) UCL	0.956
95% KM (z) UCL	0.939
95% KM (jackknife) UCL	0.955
95% KM (bootstrap t) UCL	1.05
95% KM (BCA) UCL	0.966
95% KM (Percentile Bootstrap) UCL	0.925
95% KM (Chebyshev) UCL	1.262
97.5% KM (Chebyshev) UCL	1.487
99% KM (Chebyshev) UCL	1.927
Potential UCLs to Use	
95% KM (t) UCL	0.956
95% KM (Percentile Bootstrap) UCL	0.925

319					95% Adjusted Gamma UCL	1.028						
320	**Note: DL/2 is not a recommended method.**											
321												
322												
323	**Cadmium (mg/kg)**											
324												
325	**General Statistics**											
326					Number of Valid Samples	13				Number of Detected Data	11	
327					Number of Unique Samples	10				Number of Non-Detect Data	2	
328										Percent Non-Detects	15.38%	
329												
330	**Raw Statistics**						**Log-transformed Statistics**					
331					Minimum Detected	1.5				Minimum Detected	0.405	
332					Maximum Detected	3				Maximum Detected	1.099	
333					Mean of Detected	2.295				Mean of Detected	0.809	
334					SD of Detected	0.487				SD of Detected	0.223	
335					Minimum Non-Detect	0.7				Minimum Non-Detect	-0.357	
336					Maximum Non-Detect	0.7				Maximum Non-Detect	-0.357	
337												
338												
339	**UCL Statistics**											
340	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
341					Shapiro Wilk Test Statistic	0.961				Shapiro Wilk Test Statistic	0.948	
342					5% Shapiro Wilk Critical Value	0.85				5% Shapiro Wilk Critical Value	0.85	
343	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
344												
345	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
346					DL/2 Substitution Method					DL/2 Substitution Method		
347					Mean	1.996				Mean	0.523	
348					SD	0.855				SD	0.727	
349					95% DL/2 (t) UCL	2.419				95% H-Stat (DL/2) UCL	2.42	
350												
351					Maximum Likelihood Estimate(MLE) Method					Log ROS Method		
352					Mean	1.995				Mean in Log Scale	0.728	
353					SD	0.834				SD in Log Scale	0.284	
354					95% MLE (t) UCL	2.407				Mean in Original Scale	2.147	
355					95% MLE (Tiku) UCL	2.431				SD in Original Scale	0.574	
356										95% Percentile Bootstrap UCL	2.393	
357										95% BCA Bootstrap UCL	2.389	
358												
359	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
360					k star (bias corrected)	16.85	**Data appear Normal at 5% Significance Level**					
361					Theta Star	0.136						
362					nu star	370.8						
363												
364					A-D Test Statistic	0.272	**Nonparametric Statistics**					
365					5% A-D Critical Value	0.729				Kaplan-Meier (KM) Method		
366					K-S Test Statistic	0.729				Mean	2.173	
367					5% K-S Critical Value	0.255				SD	0.515	
368	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean	0.15	
369										95% KM (t) UCL	2.44	
370	**Assuming Gamma Distribution**									95% KM (z) UCL	2.419	
371					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL	2.432	

372				Minimum	1.343					95% KM (bootstrap t) UCL		2.43
373				Maximum	3					95% KM (BCA) UCL		2.477
374				Mean	2.172					95% KM (Percentile Bootstrap) UCL		2.427
375				Median	2.2					95% KM (Chebyshev) UCL		2.826
376				SD	0.541					97.5% KM (Chebyshev) UCL		3.108
377				k star	12.92					99% KM (Chebyshev) UCL		3.663
378				Theta star	0.168							
379				Nu star	335.8					**Potential UCLs to Use**		
380				AppChi2	294.4					95% KM (t) UCL		2.44
381				95% Gamma Approximate UCL	2.477					95% KM (Percentile Bootstrap) UCL		2.427
382				95% Adjusted Gamma UCL	2.525							
383	**Note: DL/2 is not a recommended method.**											
384												
385												
386	**Calcium (mg/kg)**											
387												
388					**General Statistics**							
389				Number of Valid Samples	13					Number of Unique Samples		13
390												
391				**Raw Statistics**						**Log-transformed Statistics**		
392				Minimum	821					Minimum of Log Data		6.711
393				Maximum	156000					Maximum of Log Data		11.96
394				Mean	53133					Mean of log Data		10.09
395				Median	53700					SD of log Data		1.728
396				SD	47457							
397				Coefficient of Variation	0.893							
398				Skewness	0.814							
399												
400					**Relevant UCL Statistics**							
401				**Normal Distribution Test**						**Lognormal Distribution Test**		
402				Shapiro Wilk Test Statistic	0.92					Shapiro Wilk Test Statistic		0.848
403				Shapiro Wilk Critical Value	0.866					Shapiro Wilk Critical Value		0.866
404				**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**		
405												
406				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
407				95% Student's-t UCL	76592					95% H-UCL		900087
408				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL		285018
409				95% Adjusted-CLT UCL	77957					97.5% Chebyshev (MVUE) UCL		371298
410				95% Modified-t UCL	77087					99% Chebyshev (MVUE) UCL		540777
411												
412				**Gamma Distribution Test**						**Data Distribution**		
413				k star (bias corrected)	0.634					**Data appear Normal at 5% Significance Level**		
414				Theta Star	83832							
415				nu star	16.48							
416				Approximate Chi Square Value (.05)	8.301					**Nonparametric Statistics**		
417				Adjusted Level of Significance	0.0301					95% CLT UCL		74783
418				Adjusted Chi Square Value	7.487					95% Jackknife UCL		76592
419										95% Standard Bootstrap UCL		73632
420				Anderson-Darling Test Statistic	0.492					95% Bootstrap-t UCL		82281
421				Anderson-Darling 5% Critical Value	0.77					95% Hall's Bootstrap UCL		83962
422				Kolmogorov-Smirnov Test Statistic	0.193					95% Percentile Bootstrap UCL		74724
423				Kolmogorov-Smirnov 5% Critical Value	0.246					95% BCA Bootstrap UCL		77728
424				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL		110505

425											97.5% Chebyshev(Mean, Sd) UCL	135330
426				**Assuming Gamma Distribution**							99% Chebyshev(Mean, Sd) UCL	184094
427				95% Approximate Gamma UCL	105477							
428				95% Adjusted Gamma UCL	116942							
429												
430				**Potential UCL to Use**							Use 95% Student's-t UCL	76592
431												
432												
433	**Chromium (mg/kg)**											
434												
435				**General Statistics**								
436				Number of Valid Samples	13						Number of Unique Samples	11
437												
438				**Raw Statistics**							**Log-transformed Statistics**	
439				Minimum	13						Minimum of Log Data	2.565
440				Maximum	60						Maximum of Log Data	4.094
441				Mean	25.55						Mean of log Data	3.164
442				Median	23						SD of log Data	0.383
443				SD	11.97							
444				Coefficient of Variation	0.469							
445				Skewness	2.21							
446												
447				**Relevant UCL Statistics**								
448				**Normal Distribution Test**							**Lognormal Distribution Test**	
449				Shapiro Wilk Test Statistic	0.77						Shapiro Wilk Test Statistic	0.929
450				Shapiro Wilk Critical Value	0.866						Shapiro Wilk Critical Value	0.866
451				**Data not Normal at 5% Significance Level**							**Data appear Lognormal at 5% Significance Level**	
452												
453				**Assuming Normal Distribution**							**Assuming Lognormal Distribution**	
454				95% Student's-t UCL	31.46						95% H-UCL	31.75
455				**95% UCLs (Adjusted for Skewness)**							95% Chebyshev (MVUE) UCL	37.25
456				95% Adjusted-CLT UCL	33.18						97.5% Chebyshev (MVUE) UCL	42.41
457				95% Modified-t UCL	31.8						99% Chebyshev (MVUE) UCL	52.55
458												
459				**Gamma Distribution Test**							**Data Distribution**	
460				k star (bias corrected)	5.231						**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
461				Theta Star	4.884							
462				nu star	136							
463				Approximate Chi Square Value (.05)	110.1						**Nonparametric Statistics**	
464				Adjusted Level of Significance	0.0301						95% CLT UCL	31.01
465				Adjusted Chi Square Value	106.7						95% Jackknife UCL	31.46
466											95% Standard Bootstrap UCL	30.77
467				Anderson-Darling Test Statistic	0.609						95% Bootstrap-t UCL	36.66
468				Anderson-Darling 5% Critical Value	0.735						95% Hall's Bootstrap UCL	55.44
469				Kolmogorov-Smirnov Test Statistic	0.24						95% Percentile Bootstrap UCL	31.05
470				Kolmogorov-Smirnov 5% Critical Value	0.237						95% BCA Bootstrap UCL	33.23
471				**Data follow Appr. Gamma Distribution at 5% Significance Level**							95% Chebyshev(Mean, Sd) UCL	40.02
472											97.5% Chebyshev(Mean, Sd) UCL	46.28
473				**Assuming Gamma Distribution**							99% Chebyshev(Mean, Sd) UCL	58.58
474				95% Approximate Gamma UCL	31.57							
475				95% Adjusted Gamma UCL	32.55							
476												
477				**Potential UCL to Use**							Use 95% Approximate Gamma UCL	31.57

478												
479												
480	**Cobalt (mg/kg)**											
481												
482						**General Statistics**							
483					Number of Valid Samples	13				Number of Unique Samples	8	
484												
485				**Raw Statistics**					**Log-transformed Statistics**			
486					Minimum	7.8				Minimum of Log Data	2.054	
487					Maximum	15.9				Maximum of Log Data	2.766	
488					Mean	12.32				Mean of log Data	2.493	
489					Median	12				SD of log Data	0.206	
490					SD	2.346						
491					Coefficient of Variation	0.19						
492					Skewness	-0.501						
493												
494						**Relevant UCL Statistics**							
495				**Normal Distribution Test**					**Lognormal Distribution Test**			
496					Shapiro Wilk Test Statistic	0.953				Shapiro Wilk Test Statistic	0.918	
497					Shapiro Wilk Critical Value	0.866				Shapiro Wilk Critical Value	0.866	
498				**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**			
499												
500				**Assuming Normal Distribution**					**Assuming Lognormal Distribution**			
501					95% Student's-t UCL	13.48				95% H-UCL	13.78	
502				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	15.42	
503					95% Adjusted-CLT UCL	13.3				97.5% Chebyshev (MVUE) UCL	16.75	
504					95% Modified-t UCL	13.47				99% Chebyshev (MVUE) UCL	19.37	
505												
506				**Gamma Distribution Test**					**Data Distribution**			
507					k star (bias corrected)	20.99			**Data appear Normal at 5% Significance Level**			
508					Theta Star	0.587						
509					nu star	545.8						
510					Approximate Chi Square Value (.05)	492.6			**Nonparametric Statistics**			
511					Adjusted Level of Significance	0.0301				95% CLT UCL	13.39	
512					Adjusted Chi Square Value	485.4				95% Jackknife UCL	13.48	
513										95% Standard Bootstrap UCL	13.36	
514					Anderson-Darling Test Statistic	0.413				95% Bootstrap-t UCL	13.35	
515					Anderson-Darling 5% Critical Value	0.733				95% Hall's Bootstrap UCL	13.32	
516					Kolmogorov-Smirnov Test Statistic	0.163				95% Percentile Bootstrap UCL	13.28	
517					Kolmogorov-Smirnov 5% Critical Value	0.236				95% BCA Bootstrap UCL	13.26	
518				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	15.16	
519										97.5% Chebyshev(Mean, Sd) UCL	16.39	
520				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	18.8	
521					95% Approximate Gamma UCL	13.65						
522					95% Adjusted Gamma UCL	13.86						
523												
524				**Potential UCL to Use**						Use 95% Student's-t UCL	13.48	
525												
526												
527	**Copper (mg/kg)**											
528												
529						**General Statistics**							
530					Number of Valid Samples	13				Number of Unique Samples	12	

531												
532	**Raw Statistics**						**Log-transformed Statistics**					
533					Minimum	16					Minimum of Log Data	2.773
534					Maximum	69					Maximum of Log Data	4.234
535					Mean	30.92					Mean of log Data	3.317
536					Median	26					SD of log Data	0.474
537					SD	17.15						
538					Coefficient of Variation	0.554						
539					Skewness	1.511						
540												
541	**Relevant UCL Statistics**											
542	**Normal Distribution Test**						**Lognormal Distribution Test**					
543					Shapiro Wilk Test Statistic	0.789					Shapiro Wilk Test Statistic	0.894
544					Shapiro Wilk Critical Value	0.866					Shapiro Wilk Critical Value	0.866
545	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
546												
547	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
548					95% Student's-t UCL	39.4					95% H-UCL	41.04
549	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	48.49
550					95% Adjusted-CLT UCL	40.87					97.5% Chebyshev (MVUE) UCL	56.24
551					95% Modified-t UCL	39.73					99% Chebyshev (MVUE) UCL	71.48
552												
553	**Gamma Distribution Test**						**Data Distribution**					
554					k star (bias corrected)	3.531	**Data appear Gamma Distributed at 5% Significance Level**					
555					Theta Star	8.757						
556					nu star	91.81						
557					Approximate Chi Square Value (.05)	70.72	**Nonparametric Statistics**					
558					Adjusted Level of Significance	0.0301					95% CLT UCL	38.74
559					Adjusted Chi Square Value	68.08					95% Jackknife UCL	39.4
560											95% Standard Bootstrap UCL	38.53
561					Anderson-Darling Test Statistic	0.716					95% Bootstrap-t UCL	46.35
562					Anderson-Darling 5% Critical Value	0.737					95% Hall's Bootstrap UCL	51.88
563					Kolmogorov-Smirnov Test Statistic	0.169					95% Percentile Bootstrap UCL	38.95
564					Kolmogorov-Smirnov 5% Critical Value	0.238					95% BCA Bootstrap UCL	40.05
565	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	51.65
566											97.5% Chebyshev(Mean, Sd) UCL	60.62
567	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	78.24
568					95% Approximate Gamma UCL	40.15						
569					95% Adjusted Gamma UCL	41.7						
570												
571	**Potential UCL to Use**										Use 95% Approximate Gamma UCL	40.15
572												
573												
574	**Iron (mg/kg)**											
575												
576	**General Statistics**											
577					Number of Valid Samples	13					Number of Unique Samples	13
578												
579	**Raw Statistics**						**Log-transformed Statistics**					
580					Minimum	21100					Minimum of Log Data	9.957
581					Maximum	75500					Maximum of Log Data	11.23
582					Mean	34942					Mean of log Data	10.41
583					Median	30600					SD of log Data	0.324

584				SD	13795							
585				Coefficient of Variation	0.395							
586				Skewness	2.317							
587												
588	**Relevant UCL Statistics**											
589	**Normal Distribution Test**					**Lognormal Distribution Test**						
590				Shapiro Wilk Test Statistic	0.762					Shapiro Wilk Test Statistic	0.912	
591				Shapiro Wilk Critical Value	0.866					Shapiro Wilk Critical Value	0.866	
592	**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**						
593												
594	**Assuming Normal Distribution**					**Assuming Lognormal Distribution**						
595				95% Student's-t UCL	41761					95% H-UCL	41774	
596	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	48469	
597				95% Adjusted-CLT UCL	43863					97.5% Chebyshev (MVUE) UCL	54416	
598				95% Modified-t UCL	42171					99% Chebyshev (MVUE) UCL	66096	
599												
600	**Gamma Distribution Test**					**Data Distribution**						
601				k star (bias corrected)	7.252	**Data appear Gamma Distributed at 5% Significance Level**						
602				Theta Star	4818							
603				nu star	188.6							
604				Approximate Chi Square Value (.05)	157.8	**Nonparametric Statistics**						
605				Adjusted Level of Significance	0.0301					95% CLT UCL	41236	
606				Adjusted Chi Square Value	153.8					95% Jackknife UCL	41761	
607										95% Standard Bootstrap UCL	40985	
608				Anderson-Darling Test Statistic	0.573					95% Bootstrap-t UCL	47345	
609				Anderson-Darling 5% Critical Value	0.734					95% Hall's Bootstrap UCL	69698	
610				Kolmogorov-Smirnov Test Statistic	0.151					95% Percentile Bootstrap UCL	41758	
611				Kolmogorov-Smirnov 5% Critical Value	0.237					95% BCA Bootstrap UCL	43685	
612	**Data appear Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL	51620	
613										97.5% Chebyshev(Mean, Sd) UCL	58836	
614	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL	73011	
615				95% Approximate Gamma UCL	41755							
616				95% Adjusted Gamma UCL	42844							
617												
618	**Potential UCL to Use**									Use 95% Approximate Gamma UCL	41755	
619												
620												
621	**Magnesium (mg/kg)**											
622												
623	**General Statistics**											
624				Number of Valid Samples	13					Number of Unique Samples	13	
625												
626	**Raw Statistics**					**Log-transformed Statistics**						
627				Minimum	2700					Minimum of Log Data	7.901	
628				Maximum	82800					Maximum of Log Data	11.32	
629				Mean	28335					Mean of log Data	9.891	
630				Median	23000					SD of log Data	0.974	
631				SD	23000							
632				Coefficient of Variation	0.812							
633				Skewness	1.229							
634												
635	**Relevant UCL Statistics**											
636	**Normal Distribution Test**					**Lognormal Distribution Test**						

637				Shapiro Wilk Test Statistic	0.892					Shapiro Wilk Test Statistic	0.96	
638				Shapiro Wilk Critical Value	0.866					Shapiro Wilk Critical Value	0.866	
639				**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**		
640												
641				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
642				95% Student's-t UCL	39704					95% H-UCL	70041	
643				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	68512	
644				95% Adjusted-CLT UCL	41150					97.5% Chebyshev (MVUE) UCL	85077	
645				95% Modified-t UCL	40066					99% Chebyshev (MVUE) UCL	117616	
646												
647				**Gamma Distribution Test**						**Data Distribution**		
648				k star (bias corrected)	1.23					**Data appear Normal at 5% Significance Level**		
649				Theta Star	23028							
650				nu star	31.99							
651				Approximate Chi Square Value (.05)	20.07					**Nonparametric Statistics**		
652				Adjusted Level of Significance	0.0301					95% CLT UCL	38827	
653				Adjusted Chi Square Value	18.73					95% Jackknife UCL	39704	
654										95% Standard Bootstrap UCL	38346	
655				Anderson-Darling Test Statistic	0.169					95% Bootstrap-t UCL	43061	
656				Anderson-Darling 5% Critical Value	0.75					95% Hall's Bootstrap UCL	49170	
657				Kolmogorov-Smirnov Test Statistic	0.135					95% Percentile Bootstrap UCL	38588	
658				Kolmogorov-Smirnov 5% Critical Value	0.241					95% BCA Bootstrap UCL	40369	
659				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	56140	
660										97.5% Chebyshev(Mean, Sd) UCL	68171	
661				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	91805	
662				95% Approximate Gamma UCL	45176							
663				95% Adjusted Gamma UCL	48400							
664												
665				**Potential UCL to Use**						Use 95% Student's-t UCL	39704	
666												
667												
668	**Manganese (mg/kg)**											
669												
670				**General Statistics**								
671				Number of Valid Samples	13					Number of Unique Samples	13	
672												
673				**Raw Statistics**						**Log-transformed Statistics**		
674				Minimum	517					Minimum of Log Data	6.248	
675				Maximum	1700					Maximum of Log Data	7.438	
676				Mean	1003					Mean of log Data	6.856	
677				Median	918					SD of log Data	0.346	
678				SD	352.9							
679				Coefficient of Variation	0.352							
680				Skewness	0.754							
681												
682				**Relevant UCL Statistics**								
683				**Normal Distribution Test**						**Lognormal Distribution Test**		
684				Shapiro Wilk Test Statistic	0.937					Shapiro Wilk Test Statistic	0.977	
685				Shapiro Wilk Critical Value	0.866					Shapiro Wilk Critical Value	0.866	
686				**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**		
687												
688				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
689				95% Student's-t UCL	1178					95% H-UCL	1226	

690	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	1429	
691	95% Adjusted-CLT UCL	1186								97.5% Chebyshev (MVUE) UCL	1613	
692	95% Modified-t UCL	1181								99% Chebyshev (MVUE) UCL	1975	
693												
694	**Gamma Distribution Test**									**Data Distribution**		
695	k star (bias corrected)	7.111								**Data appear Normal at 5% Significance Level**		
696	Theta Star	141.1										
697	nu star	184.9										
698	Approximate Chi Square Value (.05)	154.4								**Nonparametric Statistics**		
699	Adjusted Level of Significance	0.0301								95% CLT UCL	1164	
700	Adjusted Chi Square Value	150.5								95% Jackknife UCL	1178	
701										95% Standard Bootstrap UCL	1153	
702	Anderson-Darling Test Statistic	0.222								95% Bootstrap-t UCL	1206	
703	Anderson-Darling 5% Critical Value	0.734								95% Hall's Bootstrap UCL	1202	
704	Kolmogorov-Smirnov Test Statistic	0.123								95% Percentile Bootstrap UCL	1157	
705	Kolmogorov-Smirnov 5% Critical Value	0.237								95% BCA Bootstrap UCL	1174	
706	**Data appear Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL	1430	
707										97.5% Chebyshev(Mean, Sd) UCL	1615	
708	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL	1977	
709	95% Approximate Gamma UCL	1201										
710	95% Adjusted Gamma UCL	1233										
711												
712	**Potential UCL to Use**									Use 95% Student's-t UCL	1178	
713												
714												
715	**Mercury (mg/kg)**											
716												
717	**General Statistics**											
718	Number of Valid Samples	13								Number of Detected Data	11	
719	Number of Unique Samples	10								Number of Non-Detect Data	2	
720										Percent Non-Detects	15.38%	
721												
722	**Raw Statistics**									**Log-transformed Statistics**		
723	Minimum Detected	0.0345								Minimum Detected	-3.367	
724	Maximum Detected	0.088								Maximum Detected	-2.43	
725	Mean of Detected	0.0586								Mean of Detected	-2.894	
726	SD of Detected	0.0208								SD of Detected	0.351	
727	Minimum Non-Detect	0.05								Minimum Non-Detect	-2.996	
728	Maximum Non-Detect	0.05								Maximum Non-Detect	-2.996	
729												
730												
731	**UCL Statistics**											
732	**Normal Distribution Test with Detected Values Only**									**Lognormal Distribution Test with Detected Values Only**		
733	Shapiro Wilk Test Statistic	0.869								Shapiro Wilk Test Statistic	0.905	
734	5% Shapiro Wilk Critical Value	0.85								5% Shapiro Wilk Critical Value	0.85	
735	**Data appear Normal at 5% Significance Level**									**Data appear Lognormal at 5% Significance Level**		
736												
737	**Assuming Normal Distribution**									**Assuming Lognormal Distribution**		
738	DL/2 Substitution Method									DL/2 Substitution Method		
739	Mean	0.0534								Mean	-3.016	
740	SD	0.0228								SD	0.438	
741	95% DL/2 (t) UCL	0.0647								95% H-Stat (DL/2) UCL	0.0578	
742												

743				Maximum Likelihood Estimate(MLE) Method							Log ROS Method	
744				Mean	0.0484						Mean in Log Scale	-2.939
745				SD	0.0283						SD in Log Scale	0.342
746				95% MLE (t) UCL	0.0624						Mean in Original Scale	0.0559
747				95% MLE (Tiku) UCL	0.0664						SD in Original Scale	0.0201
748											95% Percentile Bootstrap UCL	0.0653
749											95% BCA Bootstrap UCL	0.0668
750												
751				**Gamma Distribution Test with Detected Values Only**							**Data Distribution Test with Detected Values Only**	
752				k star (bias corrected)	6.613						**Data appear Normal at 5% Significance Level**	
753				Theta Star	0.00886							
754				nu star	145.5							
755												
756				A-D Test Statistic	0.488						**Nonparametric Statistics**	
757				5% A-D Critical Value	0.73						Kaplan-Meier (KM) Method	
758				K-S Test Statistic	0.73						Mean	0.0558
759				5% K-S Critical Value	0.256						SD	0.0195
760				**Data appear Gamma Distributed at 5% Significance Level**							SE of Mean	0.00569
761											95% KM (t) UCL	0.0659
762				**Assuming Gamma Distribution**							95% KM (z) UCL	0.0652
763				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	0.0659
764				Minimum	0.0345						95% KM (bootstrap t) UCL	0.0685
765				Maximum	0.088						95% KM (BCA) UCL	0.0644
766				Mean	0.0571						95% KM (Percentile Bootstrap) UCL	0.0652
767				Median	0.052						95% KM (Chebyshev) UCL	0.0806
768				SD	0.0197						97.5% KM (Chebyshev) UCL	0.0913
769				k star	7.529						99% KM (Chebyshev) UCL	0.112
770				Theta star	0.00758							
771				Nu star	195.8						**Potential UCLs to Use**	
772				AppChi2	164.4						95% KM (t) UCL	0.0659
773				95% Gamma Approximate UCL	0.068						95% KM (Percentile Bootstrap) UCL	0.0652
774				95% Adjusted Gamma UCL	0.0697							
775	**Note: DL/2 is not a recommended method.**											
776												
777												
778	**Nickel (mg/kg)**											
779												
780					**General Statistics**							
781				Number of Valid Samples	13						Number of Unique Samples	10
782												
783				**Raw Statistics**							**Log-transformed Statistics**	
784				Minimum	15						Minimum of Log Data	2.708
785				Maximum	34						Maximum of Log Data	3.526
786				Mean	22						Mean of log Data	3.063
787				Median	21						SD of log Data	0.241
788				SD	5.625							
789				Coefficient of Variation	0.256							
790				Skewness	1.032							
791												
792					**Relevant UCL Statistics**							
793				**Normal Distribution Test**							**Lognormal Distribution Test**	
794				Shapiro Wilk Test Statistic	0.898						Shapiro Wilk Test Statistic	0.944
795				Shapiro Wilk Critical Value	0.866						Shapiro Wilk Critical Value	0.866

796	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
797												
798	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
799					95% Student's-t UCL	24.78					95% H-UCL	25.07
800	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	28.41
801					95% Adjusted-CLT UCL	25.04					97.5% Chebyshev (MVUE) UCL	31.19
802					95% Modified-t UCL	24.85					99% Chebyshev (MVUE) UCL	36.66
803												
804	**Gamma Distribution Test**						**Data Distribution**					
805					k star (bias corrected)	14.05	**Data appear Normal at 5% Significance Level**					
806					Theta Star	1.566						
807					nu star	365.3						
808					Approximate Chi Square Value (.05)	322	**Nonparametric Statistics**					
809					Adjusted Level of Significance	0.0301					95% CLT UCL	24.57
810					Adjusted Chi Square Value	316.2					95% Jackknife UCL	24.78
811											95% Standard Bootstrap UCL	24.46
812					Anderson-Darling Test Statistic	0.445					95% Bootstrap-t UCL	25.89
813					Anderson-Darling 5% Critical Value	0.733					95% Hall's Bootstrap UCL	26.34
814					Kolmogorov-Smirnov Test Statistic	0.239					95% Percentile Bootstrap UCL	24.57
815					Kolmogorov-Smirnov 5% Critical Value	0.236					95% BCA Bootstrap UCL	24.71
816	**Data follow Appr. Gamma Distribution at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	28.8
817											97.5% Chebyshev(Mean, Sd) UCL	31.74
818	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	37.52
819					95% Approximate Gamma UCL	24.96						
820					95% Adjusted Gamma UCL	25.42						
821												
822	**Potential UCL to Use**										Use 95% Student's-t UCL	24.78
823												
824												
825	**Potassium (mg/kg)**											
826												
827	**General Statistics**											
828					Number of Valid Samples	13					Number of Unique Samples	13
829												
830	**Raw Statistics**						**Log-transformed Statistics**					
831					Minimum	1180					Minimum of Log Data	7.073
832					Maximum	3420					Maximum of Log Data	8.137
833					Mean	2077					Mean of log Data	7.602
834					Median	2080					SD of log Data	0.282
835					SD	589.5						
836					Coefficient of Variation	0.284						
837					Skewness	0.747						
838												
839	**Relevant UCL Statistics**											
840	**Normal Distribution Test**						**Lognormal Distribution Test**					
841					Shapiro Wilk Test Statistic	0.959					Shapiro Wilk Test Statistic	0.987
842					Shapiro Wilk Critical Value	0.866					Shapiro Wilk Critical Value	0.866
843	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
844												
845	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
846					95% Student's-t UCL	2369					95% H-UCL	2432
847	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	2792
848					95% Adjusted-CLT UCL	2382					97.5% Chebyshev (MVUE) UCL	3102

849				95% Modified-t UCL	2374					99% Chebyshev (MVUE) UCL	3709	
850												
851				**Gamma Distribution Test**						**Data Distribution**		
852				k star (bias corrected)	10.71					**Data appear Normal at 5% Significance Level**		
853				Theta Star	193.9							
854				nu star	278.5							
855				Approximate Chi Square Value (.05)	240.9					**Nonparametric Statistics**		
856				Adjusted Level of Significance	0.0301					95% CLT UCL	2346	
857				Adjusted Chi Square Value	235.9					95% Jackknife UCL	2369	
858										95% Standard Bootstrap UCL	2331	
859				Anderson-Darling Test Statistic	0.173					95% Bootstrap-t UCL	2423	
860				Anderson-Darling 5% Critical Value	0.734					95% Hall's Bootstrap UCL	2486	
861				Kolmogorov-Smirnov Test Statistic	0.136					95% Percentile Bootstrap UCL	2345	
862				Kolmogorov-Smirnov 5% Critical Value	0.236					95% BCA Bootstrap UCL	2363	
863				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	2790	
864										97.5% Chebyshev(Mean, Sd) UCL	3098	
865				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	3704	
866				95% Approximate Gamma UCL	2402							
867				95% Adjusted Gamma UCL	2453							
868												
869				**Potential UCL to Use**						Use 95% Student's-t UCL	2369	
870												
871												
872	**Selenium (mg.kg)**											
873												
874				**General Statistics**								
875				Number of Valid Samples	13					Number of Detected Data	11	
876				Number of Unique Samples	11					Number of Non-Detect Data	2	
877										Percent Non-Detects	15.38%	
878												
879				**Raw Statistics**						**Log-transformed Statistics**		
880				Minimum Detected	0.51					Minimum Detected	-0.673	
881				Maximum Detected	1.3					Maximum Detected	0.262	
882				Mean of Detected	0.729					Mean of Detected	-0.354	
883				SD of Detected	0.227					SD of Detected	0.276	
884				Minimum Non-Detect	0.25					Minimum Non-Detect	-1.386	
885				Maximum Non-Detect	0.25					Maximum Non-Detect	-1.386	
886												
887												
888				**UCL Statistics**								
889				**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**		
890				Shapiro Wilk Test Statistic	0.837					Shapiro Wilk Test Statistic	0.92	
891				5% Shapiro Wilk Critical Value	0.85					5% Shapiro Wilk Critical Value	0.85	
892				**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**		
893												
894				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
895				DL/2 Substitution Method						DL/2 Substitution Method		
896				Mean	0.636					Mean	-0.619	
897				SD	0.307					SD	0.695	
898				95% DL/2 (t) UCL	0.788					95% H-Stat (DL/2) UCL	0.721	
899												
900				Maximum Likelihood Estimate(MLE) Method						Log ROS Method		
901				Mean	0.633					Mean in Log Scale	-0.455	

902				SD	0.305					SD in Log Scale		0.353
903				95% MLE (t) UCL	0.783					Mean in Original Scale		0.673
904				95% MLE (Tiku) UCL	0.789					SD in Original Scale		0.248
905										95% Percentile Bootstrap UCL		0.785
906										95% BCA Bootstrap UCL		0.801
907												
908	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
909				k star (bias corrected)	9.947		**Data appear Gamma Distributed at 5% Significance Level**					
910				Theta Star	0.0733							
911				nu star	218.8							
912												
913				A-D Test Statistic	0.416		**Nonparametric Statistics**					
914				5% A-D Critical Value	0.729					Kaplan-Meier (KM) Method		
915				K-S Test Statistic	0.729					Mean		0.695
916				5% K-S Critical Value	0.255					SD		0.214
917	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0623
918										95% KM (t) UCL		0.806
919	**Assuming Gamma Distribution**									95% KM (z) UCL		0.797
920				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		0.804
921				Minimum	0.374					95% KM (bootstrap t) UCL		0.867
922				Maximum	1.3					95% KM (BCA) UCL		0.81
923				Mean	0.682					95% KM (Percentile Bootstrap) UCL		0.806
924				Median	0.62					95% KM (Chebyshev) UCL		0.966
925				SD	0.237					97.5% KM (Chebyshev) UCL		1.084
926				k star	8.013					99% KM (Chebyshev) UCL		1.315
927				Theta star	0.0851							
928				Nu star	208.3		**Potential UCLs to Use**					
929				AppChi2	175.9					95% KM (BCA) UCL		0.81
930				95% Gamma Approximate UCL	0.808							
931				95% Adjusted Gamma UCL	0.828							
932	**Note: DL/2 is not a recommended method.**											
933												
934												
935	**Silver (mg/kg)**											
936												
937	**General Statistics**											
938				Number of Valid Samples	13					Number of Detected Data		11
939				Number of Unique Samples	10					Number of Non-Detect Data		2
940										Percent Non-Detects		15.38%
941												
942	**Raw Statistics**						**Log-transformed Statistics**					
943				Minimum Detected	0.068					Minimum Detected		-2.688
944				Maximum Detected	1.45					Maximum Detected		0.371
945				Mean of Detected	0.293					Mean of Detected		-1.811
946				SD of Detected	0.432					SD of Detected		0.969
947				Minimum Non-Detect	0.589					Minimum Non-Detect		-0.529
948				Maximum Non-Detect	0.589					Maximum Non-Detect		-0.529
949												
950												
951	**UCL Statistics**											
952	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
953				Shapiro Wilk Test Statistic	0.564					Shapiro Wilk Test Statistic		0.758
954				5% Shapiro Wilk Critical Value	0.85					5% Shapiro Wilk Critical Value		0.85

	A	B	C	D	E	F	G	H	I	J	K	L
955	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
956												
957	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
958					DL/2 Substitution Method						DL/2 Substitution Method	
959					Mean	0.294					Mean	-1.72
960					SD	0.395					SD	0.912
961					95% DL/2 (t) UCL	0.489					95% H-Stat (DL/2) UCL	0.472
962												
963					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
964	**MLE method failed to converge properly**										Mean in Log Scale	-1.851
965											SD in Log Scale	0.901
966											Mean in Original Scale	0.269
967											SD in Original Scale	0.399
968											95% Percentile Bootstrap UCL	0.468
969											95% BCA Bootstrap UCL	0.566
970												
971	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
972					k star (bias corrected)	0.779	**Data do not follow a Discernable Distribution (0.05)**					
973					Theta Star	0.376						
974					nu star	17.15						
975												
976					A-D Test Statistic	1.711	**Nonparametric Statistics**					
977					5% A-D Critical Value	0.752					Kaplan-Meier (KM) Method	
978					K-S Test Statistic	0.752					Mean	0.266
979					5% K-S Critical Value	0.262					SD	0.385
980	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.112
981											95% KM (t) UCL	0.465
982	**Assuming Gamma Distribution**										95% KM (z) UCL	0.45
983					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.464
984					Minimum	0.068					95% KM (bootstrap t) UCL	2.247
985					Maximum	1.45					95% KM (BCA) UCL	0.471
986					Mean	0.293					95% KM (Percentile Bootstrap) UCL	0.465
987					Median	0.13					95% KM (Chebyshev) UCL	0.754
988					SD	0.395					97.5% KM (Chebyshev) UCL	0.965
989					k star	0.932					99% KM (Chebyshev) UCL	1.38
990					Theta star	0.314						
991					Nu star	24.24	**Potential UCLs to Use**					
992					AppChi2	14.03					95% KM (Chebyshev) UCL	0.754
993					95% Gamma Approximate UCL	0.506						
994					95% Adjusted Gamma UCL	0.549						
995	**Note: DL/2 is not a recommended method.**											
996												
997												
998	**Sodium (mg/kg)**											
999												
1000	**General Statistics**											
1001					Number of Valid Samples	13					Number of Detected Data	12
1002					Number of Unique Samples	12					Number of Non-Detect Data	1
1003											Percent Non-Detects	7.69%
1004												
1005	**Raw Statistics**						**Log-transformed Statistics**					
1006					Minimum Detected	36					Minimum Detected	3.584
1007					Maximum Detected	2040					Maximum Detected	7.621

1008				Mean of Detected	663.8					Mean of Detected	5.687	
1009				SD of Detected	737.2					SD of Detected	1.488	
1010				Minimum Non-Detect	100					Minimum Non-Detect	4.605	
1011				Maximum Non-Detect	100					Maximum Non-Detect	4.605	
1012												
1013												
1014	**UCL Statistics**											
1015	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1016				Shapiro Wilk Test Statistic	0.807					Shapiro Wilk Test Statistic	0.913	
1017				5% Shapiro Wilk Critical Value	0.859					5% Shapiro Wilk Critical Value	0.859	
1018	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1019												
1020	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1021				DL/2 Substitution Method						DL/2 Substitution Method		
1022				Mean	616.6					Mean	5.55	
1023				SD	726.1					SD	1.507	
1024				95% DL/2 (t) UCL	975.5					95% H-Stat (DL/2) UCL	3380	
1025												
1026				Maximum Likelihood Estimate(MLE) Method						Log ROS Method		
1027				Mean	361.8					Mean in Log Scale	5.566	
1028				SD	997.9					SD in Log Scale	1.49	
1029				95% MLE (t) UCL	855					Mean in Original Scale	617.5	
1030				95% MLE (Tiku) UCL	911.5					SD in Original Scale	725.3	
1031										95% Percentile Bootstrap UCL	961.4	
1032										95% BCA Bootstrap UCL	1022	
1033												
1034	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1035				k star (bias corrected)	0.61		**Data appear Gamma Distributed at 5% Significance Level**					
1036				Theta Star	1088							
1037				nu star	14.64							
1038												
1039				A-D Test Statistic	0.433		**Nonparametric Statistics**					
1040				5% A-D Critical Value	0.766					Kaplan-Meier (KM) Method		
1041				K-S Test Statistic	0.766					Mean	617	
1042				5% K-S Critical Value	0.255					SD	697.3	
1043	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean	202	
1044										95% KM (t) UCL	977	
1045	**Assuming Gamma Distribution**									95% KM (z) UCL	949.3	
1046				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	975.8	
1047				Minimum	0					95% KM (bootstrap t) UCL	1072	
1048				Maximum	2040					95% KM (BCA) UCL	950.1	
1049				Mean	612.8					95% KM (Percentile Bootstrap) UCL	953.2	
1050				Median	215					95% KM (Chebyshev) UCL	1498	
1051				SD	729.4					97.5% KM (Chebyshev) UCL	1878	
1052				k star	0.248					99% KM (Chebyshev) UCL	2627	
1053				Theta star	2468							
1054				Nu star	6.455		**Potential UCLs to Use**					
1055				AppChi2	1.877					95% KM (Chebyshev) UCL	1498	
1056				95% Gamma Approximate UCL	2108							
1057				95% Adjusted Gamma UCL	2557							
1058	**Note: DL/2 is not a recommended method.**											
1059												
1060												

1061	**Thallium (mg/kg)**											
1062												
1063	**General Statistics**											
1064					Number of Valid Samples	13			Number of Detected Data	11		
1065					Number of Unique Samples	9			Number of Non-Detect Data	2		
1066									Percent Non-Detects	15.38%		
1067												
1068	**Raw Statistics**						**Log-transformed Statistics**					
1069					Minimum Detected	0.15			Minimum Detected	-1.897		
1070					Maximum Detected	0.44			Maximum Detected	-0.821		
1071					Mean of Detected	0.225			Mean of Detected	-1.533		
1072					SD of Detected	0.0788			SD of Detected	0.291		
1073					Minimum Non-Detect	6.62			Minimum Non-Detect	1.89		
1074					Maximum Non-Detect	6.62			Maximum Non-Detect	1.89		
1075												
1076												
1077	**UCL Statistics**											
1078	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1079					Shapiro Wilk Test Statistic	0.758			Shapiro Wilk Test Statistic	0.887		
1080					5% Shapiro Wilk Critical Value	0.85			5% Shapiro Wilk Critical Value	0.85		
1081	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1082												
1083	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1084					DL/2 Substitution Method				DL/2 Substitution Method			
1085					Mean	0.7			Mean	-1.113		
1086					SD	1.161			SD	1.059		
1087					95% DL/2 (t) UCL	1.274			95% H-Stat (DL/2) UCL	1.423		
1088												
1089					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1090	**MLE method failed to converge properly**								Mean in Log Scale	-1.533		
1091									SD in Log Scale	0.271		
1092									Mean in Original Scale	0.224		
1093									SD in Original Scale	0.073		
1094									95% Percentile Bootstrap UCL	0.261		
1095									95% BCA Bootstrap UCL	0.275		
1096												
1097	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1098					k star (bias corrected)	8.636	**Data appear Gamma Distributed at 5% Significance Level**					
1099					Theta Star	0.0261						
1100					nu star	190						
1101												
1102					A-D Test Statistic	0.618	**Nonparametric Statistics**					
1103					5% A-D Critical Value	0.729			Kaplan-Meier (KM) Method			
1104					K-S Test Statistic	0.729			Mean	0.225		
1105					5% K-S Critical Value	0.255			SD	0.0751		
1106	**Data appear Gamma Distributed at 5% Significance Level**								SE of Mean	0.0238		
1107									95% KM (t) UCL	0.268		
1108	**Assuming Gamma Distribution**								95% KM (z) UCL	0.265		
1109					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL	0.268		
1110					Minimum	0.15			95% KM (bootstrap t) UCL	0.304		
1111					Maximum	0.44			95% KM (BCA) UCL	0.265		
1112					Mean	0.227			95% KM (Percentile Bootstrap) UCL	0.266		
1113					Median	0.22			95% KM (Chebyshev) UCL	0.329		

1114					SD	0.0731				97.5% KM (Chebyshev) UCL		0.374
1115					k star	10.35				99% KM (Chebyshev) UCL		0.462
1116					Theta star	0.0219						
1117					Nu star	269.1				**Potential UCLs to Use**		
1118					AppChi2	232.1				95% KM (BCA) UCL		0.265
1119					95% Gamma Approximate UCL	0.263						
1120					95% Adjusted Gamma UCL	0.268						
1121	**Note: DL/2 is not a recommended method.**											
1122												
1123												
1124	**Vanadium (mg/kg)**											
1125												
1126	**General Statistics**											
1127					Number of Valid Samples	13				Number of Unique Samples		13
1128												
1129	**Raw Statistics**						**Log-transformed Statistics**					
1130					Minimum	29				Minimum of Log Data		3.367
1131					Maximum	69				Maximum of Log Data		4.234
1132					Mean	44.96				Mean of log Data		3.776
1133					Median	48.7				SD of log Data		0.253
1134					SD	11.36						
1135					Coefficient of Variation	0.253						
1136					Skewness	0.473						
1137												
1138	**Relevant UCL Statistics**											
1139	**Normal Distribution Test**						**Lognormal Distribution Test**					
1140					Shapiro Wilk Test Statistic	0.938				Shapiro Wilk Test Statistic		0.95
1141					Shapiro Wilk Critical Value	0.866				Shapiro Wilk Critical Value		0.866
1142	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1143												
1144	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1145					95% Student's-t UCL	50.57				95% H-UCL		51.68
1146	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		58.81
1147					95% Adjusted-CLT UCL	50.58				97.5% Chebyshev (MVUE) UCL		64.8
1148					95% Modified-t UCL	50.64				99% Chebyshev (MVUE) UCL		76.57
1149												
1150	**Gamma Distribution Test**						**Data Distribution**					
1151					k star (bias corrected)	13.27	**Data appear Normal at 5% Significance Level**					
1152					Theta Star	3.387						
1153					nu star	345.1						
1154					Approximate Chi Square Value (.05)	303.1	**Nonparametric Statistics**					
1155					Adjusted Level of Significance	0.0301				95% CLT UCL		50.14
1156					Adjusted Chi Square Value	297.5				95% Jackknife UCL		50.57
1157										95% Standard Bootstrap UCL		49.83
1158					Anderson-Darling Test Statistic	0.393				95% Bootstrap-t UCL		51.06
1159					Anderson-Darling 5% Critical Value	0.733				95% Hall's Bootstrap UCL		51.12
1160					Kolmogorov-Smirnov Test Statistic	0.2				95% Percentile Bootstrap UCL		50.05
1161					Kolmogorov-Smirnov 5% Critical Value	0.236				95% BCA Bootstrap UCL		50.31
1162	**Data appear Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL		58.69
1163										97.5% Chebyshev(Mean, Sd) UCL		64.63
1164	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL		76.3
1165					95% Approximate Gamma UCL	51.2						
1166					95% Adjusted Gamma UCL	52.17						

1167												
1168	**Potential UCL to Use**									Use 95% Student's-t UCL		50.57
1169												
1170												
1171	**Zinc (mg/kg)**											
1172												
1173	**General Statistics**											
1174	Number of Valid Samples					13				Number of Unique Samples		13
1175												
1176	**Raw Statistics**									**Log-transformed Statistics**		
1177	Minimum					65				Minimum of Log Data		4.174
1178	Maximum					1490				Maximum of Log Data		7.307
1179	Mean					309				Mean of log Data		5.303
1180	Median					241				SD of log Data		0.898
1181	SD					378.9						
1182	Coefficient of Variation					1.226						
1183	Skewness					2.878						
1184												
1185	**Relevant UCL Statistics**											
1186	**Normal Distribution Test**									**Lognormal Distribution Test**		
1187	Shapiro Wilk Test Statistic					0.617				Shapiro Wilk Test Statistic		0.901
1188	Shapiro Wilk Critical Value					0.866				Shapiro Wilk Critical Value		0.866
1189	**Data not Normal at 5% Significance Level**									**Data appear Lognormal at 5% Significance Level**		
1190												
1191	**Assuming Normal Distribution**									**Assuming Lognormal Distribution**		
1192	95% Student's-t UCL					496.3				95% H-UCL		602.8
1193	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		623.2
1194	95% Adjusted-CLT UCL					571.5				97.5% Chebyshev (MVUE) UCL		768
1195	95% Modified-t UCL					510.3				99% Chebyshev (MVUE) UCL		1052
1196												
1197	**Gamma Distribution Test**									**Data Distribution**		
1198	k star (bias corrected)					1.053				**Data Follow Appr. Gamma Distribution at 5% Significance Level**		
1199	Theta Star					293.5						
1200	nu star					27.38						
1201	Approximate Chi Square Value (.05)					16.44				**Nonparametric Statistics**		
1202	Adjusted Level of Significance					0.0301				95% CLT UCL		481.9
1203	Adjusted Chi Square Value					15.25				95% Jackknife UCL		496.3
1204										95% Standard Bootstrap UCL		474.6
1205	Anderson-Darling Test Statistic					0.805				95% Bootstrap-t UCL		753.2
1206	Anderson-Darling 5% Critical Value					0.753				95% Hall's Bootstrap UCL		1163
1207	Kolmogorov-Smirnov Test Statistic					0.236				95% Percentile Bootstrap UCL		497.6
1208	Kolmogorov-Smirnov 5% Critical Value					0.242				95% BCA Bootstrap UCL		600.2
1209	**Data follow Appr. Gamma Distribution at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL		767
1210										97.5% Chebyshev(Mean, Sd) UCL		965.2
1211	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL		1355
1212	95% Approximate Gamma UCL					514.5						
1213	95% Adjusted Gamma UCL					554.9						
1214												
1215	**Potential UCL to Use**									Use 95% Approximate Gamma UCL		514.5
1216												
1217												
1218	**Total Cyanide**											
1219												

1220	**General Statistics**											
1221	Number of Valid Samples				11	Number of Unique Samples						9
1222												
1223	**Raw Statistics**					**Log-transformed Statistics**						
1224	Minimum				0.01	Minimum of Log Data						-4.605
1225	Maximum				0.42	Maximum of Log Data						-0.868
1226	Mean				0.109	Mean of log Data						-2.797
1227	Median				0.06	SD of log Data						1.089
1228	SD				0.139							
1229	Coefficient of Variation				1.278							
1230	Skewness				1.889							
1231												
1232	**Relevant UCL Statistics**											
1233	**Normal Distribution Test**					**Lognormal Distribution Test**						
1234	Shapiro Wilk Test Statistic				0.636	Shapiro Wilk Test Statistic						0.903
1235	Shapiro Wilk Critical Value				0.85	Shapiro Wilk Critical Value						0.85
1236	**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**						
1237												
1238	**Assuming Normal Distribution**					**Assuming Lognormal Distribution**						
1239	95% Student's-t UCL				0.185	95% H-UCL						0.33
1240	**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL						0.258
1241	95% Adjusted-CLT UCL				0.203	97.5% Chebyshev (MVUE) UCL						0.326
1242	95% Modified-t UCL				0.189	99% Chebyshev (MVUE) UCL						0.458
1243												
1244	**Gamma Distribution Test**					**Data Distribution**						
1245	k star (bias corrected)				0.788	**Data appear Lognormal at 5% Significance Level**						
1246	Theta Star				0.138							
1247	nu star				17.33							
1248	Approximate Chi Square Value (.05)				8.906	**Nonparametric Statistics**						
1249	Adjusted Level of Significance				0.0278	95% CLT UCL						0.178
1250	Adjusted Chi Square Value				7.94	95% Jackknife UCL						0.185
1251						95% Standard Bootstrap UCL						0.173
1252	Anderson-Darling Test Statistic				1.017	95% Bootstrap-t UCL						0.529
1253	Anderson-Darling 5% Critical Value				0.752	95% Hall's Bootstrap UCL						0.808
1254	Kolmogorov-Smirnov Test Statistic				0.343	95% Percentile Bootstrap UCL						0.176
1255	Kolmogorov-Smirnov 5% Critical Value				0.262	95% BCA Bootstrap UCL						0.201
1256	**Data not Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL						0.291
1257						97.5% Chebyshev(Mean, Sd) UCL						0.37
1258	**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL						0.525
1259	95% Approximate Gamma UCL				0.211							
1260	95% Adjusted Gamma UCL				0.237							
1261												
1262	**Potential UCL to Use**					Use 95% Chebyshev (MVUE) UCL						0.258
1263												
1264												
1265	**2-Butanone (mg/kg)**											
1266												
1267	**General Statistics**											
1268	Number of Valid Samples				11	Number of Unique Samples						11
1269												
1270	**Raw Statistics**					**Log-transformed Statistics**						
1271	Minimum				0.0046	Minimum of Log Data						-5.382
1272	Maximum				0.038	Maximum of Log Data						-3.27

1273					Mean	0.0113					Mean of log Data	-4.715
1274					Median	0.00795					SD of log Data	0.659
1275					SD	0.00974						
1276					Coefficient of Variation	0.863						
1277					Skewness	2.379						
1278												
1279	**Relevant UCL Statistics**											
1280	**Normal Distribution Test**						**Lognormal Distribution Test**					
1281					Shapiro Wilk Test Statistic	0.698					Shapiro Wilk Test Statistic	0.889
1282					Shapiro Wilk Critical Value	0.85					Shapiro Wilk Critical Value	0.85
1283	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1284												
1285	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1286					95% Student's-t UCL	0.0166					95% H-UCL	0.0184
1287	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	0.0206
1288					95% Adjusted-CLT UCL	0.0184					97.5% Chebyshev (MVUE) UCL	0.0248
1289					95% Modified-t UCL	0.017					99% Chebyshev (MVUE) UCL	0.0331
1290												
1291	**Gamma Distribution Test**						**Data Distribution**					
1292					k star (bias corrected)	1.748	**Data appear Gamma Distributed at 5% Significance Level**					
1293					Theta Star	0.00646						
1294					nu star	38.45						
1295					Approximate Chi Square Value (.05)	25.25	**Nonparametric Statistics**					
1296					Adjusted Level of Significance	0.0278					95% CLT UCL	0.0161
1297					Adjusted Chi Square Value	23.52					95% Jackknife UCL	0.0166
1298											95% Standard Bootstrap UCL	0.0158
1299					Anderson-Darling Test Statistic	0.67					95% Bootstrap-t UCL	0.0229
1300					Anderson-Darling 5% Critical Value	0.737					95% Hall's Bootstrap UCL	0.0341
1301					Kolmogorov-Smirnov Test Statistic	0.207					95% Percentile Bootstrap UCL	0.0163
1302					Kolmogorov-Smirnov 5% Critical Value	0.258					95% BCA Bootstrap UCL	0.0188
1303	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	0.0241
1304											97.5% Chebyshev(Mean, Sd) UCL	0.0296
1305	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	0.0405
1306					95% Approximate Gamma UCL	0.0172						
1307					95% Adjusted Gamma UCL	0.0185						
1308												
1309	**Potential UCL to Use**										Use 95% Approximate Gamma UCL	0.0172
1310												
1311												
1312	**Acetone (mg/kg)**											
1313												
1314	**General Statistics**											
1315					Number of Valid Samples	11					Number of Unique Samples	10
1316												
1317	**Raw Statistics**						**Log-transformed Statistics**					
1318					Minimum	0.024					Minimum of Log Data	-3.73
1319					Maximum	0.074					Maximum of Log Data	-2.604
1320					Mean	0.0407					Mean of log Data	-3.27
1321					Median	0.037					SD of log Data	0.382
1322					SD	0.0163						
1323					Coefficient of Variation	0.4						
1324					Skewness	0.883						
1325												

	A	B	C	D	E	F	G	H	I	J	K	L
1326	**Relevant UCL Statistics**											
1327	**Normal Distribution Test**						**Lognormal Distribution Test**					
1328					Shapiro Wilk Test Statistic	0.891					Shapiro Wilk Test Statistic	0.924
1329					Shapiro Wilk Critical Value	0.85					Shapiro Wilk Critical Value	0.85
1330	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1331												
1332	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1333					95% Student's-t UCL	0.0496					95% H-UCL	0.0523
1334	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	0.0612
1335					95% Adjusted-CLT UCL	0.0501					97.5% Chebyshev (MVUE) UCL	0.0701
1336					95% Modified-t UCL	0.0498					99% Chebyshev (MVUE) UCL	0.0877
1337												
1338	**Gamma Distribution Test**						**Data Distribution**					
1339					k star (bias corrected)	5.516	**Data appear Normal at 5% Significance Level**					
1340					Theta Star	0.00738						
1341					nu star	121.4						
1342					Approximate Chi Square Value (.05)	96.92	**Nonparametric Statistics**					
1343					Adjusted Level of Significance	0.0278					95% CLT UCL	0.0488
1344					Adjusted Chi Square Value	93.36					95% Jackknife UCL	0.0496
1345											95% Standard Bootstrap UCL	0.0484
1346					Anderson-Darling Test Statistic	0.429					95% Bootstrap-t UCL	0.0521
1347					Anderson-Darling 5% Critical Value	0.73					95% Hall's Bootstrap UCL	0.05
1348					Kolmogorov-Smirnov Test Statistic	0.176					95% Percentile Bootstrap UCL	0.0485
1349					Kolmogorov-Smirnov 5% Critical Value	0.256					95% BCA Bootstrap UCL	0.0503
1350	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	0.0621
1351											97.5% Chebyshev(Mean, Sd) UCL	0.0713
1352	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	0.0895
1353					95% Approximate Gamma UCL	0.0509						
1354					95% Adjusted Gamma UCL	0.0529						
1355												
1356	**Potential UCL to Use**										Use 95% Student's-t UCL	0.0496
1357												
1358												
1359	**Benzene (mg/kg)**											
1360												
1361	**General Statistics**											
1362					Number of Valid Samples	11					Number of Detected Data	9
1363					Number of Unique Samples	9					Number of Non-Detect Data	2
1364											Percent Non-Detects	18.18%
1365												
1366	**Raw Statistics**						**Log-transformed Statistics**					
1367					Minimum Detected	0.0002					Minimum Detected	-8.517
1368					Maximum Detected	0.0012					Maximum Detected	-6.725
1369					Mean of Detected	0.0004033					Mean of Detected	-7.999
1370					SD of Detected	0.0003194					SD of Detected	0.579
1371					Minimum Non-Detect	0.005					Minimum Non-Detect	-5.298
1372					Maximum Non-Detect	0.005					Maximum Non-Detect	-5.298
1373												
1374												
1375	**UCL Statistics**											
1376	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1377					Shapiro Wilk Test Statistic	0.659					Shapiro Wilk Test Statistic	0.809
1378					5% Shapiro Wilk Critical Value	0.829					5% Shapiro Wilk Critical Value	0.829

	A	B	C	D	E	F	G	H	I	J	K	L
1379	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1380												
1381	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1382	DL/2 Substitution Method						DL/2 Substitution Method					
1383	Mean					0.0007846	Mean					-7.634
1384	SD					0.000895	SD					0.963
1385	95% DL/2 (t) UCL					0.00127	95% H-Stat (DL/2) UCL					0.00472
1386												
1387	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1388	**MLE method failed to converge properly**						Mean in Log Scale					-7.999
1389							SD in Log Scale					0.532
1390							Mean in Original Scale					0.0003933
1391							SD in Original Scale					0.0002895
1392							95% Percentile Bootstrap UCL					0.0005515
1393							95% BCA Bootstrap UCL					0.0006238
1394												
1395	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1396	k star (bias corrected)					1.998	**Data do not follow a Discernable Distribution (0.05)**					
1397	Theta Star					0.0002018						
1398	nu star					35.97						
1399												
1400	A-D Test Statistic					0.983	**Nonparametric Statistics**					
1401	5% A-D Critical Value					0.727	Kaplan-Meier (KM) Method					
1402	K-S Test Statistic					0.727	Mean					0.0004033
1403	5% K-S Critical Value					0.281	SD					0.0003012
1404	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.0001065
1405							95% KM (t) UCL					0.0005963
1406	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0005785
1407	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0005985
1408	Minimum					0.0002	95% KM (bootstrap t) UCL					0.0009473
1409	Maximum					0.0012	95% KM (BCA) UCL					0.0006256
1410	Mean					0.0004062	95% KM (Percentile Bootstrap) UCL					0.0005911
1411	Median					0.00027	95% KM (Chebyshev) UCL					0.0008674
1412	SD					0.0002918	97.5% KM (Chebyshev) UCL					0.00107
1413	k star					2.457	99% KM (Chebyshev) UCL					0.00146
1414	Theta star					0.0001653						
1415	Nu star					54.04	**Potential UCLs to Use**					
1416	AppChi2					38.15	95% KM (Chebyshev) UCL					0.0008674
1417	95% Gamma Approximate UCL					0.0005753						
1418	95% Adjusted Gamma UCL					0.00061						
1419	**Note: DL/2 is not a recommended method.**											
1420												
1421												
1422	**DEHP (mg/kg)**											
1423												
1424	**General Statistics**											
1425	Number of Valid Samples					13	Number of Detected Data					11
1426	Number of Unique Samples					10	Number of Non-Detect Data					2
1427							Percent Non-Detects					15.38%
1428												
1429	**Raw Statistics**						**Log-transformed Statistics**					
1430	Minimum Detected					0.013	Minimum Detected					-4.343
1431	Maximum Detected					0.2	Maximum Detected					-1.609

1432				Mean of Detected	0.0474					Mean of Detected	-3.43	
1433				SD of Detected	0.0558					SD of Detected	0.809	
1434				Minimum Non-Detect	0.62					Minimum Non-Detect	-0.478	
1435				Maximum Non-Detect	0.62					Maximum Non-Detect	-0.478	
1436												
1437												
1438	**UCL Statistics**											
1439	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1440				Shapiro Wilk Test Statistic	0.62					Shapiro Wilk Test Statistic	0.865	
1441				5% Shapiro Wilk Critical Value	0.85					5% Shapiro Wilk Critical Value	0.85	
1442	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1443												
1444	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1445				DL/2 Substitution Method						DL/2 Substitution Method		
1446				Mean	0.0878					Mean	-3.082	
1447				SD	0.111					SD	1.125	
1448				95% DL/2 (t) UCL	0.143					95% H-Stat (DL/2) UCL	0.235	
1449												
1450				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
1451	**MLE method failed to converge properly**									Mean in Log Scale	-3.43	
1452										SD in Log Scale	0.755	
1453										Mean in Original Scale	0.0455	
1454										SD in Original Scale	0.0514	
1455										95% Percentile Bootstrap UCL	0.0702	
1456										95% BCA Bootstrap UCL	0.083	
1457												
1458	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1459				k star (bias corrected)	1.121		**Data appear Lognormal at 5% Significance Level**					
1460				Theta Star	0.0423							
1461				nu star	24.66							
1462												
1463				A-D Test Statistic	1.081		**Nonparametric Statistics**					
1464				5% A-D Critical Value	0.743					Kaplan-Meier (KM) Method		
1465				K-S Test Statistic	0.743					Mean	0.0474	
1466				5% K-S Critical Value	0.26					SD	0.0532	
1467	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean	0.0168	
1468										95% KM (t) UCL	0.0774	
1469	**Assuming Gamma Distribution**									95% KM (z) UCL	0.0751	
1470				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0776	
1471				Minimum	0.013					95% KM (bootstrap t) UCL	0.208	
1472				Maximum	0.2					95% KM (BCA) UCL	0.0777	
1473				Mean	0.0475					95% KM (Percentile Bootstrap) UCL	0.0779	
1474				Median	0.0275					95% KM (Chebyshev) UCL	0.121	
1475				SD	0.0519					97.5% KM (Chebyshev) UCL	0.153	
1476				k star	1.279					99% KM (Chebyshev) UCL	0.215	
1477				Theta star	0.0371							
1478				Nu star	33.26		**Potential UCLs to Use**					
1479				AppChi2	21.07					95% KM (Chebyshev) UCL	0.121	
1480				95% Gamma Approximate UCL	0.0749							
1481				95% Adjusted Gamma UCL	0.0802							
1482	**Note: DL/2 is not a recommended method.**											
1483												
1484												

1485	CS2 (mg/kg)											
1486												
1487	General Statistics											
1488					Number of Valid Samples	11			Number of Detected Data	10		
1489					Number of Unique Samples	10			Number of Non-Detect Data	1		
1490									Percent Non-Detects	9.09%		
1491												
1492	Raw Statistics						Log-transformed Statistics					
1493					Minimum Detected	0.0013			Minimum Detected	-6.645		
1494					Maximum Detected	0.0057			Maximum Detected	-5.167		
1495					Mean of Detected	0.0032			Mean of Detected	-5.853		
1496					SD of Detected	0.00149			SD of Detected	0.507		
1497					Minimum Non-Detect	0.005			Minimum Non-Detect	-5.298		
1498					Maximum Non-Detect	0.005			Maximum Non-Detect	-5.298		
1499												
1500												
1501	UCL Statistics											
1502	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
1503					Shapiro Wilk Test Statistic	0.957			Shapiro Wilk Test Statistic	0.951		
1504					5% Shapiro Wilk Critical Value	0.842			5% Shapiro Wilk Critical Value	0.842		
1505	Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
1506												
1507	Assuming Normal Distribution						Assuming Lognormal Distribution					
1508					DL/2 Substitution Method				DL/2 Substitution Method			
1509					Mean	0.00314			Mean	-5.865		
1510					SD	0.00143			SD	0.483		
1511					95% DL/2 (t) UCL	0.00392			95% H-Stat (DL/2) UCL	0.00432		
1512												
1513					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1514	MLE method failed to converge properly								Mean in Log Scale	-5.867		
1515									SD in Log Scale	0.483		
1516									Mean in Original Scale	0.00313		
1517									SD in Original Scale	0.00143		
1518									95% Percentile Bootstrap UCL	0.00386		
1519									95% BCA Bootstrap UCL	0.00391		
1520												
1521	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
1522					k star (bias corrected)	3.416	Data appear Normal at 5% Significance Level					
1523					Theta Star	0.0009369						
1524					nu star	68.31						
1525												
1526					A-D Test Statistic	0.194	Nonparametric Statistics					
1527					5% A-D Critical Value	0.729			Kaplan-Meier (KM) Method			
1528					K-S Test Statistic	0.729			Mean	0.00315		
1529					5% K-S Critical Value	0.268			SD	0.00139		
1530	Data appear Gamma Distributed at 5% Significance Level								SE of Mean	0.0004532		
1531									95% KM (t) UCL	0.00397		
1532	Assuming Gamma Distribution								95% KM (z) UCL	0.0039		
1533					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL	0.00397		
1534					Minimum	0.0013			95% KM (bootstrap t) UCL	0.00399		
1535					Maximum	0.0057			95% KM (BCA) UCL	0.00392		
1536					Mean	0.0032			95% KM (Percentile Bootstrap) UCL	0.0039		
1537					Median	0.00316			95% KM (Chebyshev) UCL	0.00513		

1538					SD	0.00141				97.5% KM (Chebyshev) UCL		0.00598
1539					k star	3.876				99% KM (Chebyshev) UCL		0.00766
1540					Theta star	0.0008245						
1541					Nu star	85.28	**Potential UCLs to Use**					
1542					AppChi2	64.99				95% KM (t) UCL		0.00397
1543				95% Gamma Approximate UCL		0.00419				95% KM (Percentile Bootstrap) UCL		0.0039
1544				95% Adjusted Gamma UCL		0.00439						
1545	**Note: DL/2 is not a recommended method.**											
1546												
1547												
1548	**DNBP (mg/kg)**											
1549												
1550	**General Statistics**											
1551				Number of Valid Samples		13				Number of Detected Data		11
1552				Number of Unique Samples		9				Number of Non-Detect Data		2
1553										Percent Non-Detects		15.38%
1554												
1555	**Raw Statistics**						**Log-transformed Statistics**					
1556				Minimum Detected		0.024				Minimum Detected		-3.73
1557				Maximum Detected		0.21				Maximum Detected		-1.561
1558				Mean of Detected		0.0529				Mean of Detected		-3.158
1559				SD of Detected		0.0527				SD of Detected		0.577
1560				Minimum Non-Detect		0.061				Minimum Non-Detect		-2.797
1561				Maximum Non-Detect		0.061				Maximum Non-Detect		-2.797
1562												
1563												
1564	**UCL Statistics**											
1565	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1566				Shapiro Wilk Test Statistic		0.488				Shapiro Wilk Test Statistic		0.718
1567				5% Shapiro Wilk Critical Value		0.85				5% Shapiro Wilk Critical Value		0.85
1568	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1569												
1570	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1571				DL/2 Substitution Method						DL/2 Substitution Method		
1572				Mean		0.0494				Mean		-3.209
1573				SD		0.0489				SD		0.541
1574				95% DL/2 (t) UCL		0.0736				95% H-Stat (DL/2) UCL		0.0544
1575												
1576				Maximum Likelihood Estimate(MLE) Method		N/A				Log ROS Method		
1577	**MLE method failed to converge properly**									Mean in Log Scale		-3.17
1578										SD in Log Scale		0.535
1579										Mean in Original Scale		0.0509
1580										SD in Original Scale		0.0485
1581										95% Percentile Bootstrap UCL		0.0761
1582										95% BCA Bootstrap UCL		0.0912
1583												
1584	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1585				k star (bias corrected)		1.842	**Data do not follow a Discernable Distribution (0.05)**					
1586				Theta Star		0.0287						
1587				nu star		40.52						
1588												
1589				A-D Test Statistic		1.736	**Nonparametric Statistics**					
1590				5% A-D Critical Value		0.736				Kaplan-Meier (KM) Method		

1591				K-S Test Statistic	0.736					Mean	0.0504	
1592				5% K-S Critical Value	0.258					SD	0.0467	
1593				**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	0.0136	
1594										95% KM (t) UCL	0.0747	
1595				**Assuming Gamma Distribution**						95% KM (z) UCL	0.0728	
1596				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0745	
1597				Minimum	0.024					95% KM (bootstrap t) UCL	0.154	
1598				Maximum	0.21					95% KM (BCA) UCL	0.0782	
1599				Mean	0.0529					95% KM (Percentile Bootstrap) UCL	0.0756	
1600				Median	0.04					95% KM (Chebyshev) UCL	0.11	
1601				SD	0.0481					97.5% KM (Chebyshev) UCL	0.135	
1602				k star	2.258					99% KM (Chebyshev) UCL	0.186	
1603				Theta star	0.0234							
1604				Nu star	58.71					**Potential UCLs to Use**		
1605				AppChi2	42.09					95% KM (Chebyshev) UCL	0.11	
1606				95% Gamma Approximate UCL	0.0737							
1607				95% Adjusted Gamma UCL	0.0774							
1608	**Note: DL/2 is not a recommended method.**											
1609												
1610												
1611	**Methylcyclohexane (mg/kg)**											
1612												
1613					**General Statistics**							
1614				Number of Valid Samples	11					Number of Detected Data	9	
1615				Number of Unique Samples	8					Number of Non-Detect Data	2	
1616										Percent Non-Detects	18.18%	
1617												
1618				**Raw Statistics**						**Log-transformed Statistics**		
1619				Minimum Detected	0.00019					Minimum Detected	-8.568	
1620				Maximum Detected	0.0017					Maximum Detected	-6.377	
1621				Mean of Detected	0.0004706					Mean of Detected	-7.96	
1622				SD of Detected	0.0004872					SD of Detected	0.731	
1623				Minimum Non-Detect	0.01					Minimum Non-Detect	-4.605	
1624				Maximum Non-Detect	0.01					Maximum Non-Detect	-4.605	
1625												
1626												
1627					**UCL Statistics**							
1628				**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**		
1629				Shapiro Wilk Test Statistic	0.639					Shapiro Wilk Test Statistic	0.827	
1630				5% Shapiro Wilk Critical Value	0.829					5% Shapiro Wilk Critical Value	0.829	
1631				**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**		
1632												
1633				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
1634				DL/2 Substitution Method						DL/2 Substitution Method		
1635				Mean	0.00129					Mean	-7.476	
1636				SD	0.00188					SD	1.26	
1637				95% DL/2 (t) UCL	0.00232					95% H-Stat (DL/2) UCL	0.012	
1638												
1639				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
1640				**MLE method failed to converge properly**						Mean in Log Scale	-7.96	
1641										SD in Log Scale	0.672	
1642										Mean in Original Scale	0.0004524	
1643										SD in Original Scale	0.0004412	

1644											95% Percentile Bootstrap UCL	0.0006877
1645											95% BCA Bootstrap UCL	0.0008087
1646												
1647	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1648					k star (bias corrected)	1.29	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
1649					Theta Star	0.0003647						
1650					nu star	23.22						
1651												
1652					A-D Test Statistic	0.902	**Nonparametric Statistics**					
1653					5% A-D Critical Value	0.731	Kaplan-Meier (KM) Method					
1654					K-S Test Statistic	0.731	Mean	0.0004706				
1655					5% K-S Critical Value	0.283	SD	0.0004593				
1656	**Data follow Appr. Gamma Distribution at 5% Significance Level**						SE of Mean	0.0001624				
1657							95% KM (t) UCL	0.0007649				
1658	**Assuming Gamma Distribution**						95% KM (z) UCL	0.0007377				
1659					Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0007682				
1660					Minimum	0.00019	95% KM (bootstrap t) UCL	0.00161				
1661					Maximum	0.0017	95% KM (BCA) UCL	0.0008078				
1662					Mean	0.0004723	95% KM (Percentile Bootstrap) UCL	0.0007694				
1663					Median	0.00027	95% KM (Chebyshev) UCL	0.00118				
1664					SD	0.0004461	97.5% KM (Chebyshev) UCL	0.00148				
1665					k star	1.547	99% KM (Chebyshev) UCL	0.00209				
1666					Theta star	0.0003054						
1667					Nu star	34.02	**Potential UCLs to Use**					
1668					AppChi2	21.68	95% KM (BCA) UCL	0.0008078				
1669					95% Gamma Approximate UCL	0.0007411						
1670					95% Adjusted Gamma UCL	0.0007999						
1671	**Note: DL/2 is not a recommended method.**											
1672												
1673												
1674	**Toluene (mg/kg)**											
1675												
1676	**General Statistics**											
1677					Number of Valid Samples	11	Number of Detected Data	10				
1678					Number of Unique Samples	10	Number of Non-Detect Data	1				
1679							Percent Non-Detects	9.09%				
1680												
1681	**Raw Statistics**						**Log-transformed Statistics**					
1682					Minimum Detected	0.00018	Minimum Detected	-8.623				
1683					Maximum Detected	0.0013	Maximum Detected	-6.645				
1684					Mean of Detected	0.000533	Mean of Detected	-7.795				
1685					SD of Detected	0.0004229	SD of Detected	0.736				
1686					Minimum Non-Detect	0.005	Minimum Non-Detect	-5.298				
1687					Maximum Non-Detect	0.005	Maximum Non-Detect	-5.298				
1688												
1689												
1690	**UCL Statistics**											
1691	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1692					Shapiro Wilk Test Statistic	0.792	Shapiro Wilk Test Statistic	0.888				
1693					5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842				
1694	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1695												
1696	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					

1697				DL/2 Substitution Method						DL/2 Substitution Method		
1698				Mean	0.0007118					Mean		-7.631
1699				SD	0.000716					SD		0.885
1700				95% DL/2 (t) UCL	0.0011					95% H-Stat (DL/2) UCL		0.00216
1701												
1702				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
1703				**MLE method failed to converge properly**						Mean in Log Scale		-7.795
1704										SD in Log Scale		0.698
1705										Mean in Original Scale		0.000522
1706										SD in Original Scale		0.0004028
1707										95% Percentile Bootstrap UCL		0.0007241
1708										95% BCA Bootstrap UCL		0.0007627
1709												
1710				**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**		
1711				k star (bias corrected)	1.529					**Data appear Gamma Distributed at 5% Significance Level**		
1712				Theta Star	0.0003485							
1713				nu star	30.59							
1714												
1715				A-D Test Statistic	0.654					**Nonparametric Statistics**		
1716				5% A-D Critical Value	0.735					Kaplan-Meier (KM) Method		
1717				K-S Test Statistic	0.735					Mean		0.000533
1718				5% K-S Critical Value	0.27					SD		0.0004012
1719				**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean		0.0001337
1720										95% KM (t) UCL		0.0007754
1721				**Assuming Gamma Distribution**						95% KM (z) UCL		0.000753
1722				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		0.0007766
1723				Minimum	0.00018					95% KM (bootstrap t) UCL		0.0009387
1724				Maximum	0.0013					95% KM (BCA) UCL		0.0007243
1725				Mean	0.0005354					95% KM (Percentile Bootstrap) UCL		0.0007589
1726				Median	0.00037					95% KM (Chebyshev) UCL		0.00112
1727				SD	0.0004013					97.5% KM (Chebyshev) UCL		0.00137
1728				k star	1.722					99% KM (Chebyshev) UCL		0.00186
1729				Theta star	0.000311							
1730				Nu star	37.88					**Potential UCLs to Use**		
1731				AppChi2	24.78					95% KM (Chebyshev) UCL		0.00112
1732				95% Gamma Approximate UCL	0.0008183							
1733				95% Adjusted Gamma UCL	0.0008791							
1734	**Note: DL/2 is not a recommended method.**											
1735												
1736												
1737	**Trichlorofluoromethane (mg/kg)**											
1738												
1739				**General Statistics**								
1740				Number of Valid Samples	11					Number of Detected Data		3
1741				Number of Unique Samples	3					Number of Non-Detect Data		8
1742										Percent Non-Detects		72.73%
1743												
1744				**Raw Statistics**						**Log-transformed Statistics**		
1745				Minimum Detected	0.00038					Minimum Detected		-7.875
1746				Maximum Detected	0.00064					Maximum Detected		-7.354
1747				Mean of Detected	0.00053					Mean of Detected		-7.566
1748				SD of Detected	0.0001345					SD of Detected		0.274
1749				Minimum Non-Detect	0.005					Minimum Non-Detect		-5.298

1750				Maximum Non-Detect	0.005					Maximum Non-Detect	-5.298	
1751												
1752												
1753	**UCL Statistics**											
1754	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1755				Shapiro Wilk Test Statistic	0.934					Shapiro Wilk Test Statistic	0.907	
1756				5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767	
1757	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1758												
1759	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1760				DL/2 Substitution Method						DL/2 Substitution Method		
1761				Mean	0.00196					Mean	-6.421	
1762				SD	0.0009222					SD	0.746	
1763				95% DL/2 (t) UCL	0.00247					95% H-Stat (DL/2) UCL	0.00833	
1764												
1765				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
1766	**MLE method failed to converge properly**									Mean in Log Scale	-7.566	
1767										SD in Log Scale	0.288	
1768										Mean in Original Scale	0.0005372	
1769										SD in Original Scale	0.0001528	
1770										95% Percentile Bootstrap UCL	0.0006087	
1771										95% BCA Bootstrap UCL	0.0006145	
1772												
1773	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1774				k star (bias corrected)	N/A		**Data appear Normal at 5% Significance Level**					
1775				Theta Star	N/A							
1776				nu star	N/A							
1777												
1778				A-D Test Statistic	0.366		**Nonparametric Statistics**					
1779				5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method		
1780				K-S Test Statistic	N/A					Mean	0.00053	
1781				5% K-S Critical Value	N/A					SD	0.0001099	
1782	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean	7.768E-05	
1783										95% KM (t) UCL	0.0006708	
1784	**Assuming Gamma Distribution**									95% KM (z) UCL	0.0006578	
1785				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0006944	
1786				Minimum	N/A					95% KM (bootstrap t) UCL	0.0006535	
1787				Maximum	N/A					95% KM (BCA) UCL	0.00064	
1788				Mean	N/A					95% KM (Percentile Bootstrap) UCL	0.00064	
1789				Median	N/A					95% KM (Chebyshev) UCL	0.0008686	
1790				SD	N/A					97.5% KM (Chebyshev) UCL	0.00102	
1791				k star	N/A					99% KM (Chebyshev) UCL	0.0013	
1792				Theta star	N/A							
1793				Nu star	N/A		**Potential UCLs to Use**					
1794				AppChi2	N/A					95% KM (t) UCL	0.0006708	
1795				95% Gamma Approximate UCL	N/A					95% KM (Percentile Bootstrap) UCL	0.00064	
1796				95% Adjusted Gamma UCL	N/A							
1797	**Warning: Recommended UCL exceeds the maximum observation**											
1798	**Note: DL/2 is not a recommended method.**											
1799												
1800												
1801	**Xylenes (total) (mg/kg)**											
1802												

	A	B	C	D	E	F	G	H	I	J	K	L
1803	**General Statistics**											
1804					Number of Valid Samples	11				Number of Detected Data		3
1805					Number of Unique Samples	3				Number of Non-Detect Data		8
1806										Percent Non-Detects		72.73%
1807												
1808	**Raw Statistics**						**Log-transformed Statistics**					
1809					Minimum Detected	0.00041				Minimum Detected		-7.799
1810					Maximum Detected	0.0013				Maximum Detected		-6.645
1811					Mean of Detected	0.0007933				Mean of Detected		-7.251
1812					SD of Detected	0.0004576				SD of Detected		0.579
1813					Minimum Non-Detect	0.005				Minimum Non-Detect		-5.298
1814					Maximum Non-Detect	0.005				Maximum Non-Detect		-5.298
1815												
1816												
1817	**UCL Statistics**											
1818	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1819					Shapiro Wilk Test Statistic	0.946				Shapiro Wilk Test Statistic		0.993
1820					5% Shapiro Wilk Critical Value	0.767				5% Shapiro Wilk Critical Value		0.767
1821	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1822												
1823	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1824					DL/2 Substitution Method					DL/2 Substitution Method		
1825					Mean	0.00203				Mean		-6.335
1826					SD	0.000823				SD		0.643
1827					95% DL/2 (t) UCL	0.00248				95% H-Stat (DL/2) UCL		0.00452
1828												
1829					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
1830	**MLE method failed to converge properly**									Mean in Log Scale		-7.251
1831										SD in Log Scale		0.633
1832										Mean in Original Scale		0.0008477
1833										SD in Original Scale		0.0005343
1834										95% Percentile Bootstrap UCL		0.00111
1835										95% BCA Bootstrap UCL		0.00117
1836												
1837	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1838					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
1839					Theta Star	N/A						
1840					nu star	N/A						
1841												
1842					A-D Test Statistic	0.272	**Nonparametric Statistics**					
1843					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
1844					K-S Test Statistic	N/A				Mean		0.0007933
1845					5% K-S Critical Value	N/A				SD		0.0003737
1846	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.0002642
1847										95% KM (t) UCL		0.00127
1848	**Assuming Gamma Distribution**									95% KM (z) UCL		0.00123
1849					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.00135
1850					Minimum	N/A				95% KM (bootstrap t) UCL		0.00209
1851					Maximum	N/A				95% KM (BCA) UCL		0.0013
1852					Mean	N/A				95% KM (Percentile Bootstrap) UCL		0.0013
1853					Median	N/A				95% KM (Chebyshev) UCL		0.00195
1854					SD	N/A				97.5% KM (Chebyshev) UCL		0.00244
1855					k star	N/A				99% KM (Chebyshev) UCL		0.00342

	A	B	C	D	E	F	G	H	I	J	K	L
1856					Theta star	N/A						
1857					Nu star	N/A	**Potential UCLs to Use**					
1858					AppChi2	N/A					95% KM (t) UCL	0.00127
1859				95% Gamma Approximate UCL		N/A					95% KM (Percentile Bootstrap) UCL	0.0013
1860				95% Adjusted Gamma UCL		N/A						
1861	**Note: DL/2 is not a recommended method.**											
1862												

1				General UCL Statistics for Data Sets with Non-Detects								
2		User Selected Options										
3			From File	WorkSheet.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	2-Butanone_mg/kg											
10												
11					General Statistics							
12				Number of Valid Samples	6			Number of Detected Data	4			
13				Number of Unique Samples	4			Number of Non-Detect Data	2			
14								Percent Non-Detects	33.33%			
15												
16				Raw Statistics				Log-transformed Statistics				
17				Minimum Detected	0.026			Minimum Detected	-3.65			
18				Maximum Detected	0.0488			Maximum Detected	-3.02			
19				Mean of Detected	0.033			Mean of Detected	-3.447			
20				SD of Detected	0.0107			SD of Detected	0.291			
21				Minimum Non-Detect	0.028			Minimum Non-Detect	-3.576			
22				Maximum Non-Detect	0.037			Maximum Non-Detect	-3.297			
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended							Number treated as Non-Detect	5			
25	For all methods (except KM, DL/2, and ROS Methods),							Number treated as Detected	1			
26	Observations < Largest ND are treated as NDs							Single DL Non-Detect Percentage	83.33%			
27												
28					UCL Statistics							
29				Normal Distribution Test with Detected Values Only				Lognormal Distribution Test with Detected Values Only				
30				Shapiro Wilk Test Statistic	0.761			Shapiro Wilk Test Statistic	0.798			
31				5% Shapiro Wilk Critical Value	0.748			5% Shapiro Wilk Critical Value	0.748			
32				Data appear Normal at 5% Significance Level				Data appear Lognormal at 5% Significance Level				
33												
34				Assuming Normal Distribution				Assuming Lognormal Distribution				
35				DL/2 Substitution Method				DL/2 Substitution Method				
36				Mean	0.0274			Mean	-3.674			
37				SD	0.012			SD	0.427			
38				95% DL/2 (t) UCL	0.0373			95% H-Stat (DL/2) UCL	0.0577			
39												
40				Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method				
41				MLE method failed to converge properly				Mean in Log Scale	-3.501			
42								SD in Log Scale	0.242			
43								Mean in Original Scale	0.031			
44								SD in Original Scale	0.00885			
45								95% Percentile Bootstrap UCL	0.0378			
46								95% BCA Bootstrap UCL	0.0387			
47												
48				Gamma Distribution Test with Detected Values Only				Data Distribution Test with Detected Values Only				
49				k star (bias corrected)	3.855			Data appear Normal at 5% Significance Level				
50				Theta Star	0.00855							
51				nu star	30.84							
52												
53				A-D Test Statistic	0.594			Nonparametric Statistics				

54				5% A-D Critical Value	0.657					Kaplan-Meier (KM) Method		
55				K-S Test Statistic	0.657					Mean	0.0309	
56				5% K-S Critical Value	0.395					SD	0.00811	
57	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean	0.00384	
58										95% KM (t) UCL	0.0387	
59	**Assuming Gamma Distribution**									95% KM (z) UCL	0.0373	
60				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0383	
61				Minimum	0.026					95% KM (bootstrap t) UCL	0.0569	
62				Maximum	0.0488					95% KM (BCA) UCL	0.0377	
63				Mean	0.0325					95% KM (Percentile Bootstrap) UCL	0.0379	
64				Median	0.0295					95% KM (Chebyshev) UCL	0.0477	
65				SD	0.00847					97.5% KM (Chebyshev) UCL	0.0549	
66				k star	10.57					99% KM (Chebyshev) UCL	0.0692	
67				Theta star	0.00307							
68				Nu star	126.8					**Potential UCLs to Use**		
69				AppChi2	101.8					95% KM (t) UCL	0.0387	
70				95% Gamma Approximate UCL	0.0404					95% KM (Percentile Bootstrap) UCL	0.0379	
71				95% Adjusted Gamma UCL	N/A							
72	**Note: DL/2 is not a recommended method.**											
73												
74												
75	**Aluminum_mg/kg**											
76												
77					**General Statistics**							
78				Number of Valid Samples	6					Number of Unique Samples	6	
79												
80				**Raw Statistics**						**Log-transformed Statistics**		
81				Minimum	6170					Minimum of Log Data	8.727	
82				Maximum	15500					Maximum of Log Data	9.649	
83				Mean	11172					Mean of log Data	9.265	
84				Median	11650					SD of log Data	0.379	
85				SD	3878							
86				Coefficient of Variation	0.347							
87				Skewness	-0.241							
88												
89					**Relevant UCL Statistics**							
90				**Normal Distribution Test**						**Lognormal Distribution Test**		
91				Shapiro Wilk Test Statistic	0.915					Shapiro Wilk Test Statistic	0.904	
92				Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788	
93				**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**		
94												
95				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
96				95% Student's-t UCL	14362					95% H-UCL	17098	
97				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	18755	
98				95% Adjusted-CLT UCL	13609					97.5% Chebyshev (MVUE) UCL	22022	
99				95% Modified-t UCL	14336					99% Chebyshev (MVUE) UCL	28441	
100												
101				**Gamma Distribution Test**						**Data Distribution**		
102				k star (bias corrected)	4.62					**Data appear Normal at 5% Significance Level**		
103				Theta Star	2418							
104				nu star	55.44							
105				Approximate Chi Square Value (.05)	39.33					**Nonparametric Statistics**		
106				Adjusted Level of Significance	0.0122					95% CLT UCL	13776	

107					Adjusted Chi Square Value	34.49					95% Jackknife UCL	14362
108											95% Standard Bootstrap UCL	13571
109					Anderson-Darling Test Statistic	0.356					95% Bootstrap-t UCL	14232
110					Anderson-Darling 5% Critical Value	0.698					95% Hall's Bootstrap UCL	12974
111					Kolmogorov-Smirnov Test Statistic	0.242					95% Percentile Bootstrap UCL	13643
112					Kolmogorov-Smirnov 5% Critical Value	0.333					95% BCA Bootstrap UCL	13493
113					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	18072
114											97.5% Chebyshev(Mean, Sd) UCL	21058
115					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	26923
116					95% Approximate Gamma UCL	15748						
117					95% Adjusted Gamma UCL	17957						
118												
119					**Potential UCL to Use**						Use 95% Student's-t UCL	14362
120												
121												
122	**Anthracene_mg/kg**											
123												
124					**General Statistics**							
125					Number of Valid Samples	6					Number of Detected Data	3
126					Number of Unique Samples	3					Number of Non-Detect Data	3
127											Percent Non-Detects	50.00%
128												
129					**Raw Statistics**						**Log-transformed Statistics**	
130					Minimum Detected	0.0011					Minimum Detected	-6.812
131					Maximum Detected	0.019					Maximum Detected	-3.963
132					Mean of Detected	0.00733					Mean of Detected	-5.681
133					SD of Detected	0.0101					SD of Detected	1.512
134					Minimum Non-Detect	0.32					Minimum Non-Detect	-1.139
135					Maximum Non-Detect	0.72					Maximum Non-Detect	-0.329
136												
137	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	6
138	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	0
139	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	100.00%
140												
141					**UCL Statistics**							
142					**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**	
143					Shapiro Wilk Test Statistic	0.783					Shapiro Wilk Test Statistic	0.888
144					5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767
145					**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
146												
147					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
148					DL/2 Substitution Method						DL/2 Substitution Method	
149					Mean	0.118					Mean	-3.616
150					SD	0.141					SD	2.472
151					95% DL/2 (t) UCL	0.234					95% H-Stat (DL/2) UCL	285800000
152												
153					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
154					**MLE method failed to converge properly**						Mean in Log Scale	-5.681
155											SD in Log Scale	0.956
156											Mean in Original Scale	0.00537
157											SD in Original Scale	0.00675
158											95% Percentile Bootstrap UCL	0.0107
159											95% BCA Bootstrap UCL	0.011

160												
161	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
162	k star (bias corrected)				N/A		**Data appear Normal at 5% Significance Level**					
163	Theta Star				N/A							
164	nu star				N/A							
165												
166	A-D Test Statistic				0.459		**Nonparametric Statistics**					
167	5% A-D Critical Value				N/A		Kaplan-Meier (KM) Method					
168	K-S Test Statistic				N/A		Mean					0.00733
169	5% K-S Critical Value				N/A		SD					0.00826
170	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.00584
171							95% KM (t) UCL					0.0191
172	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0169
173	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0205
174	Minimum				N/A		95% KM (bootstrap t) UCL					0.183
175	Maximum				N/A		95% KM (BCA) UCL					0.019
176	Mean				N/A		95% KM (Percentile Bootstrap) UCL					0.019
177	Median				N/A		95% KM (Chebyshev) UCL					0.0328
178	SD				N/A		97.5% KM (Chebyshev) UCL					0.0438
179	k star				N/A		99% KM (Chebyshev) UCL					0.0654
180	Theta star				N/A							
181	Nu star				N/A		**Potential UCLs to Use**					
182	AppChi2				N/A		95% KM (t) UCL					0.0191
183	95% Gamma Approximate UCL				N/A		95% KM (Percentile Bootstrap) UCL					0.019
184	95% Adjusted Gamma UCL				N/A							
185	**Warning: Recommended UCL exceeds the maximum observation**											
186	**Note: DL/2 is not a recommended method.**											
187												
188												
189	**Arsenic_mg/kg**											
190												
191	**General Statistics**											
192	Number of Valid Samples				6		Number of Unique Samples					5
193												
194	**Raw Statistics**						**Log-transformed Statistics**					
195	Minimum				3.7		Minimum of Log Data					1.308
196	Maximum				18		Maximum of Log Data					2.89
197	Mean				7.467		Mean of log Data					1.865
198	Median				5.55		SD of log Data					0.541
199	SD				5.26							
200	Coefficient of Variation				0.704							
201	Skewness				2.243							
202												
203	**Relevant UCL Statistics**											
204	**Normal Distribution Test**						**Lognormal Distribution Test**					
205	Shapiro Wilk Test Statistic				0.681		Shapiro Wilk Test Statistic					0.831
206	Shapiro Wilk Critical Value				0.788		Shapiro Wilk Critical Value					0.788
207	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
208												
209	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
210	95% Student's-t UCL				11.79		95% H-UCL					14.77
211	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					14.28
212	95% Adjusted-CLT UCL				13.1		97.5% Chebyshev (MVUE) UCL					17.3

213				95% Modified-t UCL	12.12					99% Chebyshev (MVUE) UCL	23.25
214												
215				**Gamma Distribution Test**						**Data Distribution**	
216				k star (bias corrected)	1.905					**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
217				Theta Star	3.92						
218				nu star	22.86						
219				Approximate Chi Square Value (.05)	12.98					**Nonparametric Statistics**	
220				Adjusted Level of Significance	0.0122					95% CLT UCL	11
221				Adjusted Chi Square Value	10.4					95% Jackknife UCL	11.79
222										95% Standard Bootstrap UCL	10.7
223				Anderson-Darling Test Statistic	0.753					95% Bootstrap-t UCL	22.84
224				Anderson-Darling 5% Critical Value	0.701					95% Hall's Bootstrap UCL	29.55
225				Kolmogorov-Smirnov Test Statistic	0.332					95% Percentile Bootstrap UCL	11.47
226				Kolmogorov-Smirnov 5% Critical Value	0.334					95% BCA Bootstrap UCL	11.98
227				**Data follow Appr. Gamma Distribution at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	16.83
228										97.5% Chebyshev(Mean, Sd) UCL	20.88
229				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	28.83
230				95% Approximate Gamma UCL	13.15						
231				95% Adjusted Gamma UCL	16.41						
232											
233				**Potential UCL to Use**						Use 95% Approximate Gamma UCL	13.15
234											
235											
236	**Barium_mg/kg**										
237											
238				**General Statistics**							
239				Number of Valid Samples	6					Number of Unique Samples	6
240											
241				**Raw Statistics**						**Log-transformed Statistics**	
242				Minimum	63					Minimum of Log Data	4.143
243				Maximum	195					Maximum of Log Data	5.273
244				Mean	117.8					Mean of log Data	4.704
245				Median	116					SD of log Data	0.398
246				SD	46.55						
247				Coefficient of Variation	0.395						
248				Skewness	0.757						
249											
250				**Relevant UCL Statistics**							
251				**Normal Distribution Test**						**Lognormal Distribution Test**	
252				Shapiro Wilk Test Statistic	0.954					Shapiro Wilk Test Statistic	0.985
253				Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788
254				**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
255											
256				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
257				95% Student's-t UCL	156.1					95% H-UCL	185.1
258				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	201.2
259				95% Adjusted-CLT UCL	155.4					97.5% Chebyshev (MVUE) UCL	237.2
260				95% Modified-t UCL	157.1					99% Chebyshev (MVUE) UCL	308.1
261											
262				**Gamma Distribution Test**						**Data Distribution**	
263				k star (bias corrected)	4.036					**Data appear Normal at 5% Significance Level**	
264				Theta Star	29.2						
265				nu star	48.43						

266	Approximate Chi Square Value (.05)				33.45		**Nonparametric Statistics**					
267	Adjusted Level of Significance				0.0122					95% CLT UCL	149.1	
268	Adjusted Chi Square Value				29.03					95% Jackknife UCL	156.1	
269										95% Standard Bootstrap UCL	146.2	
270	Anderson-Darling Test Statistic				0.19					95% Bootstrap-t UCL	166.6	
271	Anderson-Darling 5% Critical Value				0.698					95% Hall's Bootstrap UCL	164.8	
272	Kolmogorov-Smirnov Test Statistic				0.155					95% Percentile Bootstrap UCL	147.7	
273	Kolmogorov-Smirnov 5% Critical Value				0.333					95% BCA Bootstrap UCL	148.3	
274	**Data appear Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL	200.7	
275										97.5% Chebyshev(Mean, Sd) UCL	236.5	
276	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL	306.9	
277	95% Approximate Gamma UCL				170.6							
278	95% Adjusted Gamma UCL				196.6							
279												
280	**Potential UCL to Use**									Use 95% Student's-t UCL	156.1	
281												
282												
283	**Benzene_mg/kg**											
284												
285	**General Statistics**											
286	Number of Valid Samples				6					Number of Detected Data	3	
287	Number of Unique Samples				2					Number of Non-Detect Data	3	
288										Percent Non-Detects	50.00%	
289												
290	**Raw Statistics**						**Log-transformed Statistics**					
291	Minimum Detected				0.0002					Minimum Detected	-8.517	
292	Maximum Detected				0.00028					Maximum Detected	-8.181	
293	Mean of Detected				0.0002533					Mean of Detected	-8.293	
294	SD of Detected				4.619E-05					SD of Detected	0.194	
295	Minimum Non-Detect				0.0055					Minimum Non-Detect	-5.203	
296	Maximum Non-Detect				0.017					Maximum Non-Detect	-4.075	
297												
298	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect	6	
299	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected	0	
300	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage	100.00%	
301												
302	**UCL Statistics**											
303	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
304	Shapiro Wilk Test Statistic				0.75					Shapiro Wilk Test Statistic	0.75	
305	5% Shapiro Wilk Critical Value				0.767					5% Shapiro Wilk Critical Value	0.767	
306	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
307												
308	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
309	DL/2 Substitution Method									DL/2 Substitution Method		
310	Mean				0.00261					Mean	-6.859	
311	SD				0.00324					SD	1.618	
312	95% DL/2 (t) UCL				0.00527					95% H-Stat (DL/2) UCL	378.2	
313												
314	Maximum Likelihood Estimate(MLE) Method				N/A					Log ROS Method		
315	**MLE method failed to converge properly**									Mean in Log Scale	-8.293	
316										SD in Log Scale	0.123	
317										Mean in Original Scale	0.0002518	
318										SD in Original Scale	2.926E-05	

319											95% Percentile Bootstrap UCL	0.0002667
320											95% BCA Bootstrap UCL	0.0002652
321												
322	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
323					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
324					Theta Star	N/A						
325					nu star	N/A						
326												
327					A-D Test Statistic	0.619	**Nonparametric Statistics**					
328					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
329					K-S Test Statistic	N/A					Mean	0.0002533
330					5% K-S Critical Value	N/A					SD	3.771E-05
331	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	2.667E-05
332											95% KM (t) UCL	0.0003071
333	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0002972
334					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0003134
335					Minimum	N/A					95% KM (bootstrap t) UCL	0.0002978
336					Maximum	N/A					95% KM (BCA) UCL	0.00028
337					Mean	N/A					95% KM (Percentile Bootstrap) UCL	0.00028
338					Median	N/A					95% KM (Chebyshev) UCL	0.0003696
339					SD	N/A					97.5% KM (Chebyshev) UCL	0.0004199
340					k star	N/A					99% KM (Chebyshev) UCL	0.0005187
341					Theta star	N/A						
342					Nu star	N/A	**Potential UCLs to Use**					
343					AppChi2	N/A					95% KM (t) UCL	0.0003071
344					95% Gamma Approximate UCL	N/A					95% KM (% Bootstrap) UCL	0.00028
345					95% Adjusted Gamma UCL	N/A						
346	**Warning: Recommended UCL exceeds the maximum observation**											
347	**Note: DL/2 is not a recommended method.**											
348												
349												
350	**Benzo(a)anthracene_mg/kg**											
351												
352	**General Statistics**											
353					Number of Valid Samples	6					Number of Unique Samples	6
354												
355	**Raw Statistics**						**Log-transformed Statistics**					
356					Minimum	0.017					Minimum of Log Data	-4.075
357					Maximum	0.067					Maximum of Log Data	-2.703
358					Mean	0.0361					Mean of log Data	-3.483
359					Median	0.0322					SD of log Data	0.631
360					SD	0.0215						
361					Coefficient of Variation	0.597						
362					Skewness	0.431						
363												
364	**Relevant UCL Statistics**											
365	**Normal Distribution Test**						**Lognormal Distribution Test**					
366					Shapiro Wilk Test Statistic	0.836					Shapiro Wilk Test Statistic	0.805
367					Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788
368	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
369												
370	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
371					95% Student's-t UCL	0.0538					95% H-UCL	0.0892

372	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	0.0766	
373				95% Adjusted-CLT UCL	0.0522					97.5% Chebyshev (MVUE) UCL	0.0941	
374				95% Modified-t UCL	0.0541					99% Chebyshev (MVUE) UCL	0.128	
375												
376	**Gamma Distribution Test**									**Data Distribution**		
377				k star (bias corrected)	1.739					**Data appear Normal at 5% Significance Level**		
378				Theta Star	0.0208							
379				nu star	20.87							
380				Approximate Chi Square Value (.05)	11.5					**Nonparametric Statistics**		
381				Adjusted Level of Significance	0.0122					95% CLT UCL	0.0506	
382				Adjusted Chi Square Value	9.091					95% Jackknife UCL	0.0538	
383										95% Standard Bootstrap UCL	0.049	
384				Anderson-Darling Test Statistic	0.658					95% Bootstrap-t UCL	0.0568	
385				Anderson-Darling 5% Critical Value	0.701					95% Hall's Bootstrap UCL	0.0457	
386				Kolmogorov-Smirnov Test Statistic	0.324					95% Percentile Bootstrap UCL	0.0499	
387				Kolmogorov-Smirnov 5% Critical Value	0.334					95% BCA Bootstrap UCL	0.0493	
388	**Data appear Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL	0.0744	
389										97.5% Chebyshev(Mean, Sd) UCL	0.091	
390	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL	0.124	
391				95% Approximate Gamma UCL	0.0655							
392				95% Adjusted Gamma UCL	0.0829							
393												
394	**Potential UCL to Use**									Use 95% Student's-t UCL	0.0538	
395												
396												
397	**Benzo(a)pyrene_mg/kg**											
398												
399	**General Statistics**											
400				Number of Valid Samples	6					Number of Unique Samples	6	
401												
402	**Raw Statistics**									**Log-transformed Statistics**		
403				Minimum	0.017					Minimum of Log Data	-4.075	
404				Maximum	0.079					Maximum of Log Data	-2.538	
405				Mean	0.0464					Mean of log Data	-3.272	
406				Median	0.0451					SD of log Data	0.719	
407				SD	0.0292							
408				Coefficient of Variation	0.63							
409				Skewness	0.0504							
410												
411	**Relevant UCL Statistics**											
412	**Normal Distribution Test**									**Lognormal Distribution Test**		
413				Shapiro Wilk Test Statistic	0.798					Shapiro Wilk Test Statistic	0.804	
414				Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788	
415	**Data appear Normal at 5% Significance Level**									**Data appear Lognormal at 5% Significance Level**		
416												
417	**Assuming Normal Distribution**									**Assuming Lognormal Distribution**		
418				95% Student's-t UCL	0.0704					95% H-UCL	0.144	
419	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	0.106	
420				95% Adjusted-CLT UCL	0.0662					97.5% Chebyshev (MVUE) UCL	0.132	
421				95% Modified-t UCL	0.0704					99% Chebyshev (MVUE) UCL	0.183	
422												
423	**Gamma Distribution Test**									**Data Distribution**		
424				k star (bias corrected)	1.434					**Data appear Normal at 5% Significance Level**		

425					Theta Star	0.0323						
426					nu star	17.21						
427					Approximate Chi Square Value (.05)	8.823				**Nonparametric Statistics**		
428					Adjusted Level of Significance	0.0122					95% CLT UCL	0.066
429					Adjusted Chi Square Value	6.768					95% Jackknife UCL	0.0704
430											95% Standard Bootstrap UCL	0.0646
431					Anderson-Darling Test Statistic	0.707					95% Bootstrap-t UCL	0.0733
432					Anderson-Darling 5% Critical Value	0.702					95% Hall's Bootstrap UCL	0.0567
433					Kolmogorov-Smirnov Test Statistic	0.301					95% Percentile Bootstrap UCL	0.0646
434					Kolmogorov-Smirnov 5% Critical Value	0.335					95% BCA Bootstrap UCL	0.0645
435					**Data follow Appr. Gamma Distribution at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	0.0984
436											97.5% Chebyshev(Mean, Sd) UCL	0.121
437					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	0.165
438					95% Approximate Gamma UCL	0.0904						
439					95% Adjusted Gamma UCL	0.118						
440												
441					**Potential UCL to Use**						Use 95% Student's-t UCL	0.0704
442												
443												
444	**Benzo(b)fluoranthene_mg/kg**											
445												
446					**General Statistics**							
447					Number of Valid Samples	6					Number of Detected Data	5
448					Number of Unique Samples	5					Number of Non-Detect Data	1
449											Percent Non-Detects	16.67%
450												
451					**Raw Statistics**					**Log-transformed Statistics**		
452					Minimum Detected	0.021					Minimum Detected	-3.863
453					Maximum Detected	0.12					Maximum Detected	-2.12
454					Mean of Detected	0.0744					Mean of Detected	-2.786
455					SD of Detected	0.0436					SD of Detected	0.743
456					Minimum Non-Detect	0.021					Minimum Non-Detect	-3.863
457					Maximum Non-Detect	0.021					Maximum Non-Detect	-3.863
458												
459												
460					**UCL Statistics**							
461					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
462					Shapiro Wilk Test Statistic	0.914					Shapiro Wilk Test Statistic	0.897
463					5% Shapiro Wilk Critical Value	0.762					5% Shapiro Wilk Critical Value	0.762
464					**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
465												
466					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
467					DL/2 Substitution Method						DL/2 Substitution Method	
468					Mean	0.0638					Mean	-3.081
469					SD	0.0469					SD	0.982
470					95% DL/2 (t) UCL	0.102					95% H-Stat (DL/2) UCL	0.478
471												
472					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
473					Mean	0.0612					Mean in Log Scale	-3.092
474					SD	0.0472					SD in Log Scale	1.002
475					95% MLE (t) UCL	0.1					Mean in Original Scale	0.0637
476					95% MLE (Tiku) UCL	0.1					SD in Original Scale	0.0471
477											95% Percentile Bootstrap UCL	0.093

478											95% BCA Bootstrap UCL	0.0942
479												
480	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
481				k star (bias corrected)	1.259		**Data appear Normal at 5% Significance Level**					
482				Theta Star	0.0591							
483				nu star	12.59							
484												
485				A-D Test Statistic	0.34		**Nonparametric Statistics**					
486				5% A-D Critical Value	0.683						Kaplan-Meier (KM) Method	
487				K-S Test Statistic	0.683						Mean	0.0655
488				5% K-S Critical Value	0.36						SD	0.0408
489	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0186
490											95% KM (t) UCL	0.103
491	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0962
492				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	0.103
493				Minimum	0.0139						95% KM (bootstrap t) UCL	0.0992
494				Maximum	0.12						95% KM (BCA) UCL	0.101
495				Mean	0.0643						95% KM (Percentile Bootstrap) UCL	0.0985
496				Median	0.0591						95% KM (Chebyshev) UCL	0.147
497				SD	0.0462						97.5% KM (Chebyshev) UCL	0.182
498				k star	1.045						99% KM (Chebyshev) UCL	0.251
499				Theta star	0.0616							
500				Nu star	12.54		**Potential UCLs to Use**					
501				AppChi2	5.587						95% KM (t) UCL	0.103
502				95% Gamma Approximate UCL	0.144						95% KM (Percentile Bootstrap) UCL	0.0985
503				95% Adjusted Gamma UCL	0.2							
504	**Note: DL/2 is not a recommended method.**											
505												
506												
507	**Benzo(g,h,i)perylene_mg/kg**											
508												
509	**General Statistics**											
510				Number of Valid Samples	6						Number of Unique Samples	6
511												
512	**Raw Statistics**						**Log-transformed Statistics**					
513				Minimum	0.02						Minimum of Log Data	-3.912
514				Maximum	0.1						Maximum of Log Data	-2.303
515				Mean	0.0499						Mean of log Data	-3.138
516				Median	0.043						SD of log Data	0.58
517				SD	0.0292							
518				Coefficient of Variation	0.585							
519				Skewness	1.079							
520												
521	**Relevant UCL Statistics**											
522	**Normal Distribution Test**						**Lognormal Distribution Test**					
523				Shapiro Wilk Test Statistic	0.908						Shapiro Wilk Test Statistic	0.97
524				Shapiro Wilk Critical Value	0.788						Shapiro Wilk Critical Value	0.788
525	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
526												
527	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
528				95% Student's-t UCL	0.0738						95% H-UCL	0.109
529	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	0.101
530				95% Adjusted-CLT UCL	0.075						97.5% Chebyshev (MVUE) UCL	0.123

531				95% Modified-t UCL	0.0747					99% Chebyshev (MVUE) UCL	0.167	
532												
533				**Gamma Distribution Test**						**Data Distribution**		
534				k star (bias corrected)	1.985					**Data appear Normal at 5% Significance Level**		
535				Theta Star	0.0251							
536				nu star	23.82							
537				Approximate Chi Square Value (.05)	13.71					**Nonparametric Statistics**		
538				Adjusted Level of Significance	0.0122					95% CLT UCL	0.0694	
539				Adjusted Chi Square Value	11.04					95% Jackknife UCL	0.0738	
540										95% Standard Bootstrap UCL	0.0678	
541				Anderson-Darling Test Statistic	0.254					95% Bootstrap-t UCL	0.084	
542				Anderson-Darling 5% Critical Value	0.7					95% Hall's Bootstrap UCL	0.0804	
543				Kolmogorov-Smirnov Test Statistic	0.232					95% Percentile Bootstrap UCL	0.069	
544				Kolmogorov-Smirnov 5% Critical Value	0.334					95% BCA Bootstrap UCL	0.071	
545				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	0.102	
546										97.5% Chebyshev(Mean, Sd) UCL	0.124	
547				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	0.168	
548				95% Approximate Gamma UCL	0.0866							
549				95% Adjusted Gamma UCL	0.108							
550												
551				**Potential UCL to Use**						Use 95% Student's-t UCL	0.0738	
552												
553												
554	**Benzo(k)fluoranthene_mg/kg**											
555												
556				**General Statistics**								
557				Number of Valid Samples	6					Number of Unique Samples	6	
558												
559				**Raw Statistics**						**Log-transformed Statistics**		
560				Minimum	0.0084					Minimum of Log Data	-4.78	
561				Maximum	0.0669					Maximum of Log Data	-2.705	
562				Mean	0.0367					Mean of log Data	-3.617	
563				Median	0.0356					SD of log Data	0.944	
564				SD	0.0265							
565				Coefficient of Variation	0.723							
566				Skewness	0.0766							
567												
568				**Relevant UCL Statistics**								
569				**Normal Distribution Test**						**Lognormal Distribution Test**		
570				Shapiro Wilk Test Statistic	0.866					Shapiro Wilk Test Statistic	0.848	
571				Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788	
572				**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**		
573												
574				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
575				95% Student's-t UCL	0.0585					95% H-UCL	0.237	
576				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	0.102	
577				95% Adjusted-CLT UCL	0.0549					97.5% Chebyshev (MVUE) UCL	0.129	
578				95% Modified-t UCL	0.0586					99% Chebyshev (MVUE) UCL	0.183	
579												
580				**Gamma Distribution Test**						**Data Distribution**		
581				k star (bias corrected)	0.986					**Data appear Normal at 5% Significance Level**		
582				Theta Star	0.0372							
583				nu star	11.83							

584				Approximate Chi Square Value (.05)	5.116		**Nonparametric Statistics**					
585				Adjusted Level of Significance	0.0122					95% CLT UCL	0.0545	
586				Adjusted Chi Square Value	3.644					95% Jackknife UCL	0.0585	
587										95% Standard Bootstrap UCL	0.053	
588				Anderson-Darling Test Statistic	0.462					95% Bootstrap-t UCL	0.0584	
589				Anderson-Darling 5% Critical Value	0.706					95% Hall's Bootstrap UCL	0.0512	
590				Kolmogorov-Smirnov Test Statistic	0.223					95% Percentile Bootstrap UCL	0.0531	
591				Kolmogorov-Smirnov 5% Critical Value	0.337					95% BCA Bootstrap UCL	0.0529	
592				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	0.0839	
593										97.5% Chebyshev(Mean, Sd) UCL	0.104	
594				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	0.145	
595				95% Approximate Gamma UCL	0.0849							
596				95% Adjusted Gamma UCL	0.119							
597												
598				**Potential UCL to Use**						Use 95% Student's-t UCL	0.0585	
599												
600												
601	**Beryllium_mg/kg**											
602												
603					**General Statistics**							
604				Number of Valid Samples	6					Number of Unique Samples	6	
605												
606				**Raw Statistics**			**Log-transformed Statistics**					
607				Minimum	0.23					Minimum of Log Data	-1.47	
608				Maximum	0.88					Maximum of Log Data	-0.128	
609				Mean	0.665					Mean of log Data	-0.495	
610				Median	0.74					SD of log Data	0.509	
611				SD	0.245							
612				Coefficient of Variation	0.369							
613				Skewness	-1.337							
614												
615					**Relevant UCL Statistics**							
616				**Normal Distribution Test**			**Lognormal Distribution Test**					
617				Shapiro Wilk Test Statistic	0.868					Shapiro Wilk Test Statistic	0.77	
618				Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788	
619				**Data appear Normal at 5% Significance Level**			**Data not Lognormal at 5% Significance Level**					
620												
621				**Assuming Normal Distribution**			**Assuming Lognormal Distribution**					
622				95% Student's-t UCL	0.867					95% H-UCL	1.291	
623				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	1.291	
624				95% Adjusted-CLT UCL	0.771					97.5% Chebyshev (MVUE) UCL	1.557	
625				95% Modified-t UCL	0.858					99% Chebyshev (MVUE) UCL	2.078	
626												
627				**Gamma Distribution Test**			**Data Distribution**					
628				k star (bias corrected)	3.079		**Data appear Normal at 5% Significance Level**					
629				Theta Star	0.216							
630				nu star	36.94							
631				Approximate Chi Square Value (.05)	24.03		**Nonparametric Statistics**					
632				Adjusted Level of Significance	0.0122					95% CLT UCL	0.83	
633				Adjusted Chi Square Value	20.35					95% Jackknife UCL	0.867	
634										95% Standard Bootstrap UCL	0.816	
635				Anderson-Darling Test Statistic	0.623					95% Bootstrap-t UCL	0.821	
636				Anderson-Darling 5% Critical Value	0.698					95% Hall's Bootstrap UCL	0.776	

637	Kolmogorov-Smirnov Test Statistic				0.297				95% Percentile Bootstrap UCL			0.807
638	Kolmogorov-Smirnov 5% Critical Value				0.333				95% BCA Bootstrap UCL			0.79
639	**Data appear Gamma Distributed at 5% Significance Level**								95% Chebyshev(Mean, Sd) UCL			1.102
640									97.5% Chebyshev(Mean, Sd) UCL			1.291
641	**Assuming Gamma Distribution**								99% Chebyshev(Mean, Sd) UCL			1.662
642	95% Approximate Gamma UCL				1.022							
643	95% Adjusted Gamma UCL				1.207							
644												
645	**Potential UCL to Use**								Use 95% Student's-t UCL			0.867
646												
647												
648	**Bis(2-ethylhexyl) phthalate_mg/kg**											
649												
650	**General Statistics**											
651	Number of Valid Samples				6				Number of Detected Data			3
652	Number of Unique Samples				3				Number of Non-Detect Data			3
653									Percent Non-Detects			50.00%
654												
655	**Raw Statistics**								**Log-transformed Statistics**			
656	Minimum Detected				0.023				Minimum Detected			-3.772
657	Maximum Detected				0.047				Maximum Detected			-3.058
658	Mean of Detected				0.0343				Mean of Detected			-3.414
659	SD of Detected				0.0121				SD of Detected			0.357
660	Minimum Non-Detect				0.4				Minimum Non-Detect			-0.916
661	Maximum Non-Detect				0.9				Maximum Non-Detect			-0.105
662												
663	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			6
664	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
665	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
666												
667	**UCL Statistics**											
668	**Normal Distribution Test with Detected Values Only**								**Lognormal Distribution Test with Detected Values Only**			
669	Shapiro Wilk Test Statistic				0.991				Shapiro Wilk Test Statistic			1
670	5% Shapiro Wilk Critical Value				0.767				5% Shapiro Wilk Critical Value			0.767
671	**Data appear Normal at 5% Significance Level**								**Data appear Lognormal at 5% Significance Level**			
672												
673	**Assuming Normal Distribution**								**Assuming Lognormal Distribution**			
674	DL/2 Substitution Method								DL/2 Substitution Method			
675	Mean				0.161				Mean			-2.368
676	SD				0.165				SD			1.202
677	95% DL/2 (t) UCL				0.296				95% H-Stat (DL/2) UCL			547.5
678												
679	Maximum Likelihood Estimate(MLE) Method				N/A				Log ROS Method			
680	**MLE method failed to converge properly**								Mean in Log Scale			-3.414
681									SD in Log Scale			0.226
682									Mean in Original Scale			0.0336
683									SD in Original Scale			0.00766
684									95% Percentile Bootstrap UCL			0.0383
685									95% BCA Bootstrap UCL			0.0383
686												
687	**Gamma Distribution Test with Detected Values Only**								**Data Distribution Test with Detected Values Only**			
688	k star (bias corrected)				N/A				**Data appear Normal at 5% Significance Level**			
689	Theta Star				N/A							

690					nu star	N/A						
691												
692					A-D Test Statistic	0.247	**Nonparametric Statistics**					
693					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
694					K-S Test Statistic	N/A					Mean	0.0343
695					5% K-S Critical Value	N/A					SD	0.00984
696	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.00696
697											95% KM (t) UCL	0.0484
698	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0458
699	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.05
700					Minimum	N/A					95% KM (bootstrap t) UCL	0.0589
701					Maximum	N/A					95% KM (BCA) UCL	0.0435
702					Mean	N/A					95% KM (Percentile Bootstrap) UCL	0.047
703					Median	N/A					95% KM (Chebyshev) UCL	0.0647
704					SD	N/A					97.5% KM (Chebyshev) UCL	0.0778
705					k star	N/A					99% KM (Chebyshev) UCL	0.104
706					Theta star	N/A						
707					Nu star	N/A	**Potential UCLs to Use**					
708					AppChi2	N/A					95% KM (t) UCL	0.0484
709					95% Gamma Approximate UCL	N/A					95% KM (Percentile Bootstrap) UCL	0.047
710					95% Adjusted Gamma UCL	N/A						
711	**Warning: Recommended UCL exceeds the maximum observation**											
712	**Note: DL/2 is not a recommended method.**											
713												
714												
715	**Cadmium_mg/kg**											
716												
717	**General Statistics**											
718					Number of Valid Samples	6					Number of Detected Data	3
719					Number of Unique Samples	3					Number of Non-Detect Data	3
720											Percent Non-Detects	50.00%
721												
722	**Raw Statistics**						**Log-transformed Statistics**					
723					Minimum Detected	0.56					Minimum Detected	-0.58
724					Maximum Detected	2.2					Maximum Detected	0.788
725					Mean of Detected	1.62					Mean of Detected	0.317
726					SD of Detected	0.919					SD of Detected	0.777
727					Minimum Non-Detect	0.063					Minimum Non-Detect	-2.765
728					Maximum Non-Detect	0.58					Maximum Non-Detect	-0.545
729												
730	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	4
731	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	2
732	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	66.67%
733												
734	**UCL Statistics**											
735	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
736					Shapiro Wilk Test Statistic	0.796					Shapiro Wilk Test Statistic	0.775
737					5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767
738	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
739												
740	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
741					DL/2 Substitution Method						DL/2 Substitution Method	
742					Mean	0.875					Mean	-1.067

743				SD	1.006					SD	1.745	
744				95% DL/2 (t) UCL	1.703					95% H-Stat (DL/2) UCL	407.6	
745												
746				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
747				**MLE method failed to converge properly**						Mean in Log Scale	-0.58	
748										SD in Log Scale	1.11	
749										Mean in Original Scale	0.927	
750										SD in Original Scale	0.957	
751										95% Percentile Bootstrap UCL	1.56	
752										95% BCA Bootstrap UCL	1.578	
753												
754				**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**		
755				k star (bias corrected)	N/A					**Data appear Normal at 5% Significance Level**		
756				Theta Star	N/A							
757				nu star	N/A							
758												
759				A-D Test Statistic	0.572					**Nonparametric Statistics**		
760				5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method		
761				K-S Test Statistic	N/A					Mean	1.09	
762				5% K-S Critical Value	N/A					SD	0.75	
763				**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	0.375	
764										95% KM (t) UCL	1.846	
765				**Assuming Gamma Distribution**						95% KM (z) UCL	1.707	
766				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	2.198	
767				Minimum	N/A					95% KM (bootstrap t) UCL	1.469	
768				Maximum	N/A					95% KM (BCA) UCL	2.2	
769				Mean	N/A					95% KM (Percentile Bootstrap) UCL	N/A	
770				Median	N/A					95% KM (Chebyshev) UCL	2.725	
771				SD	N/A					97.5% KM (Chebyshev) UCL	3.432	
772				k star	N/A					99% KM (Chebyshev) UCL	4.822	
773				Theta star	N/A							
774				Nu star	N/A					**Potential UCLs to Use**		
775				AppChi2	N/A					95% KM (t) UCL	1.846	
776				95% Gamma Approximate UCL	N/A					95% KM (Percentile Bootstrap) UCL	N/A	
777				95% Adjusted Gamma UCL	N/A							
778	**Note: DL/2 is not a recommended method.**											
779												
780												
781	**Calcium_mg/kg**											
782												
783						**General Statistics**							
784				Number of Valid Samples	6					Number of Unique Samples	6	
785												
786				**Raw Statistics**						**Log-transformed Statistics**		
787				Minimum	5590					Minimum of Log Data	8.629	
788				Maximum	25600					Maximum of Log Data	10.15	
789				Mean	14232					Mean of log Data	9.448	
790				Median	12450					SD of log Data	0.54	
791				SD	7241							
792				Coefficient of Variation	0.509							
793				Skewness	0.641							
794												
795						**Relevant UCL Statistics**							

796	**Normal Distribution Test**						**Lognormal Distribution Test**					
797				Shapiro Wilk Test Statistic	0.954						Shapiro Wilk Test Statistic	0.973
798				Shapiro Wilk Critical Value	0.788						Shapiro Wilk Critical Value	0.788
799	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
800												
801	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
802				95% Student's-t UCL	20188						95% H-UCL	28926
803	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	27997
804				95% Adjusted-CLT UCL	19920						97.5% Chebyshev (MVUE) UCL	33927
805				95% Modified-t UCL	20317						99% Chebyshev (MVUE) UCL	45577
806												
807	**Gamma Distribution Test**						**Data Distribution**					
808				k star (bias corrected)	2.36		**Data appear Normal at 5% Significance Level**					
809				Theta Star	6030							
810				nu star	28.32							
811				Approximate Chi Square Value (.05)	17.18		**Nonparametric Statistics**					
812				Adjusted Level of Significance	0.0122						95% CLT UCL	19094
813				Adjusted Chi Square Value	14.14						95% Jackknife UCL	20188
814											95% Standard Bootstrap UCL	18686
815				Anderson-Darling Test Statistic	0.206						95% Bootstrap-t UCL	22143
816				Anderson-Darling 5% Critical Value	0.699						95% Hall's Bootstrap UCL	24338
817				Kolmogorov-Smirnov Test Statistic	0.194						95% Percentile Bootstrap UCL	18650
818				Kolmogorov-Smirnov 5% Critical Value	0.333						95% BCA Bootstrap UCL	19083
819	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	27117
820											97.5% Chebyshev(Mean, Sd) UCL	32692
821	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	43644
822				95% Approximate Gamma UCL	23463							
823				95% Adjusted Gamma UCL	28504							
824												
825	**Potential UCL to Use**										Use 95% Student's-t UCL	20188
826												
827												
828	**Chromium_mg/kg**											
829												
830	**General Statistics**											
831				Number of Valid Samples	6						Number of Unique Samples	6
832												
833	**Raw Statistics**						**Log-transformed Statistics**					
834				Minimum	9.6						Minimum of Log Data	2.262
835				Maximum	33						Maximum of Log Data	3.497
836				Mean	17.62						Mean of log Data	2.781
837				Median	14.55						SD of log Data	0.446
838				SD	8.629							
839				Coefficient of Variation	0.49							
840				Skewness	1.381							
841												
842	**Relevant UCL Statistics**											
843	**Normal Distribution Test**						**Lognormal Distribution Test**					
844				Shapiro Wilk Test Statistic	0.872						Shapiro Wilk Test Statistic	0.955
845				Shapiro Wilk Critical Value	0.788						Shapiro Wilk Critical Value	0.788
846	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
847												
848	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					

849				95% Student's-t UCL	24.72					95% H-UCL	29.79
850				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	31.41
851				95% Adjusted-CLT UCL	25.53					97.5% Chebyshev (MVUE) UCL	37.42
852				95% Modified-t UCL	25.05					99% Chebyshev (MVUE) UCL	49.24
853											
854				**Gamma Distribution Test**						**Data Distribution**	
855				k star (bias corrected)	3.033					**Data appear Normal at 5% Significance Level**	
856				Theta Star	5.808						
857				nu star	36.4						
858				Approximate Chi Square Value (.05)	23.59					**Nonparametric Statistics**	
859				Adjusted Level of Significance	0.0122					95% CLT UCL	23.41
860				Adjusted Chi Square Value	19.95					95% Jackknife UCL	24.72
861										95% Standard Bootstrap UCL	22.9
862				Anderson-Darling Test Statistic	0.307					95% Bootstrap-t UCL	37.38
863				Anderson-Darling 5% Critical Value	0.698					95% Hall's Bootstrap UCL	60.57
864				Kolmogorov-Smirnov Test Statistic	0.231					95% Percentile Bootstrap UCL	23.18
865				Kolmogorov-Smirnov 5% Critical Value	0.333					95% BCA Bootstrap UCL	24.35
866				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	32.97
867										97.5% Chebyshev(Mean, Sd) UCL	39.62
868				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	52.67
869				95% Approximate Gamma UCL	27.18						
870				95% Adjusted Gamma UCL	32.14						
871											
872				**Potential UCL to Use**						Use 95% Student's-t UCL	24.72
873											
874											
875	**Chrysene_mg/kg**										
876											
877				**General Statistics**							
878				Number of Valid Samples	6					Number of Unique Samples	5
879											
880				**Raw Statistics**						**Log-transformed Statistics**	
881				Minimum	0.019					Minimum of Log Data	-3.963
882				Maximum	0.0982					Maximum of Log Data	-2.321
883				Mean	0.0546					Mean of log Data	-3.123
884				Median	0.0505					SD of log Data	0.75
885				SD	0.0354						
886				Coefficient of Variation	0.649						
887				Skewness	0.213						
888											
889				**Relevant UCL Statistics**							
890				**Normal Distribution Test**						**Lognormal Distribution Test**	
891				Shapiro Wilk Test Statistic	0.867					Shapiro Wilk Test Statistic	0.857
892				Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788
893				**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
894											
895				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
896				95% Student's-t UCL	0.0837					95% H-UCL	0.185
897				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	0.128
898				95% Adjusted-CLT UCL	0.0797					97.5% Chebyshev (MVUE) UCL	0.16
899				95% Modified-t UCL	0.0839					99% Chebyshev (MVUE) UCL	0.222
900											
901				**Gamma Distribution Test**						**Data Distribution**	

902				k star (bias corrected)	1.354		**Data appear Normal at 5% Significance Level**					
903				Theta Star	0.0403							
904				nu star	16.24							
905				Approximate Chi Square Value (.05)	8.135		**Nonparametric Statistics**					
906				Adjusted Level of Significance	0.0122					95% CLT UCL	0.0783	
907				Adjusted Chi Square Value	6.178					95% Jackknife UCL	0.0837	
908										95% Standard Bootstrap UCL	0.0762	
909				Anderson-Darling Test Statistic	0.458					95% Bootstrap-t UCL	0.0825	
910				Anderson-Darling 5% Critical Value	0.703					95% Hall's Bootstrap UCL	0.0743	
911				Kolmogorov-Smirnov Test Statistic	0.216					95% Percentile Bootstrap UCL	0.0771	
912				Kolmogorov-Smirnov 5% Critical Value	0.335					95% BCA Bootstrap UCL	0.0783	
913				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	0.118	
914										97.5% Chebyshev(Mean, Sd) UCL	0.145	
915				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	0.198	
916				95% Approximate Gamma UCL	0.109							
917				95% Adjusted Gamma UCL	0.143							
918												
919				**Potential UCL to Use**						Use 95% Student's-t UCL	0.0837	
920												
921												
922	**Cobalt_mg/kg**											
923												
924				**General Statistics**								
925				Number of Valid Samples	6					Number of Unique Samples	6	
926												
927				**Raw Statistics**			**Log-transformed Statistics**					
928				Minimum	6.9					Minimum of Log Data	1.932	
929				Maximum	20					Maximum of Log Data	2.996	
930				Mean	12.3					Mean of log Data	2.452	
931				Median	11.9					SD of log Data	0.372	
932				SD	4.613							
933				Coefficient of Variation	0.375							
934				Skewness	0.812							
935												
936				**Relevant UCL Statistics**								
937				**Normal Distribution Test**			**Lognormal Distribution Test**					
938				Shapiro Wilk Test Statistic	0.952					Shapiro Wilk Test Statistic	0.987	
939				Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788	
940				**Data appear Normal at 5% Significance Level**			**Data appear Lognormal at 5% Significance Level**					
941												
942				**Assuming Normal Distribution**			**Assuming Lognormal Distribution**					
943				95% Student's-t UCL	16.09					95% H-UCL	18.58	
944				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	20.44	
945				95% Adjusted-CLT UCL	16.06					97.5% Chebyshev (MVUE) UCL	23.97	
946				95% Modified-t UCL	16.2					99% Chebyshev (MVUE) UCL	30.89	
947												
948				**Gamma Distribution Test**			**Data Distribution**					
949				k star (bias corrected)	4.529		**Data appear Normal at 5% Significance Level**					
950				Theta Star	2.716							
951				nu star	54.34							
952				Approximate Chi Square Value (.05)	38.41		**Nonparametric Statistics**					
953				Adjusted Level of Significance	0.0122					95% CLT UCL	15.4	
954				Adjusted Chi Square Value	33.63					95% Jackknife UCL	16.09	

955											95% Standard Bootstrap UCL	15.16
956					Anderson-Darling Test Statistic	0.19					95% Bootstrap-t UCL	17.37
957					Anderson-Darling 5% Critical Value	0.698					95% Hall's Bootstrap UCL	16.99
958					Kolmogorov-Smirnov Test Statistic	0.145					95% Percentile Bootstrap UCL	15.2
959					Kolmogorov-Smirnov 5% Critical Value	0.333					95% BCA Bootstrap UCL	15.72
960					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	20.51
961											97.5% Chebyshev(Mean, Sd) UCL	24.06
962					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	31.04
963					95% Approximate Gamma UCL	17.4						
964					95% Adjusted Gamma UCL	19.88						
965												
966					**Potential UCL to Use**						Use 95% Student's-t UCL	16.09
967												
968												
969	**Copper_mg/kg**											
970												
971					**General Statistics**							
972					Number of Valid Samples	6					Number of Unique Samples	6
973												
974					**Raw Statistics**						**Log-transformed Statistics**	
975					Minimum	12.7					Minimum of Log Data	2.542
976					Maximum	26					Maximum of Log Data	3.258
977					Mean	20.08					Mean of log Data	2.958
978					Median	22					SD of log Data	0.326
979					SD	5.955						
980					Coefficient of Variation	0.296						
981					Skewness	-0.548						
982												
983					**Relevant UCL Statistics**							
984					**Normal Distribution Test**						**Lognormal Distribution Test**	
985					Shapiro Wilk Test Statistic	0.842					Shapiro Wilk Test Statistic	0.814
986					Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788
987					**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
988												
989					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
990					95% Student's-t UCL	24.98					95% H-UCL	28.47
991					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	31.81
992					95% Adjusted-CLT UCL	23.5					97.5% Chebyshev (MVUE) UCL	36.86
993					95% Modified-t UCL	24.89					99% Chebyshev (MVUE) UCL	46.79
994												
995					**Gamma Distribution Test**						**Data Distribution**	
996					k star (bias corrected)	6.192					**Data appear Normal at 5% Significance Level**	
997					Theta Star	3.244						
998					nu star	74.3						
999					Approximate Chi Square Value (.05)	55.45					**Nonparametric Statistics**	
1000					Adjusted Level of Significance	0.0122					95% CLT UCL	24.08
1001					Adjusted Chi Square Value	49.61					95% Jackknife UCL	24.98
1002											95% Standard Bootstrap UCL	23.71
1003					Anderson-Darling Test Statistic	0.599					95% Bootstrap-t UCL	24.73
1004					Anderson-Darling 5% Critical Value	0.698					95% Hall's Bootstrap UCL	22.63
1005					Kolmogorov-Smirnov Test Statistic	0.269					95% Percentile Bootstrap UCL	23.67
1006					Kolmogorov-Smirnov 5% Critical Value	0.332					95% BCA Bootstrap UCL	23.17
1007					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	30.68

1008											97.5% Chebyshev(Mean, Sd) UCL	35.26
1009	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	44.27
1010				95% Approximate Gamma UCL	26.91							
1011				95% Adjusted Gamma UCL	30.08							
1012												
1013	**Potential UCL to Use**										Use 95% Student's-t UCL	24.98
1014												
1015												
1016	**Di-n-butyl phthalate_mg/kg**											
1017												
1018	**General Statistics**											
1019				Number of Valid Samples	6						Number of Detected Data	3
1020				Number of Unique Samples	3						Number of Non-Detect Data	3
1021											Percent Non-Detects	50.00%
1022												
1023	**Raw Statistics**										**Log-transformed Statistics**	
1024				Minimum Detected	0.048						Minimum Detected	-3.037
1025				Maximum Detected	0.069						Maximum Detected	-2.674
1026				Mean of Detected	0.0553						Mean of Detected	-2.909
1027				SD of Detected	0.0118						SD of Detected	0.204
1028				Minimum Non-Detect	0.4						Minimum Non-Detect	-0.916
1029				Maximum Non-Detect	0.9						Maximum Non-Detect	-0.105
1030												
1031	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	6
1032	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	0
1033	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	100.00%
1034												
1035	**UCL Statistics**											
1036	**Normal Distribution Test with Detected Values Only**										**Lognormal Distribution Test with Detected Values Only**	
1037				Shapiro Wilk Test Statistic	0.786						Shapiro Wilk Test Statistic	0.792
1038				5% Shapiro Wilk Critical Value	0.767						5% Shapiro Wilk Critical Value	0.767
1039	**Data appear Normal at 5% Significance Level**										**Data appear Lognormal at 5% Significance Level**	
1040												
1041	**Assuming Normal Distribution**										**Assuming Lognormal Distribution**	
1042				DL/2 Substitution Method							DL/2 Substitution Method	
1043				Mean	0.171						Mean	-2.116
1044				SD	0.155						SD	0.924
1045				95% DL/2 (t) UCL	0.299						95% H-Stat (DL/2) UCL	71.28
1046												
1047				Maximum Likelihood Estimate(MLE) Method	N/A						Log ROS Method	
1048	**MLE method failed to converge properly**										Mean in Log Scale	-2.909
1049											SD in Log Scale	0.129
1050											Mean in Original Scale	0.0549
1051											SD in Original Scale	0.0075
1052											95% Percentile Bootstrap UCL	0.0598
1053											95% BCA Bootstrap UCL	0.0607
1054												
1055	**Gamma Distribution Test with Detected Values Only**										**Data Distribution Test with Detected Values Only**	
1056				k star (bias corrected)	N/A						**Data appear Normal at 5% Significance Level**	
1057				Theta Star	N/A							
1058				nu star	N/A							
1059												
1060				A-D Test Statistic	0.556						**Nonparametric Statistics**	

1061				5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method		
1062				K-S Test Statistic	N/A					Mean		0.0553
1063				5% K-S Critical Value	N/A					SD		0.00967
1064				**Data not Gamma Distributed at 5% Significance Level**						SE of Mean		0.00684
1065										95% KM (t) UCL		0.0691
1066				**Assuming Gamma Distribution**						95% KM (z) UCL		0.0666
1067				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		0.0707
1068				Minimum	N/A					95% KM (bootstrap t) UCL		0.249
1069				Maximum	N/A					95% KM (BCA) UCL		0.069
1070				Mean	N/A					95% KM (Percentile Bootstrap) UCL		0.069
1071				Median	N/A					95% KM (Chebyshev) UCL		0.0851
1072				SD	N/A					97.5% KM (Chebyshev) UCL		0.098
1073				k star	N/A					99% KM (Chebyshev) UCL		0.123
1074				Theta star	N/A							
1075				Nu star	N/A					**Potential UCLs to Use**		
1076				AppChi2	N/A					95% KM (t) UCL		0.0691
1077				95% Gamma Approximate UCL	N/A					95% KM (Percentile Bootstrap) UCL		0.069
1078				95% Adjusted Gamma UCL	N/A							
1079				**Warning: Recommended UCL exceeds the maximum observation**								
1080	**Note: DL/2 is not a recommended method.**											
1081												
1082												
1083	**Fluoranthene_mg/kg**											
1084												
1085					**General Statistics**							
1086				Number of Valid Samples	6					Number of Detected Data		5
1087				Number of Unique Samples	5					Number of Non-Detect Data		1
1088										Percent Non-Detects		16.67%
1089												
1090				**Raw Statistics**						**Log-transformed Statistics**		
1091				Minimum Detected	0.034					Minimum Detected		-3.381
1092				Maximum Detected	0.2					Maximum Detected		-1.609
1093				Mean of Detected	0.122					Mean of Detected		-2.321
1094				SD of Detected	0.0754					SD of Detected		0.809
1095				Minimum Non-Detect	0.32					Minimum Non-Detect		-1.139
1096				Maximum Non-Detect	0.32					Maximum Non-Detect		-1.139
1097												
1098												
1099					**UCL Statistics**							
1100				**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**		
1101				Shapiro Wilk Test Statistic	0.865					Shapiro Wilk Test Statistic		0.836
1102				5% Shapiro Wilk Critical Value	0.762					5% Shapiro Wilk Critical Value		0.762
1103				**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**		
1104												
1105				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
1106				DL/2 Substitution Method						DL/2 Substitution Method		
1107				Mean	0.129					Mean		-2.24
1108				SD	0.0692					SD		0.75
1109				95% DL/2 (t) UCL	0.186					95% H-Stat (DL/2) UCL		1.824
1110												
1111				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
1112				**MLE method failed to converge properly**						Mean in Log Scale		-2.321
1113										SD in Log Scale		0.723

1114											Mean in Original Scale	0.118
1115											SD in Original Scale	0.0682
1116											95% Percentile Bootstrap UCL	0.159
1117											95% BCA Bootstrap UCL	0.159
1118												
1119	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1120					k star (bias corrected)	1.101	**Data appear Normal at 5% Significance Level**					
1121					Theta Star	0.111						
1122					nu star	11.01						
1123												
1124					A-D Test Statistic	0.529	**Nonparametric Statistics**					
1125					5% A-D Critical Value	0.684					Kaplan-Meier (KM) Method	
1126					K-S Test Statistic	0.684					Mean	0.122
1127					5% K-S Critical Value	0.36					SD	0.0674
1128	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0337
1129											95% KM (t) UCL	0.19
1130	**Assuming Gamma Distribution**										95% KM (z) UCL	0.178
1131					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.192
1132					Minimum	0.034					95% KM (bootstrap t) UCL	0.186
1133					Maximum	0.2					95% KM (BCA) UCL	0.167
1134					Mean	0.122					95% KM (Percentile Bootstrap) UCL	0.174
1135					Median	0.138					95% KM (Chebyshev) UCL	0.269
1136					SD	0.0674					97.5% KM (Chebyshev) UCL	0.333
1137					k star	1.548					99% KM (Chebyshev) UCL	0.458
1138					Theta star	0.0791						
1139					Nu star	18.58	**Potential UCLs to Use**					
1140					AppChi2	9.808					95% KM (t) UCL	0.19
1141					95% Gamma Approximate UCL	0.232					95% KM (Percentile Bootstrap) UCL	0.174
1142					95% Adjusted Gamma UCL	0.298						
1143	**Note: DL/2 is not a recommended method.**											
1144												
1145												
1146	**Indeno(1,2,3-cd)pyrene_mg/kg**											
1147												
1148	**General Statistics**											
1149					Number of Valid Samples	6					Number of Unique Samples	6
1150												
1151	**Raw Statistics**						**Log-transformed Statistics**					
1152					Minimum	0.015					Minimum of Log Data	-4.2
1153					Maximum	0.0671					Maximum of Log Data	-2.702
1154					Mean	0.0382					Mean of log Data	-3.443
1155					Median	0.0365					SD of log Data	0.674
1156					SD	0.0231						
1157					Coefficient of Variation	0.605						
1158					Skewness	0.155						
1159												
1160	**Relevant UCL Statistics**											
1161	**Normal Distribution Test**						**Lognormal Distribution Test**					
1162					Shapiro Wilk Test Statistic	0.845					Shapiro Wilk Test Statistic	0.842
1163					Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788
1164	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1165												
1166	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					

1167				95% Student's-t UCL	0.0572					95% H-UCL	0.105	
1168			**95% UCLs (Adjusted for Skewness)**							95% Chebyshev (MVUE) UCL	0.0844	
1169				95% Adjusted-CLT UCL	0.0544					97.5% Chebyshev (MVUE) UCL	0.104	
1170				95% Modified-t UCL	0.0573					99% Chebyshev (MVUE) UCL	0.143	
1171												
1172			**Gamma Distribution Test**							**Data Distribution**		
1173				k star (bias corrected)	1.591					**Data appear Normal at 5% Significance Level**		
1174				Theta Star	0.024							
1175				nu star	19.09							
1176				Approximate Chi Square Value (.05)	10.19					**Nonparametric Statistics**		
1177				Adjusted Level of Significance	0.0122					95% CLT UCL	0.0537	
1178				Adjusted Chi Square Value	7.947					95% Jackknife UCL	0.0572	
1179										95% Standard Bootstrap UCL	0.0525	
1180				Anderson-Darling Test Statistic	0.574					95% Bootstrap-t UCL	0.0591	
1181				Anderson-Darling 5% Critical Value	0.701					95% Hall's Bootstrap UCL	0.0473	
1182				Kolmogorov-Smirnov Test Statistic	0.273					95% Percentile Bootstrap UCL	0.0526	
1183				Kolmogorov-Smirnov 5% Critical Value	0.335					95% BCA Bootstrap UCL	0.0529	
1184			**Data appear Gamma Distributed at 5% Significance Level**							95% Chebyshev(Mean, Sd) UCL	0.0793	
1185										97.5% Chebyshev(Mean, Sd) UCL	0.0971	
1186			**Assuming Gamma Distribution**							99% Chebyshev(Mean, Sd) UCL	0.132	
1187				95% Approximate Gamma UCL	0.0716							
1188				95% Adjusted Gamma UCL	0.0918							
1189												
1190			**Potential UCL to Use**							Use 95% Student's-t UCL	0.0572	
1191												
1192												
1193	**Iron_mg/kg**											
1194												
1195					**General Statistics**							
1196				Number of Valid Samples	6					Number of Unique Samples	6	
1197												
1198			**Raw Statistics**							**Log-transformed Statistics**		
1199				Minimum	12500					Minimum of Log Data	9.433	
1200				Maximum	47900					Maximum of Log Data	10.78	
1201				Mean	25900					Mean of log Data	10.07	
1202				Median	22900					SD of log Data	0.461	
1203				SD	12449							
1204				Coefficient of Variation	0.481							
1205				Skewness	1.212							
1206												
1207					**Relevant UCL Statistics**							
1208			**Normal Distribution Test**							**Lognormal Distribution Test**		
1209				Shapiro Wilk Test Statistic	0.921					Shapiro Wilk Test Statistic	0.994	
1210				Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788	
1211			**Data appear Normal at 5% Significance Level**							**Data appear Lognormal at 5% Significance Level**		
1212												
1213			**Assuming Normal Distribution**							**Assuming Lognormal Distribution**		
1214				95% Student's-t UCL	36141					95% H-UCL	45105	
1215			**95% UCLs (Adjusted for Skewness)**							95% Chebyshev (MVUE) UCL	47027	
1216				95% Adjusted-CLT UCL	36946					97.5% Chebyshev (MVUE) UCL	56197	
1217				95% Modified-t UCL	36560					99% Chebyshev (MVUE) UCL	74209	
1218												
1219			**Gamma Distribution Test**							**Data Distribution**		

1220					k star (bias corrected)	2.967		**Data appear Normal at 5% Significance Level**				
1221					Theta Star	8731						
1222					nu star	35.6						
1223					Approximate Chi Square Value (.05)	22.95		**Nonparametric Statistics**				
1224					Adjusted Level of Significance	0.0122					95% CLT UCL	34259
1225					Adjusted Chi Square Value	19.36					95% Jackknife UCL	36141
1226											95% Standard Bootstrap UCL	33642
1227					Anderson-Darling Test Statistic	0.189					95% Bootstrap-t UCL	42946
1228					Anderson-Darling 5% Critical Value	0.698					95% Hall's Bootstrap UCL	83667
1229					Kolmogorov-Smirnov Test Statistic	0.148					95% Percentile Bootstrap UCL	34333
1230					Kolmogorov-Smirnov 5% Critical Value	0.333					95% BCA Bootstrap UCL	35350
1231					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	48053
1232											97.5% Chebyshev(Mean, Sd) UCL	57638
1233					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	76467
1234					95% Approximate Gamma UCL	40182						
1235					95% Adjusted Gamma UCL	47616						
1236												
1237					**Potential UCL to Use**						Use 95% Student's-t UCL	36141
1238												
1239												
1240	**Lead_mg/kg**											
1241												
1242					**General Statistics**							
1243					Number of Valid Samples	6					Number of Unique Samples	6
1244												
1245					**Raw Statistics**						**Log-transformed Statistics**	
1246					Minimum	10.4					Minimum of Log Data	2.342
1247					Maximum	35					Maximum of Log Data	3.555
1248					Mean	20.65					Mean of log Data	2.945
1249					Median	17.75					SD of log Data	0.445
1250					SD	9.217						
1251					Coefficient of Variation	0.446						
1252					Skewness	0.747						
1253												
1254					**Relevant UCL Statistics**							
1255					**Normal Distribution Test**						**Lognormal Distribution Test**	
1256					Shapiro Wilk Test Statistic	0.93					Shapiro Wilk Test Statistic	0.968
1257					Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788
1258					**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
1259												
1260					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
1261					95% Student's-t UCL	28.23					95% H-UCL	35.01
1262					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	36.96
1263					95% Adjusted-CLT UCL	28.07					97.5% Chebyshev (MVUE) UCL	44.02
1264					95% Modified-t UCL	28.42					99% Chebyshev (MVUE) UCL	57.9
1265												
1266					**Gamma Distribution Test**						**Data Distribution**	
1267					k star (bias corrected)	3.23					**Data appear Normal at 5% Significance Level**	
1268					Theta Star	6.394						
1269					nu star	38.76						
1270					Approximate Chi Square Value (.05)	25.5					**Nonparametric Statistics**	
1271					Adjusted Level of Significance	0.0122					95% CLT UCL	26.84
1272					Adjusted Chi Square Value	21.7					95% Jackknife UCL	28.23

1273											95% Standard Bootstrap UCL	26.21
1274				Anderson-Darling Test Statistic	0.249						95% Bootstrap-t UCL	34.49
1275				Anderson-Darling 5% Critical Value	0.698						95% Hall's Bootstrap UCL	38.31
1276				Kolmogorov-Smirnov Test Statistic	0.213						95% Percentile Bootstrap UCL	26.13
1277				Kolmogorov-Smirnov 5% Critical Value	0.333						95% BCA Bootstrap UCL	26.4
1278				**Data appear Gamma Distributed at 5% Significance Level**							95% Chebyshev(Mean, Sd) UCL	37.05
1279											97.5% Chebyshev(Mean, Sd) UCL	44.15
1280				**Assuming Gamma Distribution**							99% Chebyshev(Mean, Sd) UCL	58.09
1281				95% Approximate Gamma UCL	31.39							
1282				95% Adjusted Gamma UCL	36.89							
1283												
1284				**Potential UCL to Use**							Use 95% Student's-t UCL	28.23
1285												
1286												
1287	**Magnesium_mg/kg**											
1288												
1289					**General Statistics**							
1290				Number of Valid Samples	6						Number of Unique Samples	6
1291												
1292				**Raw Statistics**							**Log-transformed Statistics**	
1293				Minimum	3680						Minimum of Log Data	8.211
1294				Maximum	10900						Maximum of Log Data	9.297
1295				Mean	6890						Mean of log Data	8.752
1296				Median	5670						SD of log Data	0.451
1297				SD	3155							
1298				Coefficient of Variation	0.458							
1299				Skewness	0.655							
1300												
1301					**Relevant UCL Statistics**							
1302				**Normal Distribution Test**							**Lognormal Distribution Test**	
1303				Shapiro Wilk Test Statistic	0.837						Shapiro Wilk Test Statistic	0.891
1304				Shapiro Wilk Critical Value	0.788						Shapiro Wilk Critical Value	0.788
1305				**Data appear Normal at 5% Significance Level**							**Data appear Lognormal at 5% Significance Level**	
1306												
1307				**Assuming Normal Distribution**							**Assuming Lognormal Distribution**	
1308				95% Student's-t UCL	9485						95% H-UCL	11789
1309				**95% UCLs (Adjusted for Skewness)**							95% Chebyshev (MVUE) UCL	12389
1310				95% Adjusted-CLT UCL	9376						97.5% Chebyshev (MVUE) UCL	14775
1311				95% Modified-t UCL	9543						99% Chebyshev (MVUE) UCL	19461
1312												
1313				**Gamma Distribution Test**							**Data Distribution**	
1314				k star (bias corrected)	3.105						**Data appear Normal at 5% Significance Level**	
1315				Theta Star	2219							
1316				nu star	37.26							
1317				Approximate Chi Square Value (.05)	24.28						**Nonparametric Statistics**	
1318				Adjusted Level of Significance	0.0122						95% CLT UCL	9009
1319				Adjusted Chi Square Value	20.59						95% Jackknife UCL	9485
1320											95% Standard Bootstrap UCL	8866
1321				Anderson-Darling Test Statistic	0.467						95% Bootstrap-t UCL	13612
1322				Anderson-Darling 5% Critical Value	0.698						95% Hall's Bootstrap UCL	12232
1323				Kolmogorov-Smirnov Test Statistic	0.242						95% Percentile Bootstrap UCL	8887
1324				Kolmogorov-Smirnov 5% Critical Value	0.333						95% BCA Bootstrap UCL	9090
1325				**Data appear Gamma Distributed at 5% Significance Level**							95% Chebyshev(Mean, Sd) UCL	12504

1326											97.5% Chebyshev(Mean, Sd) UCL	14934
1327	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	19706
1328					95% Approximate Gamma UCL	10571						
1329					95% Adjusted Gamma UCL	12471						
1330												
1331	**Potential UCL to Use**										Use 95% Student's-t UCL	9485
1332												
1333												
1334	**Manganese_mg/kg**											
1335												
1336	**General Statistics**											
1337					Number of Valid Samples	6					Number of Unique Samples	6
1338												
1339	**Raw Statistics**						**Log-transformed Statistics**					
1340					Minimum	299					Minimum of Log Data	5.7
1341					Maximum	1640					Maximum of Log Data	7.402
1342					Mean	772.3					Mean of log Data	6.48
1343					Median	700.5					SD of log Data	0.64
1344					SD	496.3						
1345					Coefficient of Variation	0.643						
1346					Skewness	1.153						
1347												
1348	**Relevant UCL Statistics**											
1349	**Normal Distribution Test**						**Lognormal Distribution Test**					
1350					Shapiro Wilk Test Statistic	0.897					Shapiro Wilk Test Statistic	0.96
1351					Shapiro Wilk Critical Value	0.788					Shapiro Wilk Critical Value	0.788
1352	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1353												
1354	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1355					95% Student's-t UCL	1181					95% H-UCL	1943
1356	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	1645
1357					95% Adjusted-CLT UCL	1208					97.5% Chebyshev (MVUE) UCL	2023
1358					95% Modified-t UCL	1197					99% Chebyshev (MVUE) UCL	2767
1359												
1360	**Gamma Distribution Test**						**Data Distribution**					
1361					k star (bias corrected)	1.667	**Data appear Normal at 5% Significance Level**					
1362					Theta Star	463.4						
1363					nu star	20						
1364					Approximate Chi Square Value (.05)	10.85	**Nonparametric Statistics**					
1365					Adjusted Level of Significance	0.0122					95% CLT UCL	1106
1366					Adjusted Chi Square Value	8.527					95% Jackknife UCL	1181
1367											95% Standard Bootstrap UCL	1075
1368					Anderson-Darling Test Statistic	0.246					95% Bootstrap-t UCL	1391
1369					Anderson-Darling 5% Critical Value	0.701					95% Hall's Bootstrap UCL	1355
1370					Kolmogorov-Smirnov Test Statistic	0.174					95% Percentile Bootstrap UCL	1078
1371					Kolmogorov-Smirnov 5% Critical Value	0.334					95% BCA Bootstrap UCL	1168
1372	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	1656
1373											97.5% Chebyshev(Mean, Sd) UCL	2038
1374	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	2788
1375					95% Approximate Gamma UCL	1423						
1376					95% Adjusted Gamma UCL	1812						
1377												
1378	**Potential UCL to Use**										Use 95% Student's-t UCL	1181

1379												
1380												
1381	**Methylene chloride_mg/kg**											
1382												
1383						**General Statistics**							
1384						Number of Valid Samples	6			Number of Detected Data		3
1385						Number of Unique Samples	3			Number of Non-Detect Data		3
1386										Percent Non-Detects		50.00%
1387												
1388						**Raw Statistics**				**Log-transformed Statistics**		
1389						Minimum Detected	0.0038			Minimum Detected		-5.573
1390						Maximum Detected	0.0078			Maximum Detected		-4.854
1391						Mean of Detected	0.0056			Mean of Detected		-5.228
1392						SD of Detected	0.00203			SD of Detected		0.361
1393						Minimum Non-Detect	0.011			Minimum Non-Detect		-4.51
1394						Maximum Non-Detect	0.035			Maximum Non-Detect		-3.352
1395												
1396	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		6
1397	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
1398	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
1399												
1400						**UCL Statistics**							
1401						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
1402						Shapiro Wilk Test Statistic	0.971			Shapiro Wilk Test Statistic		0.995
1403						5% Shapiro Wilk Critical Value	0.767			5% Shapiro Wilk Critical Value		0.767
1404						**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**		
1405												
1406						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
1407						DL/2 Substitution Method				DL/2 Substitution Method		
1408						Mean	0.00788			Mean		-4.971
1409						SD	0.00494			SD		0.524
1410						95% DL/2 (t) UCL	0.012			95% H-Stat (DL/2) UCL		0.147
1411												
1412						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
1413						**MLE method failed to converge properly**				Mean in Log Scale		-5.228
1414										SD in Log Scale		0.228
1415										Mean in Original Scale		0.00548
1416										SD in Original Scale		0.00129
1417										95% Percentile Bootstrap UCL		0.00629
1418										95% BCA Bootstrap UCL		0.00655
1419												
1420						**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**		
1421						k star (bias corrected)	N/A			**Data appear Normal at 5% Significance Level**		
1422						Theta Star	N/A					
1423						nu star	N/A					
1424												
1425						A-D Test Statistic	0.261			**Nonparametric Statistics**		
1426						5% A-D Critical Value	N/A			Kaplan-Meier (KM) Method		
1427						K-S Test Statistic	N/A			Mean		0.0056
1428						5% K-S Critical Value	N/A			SD		0.00166
1429						**Data not Gamma Distributed at 5% Significance Level**				SE of Mean		0.00117
1430										95% KM (t) UCL		0.00796
1431						**Assuming Gamma Distribution**				95% KM (z) UCL		0.00753

1432	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.00824
1433					Minimum	N/A				95% KM (bootstrap t) UCL		0.0105
1434					Maximum	N/A				95% KM (BCA) UCL		0.0078
1435					Mean	N/A				95% KM (Percentile Bootstrap) UCL		0.0078
1436					Median	N/A				95% KM (Chebyshev) UCL		0.0107
1437					SD	N/A				97.5% KM (Chebyshev) UCL		0.0129
1438					k star	N/A				99% KM (Chebyshev) UCL		0.0173
1439					Theta star	N/A						
1440					Nu star	N/A				**Potential UCLs to Use**		
1441					AppChi2	N/A				95% KM (t) UCL		0.00796
1442					95% Gamma Approximate UCL	N/A				95% KM (Percentile Bootstrap) UCL		0.0078
1443					95% Adjusted Gamma UCL	N/A						
1444	**Warning: Recommended UCL exceeds the maximum observation**											
1445	**Note: DL/2 is not a recommended method.**											
1446												
1447												
1448	**Nickel_mg/kg**											
1449												
1450	**General Statistics**											
1451					Number of Valid Samples	6				Number of Unique Samples		6
1452												
1453	**Raw Statistics**						**Log-transformed Statistics**					
1454					Minimum	10				Minimum of Log Data		2.303
1455					Maximum	25				Maximum of Log Data		3.219
1456					Mean	18.45				Mean of log Data		2.871
1457					Median	18.35				SD of log Data		0.338
1458					SD	5.619						
1459					Coefficient of Variation	0.305						
1460					Skewness	-0.326						
1461												
1462	**Relevant UCL Statistics**											
1463	**Normal Distribution Test**						**Lognormal Distribution Test**					
1464					Shapiro Wilk Test Statistic	0.956				Shapiro Wilk Test Statistic		0.928
1465					Shapiro Wilk Critical Value	0.788				Shapiro Wilk Critical Value		0.788
1466	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1467												
1468	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1469					95% Student's-t UCL	23.07				95% H-UCL		26.6
1470	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		29.63
1471					95% Adjusted-CLT UCL	21.9				97.5% Chebyshev (MVUE) UCL		34.44
1472					95% Modified-t UCL	23.02				99% Chebyshev (MVUE) UCL		43.89
1473												
1474	**Gamma Distribution Test**						**Data Distribution**					
1475					k star (bias corrected)	5.857				**Data appear Normal at 5% Significance Level**		
1476					Theta Star	3.15						
1477					nu star	70.29						
1478					Approximate Chi Square Value (.05)	51.99				**Nonparametric Statistics**		
1479					Adjusted Level of Significance	0.0122				95% CLT UCL		22.22
1480					Adjusted Chi Square Value	46.35				95% Jackknife UCL		23.07
1481										95% Standard Bootstrap UCL		21.85
1482					Anderson-Darling Test Statistic	0.259				95% Bootstrap-t UCL		22.88
1483					Anderson-Darling 5% Critical Value	0.698				95% Hall's Bootstrap UCL		23.13
1484					Kolmogorov-Smirnov Test Statistic	0.182				95% Percentile Bootstrap UCL		21.78

1485				Kolmogorov-Smirnov 5% Critical Value	0.332					95% BCA Bootstrap UCL	21.4
1486				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	28.45
1487										97.5% Chebyshev(Mean, Sd) UCL	32.78
1488				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	41.28
1489				95% Approximate Gamma UCL	24.94						
1490				95% Adjusted Gamma UCL	27.98						
1491											
1492				**Potential UCL to Use**						Use 95% Student's-t UCL	23.07
1493											
1494											
1495	**Phenanthrene_mg/kg**										
1496											
1497				**General Statistics**							
1498				Number of Valid Samples	6					Number of Detected Data	4
1499				Number of Unique Samples	4					Number of Non-Detect Data	2
1500										Percent Non-Detects	33.33%
1501											
1502				**Raw Statistics**						**Log-transformed Statistics**	
1503				Minimum Detected	0.0063					Minimum Detected	-5.067
1504				Maximum Detected	0.11					Maximum Detected	-2.207
1505				Mean of Detected	0.0521					Mean of Detected	-3.382
1506				SD of Detected	0.0444					SD of Detected	1.232
1507				Minimum Non-Detect	0.32					Minimum Non-Detect	-1.139
1508				Maximum Non-Detect	0.72					Maximum Non-Detect	-0.329
1509											
1510	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect	6
1511	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected	0
1512	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage	100.00%
1513											
1514				**UCL Statistics**							
1515				**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**	
1516				Shapiro Wilk Test Statistic	0.976					Shapiro Wilk Test Statistic	0.943
1517				5% Shapiro Wilk Critical Value	0.748					5% Shapiro Wilk Critical Value	0.748
1518				**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
1519											
1520				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
1521				DL/2 Substitution Method						DL/2 Substitution Method	
1522				Mean	0.121					Mean	-2.73
1523				SD	0.129					SD	1.412
1524				95% DL/2 (t) UCL	0.228					95% H-Stat (DL/2) UCL	581
1525											
1526				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1527				**MLE method failed to converge properly**						Mean in Log Scale	-3.382
1528										SD in Log Scale	0.954
1529										Mean in Original Scale	0.0461
1530										SD in Original Scale	0.0357
1531										95% Percentile Bootstrap UCL	0.0681
1532										95% BCA Bootstrap UCL	0.072
1533											
1534				**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**	
1535				k star (bias corrected)	0.494					**Data appear Normal at 5% Significance Level**	
1536				Theta Star	0.105						
1537				nu star	3.956						

1538												
1539					A-D Test Statistic	0.215	**Nonparametric Statistics**					
1540					5% A-D Critical Value	0.664					Kaplan-Meier (KM) Method	
1541					K-S Test Statistic	0.664					Mean	0.0521
1542					5% K-S Critical Value	0.401					SD	0.0385
1543	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0222
1544											95% KM (t) UCL	0.0969
1545	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0887
1546					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0993
1547					Minimum	0.0063					95% KM (bootstrap t) UCL	0.114
1548					Maximum	0.11					95% KM (BCA) UCL	0.0851
1549					Mean	0.0492					95% KM (Percentile Bootstrap) UCL	0.0851
1550					Median	0.0434					95% KM (Chebyshev) UCL	0.149
1551					SD	0.0347					97.5% KM (Chebyshev) UCL	0.191
1552					k star	1.052					99% KM (Chebyshev) UCL	0.273
1553					Theta star	0.0468						
1554					Nu star	12.62	**Potential UCLs to Use**					
1555					AppChi2	5.64					95% KM (t) UCL	0.0969
1556					95% Gamma Approximate UCL	0.11					95% KM (Percentile Bootstrap) UCL	0.0851
1557					95% Adjusted Gamma UCL	N/A						
1558	**Note: DL/2 is not a recommended method.**											
1559												
1560												
1561	**Pyrene_mg/kg**											
1562												
1563	**General Statistics**											
1564					Number of Valid Samples	6					Number of Detected Data	5
1565					Number of Unique Samples	5					Number of Non-Detect Data	1
1566											Percent Non-Detects	16.67%
1567												
1568	**Raw Statistics**						**Log-transformed Statistics**					
1569					Minimum Detected	0.028					Minimum Detected	-3.576
1570					Maximum Detected	0.15					Maximum Detected	-1.897
1571					Mean of Detected	0.0974					Mean of Detected	-2.569
1572					SD of Detected	0.0613					SD of Detected	0.847
1573					Minimum Non-Detect	0.32					Minimum Non-Detect	-1.139
1574					Maximum Non-Detect	0.32					Maximum Non-Detect	-1.139
1575												
1576												
1577	**UCL Statistics**											
1578	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1579					Shapiro Wilk Test Statistic	0.763					Shapiro Wilk Test Statistic	0.75
1580					5% Shapiro Wilk Critical Value	0.762					5% Shapiro Wilk Critical Value	0.762
1581	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1582												
1583	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1584					DL/2 Substitution Method						DL/2 Substitution Method	
1585					Mean	0.108					Mean	-2.446
1586					SD	0.0605					SD	0.815
1587					95% DL/2 (t) UCL	0.158					95% H-Stat (DL/2) UCL	2.104
1588												
1589					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1590	**MLE method failed to converge properly**										Mean in Log Scale	-2.569

1591											SD in Log Scale	0.757
1592											Mean in Original Scale	0.0939
1593											SD in Original Scale	0.0555
1594											95% Percentile Bootstrap UCL	0.127
1595											95% BCA Bootstrap UCL	0.125
1596												
1597	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1598					k star (bias corrected)	1.027	**Data appear Normal at 5% Significance Level**					
1599					Theta Star	0.0948						
1600					nu star	10.27						
1601												
1602					A-D Test Statistic	0.768	**Nonparametric Statistics**					
1603					5% A-D Critical Value	0.684	Kaplan-Meier (KM) Method					
1604					K-S Test Statistic	0.684	Mean	0.0974				
1605					5% K-S Critical Value	0.36	SD	0.0549				
1606	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	0.0274				
1607							95% KM (t) UCL	0.153				
1608	**Assuming Gamma Distribution**						95% KM (z) UCL	0.143				
1609	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.154				
1610					Minimum	0.028	95% KM (bootstrap t) UCL	0.152				
1611					Maximum	0.15	95% KM (BCA) UCL	0.142				
1612					Mean	0.0973	95% KM (Percentile Bootstrap) UCL	0.141				
1613					Median	0.116	95% KM (Chebyshev) UCL	0.217				
1614					SD	0.0549	97.5% KM (Chebyshev) UCL	0.269				
1615					k star	1.438	99% KM (Chebyshev) UCL	0.37				
1616					Theta star	0.0677						
1617					Nu star	17.25	**Potential UCLs to Use**					
1618					AppChi2	8.853	95% KM (t) UCL	0.153				
1619					95% Gamma Approximate UCL	0.19	95% KM (Percentile Bootstrap) UCL	0.141				
1620					95% Adjusted Gamma UCL	0.247						
1621	**Warning: Recommended UCL exceeds the maximum observation**											
1622	**Note: DL/2 is not a recommended method.**											
1623												
1624												
1625	**Silver_mg/kg**											
1626												
1627	**General Statistics**											
1628					Number of Valid Samples	6	Number of Detected Data	4				
1629					Number of Unique Samples	4	Number of Non-Detect Data	2				
1630							Percent Non-Detects	33.33%				
1631												
1632	**Raw Statistics**						**Log-transformed Statistics**					
1633					Minimum Detected	0.072	Minimum Detected	-2.631				
1634					Maximum Detected	0.16	Maximum Detected	-1.833				
1635					Mean of Detected	0.121	Mean of Detected	-2.156				
1636					SD of Detected	0.0365	SD of Detected	0.339				
1637					Minimum Non-Detect	0.052	Minimum Non-Detect	-2.957				
1638					Maximum Non-Detect	0.12	Maximum Non-Detect	-2.12				
1639												
1640	Note: Data have multiple DLs - Use of KM Method is recommended						Number treated as Non-Detect	3				
1641	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected	3				
1642	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage	50.00%				
1643												

	A	B	C	D	E	F	G	H	I	J	K	L
1644	**UCL Statistics**											
1645	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1646	Shapiro Wilk Test Statistic					0.965	Shapiro Wilk Test Statistic					0.916
1647	5% Shapiro Wilk Critical Value					0.748	5% Shapiro Wilk Critical Value					0.748
1648	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1649												
1650	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1651	DL/2 Substitution Method						DL/2 Substitution Method					
1652	Mean					0.0947	Mean					-2.515
1653	SD					0.0502	SD					0.669
1654	95% DL/2 (t) UCL					0.136	95% H-Stat (DL/2) UCL					0.361
1655												
1656	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
1657	Mean					0.118	Mean in Log Scale					-2.399
1658	SD					0.0244	SD in Log Scale					0.467
1659	95% MLE (t) UCL					0.138	Mean in Original Scale					0.0991
1660	95% MLE (Tiku) UCL					0.143	SD in Original Scale					0.0438
1661							95% Percentile Bootstrap UCL					0.127
1662							95% BCA Bootstrap UCL					0.128
1663												
1664	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1665	k star (bias corrected)					3.338	**Data appear Normal at 5% Significance Level**					
1666	Theta Star					0.0361						
1667	nu star					26.7						
1668												
1669	A-D Test Statistic					0.322	**Nonparametric Statistics**					
1670	5% A-D Critical Value					0.657	Kaplan-Meier (KM) Method					
1671	K-S Test Statistic					0.657	Mean					0.104
1672	5% K-S Critical Value					0.395	SD					0.0345
1673	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.0163
1674							95% KM (t) UCL					0.137
1675	**Assuming Gamma Distribution**						95% KM (z) UCL					0.131
1676	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.142
1677	Minimum					0.072	95% KM (bootstrap t) UCL					0.125
1678	Maximum					0.16	95% KM (BCA) UCL					0.14
1679	Mean					0.112	95% KM (Percentile Bootstrap) UCL					0.14
1680	Median					0.115	95% KM (Chebyshev) UCL					0.175
1681	SD					0.0322	97.5% KM (Chebyshev) UCL					0.206
1682	k star					7.182	99% KM (Chebyshev) UCL					0.266
1683	Theta star					0.0156						
1684	Nu star					86.19	**Potential UCLs to Use**					
1685	AppChi2					65.79	95% KM (t) UCL					0.137
1686	95% Gamma Approximate UCL					0.147	95% KM (Percentile Bootstrap) UCL					0.14
1687	95% Adjusted Gamma UCL					N/A						
1688	**Note: DL/2 is not a recommended method.**											
1689												
1690												
1691	**Toluene_mg/kg**											
1692												
1693	**General Statistics**											
1694	Number of Valid Samples					6	Number of Detected Data					3
1695	Number of Unique Samples					3	Number of Non-Detect Data					3
1696							Percent Non-Detects					50.00%

Raw Statistics		
Minimum Detected	0.00026	
Maximum Detected	0.0011	
Mean of Detected	0.0006133	
SD of Detected	0.0004356	
Minimum Non-Detect	0.0055	
Maximum Non-Detect	0.017	
Note: Data have multiple DLs - Use of KM Method is recommended		
For all methods (except KM, DL/2, and ROS Methods),		
Observations < Largest ND are treated as NDs		

Log-transformed Statistics	
Minimum Detected	-8.255
Maximum Detected	-6.812
Mean of Detected	-7.57
SD of Detected	0.724
Minimum Non-Detect	-5.203
Maximum Non-Detect	-4.075
Number treated as Non-Detect	6
Number treated as Detected	0
Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.93
5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	0.00279
SD	0.0031
95% DL/2 (t) UCL	0.00534
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.993
5% Shapiro Wilk Critical Value	0.767
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-6.498
SD	1.314
95% H-Stat (DL/2) UCL	18.42
Log ROS Method	
Mean in Log Scale	-7.57
SD in Log Scale	0.458
Mean in Original Scale	0.0005646
SD in Original Scale	0.0002806
95% Percentile Bootstrap UCL	0.0007593
95% BCA Bootstrap UCL	0.0007653

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	0.277
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A

Data Distribution Test with Detected Values Only	
Data appear Normal at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.0006133
SD	0.0003557
SE of Mean	0.0002515
95% KM (t) UCL	0.00112
95% KM (z) UCL	0.00103
95% KM (jackknife) UCL	0.00118
95% KM (bootstrap t) UCL	0.00198
95% KM (BCA) UCL	0.000945
95% KM (Percentile Bootstrap) UCL	0.0011
95% KM (Chebyshev) UCL	0.00171
97.5% KM (Chebyshev) UCL	0.00218
99% KM (Chebyshev) UCL	0.00312

1750					Nu star	N/A	**Potential UCLs to Use**					
1751					AppChi2	N/A				95% KM (t) UCL		0.00112
1752					95% Gamma Approximate UCL	N/A				95% KM (Percentile Bootstrap) UCL		0.0011
1753					95% Adjusted Gamma UCL	N/A						
1754	**Warning: Recommended UCL exceeds the maximum observation**											
1755	**Note: DL/2 is not a recommended method.**											
1756												
1757												
1758	**Vanadium_mg/kg**											
1759												
1760	**General Statistics**											
1761					Number of Valid Samples	6				Number of Unique Samples		6
1762												
1763	**Raw Statistics**						**Log-transformed Statistics**					
1764					Minimum	12.1				Minimum of Log Data		2.493
1765					Maximum	36				Maximum of Log Data		3.584
1766					Mean	21.47				Mean of log Data		2.982
1767					Median	19.35				SD of log Data		0.45
1768					SD	9.67						
1769					Coefficient of Variation	0.45						
1770					Skewness	0.614						
1771												
1772	**Relevant UCL Statistics**											
1773	**Normal Distribution Test**						**Lognormal Distribution Test**					
1774					Shapiro Wilk Test Statistic	0.903				Shapiro Wilk Test Statistic		0.915
1775					Shapiro Wilk Critical Value	0.788				Shapiro Wilk Critical Value		0.788
1776	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1777												
1778	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1779					95% Student's-t UCL	29.42				95% H-UCL		36.69
1780	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		38.59
1781					95% Adjusted-CLT UCL	29.02				97.5% Chebyshev (MVUE) UCL		46.01
1782					95% Modified-t UCL	29.59				99% Chebyshev (MVUE) UCL		60.59
1783												
1784	**Gamma Distribution Test**						**Data Distribution**					
1785					k star (bias corrected)	3.149	**Data appear Normal at 5% Significance Level**					
1786					Theta Star	6.816						
1787					nu star	37.79						
1788					Approximate Chi Square Value (.05)	24.72	**Nonparametric Statistics**					
1789					Adjusted Level of Significance	0.0122				95% CLT UCL		27.96
1790					Adjusted Chi Square Value	20.98				95% Jackknife UCL		29.42
1791										95% Standard Bootstrap UCL		27.51
1792					Anderson-Darling Test Statistic	0.345				95% Bootstrap-t UCL		30.8
1793					Anderson-Darling 5% Critical Value	0.698				95% Hall's Bootstrap UCL		27.81
1794					Kolmogorov-Smirnov Test Statistic	0.238				95% Percentile Bootstrap UCL		27.72
1795					Kolmogorov-Smirnov 5% Critical Value	0.333				95% BCA Bootstrap UCL		28.12
1796	**Data appear Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL		38.67
1797										97.5% Chebyshev(Mean, Sd) UCL		46.12
1798	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL		60.75
1799					95% Approximate Gamma UCL	32.82						
1800					95% Adjusted Gamma UCL	38.67						
1801												
1802	**Potential UCL to Use**									Use 95% Student's-t UCL		29.42

	A	B	C	D	E	F	G	H	I	J	K	L
1803												
1804												
1805	**Zinc_mg/kg**											
1806												
1807	**General Statistics**											
1808	Number of Valid Samples					6	Number of Unique Samples					6
1809												
1810	**Raw Statistics**						**Log-transformed Statistics**					
1811	Minimum					57.9	Minimum of Log Data					4.059
1812	Maximum					121	Maximum of Log Data					4.796
1813	Mean					83.65	Mean of log Data					4.392
1814	Median					85.5	SD of log Data					0.289
1815	SD					23.92						
1816	Coefficient of Variation					0.286						
1817	Skewness					0.426						
1818												
1819	**Relevant UCL Statistics**											
1820	**Normal Distribution Test**						**Lognormal Distribution Test**					
1821	Shapiro Wilk Test Statistic					0.922	Shapiro Wilk Test Statistic					0.914
1822	Shapiro Wilk Critical Value					0.788	Shapiro Wilk Critical Value					0.788
1823	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1824												
1825	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1826	95% Student's-t UCL					103.3	95% H-UCL					112.6
1827	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					126.7
1828	95% Adjusted-CLT UCL					101.5	97.5% Chebyshev (MVUE) UCL					145.3
1829	95% Modified-t UCL					103.6	99% Chebyshev (MVUE) UCL					181.8
1830												
1831	**Gamma Distribution Test**						**Data Distribution**					
1832	k star (bias corrected)					7.448	**Data appear Normal at 5% Significance Level**					
1833	Theta Star					11.23						
1834	nu star					89.38						
1835	Approximate Chi Square Value (.05)					68.58	**Nonparametric Statistics**					
1836	Adjusted Level of Significance					0.0122	95% CLT UCL					99.72
1837	Adjusted Chi Square Value					62.03	95% Jackknife UCL					103.3
1838							95% Standard Bootstrap UCL					98.22
1839	Anderson-Darling Test Statistic					0.336	95% Bootstrap-t UCL					104.2
1840	Anderson-Darling 5% Critical Value					0.698	95% Hall's Bootstrap UCL					101.4
1841	Kolmogorov-Smirnov Test Statistic					0.224	95% Percentile Bootstrap UCL					98.67
1842	Kolmogorov-Smirnov 5% Critical Value					0.332	95% BCA Bootstrap UCL					98.83
1843	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					126.2
1844							97.5% Chebyshev(Mean, Sd) UCL					144.6
1845	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					180.8
1846	95% Approximate Gamma UCL					109						
1847	95% Adjusted Gamma UCL					120.5						
1848												
1849	**Potential UCL to Use**						Use 95% Student's-t UCL					103.3
1850												

	General UCL Statistics for Data Sets with Non-Detects	
User Selected Options		
From File	WorkSheet.wst	
Full Precision	OFF	
Confidence Coefficient	95%	
Number of Bootstrap Operations	2000	

Barium (mg/L)

General Statistics

Number of Valid Samples	6	Number of Unique Samples	6

Raw Statistics		**Log-transformed Statistics**	
Minimum	0.048	Minimum of Log Data	-3.037
Maximum	0.0649	Maximum of Log Data	-2.735
Mean	0.058	Mean of log Data	-2.855
Median	0.0608	SD of log Data	0.13
SD	0.00724		
Coefficient of Variation	0.125		
Skewness	-0.72		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.85	Shapiro Wilk Test Statistic	0.839
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	0.0639	95% H-UCL	0.0652
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.0713
95% Adjusted-CLT UCL	0.0619	97.5% Chebyshev (MVUE) UCL	0.0771
95% Modified-t UCL	0.0638	99% Chebyshev (MVUE) UCL	0.0885
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	36.83	**Data appear Normal at 5% Significance Level**	
Theta Star	0.00157		
nu star	441.9		
Approximate Chi Square Value (.05)	394.2	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0122	95% CLT UCL	0.0628
Adjusted Chi Square Value	377.7	95% Jackknife UCL	0.0639
		95% Standard Bootstrap UCL	0.0623
Anderson-Darling Test Statistic	0.563	95% Bootstrap-t UCL	0.063
Anderson-Darling 5% Critical Value	0.697	95% Hall's Bootstrap UCL	0.061
Kolmogorov-Smirnov Test Statistic	0.26	95% Percentile Bootstrap UCL	0.0624
Kolmogorov-Smirnov 5% Critical Value	0.332	95% BCA Bootstrap UCL	0.0614
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.0708
		97.5% Chebyshev(Mean, Sd) UCL	0.0764
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0874
95% Approximate Gamma UCL	0.065		
95% Adjusted Gamma UCL	0.0678		
Potential UCL to Use		Use 95% Student's-t UCL	0.0639

54												
55												
56	**Calcium (mg/L)**											
57												
58						**General Statistics**							
59					Number of Valid Samples	6			Number of Unique Samples	5		
60												
61					**Raw Statistics**				**Log-transformed Statistics**			
62					Minimum	40			Minimum of Log Data	3.689		
63					Maximum	53			Maximum of Log Data	3.97		
64					Mean	48.3			Mean of log Data	3.87		
65					Median	51.4			SD of log Data	0.133		
66					SD	6.148						
67					Coefficient of Variation	0.127						
68					Skewness	-0.855						
69												
70						**Relevant UCL Statistics**							
71					**Normal Distribution Test**				**Lognormal Distribution Test**			
72					Shapiro Wilk Test Statistic	0.756			Shapiro Wilk Test Statistic	0.751		
73					Shapiro Wilk Critical Value	0.788			Shapiro Wilk Critical Value	0.788		
74					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
75												
76					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
77					95% Student's-t UCL	53.36			95% H-UCL	54.49		
78					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL	59.73		
79					95% Adjusted-CLT UCL	51.49			97.5% Chebyshev (MVUE) UCL	64.68		
80					95% Modified-t UCL	53.21			99% Chebyshev (MVUE) UCL	74.38		
81												
82					**Gamma Distribution Test**				**Data Distribution**			
83					k star (bias corrected)	35.14			**Data Follow Appr. Gamma Distribution at 5% Significance Level**			
84					Theta Star	1.374						
85					nu star	421.7						
86					Approximate Chi Square Value (.05)	375.1			**Nonparametric Statistics**			
87					Adjusted Level of Significance	0.0122			95% CLT UCL	52.43		
88					Adjusted Chi Square Value	359.1			95% Jackknife UCL	53.36		
89									95% Standard Bootstrap UCL	51.94		
90					Anderson-Darling Test Statistic	0.827			95% Bootstrap-t UCL	52.02		
91					Anderson-Darling 5% Critical Value	0.697			95% Hall's Bootstrap UCL	50.7		
92					Kolmogorov-Smirnov Test Statistic	0.303			95% Percentile Bootstrap UCL	52.03		
93					Kolmogorov-Smirnov 5% Critical Value	0.332			95% BCA Bootstrap UCL	51.45		
94					**Data follow Appr. Gamma Distribution at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL	59.24		
95									97.5% Chebyshev(Mean, Sd) UCL	63.97		
96					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL	73.27		
97					95% Approximate Gamma UCL	54.3						
98					95% Adjusted Gamma UCL	56.72						
99												
100					**Potential UCL to Use**				Use 95% Approximate Gamma UCL	54.3		
101						**Recommended UCL exceeds the maximum observation**							
102												
103												
104	**Chromium (mg/L)**											
105												
106						**General Statistics**							

107					Number of Valid Samples	6					Number of Detected Data	3
108					Number of Unique Samples	2					Number of Non-Detect Data	3
109											Percent Non-Detects	50.00%
110												
111					**Raw Statistics**						**Log-transformed Statistics**	
112					Minimum Detected	0.0009					Minimum Detected	-7.013
113					Maximum Detected	0.00098					Maximum Detected	-6.928
114					Mean of Detected	0.0009267					Mean of Detected	-6.985
115					SD of Detected	4.619E-05					SD of Detected	0.0492
116					Minimum Non-Detect	0.0006					Minimum Non-Detect	-7.419
117					Maximum Non-Detect	0.0006					Maximum Non-Detect	-7.419
118												
119												
120					**UCL Statistics**							
121					**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**	
122					Shapiro Wilk Test Statistic	0.75					Shapiro Wilk Test Statistic	0.75
123					5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767
124					**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**	
125												
126					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
127					DL/2 Substitution Method						DL/2 Substitution Method	
128					Mean	0.0006133					Mean	-7.548
129					SD	0.0003445					SD	0.618
130					95% DL/2 (t) UCL	0.0008967					95% H-Stat (DL/2) UCL	0.00148
131												
132					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
133					Mean	0.0006518					Mean in Log Scale	-7.061
134					SD	0.000302					SD in Log Scale	0.0934
135					95% MLE (t) UCL	0.0009002					Mean in Original Scale	0.0008612
136					95% MLE (Tiku) UCL	0.0009578					SD in Original Scale	8.063E-05
137											95% Percentile Bootstrap UCL	0.0009098
138											95% BCA Bootstrap UCL	0.0009098
139												
140					**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**	
141					k star (bias corrected)	N/A					**Data do not follow a Discernable Distribution (0.05)**	
142					Theta Star	N/A						
143					nu star	N/A						
144												
145					A-D Test Statistic	0.619					**Nonparametric Statistics**	
146					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
147					K-S Test Statistic	N/A					Mean	0.0009133
148					5% K-S Critical Value	N/A					SD	2.981E-05
149					**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	1.491E-05
150											95% KM (t) UCL	0.0009434
151					**Assuming Gamma Distribution**						95% KM (z) UCL	0.0009379
152					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0009402
153					Minimum	N/A					95% KM (bootstrap t) UCL	1.8E+308
154					Maximum	N/A					95% KM (BCA) UCL	0.0009267
155					Mean	N/A					95% KM (Percentile Bootstrap) UCL	0.00098
156					Median	N/A					95% KM (Chebyshev) UCL	0.0009783
157					SD	N/A					97.5% KM (Chebyshev) UCL	0.00101
158					k star	N/A					99% KM (Chebyshev) UCL	0.00106
159					Theta star	N/A						

160					Nu star	N/A		**Potential UCLs to Use**				
161					AppChi2	N/A				95% KM (t) UCL	0.0009434	
162					95% Gamma Approximate UCL	N/A				95% KM (% Bootstrap) UCL	0.00098	
163					95% Adjusted Gamma UCL	N/A						
164	**Note: DL/2 is not a recommended method.**											
165												
166												
167	**Magnesium (mg/L)**											
168												
169					**General Statistics**							
170					Number of Valid Samples	6				Number of Unique Samples	5	
171												
172					**Raw Statistics**			**Log-transformed Statistics**				
173					Minimum	18				Minimum of Log Data	2.89	
174					Maximum	32				Maximum of Log Data	3.466	
175					Mean	25.02				Mean of log Data	3.193	
176					Median	25.95				SD of log Data	0.255	
177					SD	6.084						
178					Coefficient of Variation	0.243						
179					Skewness	-0.245						
180												
181					**Relevant UCL Statistics**							
182					**Normal Distribution Test**			**Lognormal Distribution Test**				
183					Shapiro Wilk Test Statistic	0.886				Shapiro Wilk Test Statistic	0.864	
184					Shapiro Wilk Critical Value	0.788				Shapiro Wilk Critical Value	0.788	
185					**Data appear Normal at 5% Significance Level**			**Data appear Lognormal at 5% Significance Level**				
186												
187					**Assuming Normal Distribution**			**Assuming Lognormal Distribution**				
188					95% Student's-t UCL	30.02				95% H-UCL	32.28	
189					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	36.38	
190					95% Adjusted-CLT UCL	28.84				97.5% Chebyshev (MVUE) UCL	41.3	
191					95% Modified-t UCL	29.98				99% Chebyshev (MVUE) UCL	50.94	
192												
193					**Gamma Distribution Test**			**Data Distribution**				
194					k star (bias corrected)	9.719		**Data appear Normal at 5% Significance Level**				
195					Theta Star	2.574						
196					nu star	116.6						
197					Approximate Chi Square Value (.05)	92.69		**Nonparametric Statistics**				
198					Adjusted Level of Significance	0.0122				95% CLT UCL	29.1	
199					Adjusted Chi Square Value	85				95% Jackknife UCL	30.02	
200										95% Standard Bootstrap UCL	28.72	
201					Anderson-Darling Test Statistic	0.444				95% Bootstrap-t UCL	29.87	
202					Anderson-Darling 5% Critical Value	0.697				95% Hall's Bootstrap UCL	27.88	
203					Kolmogorov-Smirnov Test Statistic	0.235				95% Percentile Bootstrap UCL	28.75	
204					Kolmogorov-Smirnov 5% Critical Value	0.332				95% BCA Bootstrap UCL	28.72	
205					**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	35.84	
206										97.5% Chebyshev(Mean, Sd) UCL	40.53	
207					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	49.73	
208					95% Approximate Gamma UCL	31.48						
209					95% Adjusted Gamma UCL	34.33						
210												
211					**Potential UCL to Use**					Use 95% Student's-t UCL	30.02	
212												

213												
214	**Manganese (mg/L)**											
215												
216						**General Statistics**							
217					Number of Valid Samples	6				Number of Detected Data		5
218					Number of Unique Samples	5				Number of Non-Detect Data		1
219										Percent Non-Detects		16.67%
220												
221					**Raw Statistics**					**Log-transformed Statistics**		
222					Minimum Detected	0.0021				Minimum Detected		-6.166
223					Maximum Detected	0.0619				Maximum Detected		-2.782
224					Mean of Detected	0.0269				Mean of Detected		-4.129
225					SD of Detected	0.0241				SD of Detected		1.329
226					Minimum Non-Detect	0.01				Minimum Non-Detect		-4.605
227					Maximum Non-Detect	0.01				Maximum Non-Detect		-4.605
228												
229												
230						**UCL Statistics**							
231					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
232					Shapiro Wilk Test Statistic	0.947				Shapiro Wilk Test Statistic		0.942
233					5% Shapiro Wilk Critical Value	0.762				5% Shapiro Wilk Critical Value		0.762
234					**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
235												
236					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
237					DL/2 Substitution Method					DL/2 Substitution Method		
238					Mean	0.0233				Mean		-4.324
239					SD	0.0233				SD		1.281
240					95% DL/2 (t) UCL	0.0424				95% H-Stat (DL/2) UCL		0.27
241												
242					Maximum Likelihood Estimate(MLE) Method					Log ROS Method		
243					Mean	0.0194				Mean in Log Scale		-4.453
244					SD	0.0265				SD in Log Scale		1.43
245					95% MLE (t) UCL	0.0412				Mean in Original Scale		0.0228
246					95% MLE (Tiku) UCL	0.0429				SD in Original Scale		0.0238
247										95% Percentile Bootstrap UCL		0.0378
248										95% BCA Bootstrap UCL		0.039
249												
250					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
251					k star (bias corrected)	0.577				**Data appear Normal at 5% Significance Level**		
252					Theta Star	0.0466						
253					nu star	5.774						
254												
255					A-D Test Statistic	0.186				**Nonparametric Statistics**		
256					5% A-D Critical Value	0.69				Kaplan-Meier (KM) Method		
257					K-S Test Statistic	0.69				Mean		0.0228
258					5% K-S Critical Value	0.364				SD		0.0217
259					**Data appear Gamma Distributed at 5% Significance Level**					SE of Mean		0.00992
260										95% KM (t) UCL		0.0428
261					**Assuming Gamma Distribution**					95% KM (z) UCL		0.0391
262					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.0423
263					Minimum	0.0021				95% KM (bootstrap t) UCL		0.0565
264					Maximum	0.0619				95% KM (BCA) UCL		0.0415
265					Mean	0.0231				95% KM (Percentile Bootstrap) UCL		0.0396

266					Median	0.0156				95% KM (Chebyshev) UCL		0.066
267					SD	0.0234				97.5% KM (Chebyshev) UCL		0.0847
268					k star	0.604				99% KM (Chebyshev) UCL		0.121
269					Theta star	0.0383						
270					Nu star	7.253				**Potential UCLs to Use**		
271					AppChi2	2.311				95% KM (t) UCL		0.0428
272					95% Gamma Approximate UCL	0.0726				95% KM (Percentile Bootstrap) UCL		0.0396
273					95% Adjusted Gamma UCL	0.117						
274	**Note: DL/2 is not a recommended method.**											
275												
276												
277	**Sodium (mg/L)**											
278												
279					**General Statistics**							
280					Number of Valid Samples	6				Number of Unique Samples		6
281												
282					**Raw Statistics**					**Log-transformed Statistics**		
283					Minimum	11				Minimum of Log Data		2.398
284					Maximum	16.6				Maximum of Log Data		2.809
285					Mean	14.8				Mean of log Data		2.686
286					Median	15.45				SD of log Data		0.151
287					SD	2.031						
288					Coefficient of Variation	0.137						
289					Skewness	-1.651						
290												
291					**Relevant UCL Statistics**							
292					**Normal Distribution Test**					**Lognormal Distribution Test**		
293					Shapiro Wilk Test Statistic	0.838				Shapiro Wilk Test Statistic		0.801
294					Shapiro Wilk Critical Value	0.788				Shapiro Wilk Critical Value		0.788
295					**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
296												
297					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
298					95% Student's-t UCL	16.47				95% H-UCL		17
299					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL		18.78
300					95% Adjusted-CLT UCL	15.57				97.5% Chebyshev (MVUE) UCL		20.49
301					95% Modified-t UCL	16.38				99% Chebyshev (MVUE) UCL		23.86
302												
303					**Gamma Distribution Test**					**Data Distribution**		
304					k star (bias corrected)	28.36				**Data appear Normal at 5% Significance Level**		
305					Theta Star	0.522						
306					nu star	340.4						
307					Approximate Chi Square Value (.05)	298.6				**Nonparametric Statistics**		
308					Adjusted Level of Significance	0.0122				95% CLT UCL		16.16
309					Adjusted Chi Square Value	284.4				95% Jackknife UCL		16.47
310										95% Standard Bootstrap UCL		16.03
311					Anderson-Darling Test Statistic	0.6				95% Bootstrap-t UCL		15.98
312					Anderson-Darling 5% Critical Value	0.697				95% Hall's Bootstrap UCL		15.7
313					Kolmogorov-Smirnov Test Statistic	0.249				95% Percentile Bootstrap UCL		15.9
314					Kolmogorov-Smirnov 5% Critical Value	0.332				95% BCA Bootstrap UCL		15.7
315					**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL		18.41
316										97.5% Chebyshev(Mean, Sd) UCL		19.98
317					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL		23.05
318					95% Approximate Gamma UCL	16.87						

319				95% Adjusted Gamma UCL	17.71							
320												
321	**Potential UCL to Use**									Use 95% Student's-t UCL	16.47	
322												
323												
324	**Vanadium (mg/L)**											
325												
326	**General Statistics**											
327				Number of Valid Samples	6				Number of Detected Data	3		
328				Number of Unique Samples	3				Number of Non-Detect Data	3		
329									Percent Non-Detects	50.00%		
330												
331	**Raw Statistics**					**Log-transformed Statistics**						
332				Minimum Detected	0.0011				Minimum Detected	-6.812		
333				Maximum Detected	0.0014				Maximum Detected	-6.571		
334				Mean of Detected	0.00127				Mean of Detected	-6.676		
335				SD of Detected	0.0001528				SD of Detected	0.124		
336				Minimum Non-Detect	0.025				Minimum Non-Detect	-3.689		
337				Maximum Non-Detect	0.025				Maximum Non-Detect	-3.689		
338												
339												
340	**UCL Statistics**											
341	**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**						
342				Shapiro Wilk Test Statistic	0.964				Shapiro Wilk Test Statistic	0.953		
343				5% Shapiro Wilk Critical Value	0.767				5% Shapiro Wilk Critical Value	0.767		
344	**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**						
345												
346	**Assuming Normal Distribution**					**Assuming Lognormal Distribution**						
347				DL/2 Substitution Method					DL/2 Substitution Method			
348				Mean	0.00688				Mean	-5.529		
349				SD	0.00615				SD	1.259		
350				95% DL/2 (t) UCL	0.0119				95% H-Stat (DL/2) UCL	0.168		
351												
352				Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method			
353	**MLE method failed to converge properly**								Mean in Log Scale	-6.676		
354									SD in Log Scale	0.109		
355									Mean in Original Scale	0.00127		
356									SD in Original Scale	0.0001365		
357									95% Percentile Bootstrap UCL	0.00134		
358									95% BCA Bootstrap UCL	0.00134		
359												
360	**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**						
361				k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**						
362				Theta Star	N/A							
363				nu star	N/A							
364												
365				A-D Test Statistic	0.307	**Nonparametric Statistics**						
366				5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method			
367				K-S Test Statistic	N/A				Mean	0.00127		
368				5% K-S Critical Value	N/A				SD	0.0001247		
369	**Data not Gamma Distributed at 5% Significance Level**								SE of Mean	8.819E-05		
370									95% KM (t) UCL	0.00144		
371	**Assuming Gamma Distribution**								95% KM (z) UCL	0.00141		

372	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.00147
373					Minimum	N/A				95% KM (bootstrap t) UCL		0.00142
374					Maximum	N/A				95% KM (BCA) UCL		0.0014
375					Mean	N/A				95% KM (Percentile Bootstrap) UCL		0.0014
376					Median	N/A				95% KM (Chebyshev) UCL		0.00165
377					SD	N/A				97.5% KM (Chebyshev) UCL		0.00182
378					k star	N/A				99% KM (Chebyshev) UCL		0.00214
379					Theta star	N/A						
380					Nu star	N/A	**Potential UCLs to Use**					
381					AppChi2	N/A				95% KM (t) UCL		0.00144
382				95% Gamma Approximate UCL		N/A				95% KM (Percentile Bootstrap) UCL		0.0014
383				95% Adjusted Gamma UCL		N/A						
384	**Warning: Recommended UCL exceeds the maximum observation**											
385	**Note: DL/2 is not a recommended method.**											
386												
387												
388	**Zinc (mg/L)**											
389												
390	**General Statistics**											
391				Number of Valid Samples		6				Number of Detected Data		3
392				Number of Unique Samples		3				Number of Non-Detect Data		3
393										Percent Non-Detects		50.00%
394												
395	**Raw Statistics**						**Log-transformed Statistics**					
396					Minimum Detected	0.0026				Minimum Detected		-5.952
397					Maximum Detected	0.0067				Maximum Detected		-5.006
398					Mean of Detected	0.00493				Mean of Detected		-5.387
399					SD of Detected	0.00211				SD of Detected		0.499
400					Minimum Non-Detect	0.02				Minimum Non-Detect		-3.912
401					Maximum Non-Detect	0.02				Maximum Non-Detect		-3.912
402												
403												
404	**UCL Statistics**											
405	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
406					Shapiro Wilk Test Statistic	0.946				Shapiro Wilk Test Statistic		0.898
407					5% Shapiro Wilk Critical Value	0.767				5% Shapiro Wilk Critical Value		0.767
408	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
409												
410	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
411					DL/2 Substitution Method					DL/2 Substitution Method		
412					Mean	0.00747				Mean		-4.996
413					SD	0.00308				SD		0.532
414					95% DL/2 (t) UCL	0.01				95% H-Stat (DL/2) UCL		0.0151
415												
416					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
417	**MLE method failed to converge properly**									Mean in Log Scale		-5.387
418										SD in Log Scale		0.435
419										Mean in Original Scale		0.00493
420										SD in Original Scale		0.00196
421										95% Percentile Bootstrap UCL		0.00607
422										95% BCA Bootstrap UCL		0.00614
423												
424	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					

425				k star (bias corrected)	N/A		**Data appear Normal at 5% Significance Level**					
426				Theta Star	N/A							
427				nu star	N/A							
428												
429				A-D Test Statistic	0.368		**Nonparametric Statistics**					
430				5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method		
431				K-S Test Statistic	N/A					Mean		0.00493
432				5% K-S Critical Value	N/A					SD		0.00172
433			**Data not Gamma Distributed at 5% Significance Level**							SE of Mean		0.00122
434										95% KM (t) UCL		0.00739
435			**Assuming Gamma Distribution**							95% KM (z) UCL		0.00694
436				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		0.00768
437				Minimum	N/A					95% KM (bootstrap t) UCL		0.00694
438				Maximum	N/A					95% KM (BCA) UCL		0.0064
439				Mean	N/A					95% KM (Percentile Bootstrap) UCL		0.0067
440				Median	N/A					95% KM (Chebyshev) UCL		0.0102
441				SD	N/A					97.5% KM (Chebyshev) UCL		0.0125
442				k star	N/A					99% KM (Chebyshev) UCL		0.017
443				Theta star	N/A							
444				Nu star	N/A		**Potential UCLs to Use**					
445				AppChi2	N/A					95% KM (t) UCL		0.00739
446				95% Gamma Approximate UCL	N/A					95% KM (Percentile Bootstrap) UCL		0.0067
447				95% Adjusted Gamma UCL	N/A							
448			**Warning: Recommended UCL exceeds the maximum observation**									
449	**Note: DL/2 is not a recommended method.**											
450												
451												
452	**Perchlorate (mg/L)**											
453												
454					**General Statistics**							
455				Number of Valid Samples	6					Number of Detected Data		3
456				Number of Unique Samples	3					Number of Non-Detect Data		3
457										Percent Non-Detects		50.00%
458												
459				**Raw Statistics**			**Log-transformed Statistics**					
460				Minimum Detected	0.000135					Minimum Detected		-8.91
461				Maximum Detected	0.000168					Maximum Detected		-8.692
462				Mean of Detected	0.0001483					Mean of Detected		-8.82
463				SD of Detected	1.739E-05					SD of Detected		0.114
464				Minimum Non-Detect	0.001					Minimum Non-Detect		-6.908
465				Maximum Non-Detect	0.001					Maximum Non-Detect		-6.908
466												
467												
468					**UCL Statistics**							
469			**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**					
470				Shapiro Wilk Test Statistic	0.9					Shapiro Wilk Test Statistic		0.912
471				5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value		0.767
472			**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**					
473												
474			**Assuming Normal Distribution**				**Assuming Lognormal Distribution**					
475				DL/2 Substitution Method						DL/2 Substitution Method		
476				Mean	0.0003242					Mean		-8.211
477				SD	0.0001929					SD		0.672

478				95% DL/2 (t) UCL	0.0004829				95% H-Stat (DL/2) UCL			0.0008894
479												
480				Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method			
481	**MLE method failed to converge properly**								Mean in Log Scale			-8.82
482									SD in Log Scale			0.1
483									Mean in Original Scale			0.0001483
484									SD in Original Scale			1.503E-05
485									95% Percentile Bootstrap UCL			0.0001576
486									95% BCA Bootstrap UCL			0.0001581
487												
488	**Gamma Distribution Test with Detected Values Only**								**Data Distribution Test with Detected Values Only**			
489				k star (bias corrected)	N/A				**Data appear Normal at 5% Significance Level**			
490				Theta Star	N/A							
491				nu star	N/A							
492												
493				A-D Test Statistic	0.377				**Nonparametric Statistics**			
494				5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method			
495				K-S Test Statistic	N/A				Mean			0.0001483
496				5% K-S Critical Value	N/A				SD			1.42E-05
497	**Data not Gamma Distributed at 5% Significance Level**								SE of Mean			1.004E-05
498									95% KM (t) UCL			0.0001686
499	**Assuming Gamma Distribution**								95% KM (z) UCL			0.0001649
500				Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL			0.000171
501				Minimum	N/A				95% KM (bootstrap t) UCL			0.0002148
502				Maximum	N/A				95% KM (BCA) UCL			0.000168
503				Mean	N/A				95% KM (Percentile Bootstrap) UCL			0.000168
504				Median	N/A				95% KM (Chebyshev) UCL			0.0001921
505				SD	N/A				97.5% KM (Chebyshev) UCL			0.000211
506				k star	N/A				99% KM (Chebyshev) UCL			0.0002482
507				Theta star	N/A							
508				Nu star	N/A				**Potential UCLs to Use**			
509				AppChi2	N/A				95% KM (t) UCL			0.0001686
510				95% Gamma Approximate UCL	N/A				95% KM (Percentile Bootstrap) UCL			0.000168
511				95% Adjusted Gamma UCL	N/A							
512	**Warning: Recommended UCL exceeds the maximum observation**											
513	**Note: DL/2 is not a recommended method.**											
514												
515												
516	**2-Am-4,6-DNT (mg/L)**											
517												
518						**General Statistics**							
519				Number of Valid Samples	6				Number of Detected Data			3
520				Number of Unique Samples	3				Number of Non-Detect Data			3
521									Percent Non-Detects			50.00%
522												
523	**Raw Statistics**								**Log-transformed Statistics**			
524				Minimum Detected	0.00027				Minimum Detected			-8.217
525				Maximum Detected	0.0011				Maximum Detected			-6.812
526				Mean of Detected	0.00071				Mean of Detected			-7.404
527				SD of Detected	0.0004173				SD of Detected			0.728
528				Minimum Non-Detect	0.001				Minimum Non-Detect			-6.908
529				Maximum Non-Detect	0.001				Maximum Non-Detect			-6.908
530												

531												
532	**UCL Statistics**											
533	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
534					Shapiro Wilk Test Statistic	0.989					Shapiro Wilk Test Statistic	0.93
535					5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767
536	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
537												
538	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
539					DL/2 Substitution Method						DL/2 Substitution Method	
540					Mean	0.000605					Mean	-7.502
541					SD	0.0002879					SD	0.473
542					95% DL/2 (t) UCL	0.0008418					95% H-Stat (DL/2) UCL	0.00101
543												
544					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
545	**MLE method failed to converge properly**										Mean in Log Scale	-7.586
546											SD in Log Scale	0.556
547											Mean in Original Scale	0.0005766
548											SD in Original Scale	0.0003187
549											95% Percentile Bootstrap UCL	0.0007936
550											95% BCA Bootstrap UCL	0.0008237
551												
552	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
553					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
554					Theta Star	N/A						
555					nu star	N/A						
556												
557					A-D Test Statistic	0.312	**Nonparametric Statistics**					
558					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
559					K-S Test Statistic	N/A					Mean	0.0006125
560					5% K-S Critical Value	N/A					SD	0.0003123
561	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.0002077
562											95% KM (t) UCL	0.00103
563	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0009542
564					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.00116
565					Minimum	N/A					95% KM (bootstrap t) UCL	0.0009191
566					Maximum	N/A					95% KM (BCA) UCL	0.0011
567					Mean	N/A					95% KM (Percentile Bootstrap) UCL	0.0011
568					Median	N/A					95% KM (Chebyshev) UCL	0.00152
569					SD	N/A					97.5% KM (Chebyshev) UCL	0.00191
570					k star	N/A					99% KM (Chebyshev) UCL	0.00268
571					Theta star	N/A						
572					Nu star	N/A	**Potential UCLs to Use**					
573					AppChi2	N/A					95% KM (t) UCL	0.00103
574					95% Gamma Approximate UCL	N/A					95% KM (Percentile Bootstrap) UCL	0.0011
575					95% Adjusted Gamma UCL	N/A						
576	**Note: DL/2 is not a recommended method.**											
577												
578												
579	**4-Am-2,6-DNT (mg/L)**											
580												
581	**General Statistics**											
582					Number of Valid Samples	6					Number of Detected Data	3
583					Number of Unique Samples	3					Number of Non-Detect Data	3

584											Percent Non-Detects	50.00%
585												
586	**Raw Statistics**						**Log-transformed Statistics**					
587					Minimum Detected	0.00087					Minimum Detected	-7.047
588					Maximum Detected	0.0025					Maximum Detected	-5.991
589					Mean of Detected	0.00169					Mean of Detected	-6.472
590					SD of Detected	0.0008151					SD of Detected	0.534
591					Minimum Non-Detect	0.001					Minimum Non-Detect	-6.908
592					Maximum Non-Detect	0.001					Maximum Non-Detect	-6.908
593												
594												
595	**UCL Statistics**											
596	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
597					Shapiro Wilk Test Statistic	1					Shapiro Wilk Test Statistic	0.976
598					5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767
599	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
600												
601	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
602					DL/2 Substitution Method						DL/2 Substitution Method	
603					Mean	0.0011					Mean	-7.036
604					SD	0.000831					SD	0.705
605					95% DL/2 (t) UCL	0.00178					95% H-Stat (DL/2) UCL	0.00126
606												
607					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
608	**MLE method failed to converge properly**										Mean in Log Scale	-6.779
609											SD in Log Scale	0.513
610											Mean in Original Scale	0.00128
611											SD in Original Scale	0.0007048
612											95% Percentile Bootstrap UCL	0.00173
613											95% BCA Bootstrap UCL	0.00186
614												
615	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
616					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
617					Theta Star	N/A						
618					nu star	N/A						
619												
620					A-D Test Statistic	0.262	**Nonparametric Statistics**					
621					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
622					K-S Test Statistic	N/A					Mean	0.00128
623					5% K-S Critical Value	N/A					SD	0.0006241
624	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.0003121
625											95% KM (t) UCL	0.00191
626	**Assuming Gamma Distribution**										95% KM (z) UCL	0.00179
627					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.002
628					Minimum	N/A					95% KM (bootstrap t) UCL	0.00151
629					Maximum	N/A					95% KM (BCA) UCL	0.0025
630					Mean	N/A					95% KM (Percentile Bootstrap) UCL	0.0025
631					Median	N/A					95% KM (Chebyshev) UCL	0.00264
632					SD	N/A					97.5% KM (Chebyshev) UCL	0.00323
633					k star	N/A					99% KM (Chebyshev) UCL	0.00438
634					Theta star	N/A						
635					Nu star	N/A	**Potential UCLs to Use**					
636					AppChi2	N/A					95% KM (t) UCL	0.00191

637				95% Gamma Approximate UCL		N/A				95% KM (Percentile Bootstrap) UCL		0.0025
638				95% Adjusted Gamma UCL		N/A						
639	**Note: DL/2 is not a recommended method.**											
640												
641												
642	**Diethyl phthalate (mg/L)**											
643												
644	**General Statistics**											
645				Number of Valid Samples		6				Number of Detected Data		3
646				Number of Unique Samples		2				Number of Non-Detect Data		3
647										Percent Non-Detects		50.00%
648												
649	**Raw Statistics**						**Log-transformed Statistics**					
650				Minimum Detected		0.00018				Minimum Detected		-8.623
651				Maximum Detected		0.00021				Maximum Detected		-8.468
652				Mean of Detected		0.00019				Mean of Detected		-8.571
653				SD of Detected		1.732E-05				SD of Detected		0.089
654				Minimum Non-Detect		0.0049				Minimum Non-Detect		-5.319
655				Maximum Non-Detect		0.0057				Maximum Non-Detect		-5.167
656												
657	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		6
658	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
659	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
660												
661	**UCL Statistics**											
662	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
663				Shapiro Wilk Test Statistic		0.75				Shapiro Wilk Test Statistic		0.75
664				5% Shapiro Wilk Critical Value		0.767				5% Shapiro Wilk Critical Value		0.767
665	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
666												
667	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
668				DL/2 Substitution Method						DL/2 Substitution Method		
669				Mean		0.0014				Mean		-7.263
670				SD		0.00133				SD		1.435
671				95% DL/2 (t) UCL		0.00249				95% H-Stat (DL/2) UCL		44.39
672												
673				Maximum Likelihood Estimate(MLE) Method		N/A				Log ROS Method		
674	**MLE method failed to converge properly**									Mean in Log Scale		-8.571
675										SD in Log Scale		0.0563
676										Mean in Original Scale		0.0001898
677										SD in Original Scale		1.096E-05
678										95% Percentile Bootstrap UCL		0.0001966
679										95% BCA Bootstrap UCL		0.0001982
680												
681	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
682				k star (bias corrected)		N/A	**Data do not follow a Discernable Distribution (0.05)**					
683				Theta Star		N/A						
684				nu star		N/A						
685												
686				A-D Test Statistic		0.619	**Nonparametric Statistics**					
687				5% A-D Critical Value		N/A				Kaplan-Meier (KM) Method		
688				K-S Test Statistic		N/A				Mean		0.00019
689				5% K-S Critical Value		N/A				SD		1.414E-05

	A	B	C	D	E	F	G	H	I	J	K	L
690	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0
691											95% KM (t) UCL	0.0002102
692	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0002065
693	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.0002125
694	Minimum					N/A					95% KM (bootstrap t) UCL	1.8E+308
695	Maximum					N/A					95% KM (BCA) UCL	0.0002025
696	Mean					N/A					95% KM (Percentile Bootstrap) UCL	0.00021
697	Median					N/A					95% KM (Chebyshev) UCL	0.0002336
698	SD					N/A					97.5% KM (Chebyshev) UCL	0.0002525
699	k star					N/A					99% KM (Chebyshev) UCL	0.0002895
700	Theta star					N/A						
701	Nu star					N/A	**Potential UCLs to Use**					
702	AppChi2					N/A					95% KM (t) UCL	0.0002102
703	95% Gamma Approximate UCL					N/A					95% KM (% Bootstrap) UCL	0.00021
704	95% Adjusted Gamma UCL					N/A						
705	**Warning: Recommended UCL exceeds the maximum observation**											
706	**Note: DL/2 is not a recommended method.**											
707												

Appendix E-5

Exposure Point Concentrations ProUCl 4.0 Output - SWMU 41B

1				**General UCL Statistics for Data Sets with Non-Detects**								
2			**User Selected Options**									
3			From File	H:\Risk DB\Radford\SWMU 41\Area-B\ProUCL\41_B_ProUCL_input_SS.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	**Lead (mg/kg)**											
10												
11						**General Statistics**							
12						Number of Valid Samples	8				Number of Unique Samples	7
13												
14						**Raw Statistics**					**Log-transformed Statistics**	
15						Minimum	33				Minimum of Log Data	3.497
16						Maximum	75				Maximum of Log Data	4.317
17						Mean	43.56				Mean of log Data	3.742
18						Median	41				SD of log Data	0.254
19						SD	13.3					
20						Coefficient of Variation	0.305					
21						Skewness	2.331					
22												
23						**Relevant UCL Statistics**						
24						**Normal Distribution Test**					**Lognormal Distribution Test**	
25						Shapiro Wilk Test Statistic	0.7				Shapiro Wilk Test Statistic	0.793
26						Shapiro Wilk Critical Value	0.818				Shapiro Wilk Critical Value	0.818
27						**Data not Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**	
28												
29						**Assuming Normal Distribution**					**Assuming Lognormal Distribution**	
30						95% Student's-t UCL	52.47				95% H-UCL	52.92
31						**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	60.48
32						95% Adjusted-CLT UCL	55.44				97.5% Chebyshev (MVUE) UCL	67.86
33						95% Modified-t UCL	53.12				99% Chebyshev (MVUE) UCL	82.38
34												
35						**Gamma Distribution Test**					**Data Distribution**	
36						k star (bias corrected)	9.978				**Data do not follow a Discernable Distribution (0.05)**	
37						Theta Star	4.366					
38						nu star	159.6					
39						Approximate Chi Square Value (.05)	131.4				**Nonparametric Statistics**	
40						Adjusted Level of Significance	0.0195				95% CLT UCL	51.3
41						Adjusted Chi Square Value	125				95% Jackknife UCL	52.47
42											95% Standard Bootstrap UCL	50.88
43						Anderson-Darling Test Statistic	0.87				95% Bootstrap-t UCL	65.32
44						Anderson-Darling 5% Critical Value	0.716				95% Hall's Bootstrap UCL	86.55
45						Kolmogorov-Smirnov Test Statistic	0.308				95% Percentile Bootstrap UCL	52.06
46						Kolmogorov-Smirnov 5% Critical Value	0.294				95% BCA Bootstrap UCL	54.25
47						**Data not Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	64.06
48											97.5% Chebyshev(Mean, Sd) UCL	72.93
49						**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	90.36
50						95% Approximate Gamma UCL	52.91					
51						95% Adjusted Gamma UCL	55.66					
52												
53						**Potential UCL to Use**					Use 95% Student's-t UCL	52.47

54											or 95% Modified-t UCL	53.12
55												
56												
57	**Aluminum (mg/kg)**											
58												
59						**General Statistics**							
60						Number of Valid Samples	8				Number of Unique Samples	8
61												
62						**Raw Statistics**					**Log-transformed Statistics**	
63						Minimum	14400				Minimum of Log Data	9.575
64						Maximum	27150				Maximum of Log Data	10.21
65						Mean	20444				Mean of log Data	9.904
66						Median	21300				SD of log Data	0.225
67						SD	4448					
68						Coefficient of Variation	0.218					
69						Skewness	-0.0407					
70												
71						**Relevant UCL Statistics**							
72						**Normal Distribution Test**					**Lognormal Distribution Test**	
73						Shapiro Wilk Test Statistic	0.954				Shapiro Wilk Test Statistic	0.94
74						Shapiro Wilk Critical Value	0.818				Shapiro Wilk Critical Value	0.818
75						**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**	
76												
77						**Assuming Normal Distribution**					**Assuming Lognormal Distribution**	
78						95% Student's-t UCL	23423				95% H-UCL	24286
79						**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	27558
80						95% Adjusted-CLT UCL	23006				97.5% Chebyshev (MVUE) UCL	30633
81						95% Modified-t UCL	23419				99% Chebyshev (MVUE) UCL	36672
82												
83						**Gamma Distribution Test**					**Data Distribution**	
84						k star (bias corrected)	14.64				**Data appear Normal at 5% Significance Level**	
85						Theta Star	1396					
86						nu star	234.3					
87						Approximate Chi Square Value (.05)	199.9				**Nonparametric Statistics**	
88						Adjusted Level of Significance	0.0195				95% CLT UCL	23030
89						Adjusted Chi Square Value	191.8				95% Jackknife UCL	23423
90											95% Standard Bootstrap UCL	22874
91						Anderson-Darling Test Statistic	0.293				95% Bootstrap-t UCL	23250
92						Anderson-Darling 5% Critical Value	0.716				95% Hall's Bootstrap UCL	22883
93						Kolmogorov-Smirnov Test Statistic	0.213				95% Percentile Bootstrap UCL	22800
94						Kolmogorov-Smirnov 5% Critical Value	0.294				95% BCA Bootstrap UCL	22744
95						**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	27298
96											97.5% Chebyshev(Mean, Sd) UCL	30264
97						**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	36091
98						95% Approximate Gamma UCL	23966					
99						95% Adjusted Gamma UCL	24974					
100												
101						**Potential UCL to Use**					Use 95% Student's-t UCL	23423
102												
103												
104	**Antimony (mg/kg)**											
105												
106						**General Statistics**							

107					Number of Valid Samples	8					Number of Unique Samples	8
108												
109					**Raw Statistics**						**Log-transformed Statistics**	
110					Minimum	0.47					Minimum of Log Data	-0.755
111					Maximum	0.7					Maximum of Log Data	-0.357
112					Mean	0.566					Mean of log Data	-0.577
113					Median	0.55					SD of log Data	0.134
114					SD	0.0776						
115					Coefficient of Variation	0.137						
116					Skewness	0.692						
117												
118					**Relevant UCL Statistics**							
119					**Normal Distribution Test**						**Lognormal Distribution Test**	
120					Shapiro Wilk Test Statistic	0.952					Shapiro Wilk Test Statistic	0.97
121					Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818
122					**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
123												
124					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
125					95% Student's-t UCL	0.618					95% H-UCL	0.624
126					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	0.683
127					95% Adjusted-CLT UCL	0.618					97.5% Chebyshev (MVUE) UCL	0.734
128					95% Modified-t UCL	0.619					99% Chebyshev (MVUE) UCL	0.833
129												
130					**Gamma Distribution Test**						**Data Distribution**	
131					k star (bias corrected)	39.45					**Data appear Normal at 5% Significance Level**	
132					Theta Star	0.0143						
133					nu star	631.2						
134					Approximate Chi Square Value (.05)	573.9					**Nonparametric Statistics**	
135					Adjusted Level of Significance	0.0195					95% CLT UCL	0.611
136					Adjusted Chi Square Value	560.1					95% Jackknife UCL	0.618
137											95% Standard Bootstrap UCL	0.608
138					Anderson-Darling Test Statistic	0.211					95% Bootstrap-t UCL	0.634
139					Anderson-Darling 5% Critical Value	0.715					95% Hall's Bootstrap UCL	0.644
140					Kolmogorov-Smirnov Test Statistic	0.143					95% Percentile Bootstrap UCL	0.611
141					Kolmogorov-Smirnov 5% Critical Value	0.293					95% BCA Bootstrap UCL	0.612
142					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	0.686
143											97.5% Chebyshev(Mean, Sd) UCL	0.737
144					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	0.839
145					95% Approximate Gamma UCL	0.623						
146					95% Adjusted Gamma UCL	0.638						
147												
148					**Potential UCL to Use**						Use 95% Student's-t UCL	0.618
149												
150												
151	**Arsenic (mg/kg)**											
152												
153					**General Statistics**							
154					Number of Valid Samples	8					Number of Unique Samples	6
155												
156					**Raw Statistics**						**Log-transformed Statistics**	
157					Minimum	14					Minimum of Log Data	2.639
158					Maximum	23					Maximum of Log Data	3.135
159					Mean	19.38					Mean of log Data	2.948

160					Median	20.5					SD of log Data	0.199
161					SD	3.543						
162					Coefficient of Variation	0.183						
163					Skewness	-0.952						
164												
165					**Relevant UCL Statistics**							
166					**Normal Distribution Test**						**Lognormal Distribution Test**	
167					Shapiro Wilk Test Statistic	0.833					Shapiro Wilk Test Statistic	0.799
168					Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818
169					**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**	
170												
171					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
172					95% Student's-t UCL	21.75					95% H-UCL	22.53
173					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	25.37
174					95% Adjusted-CLT UCL	20.98					97.5% Chebyshev (MVUE) UCL	27.95
175					95% Modified-t UCL	21.68					99% Chebyshev (MVUE) UCL	33.03
176												
177					**Gamma Distribution Test**						**Data Distribution**	
178					k star (bias corrected)	19.2					**Data appear Normal at 5% Significance Level**	
179					Theta Star	1.009						
180					nu star	307.2						
181					Approximate Chi Square Value (.05)	267.6					**Nonparametric Statistics**	
182					Adjusted Level of Significance	0.0195					95% CLT UCL	21.44
183					Adjusted Chi Square Value	258.2					95% Jackknife UCL	21.75
184											95% Standard Bootstrap UCL	21.3
185					Anderson-Darling Test Statistic	0.756					95% Bootstrap-t UCL	21.32
186					Anderson-Darling 5% Critical Value	0.716					95% Hall's Bootstrap UCL	20.92
187					Kolmogorov-Smirnov Test Statistic	0.231					95% Percentile Bootstrap UCL	21.25
188					Kolmogorov-Smirnov 5% Critical Value	0.294					95% BCA Bootstrap UCL	21
189					**Data follow Appr. Gamma Distribution at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	24.84
190											97.5% Chebyshev(Mean, Sd) UCL	27.2
191					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	31.84
192					95% Approximate Gamma UCL	22.24						
193					95% Adjusted Gamma UCL	23.05						
194												
195					**Potential UCL to Use**						Use 95% Student's-t UCL	21.75
196												
197												
198	**Barium (mg/kg)**											
199												
200					**General Statistics**							
201					Number of Valid Samples	8					Number of Unique Samples	8
202												
203					**Raw Statistics**						**Log-transformed Statistics**	
204					Minimum	58					Minimum of Log Data	4.06
205					Maximum	281					Maximum of Log Data	5.638
206					Mean	109.3					Mean of log Data	4.556
207					Median	82.5					SD of log Data	0.512
208					SD	73.96						
209					Coefficient of Variation	0.677						
210					Skewness	2.257						
211												
212					**Relevant UCL Statistics**							

213	**Normal Distribution Test**						**Lognormal Distribution Test**					
214				Shapiro Wilk Test Statistic	0.676					Shapiro Wilk Test Statistic	0.813	
215				Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818	
216	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
217												
218	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
219				95% Student's-t UCL	158.8					95% H-UCL	172.7	
220	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	191.5	
221				95% Adjusted-CLT UCL	174.6					97.5% Chebyshev (MVUE) UCL	228.2	
222				95% Modified-t UCL	162.3					99% Chebyshev (MVUE) UCL	300.4	
223												
224	**Gamma Distribution Test**						**Data Distribution**					
225				k star (bias corrected)	2.449		**Data do not follow a Discernable Distribution (0.05)**					
226				Theta Star	44.6							
227				nu star	39.19							
228				Approximate Chi Square Value (.05)	25.85		**Nonparametric Statistics**					
229				Adjusted Level of Significance	0.0195					95% CLT UCL	152.3	
230				Adjusted Chi Square Value	23.15					95% Jackknife UCL	158.8	
231										95% Standard Bootstrap UCL	149.6	
232				Anderson-Darling Test Statistic	0.93					95% Bootstrap-t UCL	356	
233				Anderson-Darling 5% Critical Value	0.719					95% Hall's Bootstrap UCL	440.4	
234				Kolmogorov-Smirnov Test Statistic	0.373					95% Percentile Bootstrap UCL	153.6	
235				Kolmogorov-Smirnov 5% Critical Value	0.296					95% BCA Bootstrap UCL	171.3	
236	**Data not Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL	223.2	
237										97.5% Chebyshev(Mean, Sd) UCL	272.6	
238	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL	369.4	
239				95% Approximate Gamma UCL	165.6							
240				95% Adjusted Gamma UCL	185							
241												
242	**Potential UCL to Use**									Use 95% Chebyshev (Mean, Sd) UCL	223.2	
243												
244												
245	**Beryllium (mg/kg)**											
246												
247	**General Statistics**											
248				Number of Valid Samples	8					Number of Unique Samples	8	
249												
250	**Raw Statistics**						**Log-transformed Statistics**					
251				Minimum	0.097					Minimum of Log Data	-2.333	
252				Maximum	0.97					Maximum of Log Data	-0.0305	
253				Mean	0.598					Mean of log Data	-0.749	
254				Median	0.668					SD of log Data	0.846	
255				SD	0.335							
256				Coefficient of Variation	0.561							
257				Skewness	-0.47							
258												
259	**Relevant UCL Statistics**											
260	**Normal Distribution Test**						**Lognormal Distribution Test**					
261				Shapiro Wilk Test Statistic	0.913					Shapiro Wilk Test Statistic	0.833	
262				Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818	
263	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
264												
265	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					

266				95% Student's-t UCL	0.822					95% H-UCL	1.83	
267			**95% UCLs (Adjusted for Skewness)**							95% Chebyshev (MVUE) UCL	1.491	
268				95% Adjusted-CLT UCL	0.772					97.5% Chebyshev (MVUE) UCL	1.859	
269				95% Modified-t UCL	0.819					99% Chebyshev (MVUE) UCL	2.582	
270												
271			**Gamma Distribution Test**							**Data Distribution**		
272				k star (bias corrected)	1.512					**Data appear Normal at 5% Significance Level**		
273				Theta Star	0.395							
274				nu star	24.2							
275				Approximate Chi Square Value (.05)	14					**Nonparametric Statistics**		
276				Adjusted Level of Significance	0.0195					95% CLT UCL	0.793	
277				Adjusted Chi Square Value	12.08					95% Jackknife UCL	0.822	
278										95% Standard Bootstrap UCL	0.779	
279				Anderson-Darling Test Statistic	0.53					95% Bootstrap-t UCL	0.799	
280				Anderson-Darling 5% Critical Value	0.723					95% Hall's Bootstrap UCL	0.753	
281				Kolmogorov-Smirnov Test Statistic	0.228					95% Percentile Bootstrap UCL	0.771	
282				Kolmogorov-Smirnov 5% Critical Value	0.297					95% BCA Bootstrap UCL	0.765	
283			**Data appear Gamma Distributed at 5% Significance Level**							95% Chebyshev(Mean, Sd) UCL	1.114	
284										97.5% Chebyshev(Mean, Sd) UCL	1.338	
285			**Assuming Gamma Distribution**							99% Chebyshev(Mean, Sd) UCL	1.777	
286				95% Approximate Gamma UCL	1.033							
287				95% Adjusted Gamma UCL	1.197							
288												
289			**Potential UCL to Use**							Use 95% Student's-t UCL	0.822	
290												
291												
292	**Cadmium (mg/kg)**											
293												
294					**General Statistics**							
295				Number of Valid Samples	8					Number of Unique Samples	7	
296												
297			**Raw Statistics**							**Log-transformed Statistics**		
298				Minimum	1.6					Minimum of Log Data	0.47	
299				Maximum	3.5					Maximum of Log Data	1.253	
300				Mean	2.65					Mean of log Data	0.94	
301				Median	2.75					SD of log Data	0.29	
302				SD	0.711							
303				Coefficient of Variation	0.268							
304				Skewness	-0.286							
305												
306					**Relevant UCL Statistics**							
307			**Normal Distribution Test**							**Lognormal Distribution Test**		
308				Shapiro Wilk Test Statistic	0.931					Shapiro Wilk Test Statistic	0.912	
309				Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818	
310			**Data appear Normal at 5% Significance Level**							**Data appear Lognormal at 5% Significance Level**		
311												
312			**Assuming Normal Distribution**							**Assuming Lognormal Distribution**		
313				95% Student's-t UCL	3.126					95% H-UCL	3.346	
314			**95% UCLs (Adjusted for Skewness)**							95% Chebyshev (MVUE) UCL	3.845	
315				95% Adjusted-CLT UCL	3.036					97.5% Chebyshev (MVUE) UCL	4.36	
316				95% Modified-t UCL	3.122					99% Chebyshev (MVUE) UCL	5.372	
317												
318			**Gamma Distribution Test**							**Data Distribution**		

319				k star (bias corrected)	9.154		**Data appear Normal at 5% Significance Level**					
320				Theta Star	0.289							
321				nu star	146.5							
322				Approximate Chi Square Value (.05)	119.5		**Nonparametric Statistics**					
323				Adjusted Level of Significance	0.0195						95% CLT UCL	3.064
324				Adjusted Chi Square Value	113.3						95% Jackknife UCL	3.126
325											95% Standard Bootstrap UCL	3.044
326				Anderson-Darling Test Statistic	0.328						95% Bootstrap-t UCL	3.094
327				Anderson-Darling 5% Critical Value	0.716						95% Hall's Bootstrap UCL	3.05
328				Kolmogorov-Smirnov Test Statistic	0.188						95% Percentile Bootstrap UCL	3.038
329				Kolmogorov-Smirnov 5% Critical Value	0.294						95% BCA Bootstrap UCL	3.013
330				**Data appear Gamma Distributed at 5% Significance Level**							95% Chebyshev(Mean, Sd) UCL	3.746
331											97.5% Chebyshev(Mean, Sd) UCL	4.22
332				**Assuming Gamma Distribution**							99% Chebyshev(Mean, Sd) UCL	5.152
333				95% Approximate Gamma UCL	3.248							
334				95% Adjusted Gamma UCL	3.425							
335												
336				**Potential UCL to Use**							Use 95% Student's-t UCL	3.126
337												
338												
339	**Calcium (mg/kg)**											
340												
341				**General Statistics**								
342				Number of Valid Samples	8						Number of Unique Samples	8
343												
344				**Raw Statistics**			**Log-transformed Statistics**					
345				Minimum	28400						Minimum of Log Data	10.25
346				Maximum	154000						Maximum of Log Data	11.94
347				Mean	97625						Mean of log Data	11.37
348				Median	90550						SD of log Data	0.559
349				SD	44067							
350				Coefficient of Variation	0.451							
351				Skewness	-0.148							
352												
353				**Relevant UCL Statistics**								
354				**Normal Distribution Test**			**Lognormal Distribution Test**					
355				Shapiro Wilk Test Statistic	0.925						Shapiro Wilk Test Statistic	0.878
356				Shapiro Wilk Critical Value	0.818						Shapiro Wilk Critical Value	0.818
357				**Data appear Normal at 5% Significance Level**			**Data appear Lognormal at 5% Significance Level**					
358												
359				**Assuming Normal Distribution**			**Assuming Lognormal Distribution**					
360				95% Student's-t UCL	127142						95% H-UCL	171944
361				**95% UCLs (Adjusted for Skewness)**							95% Chebyshev (MVUE) UCL	186090
362				95% Adjusted-CLT UCL	122383						97.5% Chebyshev (MVUE) UCL	223582
363				95% Modified-t UCL	127007						99% Chebyshev (MVUE) UCL	297227
364												
365				**Gamma Distribution Test**			**Data Distribution**					
366				k star (bias corrected)	2.875		**Data appear Normal at 5% Significance Level**					
367				Theta Star	33962							
368				nu star	45.99							
369				Approximate Chi Square Value (.05)	31.43		**Nonparametric Statistics**					
370				Adjusted Level of Significance	0.0195						95% CLT UCL	123252
371				Adjusted Chi Square Value	28.42						95% Jackknife UCL	127142

372											95% Standard Bootstrap UCL	120970
373					Anderson-Darling Test Statistic	0.406					95% Bootstrap-t UCL	126242
374					Anderson-Darling 5% Critical Value	0.719					95% Hall's Bootstrap UCL	120055
375					Kolmogorov-Smirnov Test Statistic	0.199					95% Percentile Bootstrap UCL	121800
376					Kolmogorov-Smirnov 5% Critical Value	0.295					95% BCA Bootstrap UCL	122050
377					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	165536
378											97.5% Chebyshev(Mean, Sd) UCL	194922
379					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	252644
380					95% Approximate Gamma UCL	142845						
381					95% Adjusted Gamma UCL	157985						
382												
383					**Potential UCL to Use**						Use 95% Student's-t UCL	127142
384												
385												
386	**Chromium (mg/kg)**											
387												
388					**General Statistics**							
389					Number of Valid Samples	8					Number of Unique Samples	7
390												
391					**Raw Statistics**						**Log-transformed Statistics**	
392					Minimum	12					Minimum of Log Data	2.485
393					Maximum	23					Maximum of Log Data	3.135
394					Mean	18.13					Mean of log Data	2.871
395					Median	18					SD of log Data	0.246
396					SD	4.291						
397					Coefficient of Variation	0.237						
398					Skewness	-0.0997						
399												
400					**Relevant UCL Statistics**							
401					**Normal Distribution Test**						**Lognormal Distribution Test**	
402					Shapiro Wilk Test Statistic	0.911					Shapiro Wilk Test Statistic	0.917
403					Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818
404					**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
405												
406					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
407					95% Student's-t UCL	21					95% H-UCL	21.95
408					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	25.04
409					95% Adjusted-CLT UCL	20.56					97.5% Chebyshev (MVUE) UCL	28.03
410					95% Modified-t UCL	20.99					99% Chebyshev (MVUE) UCL	33.89
411												
412					**Gamma Distribution Test**						**Data Distribution**	
413					k star (bias corrected)	12.28					**Data appear Normal at 5% Significance Level**	
414					Theta Star	1.475						
415					nu star	196.6						
416					Approximate Chi Square Value (.05)	165.1					**Nonparametric Statistics**	
417					Adjusted Level of Significance	0.0195					95% CLT UCL	20.62
418					Adjusted Chi Square Value	157.8					95% Jackknife UCL	21
419											95% Standard Bootstrap UCL	20.5
420					Anderson-Darling Test Statistic	0.346					95% Bootstrap-t UCL	21.15
421					Anderson-Darling 5% Critical Value	0.716					95% Hall's Bootstrap UCL	20.24
422					Kolmogorov-Smirnov Test Statistic	0.206					95% Percentile Bootstrap UCL	20.5
423					Kolmogorov-Smirnov 5% Critical Value	0.294					95% BCA Bootstrap UCL	20.25
424					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	24.74

425											97.5% Chebyshev(Mean, Sd) UCL	27.6
426	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	33.22
427				95% Approximate Gamma UCL	21.58							
428				95% Adjusted Gamma UCL	22.57							
429												
430	**Potential UCL to Use**										Use 95% Student's-t UCL	21
431												
432												
433	**Cobalt (mg/kg)**											
434												
435	**General Statistics**											
436				Number of Valid Samples	8						Number of Unique Samples	6
437												
438	**Raw Statistics**						**Log-transformed Statistics**					
439				Minimum	7.2						Minimum of Log Data	1.974
440				Maximum	12						Maximum of Log Data	2.485
441				Mean	9.525						Mean of log Data	2.231
442				Median	9.45						SD of log Data	0.228
443				SD	2.153							
444				Coefficient of Variation	0.226							
445				Skewness	0.0848							
446												
447	**Relevant UCL Statistics**											
448	**Normal Distribution Test**						**Lognormal Distribution Test**					
449				Shapiro Wilk Test Statistic	0.8						Shapiro Wilk Test Statistic	0.801
450				Shapiro Wilk Critical Value	0.818						Shapiro Wilk Critical Value	0.818
451	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
452												
453	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
454				95% Student's-t UCL	10.97						95% H-UCL	11.35
455	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	12.89
456				95% Adjusted-CLT UCL	10.8						97.5% Chebyshev (MVUE) UCL	14.34
457				95% Modified-t UCL	10.97						99% Chebyshev (MVUE) UCL	17.2
458												
459	**Gamma Distribution Test**						**Data Distribution**					
460				k star (bias corrected)	13.94		**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
461				Theta Star	0.683							
462				nu star	223.1							
463				Approximate Chi Square Value (.05)	189.5		**Nonparametric Statistics**					
464				Adjusted Level of Significance	0.0195						95% CLT UCL	10.78
465				Adjusted Chi Square Value	181.6						95% Jackknife UCL	10.97
466											95% Standard Bootstrap UCL	10.72
467				Anderson-Darling Test Statistic	0.843						95% Bootstrap-t UCL	11.06
468				Anderson-Darling 5% Critical Value	0.716						95% Hall's Bootstrap UCL	10.36
469				Kolmogorov-Smirnov Test Statistic	0.283						95% Percentile Bootstrap UCL	10.69
470				Kolmogorov-Smirnov 5% Critical Value	0.294						95% BCA Bootstrap UCL	10.65
471	**Data follow Appr. Gamma Distribution at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	12.84
472											97.5% Chebyshev(Mean, Sd) UCL	14.28
473	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	17.1
474				95% Approximate Gamma UCL	11.21							
475				95% Adjusted Gamma UCL	11.7							
476												
477	**Potential UCL to Use**										Use 95% Approximate Gamma UCL	11.21

Copper (mg/kg)		
General Statistics		
Number of Valid Samples	8	Number of Unique Samples 7
Raw Statistics		**Log-transformed Statistics**
Minimum	31	Minimum of Log Data 3.434
Maximum	57	Maximum of Log Data 4.043
Mean	43.5	Mean of log Data 3.753
Median	40	SD of log Data 0.215
SD	9.396	
Coefficient of Variation	0.216	
Skewness	0.389	
Relevant UCL Statistics		
Normal Distribution Test		**Lognormal Distribution Test**
Shapiro Wilk Test Statistic	0.912	Shapiro Wilk Test Statistic 0.928
Shapiro Wilk Critical Value	0.818	Shapiro Wilk Critical Value 0.818
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**
Assuming Normal Distribution		**Assuming Lognormal Distribution**
95% Student's-t UCL	49.79	95% H-UCL 51.19
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL 57.92
95% Adjusted-CLT UCL	49.45	97.5% Chebyshev (MVUE) UCL 64.17
95% Modified-t UCL	49.87	99% Chebyshev (MVUE) UCL 76.43
Gamma Distribution Test		**Data Distribution**
k star (bias corrected)	15.63	**Data appear Normal at 5% Significance Level**
Theta Star	2.784	
nu star	250	
Approximate Chi Square Value (.05)	214.4	**Nonparametric Statistics**
Adjusted Level of Significance	0.0195	95% CLT UCL 48.96
Adjusted Chi Square Value	206	95% Jackknife UCL 49.79
		95% Standard Bootstrap UCL 48.45
Anderson-Darling Test Statistic	0.391	95% Bootstrap-t UCL 50.25
Anderson-Darling 5% Critical Value	0.716	95% Hall's Bootstrap UCL 48.37
Kolmogorov-Smirnov Test Statistic	0.223	95% Percentile Bootstrap UCL 48.63
Kolmogorov-Smirnov 5% Critical Value	0.294	95% BCA Bootstrap UCL 49
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 57.98
		97.5% Chebyshev(Mean, Sd) UCL 64.25
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 76.55
95% Approximate Gamma UCL	50.72	
95% Adjusted Gamma UCL	52.78	
Potential UCL to Use		Use 95% Student's-t UCL 49.79
Iron (mg/kg)		
General Statistics		
Number of Valid Samples	8	Number of Unique Samples 8

531												
532	**Raw Statistics**						**Log-transformed Statistics**					
533					Minimum	29500					Minimum of Log Data	10.29
534					Maximum	47450					Maximum of Log Data	10.77
535					Mean	36794					Mean of log Data	10.5
536					Median	36650					SD of log Data	0.153
537					SD	5754						
538					Coefficient of Variation	0.156						
539					Skewness	0.686						
540												
541	**Relevant UCL Statistics**											
542	**Normal Distribution Test**						**Lognormal Distribution Test**					
543					Shapiro Wilk Test Statistic	0.927					Shapiro Wilk Test Statistic	0.945
544					Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818
545	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
546												
547	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
548					95% Student's-t UCL	40648					95% H-UCL	41138
549	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	45475
550					95% Adjusted-CLT UCL	40667					97.5% Chebyshev (MVUE) UCL	49233
551					95% Modified-t UCL	40730					99% Chebyshev (MVUE) UCL	56616
552												
553	**Gamma Distribution Test**						**Data Distribution**					
554					k star (bias corrected)	30.29	**Data appear Normal at 5% Significance Level**					
555					Theta Star	1215						
556					nu star	484.7						
557					Approximate Chi Square Value (.05)	434.6	**Nonparametric Statistics**					
558					Adjusted Level of Significance	0.0195					95% CLT UCL	40140
559					Adjusted Chi Square Value	422.6					95% Jackknife UCL	40648
560											95% Standard Bootstrap UCL	39960
561					Anderson-Darling Test Statistic	0.34					95% Bootstrap-t UCL	41195
562					Anderson-Darling 5% Critical Value	0.715					95% Hall's Bootstrap UCL	41094
563					Kolmogorov-Smirnov Test Statistic	0.195					95% Percentile Bootstrap UCL	40031
564					Kolmogorov-Smirnov 5% Critical Value	0.293					95% BCA Bootstrap UCL	40419
565	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	45661
566											97.5% Chebyshev(Mean, Sd) UCL	49498
567	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	57035
568					95% Approximate Gamma UCL	41031						
569					95% Adjusted Gamma UCL	42201						
570												
571	**Potential UCL to Use**										Use 95% Student's-t UCL	40648
572												
573												
574	**Magnesium (mg/kg)**											
575												
576	**General Statistics**											
577					Number of Valid Samples	8					Number of Unique Samples	8
578												
579	**Raw Statistics**						**Log-transformed Statistics**					
580					Minimum	20900					Minimum of Log Data	9.948
581					Maximum	58000					Maximum of Log Data	10.97
582					Mean	39675					Mean of log Data	10.53
583					Median	37600					SD of log Data	0.364

584				SD	13529							
585				Coefficient of Variation	0.341							
586				Skewness	0.121							
587												
588	**Relevant UCL Statistics**											
589	**Normal Distribution Test**					**Lognormal Distribution Test**						
590				Shapiro Wilk Test Statistic	0.935					Shapiro Wilk Test Statistic	0.932	
591				Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818	
592	**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**						
593												
594	**Assuming Normal Distribution**					**Assuming Lognormal Distribution**						
595				95% Student's-t UCL	48737					95% H-UCL	54034	
596	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	62216	
597				95% Adjusted-CLT UCL	47762					97.5% Chebyshev (MVUE) UCL	71928	
598				95% Modified-t UCL	48771					99% Chebyshev (MVUE) UCL	91006	
599												
600	**Gamma Distribution Test**					**Data Distribution**						
601				k star (bias corrected)	5.845	**Data appear Normal at 5% Significance Level**						
602				Theta Star	6788							
603				nu star	93.52							
604				Approximate Chi Square Value (.05)	72.22	**Nonparametric Statistics**						
605				Adjusted Level of Significance	0.0195					95% CLT UCL	47543	
606				Adjusted Chi Square Value	67.5					95% Jackknife UCL	48737	
607										95% Standard Bootstrap UCL	47267	
608				Anderson-Darling Test Statistic	0.283					95% Bootstrap-t UCL	49541	
609				Anderson-Darling 5% Critical Value	0.716					95% Hall's Bootstrap UCL	49474	
610				Kolmogorov-Smirnov Test Statistic	0.172					95% Percentile Bootstrap UCL	46788	
611				Kolmogorov-Smirnov 5% Critical Value	0.294					95% BCA Bootstrap UCL	46763	
612	**Data appear Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL	60525	
613										97.5% Chebyshev(Mean, Sd) UCL	69546	
614	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL	87267	
615				95% Approximate Gamma UCL	51378							
616				95% Adjusted Gamma UCL	54972							
617												
618	**Potential UCL to Use**									Use 95% Student's-t UCL	48737	
619												
620												
621	**Manganese (mg/kg)**											
622												
623	**General Statistics**											
624				Number of Valid Samples	8					Number of Unique Samples	8	
625												
626	**Raw Statistics**					**Log-transformed Statistics**						
627				Minimum	912					Minimum of Log Data	6.816	
628				Maximum	2340					Maximum of Log Data	7.758	
629				Mean	1364					Mean of log Data	7.177	
630				Median	1275					SD of log Data	0.298	
631				SD	453.1							
632				Coefficient of Variation	0.332							
633				Skewness	1.595							
634												
635	**Relevant UCL Statistics**											
636	**Normal Distribution Test**					**Lognormal Distribution Test**						

637					Shapiro Wilk Test Statistic	0.86					Shapiro Wilk Test Statistic	0.943
638					Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818
639					**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
640												
641					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
642					95% Student's-t UCL	1668					95% H-UCL	1727
643					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	1987
644					95% Adjusted-CLT UCL	1724					97.5% Chebyshev (MVUE) UCL	2258
645					95% Modified-t UCL	1683					99% Chebyshev (MVUE) UCL	2791
646												
647					**Gamma Distribution Test**						**Data Distribution**	
648					k star (bias corrected)	7.715					**Data appear Normal at 5% Significance Level**	
649					Theta Star	176.8						
650					nu star	123.4						
651					Approximate Chi Square Value (.05)	98.79					**Nonparametric Statistics**	
652					Adjusted Level of Significance	0.0195					95% CLT UCL	1628
653					Adjusted Chi Square Value	93.21					95% Jackknife UCL	1668
654											95% Standard Bootstrap UCL	1609
655					Anderson-Darling Test Statistic	0.323					95% Bootstrap-t UCL	1860
656					Anderson-Darling 5% Critical Value	0.715					95% Hall's Bootstrap UCL	2861
657					Kolmogorov-Smirnov Test Statistic	0.147					95% Percentile Bootstrap UCL	1614
658					Kolmogorov-Smirnov 5% Critical Value	0.294					95% BCA Bootstrap UCL	1670
659					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	2062
660											97.5% Chebyshev(Mean, Sd) UCL	2364
661					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	2958
662					95% Approximate Gamma UCL	1704						
663					95% Adjusted Gamma UCL	1806						
664												
665					**Potential UCL to Use**						Use 95% Student's-t UCL	1668
666												
667												
668	**Mercury (mg/kg)**											
669												
670					**General Statistics**							
671					Number of Valid Samples	8					Number of Unique Samples	8
672												
673					**Raw Statistics**						**Log-transformed Statistics**	
674					Minimum	0.036					Minimum of Log Data	-3.324
675					Maximum	0.24					Maximum of Log Data	-1.427
676					Mean	0.0891					Mean of log Data	-2.574
677					Median	0.0733					SD of log Data	0.554
678					SD	0.0637						
679					Coefficient of Variation	0.716						
680					Skewness	2.358						
681												
682					**Relevant UCL Statistics**							
683					**Normal Distribution Test**						**Lognormal Distribution Test**	
684					Shapiro Wilk Test Statistic	0.703					Shapiro Wilk Test Statistic	0.912
685					Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818
686					**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
687												
688					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
689					95% Student's-t UCL	0.132					95% H-UCL	0.149

690	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	0.162	
691				95% Adjusted-CLT UCL	0.146					97.5% Chebyshev (MVUE) UCL	0.195	
692				95% Modified-t UCL	0.135					99% Chebyshev (MVUE) UCL	0.258	
693												
694	**Gamma Distribution Test**									**Data Distribution**		
695				k star (bias corrected)	2.186					**Data appear Gamma Distributed at 5% Significance Level**		
696				Theta Star	0.0407							
697				nu star	34.98							
698				Approximate Chi Square Value (.05)	22.45					**Nonparametric Statistics**		
699				Adjusted Level of Significance	0.0195					95% CLT UCL	0.126	
700				Adjusted Chi Square Value	19.94					95% Jackknife UCL	0.132	
701										95% Standard Bootstrap UCL	0.124	
702				Anderson-Darling Test Statistic	0.601					95% Bootstrap-t UCL	0.196	
703				Anderson-Darling 5% Critical Value	0.72					95% Hall's Bootstrap UCL	0.289	
704				Kolmogorov-Smirnov Test Statistic	0.256					95% Percentile Bootstrap UCL	0.129	
705				Kolmogorov-Smirnov 5% Critical Value	0.296					95% BCA Bootstrap UCL	0.141	
706	**Data appear Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL	0.187	
707										97.5% Chebyshev(Mean, Sd) UCL	0.23	
708	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL	0.313	
709				95% Approximate Gamma UCL	0.139							
710				95% Adjusted Gamma UCL	0.156							
711												
712	**Potential UCL to Use**									Use 95% Approximate Gamma UCL	0.139	
713												
714												
715	**Nickel (mg/kg)**											
716												
717	**General Statistics**											
718				Number of Valid Samples	8					Number of Unique Samples	6	
719												
720	**Raw Statistics**									**Log-transformed Statistics**		
721				Minimum	16					Minimum of Log Data	2.773	
722				Maximum	26					Maximum of Log Data	3.258	
723				Mean	19.13					Mean of log Data	2.938	
724				Median	18					SD of log Data	0.172	
725				SD	3.482							
726				Coefficient of Variation	0.182							
727				Skewness	1.214							
728												
729	**Relevant UCL Statistics**											
730	**Normal Distribution Test**									**Lognormal Distribution Test**		
731				Shapiro Wilk Test Statistic	0.868					Shapiro Wilk Test Statistic	0.894	
732				Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818	
733	**Data appear Normal at 5% Significance Level**									**Data appear Lognormal at 5% Significance Level**		
734												
735	**Assuming Normal Distribution**									**Assuming Lognormal Distribution**		
736				95% Student's-t UCL	21.46					95% H-UCL	21.7	
737	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	24.17	
738				95% Adjusted-CLT UCL	21.71					97.5% Chebyshev (MVUE) UCL	26.36	
739				95% Modified-t UCL	21.55					99% Chebyshev (MVUE) UCL	30.66	
740												
741	**Gamma Distribution Test**									**Data Distribution**		
742				k star (bias corrected)	23.54					**Data appear Normal at 5% Significance Level**		

743					Theta Star	0.812						
744					nu star	376.6						
745					Approximate Chi Square Value (.05)	332.6				**Nonparametric Statistics**		
746					Adjusted Level of Significance	0.0195				95% CLT UCL	21.15	
747					Adjusted Chi Square Value	322.1				95% Jackknife UCL	21.46	
748										95% Standard Bootstrap UCL	20.96	
749					Anderson-Darling Test Statistic	0.434				95% Bootstrap-t UCL	22.65	
750					Anderson-Darling 5% Critical Value	0.715				95% Hall's Bootstrap UCL	23.25	
751					Kolmogorov-Smirnov Test Statistic	0.243				95% Percentile Bootstrap UCL	21.13	
752					Kolmogorov-Smirnov 5% Critical Value	0.294				95% BCA Bootstrap UCL	21.25	
753					**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	24.49	
754										97.5% Chebyshev(Mean, Sd) UCL	26.81	
755					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	31.37	
756					95% Approximate Gamma UCL	21.65						
757					95% Adjusted Gamma UCL	22.36						
758												
759					**Potential UCL to Use**					Use 95% Student's-t UCL	21.46	
760												
761												
762	**Potassium (mg/kg)**											
763												
764					**General Statistics**							
765					Number of Valid Samples	8				Number of Unique Samples	8	
766												
767					**Raw Statistics**					**Log-transformed Statistics**		
768					Minimum	546				Minimum of Log Data	6.303	
769					Maximum	1440				Maximum of Log Data	7.272	
770					Mean	999.4				Mean of log Data	6.853	
771					Median	1037				SD of log Data	0.361	
772					SD	338.4						
773					Coefficient of Variation	0.339						
774					Skewness	0.00569						
775												
776					**Relevant UCL Statistics**							
777					**Normal Distribution Test**					**Lognormal Distribution Test**		
778					Shapiro Wilk Test Statistic	0.928				Shapiro Wilk Test Statistic	0.924	
779					Shapiro Wilk Critical Value	0.818				Shapiro Wilk Critical Value	0.818	
780					**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
781												
782					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
783					95% Student's-t UCL	1226				95% H-UCL	1356	
784					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	1562	
785					95% Adjusted-CLT UCL	1196				97.5% Chebyshev (MVUE) UCL	1804	
786					95% Modified-t UCL	1226				99% Chebyshev (MVUE) UCL	2281	
787												
788					**Gamma Distribution Test**					**Data Distribution**		
789					k star (bias corrected)	5.912				**Data appear Normal at 5% Significance Level**		
790					Theta Star	169						
791					nu star	94.59						
792					Approximate Chi Square Value (.05)	73.16				**Nonparametric Statistics**		
793					Adjusted Level of Significance	0.0195				95% CLT UCL	1196	
794					Adjusted Chi Square Value	68.41				95% Jackknife UCL	1226	
795										95% Standard Bootstrap UCL	1178	

796				Anderson-Darling Test Statistic	0.327					95% Bootstrap-t UCL	1225
797				Anderson-Darling 5% Critical Value	0.716					95% Hall's Bootstrap UCL	1182
798				Kolmogorov-Smirnov Test Statistic	0.188					95% Percentile Bootstrap UCL	1186
799				Kolmogorov-Smirnov 5% Critical Value	0.294					95% BCA Bootstrap UCL	1191
800				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	1521
801										97.5% Chebyshev(Mean, Sd) UCL	1747
802				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	2190
803				95% Approximate Gamma UCL	1292						
804				95% Adjusted Gamma UCL	1382						
805											
806				**Potential UCL to Use**						Use 95% Student's-t UCL	1226
807											
808											
809	**Selenium (mg.kg)**										
810											
811				**General Statistics**							
812				Number of Valid Samples	8					Number of Unique Samples	8
813											
814				**Raw Statistics**						**Log-transformed Statistics**	
815				Minimum	0.5					Minimum of Log Data	-0.693
816				Maximum	0.92					Maximum of Log Data	-0.0834
817				Mean	0.64					Mean of log Data	-0.465
818				Median	0.595					SD of log Data	0.199
819				SD	0.138						
820				Coefficient of Variation	0.216						
821				Skewness	1.389						
822											
823				**Relevant UCL Statistics**							
824				**Normal Distribution Test**						**Lognormal Distribution Test**	
825				Shapiro Wilk Test Statistic	0.873					Shapiro Wilk Test Statistic	0.919
826				Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818
827				**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
828											
829				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
830				95% Student's-t UCL	0.732					95% H-UCL	0.743
831				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	0.836
832				95% Adjusted-CLT UCL	0.746					97.5% Chebyshev (MVUE) UCL	0.921
833				95% Modified-t UCL	0.736					99% Chebyshev (MVUE) UCL	1.089
834											
835				**Gamma Distribution Test**						**Data Distribution**	
836				k star (bias corrected)	17.25					**Data appear Normal at 5% Significance Level**	
837				Theta Star	0.0371						
838				nu star	276.1						
839				Approximate Chi Square Value (.05)	238.6					**Nonparametric Statistics**	
840				Adjusted Level of Significance	0.0195					95% CLT UCL	0.72
841				Adjusted Chi Square Value	229.7					95% Jackknife UCL	0.732
842										95% Standard Bootstrap UCL	0.715
843				Anderson-Darling Test Statistic	0.409					95% Bootstrap-t UCL	0.836
844				Anderson-Darling 5% Critical Value	0.716					95% Hall's Bootstrap UCL	1.176
845				Kolmogorov-Smirnov Test Statistic	0.199					95% Percentile Bootstrap UCL	0.721
846				Kolmogorov-Smirnov 5% Critical Value	0.294					95% BCA Bootstrap UCL	0.74
847				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	0.853
848										97.5% Chebyshev(Mean, Sd) UCL	0.945

849	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL		1.126
850				95% Approximate Gamma UCL	0.741							
851				95% Adjusted Gamma UCL	0.769							
852												
853	**Potential UCL to Use**									Use 95% Student's-t UCL		0.732
854												
855												
856	**Silver (mg/kg)**											
857												
858	**General Statistics**											
859				Number of Valid Samples	8					Number of Unique Samples		8
860												
861	**Raw Statistics**							**Log-transformed Statistics**				
862				Minimum	0.064					Minimum of Log Data		-2.749
863				Maximum	0.22					Maximum of Log Data		-1.514
864				Mean	0.101					Mean of log Data		-2.377
865				Median	0.081					SD of log Data		0.417
866				SD	0.0528							
867				Coefficient of Variation	0.521							
868				Skewness	2.043							
869												
870	**Relevant UCL Statistics**											
871	**Normal Distribution Test**							**Lognormal Distribution Test**				
872				Shapiro Wilk Test Statistic	0.719					Shapiro Wilk Test Statistic		0.821
873				Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value		0.818
874	**Data not Normal at 5% Significance Level**							**Data appear Lognormal at 5% Significance Level**				
875												
876	**Assuming Normal Distribution**							**Assuming Lognormal Distribution**				
877				95% Student's-t UCL	0.137					95% H-UCL		0.144
878	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		0.165
879				95% Adjusted-CLT UCL	0.146					97.5% Chebyshev (MVUE) UCL		0.193
880				95% Modified-t UCL	0.139					99% Chebyshev (MVUE) UCL		0.248
881												
882	**Gamma Distribution Test**							**Data Distribution**				
883				k star (bias corrected)	3.73			**Data appear Lognormal at 5% Significance Level**				
884				Theta Star	0.0272							
885				nu star	59.69							
886				Approximate Chi Square Value (.05)	42.92			**Nonparametric Statistics**				
887				Adjusted Level of Significance	0.0195					95% CLT UCL		0.132
888				Adjusted Chi Square Value	39.35					95% Jackknife UCL		0.137
889										95% Standard Bootstrap UCL		0.129
890				Anderson-Darling Test Statistic	0.824					95% Bootstrap-t UCL		0.25
891				Anderson-Darling 5% Critical Value	0.718					95% Hall's Bootstrap UCL		0.313
892				Kolmogorov-Smirnov Test Statistic	0.327					95% Percentile Bootstrap UCL		0.133
893				Kolmogorov-Smirnov 5% Critical Value	0.295					95% BCA Bootstrap UCL		0.147
894	**Data not Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL		0.183
895										97.5% Chebyshev(Mean, Sd) UCL		0.218
896	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL		0.287
897				95% Approximate Gamma UCL	0.141							
898				95% Adjusted Gamma UCL	0.154							
899												
900	**Potential UCL to Use**									Use 95% Student's-t UCL		0.137
901										or 95% Modified-t UCL		0.139

902											or 95% H-UCL	0.144
903												
904												
905	**Sodium (mg/kg)**											
906												
907						**General Statistics**							
908						Number of Valid Samples	8				Number of Unique Samples	8
909												
910						**Raw Statistics**					**Log-transformed Statistics**	
911						Minimum	86				Minimum of Log Data	4.454
912						Maximum	3730				Maximum of Log Data	8.224
913						Mean	628.1				Mean of log Data	5.337
914						Median	110.8				SD of log Data	1.336
915						SD	1268					
916						Coefficient of Variation	2.018					
917						Skewness	2.712					
918												
919						**Relevant UCL Statistics**							
920						**Normal Distribution Test**					**Lognormal Distribution Test**	
921						Shapiro Wilk Test Statistic	0.507				Shapiro Wilk Test Statistic	0.699
922						Shapiro Wilk Critical Value	0.818				Shapiro Wilk Critical Value	0.818
923						**Data not Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**	
924												
925						**Assuming Normal Distribution**					**Assuming Lognormal Distribution**	
926						95% Student's-t UCL	1477				95% H-UCL	4671
927						**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	1324
928						95% Adjusted-CLT UCL	1824				97.5% Chebyshev (MVUE) UCL	1711
929						95% Modified-t UCL	1549				99% Chebyshev (MVUE) UCL	2472
930												
931						**Gamma Distribution Test**					**Data Distribution**	
932						k star (bias corrected)	0.436				**Data do not follow a Discernable Distribution (0.05)**	
933						Theta Star	1441					
934						nu star	6.975					
935						Approximate Chi Square Value (.05)	2.157				**Nonparametric Statistics**	
936						Adjusted Level of Significance	0.0195				95% CLT UCL	1365
937						Adjusted Chi Square Value	1.545				95% Jackknife UCL	1477
938											95% Standard Bootstrap UCL	1308
939						Anderson-Darling Test Statistic	1.492				95% Bootstrap-t UCL	33697
940						Anderson-Darling 5% Critical Value	0.758				95% Hall's Bootstrap UCL	15854
941						Kolmogorov-Smirnov Test Statistic	0.413				95% Percentile Bootstrap UCL	1467
942						Kolmogorov-Smirnov 5% Critical Value	0.308				95% BCA Bootstrap UCL	1920
943						**Data not Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	2582
944											97.5% Chebyshev(Mean, Sd) UCL	3427
945						**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	5087
946						95% Approximate Gamma UCL	2031					
947						95% Adjusted Gamma UCL	2836					
948												
949						**Potential UCL to Use**					Use 99% Chebyshev (Mean, Sd) UCL	5087
950						**Recommended UCL exceeds the maximum observation**						
951												
952												
953	**Thallium (mg/kg)**											
954												

	A	B	C	D	E	F	G	H	I	J	K	L
955	**General Statistics**											
956					Number of Valid Samples	8				Number of Detected Data		6
957					Number of Unique Samples	6				Number of Non-Detect Data		2
958										Percent Non-Detects		25.00%
959												
960	**Raw Statistics**						**Log-transformed Statistics**					
961					Minimum Detected	0.092				Minimum Detected		-2.386
962					Maximum Detected	0.27				Maximum Detected		-1.309
963					Mean of Detected	0.158				Mean of Detected		-1.92
964					SD of Detected	0.0676				SD of Detected		0.42
965					Minimum Non-Detect	0.5				Minimum Non-Detect		-0.693
966					Maximum Non-Detect	0.5				Maximum Non-Detect		-0.693
967												
968												
969	**UCL Statistics**											
970	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
971					Shapiro Wilk Test Statistic	0.917				Shapiro Wilk Test Statistic		0.94
972					5% Shapiro Wilk Critical Value	0.788				5% Shapiro Wilk Critical Value		0.788
973	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
974												
975	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
976					DL/2 Substitution Method					DL/2 Substitution Method		
977					Mean	0.181				Mean		-1.787
978					SD	0.0713				SD		0.433
979					95% DL/2 (t) UCL	0.229				95% H-Stat (DL/2) UCL		0.33
980												
981					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
982	**MLE method failed to converge properly**									Mean in Log Scale		-1.92
983										SD in Log Scale		0.376
984										Mean in Original Scale		0.156
985										SD in Original Scale		0.06
986										95% Percentile Bootstrap UCL		0.19
987										95% BCA Bootstrap UCL		0.194
988												
989	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
990					k star (bias corrected)	3.565	**Data appear Normal at 5% Significance Level**					
991					Theta Star	0.0443						
992					nu star	42.78						
993												
994					A-D Test Statistic	0.268	**Nonparametric Statistics**					
995					5% A-D Critical Value	0.698				Kaplan-Meier (KM) Method		
996					K-S Test Statistic	0.698				Mean		0.158
997					5% K-S Critical Value	0.333				SD		0.0617
998	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0276
999										95% KM (t) UCL		0.21
1000	**Assuming Gamma Distribution**									95% KM (z) UCL		0.203
1001					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.211
1002					Minimum	0.092				95% KM (bootstrap t) UCL		0.236
1003					Maximum	0.27				95% KM (BCA) UCL		0.205
1004					Mean	0.159				95% KM (Percentile Bootstrap) UCL		0.203
1005					Median	0.15				95% KM (Chebyshev) UCL		0.278
1006					SD	0.0603				97.5% KM (Chebyshev) UCL		0.33
1007					k star	5.22				99% KM (Chebyshev) UCL		0.432

1008					Theta star	0.0305						
1009					Nu star	83.52	**Potential UCLs to Use**					
1010					AppChi2	63.46				95% KM (t) UCL		0.21
1011				95% Gamma Approximate UCL		0.209				95% KM (Percentile Bootstrap) UCL		0.203
1012				95% Adjusted Gamma UCL		0.225						
1013	**Note: DL/2 is not a recommended method.**											
1014												
1015												
1016	**Vanadium (mg/kg)**											
1017												
1018	**General Statistics**											
1019				Number of Valid Samples		8				Number of Unique Samples		8
1020												
1021	**Raw Statistics**						**Log-transformed Statistics**					
1022				Minimum		26				Minimum of Log Data		3.258
1023				Maximum		47				Maximum of Log Data		3.85
1024				Mean		36.69				Mean of log Data		3.579
1025				Median		38.25				SD of log Data		0.236
1026				SD		8.362						
1027				Coefficient of Variation		0.228						
1028				Skewness		-0.135						
1029												
1030	**Relevant UCL Statistics**											
1031	**Normal Distribution Test**						**Lognormal Distribution Test**					
1032				Shapiro Wilk Test Statistic		0.874				Shapiro Wilk Test Statistic		0.871
1033				Shapiro Wilk Critical Value		0.818				Shapiro Wilk Critical Value		0.818
1034	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1035												
1036	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1037				95% Student's-t UCL		42.29				95% H-UCL		44.01
1038	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		50.08
1039				95% Adjusted-CLT UCL		41.4				97.5% Chebyshev (MVUE) UCL		55.87
1040				95% Modified-t UCL		42.27				99% Chebyshev (MVUE) UCL		67.24
1041												
1042	**Gamma Distribution Test**						**Data Distribution**					
1043				k star (bias corrected)		13.31	**Data appear Normal at 5% Significance Level**					
1044				Theta Star		2.756						
1045				nu star		213						
1046				Approximate Chi Square Value (.05)		180.2	**Nonparametric Statistics**					
1047				Adjusted Level of Significance		0.0195				95% CLT UCL		41.55
1048				Adjusted Chi Square Value		172.6				95% Jackknife UCL		42.29
1049										95% Standard Bootstrap UCL		41.29
1050				Anderson-Darling Test Statistic		0.568				95% Bootstrap-t UCL		42.08
1051				Anderson-Darling 5% Critical Value		0.716				95% Hall's Bootstrap UCL		40.37
1052				Kolmogorov-Smirnov Test Statistic		0.278				95% Percentile Bootstrap UCL		41.5
1053				Kolmogorov-Smirnov 5% Critical Value		0.294				95% BCA Bootstrap UCL		41.19
1054	**Data appear Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL		49.57
1055										97.5% Chebyshev(Mean, Sd) UCL		55.15
1056	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL		66.1
1057				95% Approximate Gamma UCL		43.36						
1058				95% Adjusted Gamma UCL		45.28						
1059												
1060	**Potential UCL to Use**									Use 95% Student's-t UCL		42.29

1061												
1062												
1063	**Zinc (mg/kg)**											
1064												
1065					**General Statistics**							
1066					Number of Valid Samples	8				Number of Unique Samples	8	
1067												
1068					**Raw Statistics**					**Log-transformed Statistics**		
1069					Minimum	110				Minimum of Log Data	4.7	
1070					Maximum	234				Maximum of Log Data	5.455	
1071					Mean	170.9				Mean of log Data	5.116	
1072					Median	166.5				SD of log Data	0.241	
1073					SD	40.24						
1074					Coefficient of Variation	0.236						
1075					Skewness	0.246						
1076												
1077					**Relevant UCL Statistics**							
1078					**Normal Distribution Test**					**Lognormal Distribution Test**		
1079					Shapiro Wilk Test Statistic	0.97				Shapiro Wilk Test Statistic	0.973	
1080					Shapiro Wilk Critical Value	0.818				Shapiro Wilk Critical Value	0.818	
1081					**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
1082												
1083					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
1084					95% Student's-t UCL	197.8				95% H-UCL	205.9	
1085					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	234.6	
1086					95% Adjusted-CLT UCL	195.6				97.5% Chebyshev (MVUE) UCL	262.2	
1087					95% Modified-t UCL	198				99% Chebyshev (MVUE) UCL	316.3	
1088												
1089					**Gamma Distribution Test**					**Data Distribution**		
1090					k star (bias corrected)	12.73				**Data appear Normal at 5% Significance Level**		
1091					Theta Star	13.42						
1092					nu star	203.7						
1093					Approximate Chi Square Value (.05)	171.7				**Nonparametric Statistics**		
1094					Adjusted Level of Significance	0.0195				95% CLT UCL	194.3	
1095					Adjusted Chi Square Value	164.2				95% Jackknife UCL	197.8	
1096										95% Standard Bootstrap UCL	191.8	
1097					Anderson-Darling Test Statistic	0.192				95% Bootstrap-t UCL	203.8	
1098					Anderson-Darling 5% Critical Value	0.716				95% Hall's Bootstrap UCL	212.2	
1099					Kolmogorov-Smirnov Test Statistic	0.138				95% Percentile Bootstrap UCL	193	
1100					Kolmogorov-Smirnov 5% Critical Value	0.294				95% BCA Bootstrap UCL	193.3	
1101					**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	232.9	
1102										97.5% Chebyshev(Mean, Sd) UCL	259.7	
1103					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	312.4	
1104					95% Approximate Gamma UCL	202.8						
1105					95% Adjusted Gamma UCL	212						
1106												
1107					**Potential UCL to Use**					Use 95% Student's-t UCL	197.8	
1108												
1109												
1110	**Total Cyanide**											
1111												
1112					**General Statistics**							
1113					Number of Valid Samples	8				Number of Unique Samples	8	

1114												
1115	**Raw Statistics**						**Log-transformed Statistics**					
1116	Minimum	0.04					Minimum of Log Data	-3.219				
1117	Maximum	0.37					Maximum of Log Data	-0.994				
1118	Mean	0.133					Mean of log Data	-2.27				
1119	Median	0.0825					SD of log Data	0.731				
1120	SD	0.111										
1121	Coefficient of Variation	0.837										
1122	Skewness	1.686										
1123												
1124	**Relevant UCL Statistics**											
1125	**Normal Distribution Test**						**Lognormal Distribution Test**					
1126	Shapiro Wilk Test Statistic	0.795					Shapiro Wilk Test Statistic	0.946				
1127	Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818				
1128	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1129												
1130	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1131	95% Student's-t UCL	0.208					95% H-UCL	0.297				
1132	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	0.279				
1133	95% Adjusted-CLT UCL	0.223					97.5% Chebyshev (MVUE) UCL	0.343				
1134	95% Modified-t UCL	0.212					99% Chebyshev (MVUE) UCL	0.469				
1135												
1136	**Gamma Distribution Test**						**Data Distribution**					
1137	k star (bias corrected)	1.413					**Data appear Gamma Distributed at 5% Significance Level**					
1138	Theta Star	0.0942										
1139	nu star	22.6										
1140	Approximate Chi Square Value (.05)	12.79					**Nonparametric Statistics**					
1141	Adjusted Level of Significance	0.0195					95% CLT UCL	0.198				
1142	Adjusted Chi Square Value	10.97					95% Jackknife UCL	0.208				
1143							95% Standard Bootstrap UCL	0.194				
1144	Anderson-Darling Test Statistic	0.44					95% Bootstrap-t UCL	0.34				
1145	Anderson-Darling 5% Critical Value	0.724					95% Hall's Bootstrap UCL	0.485				
1146	Kolmogorov-Smirnov Test Statistic	0.27					95% Percentile Bootstrap UCL	0.199				
1147	Kolmogorov-Smirnov 5% Critical Value	0.297					95% BCA Bootstrap UCL	0.219				
1148	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	0.305				
1149							97.5% Chebyshev(Mean, Sd) UCL	0.379				
1150	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	0.525				
1151	95% Approximate Gamma UCL	0.235										
1152	95% Adjusted Gamma UCL	0.274										
1153												
1154	**Potential UCL to Use**						Use 95% Approximate Gamma UCL	0.235				
1155												
1156												
1157	**1,2,3-TCB (mg/kg)**											
1158												
1159	**General Statistics**											
1160	Number of Valid Samples	8					Number of Detected Data	5				
1161	Number of Unique Samples	4					Number of Non-Detect Data	3				
1162							Percent Non-Detects	37.50%				
1163												
1164	**Raw Statistics**						**Log-transformed Statistics**					
1165	Minimum Detected	0.0004					Minimum Detected	-7.824				
1166	Maximum Detected	0.0038					Maximum Detected	-5.573				

1167				Mean of Detected	0.00262					Mean of Detected	-6.206	
1168				SD of Detected	0.00151					SD of Detected	0.964	
1169				Minimum Non-Detect	0.005					Minimum Non-Detect	-5.298	
1170				Maximum Non-Detect	0.005					Maximum Non-Detect	-5.298	
1171												
1172												
1173	**UCL Statistics**											
1174	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1175				Shapiro Wilk Test Statistic	0.813					Shapiro Wilk Test Statistic	0.756	
1176				5% Shapiro Wilk Critical Value	0.762					5% Shapiro Wilk Critical Value	0.762	
1177	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1178												
1179	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1180				DL/2 Substitution Method						DL/2 Substitution Method		
1181				Mean	0.00258					Mean	-6.125	
1182				SD	0.00114					SD	0.737	
1183				95% DL/2 (t) UCL	0.00334					95% H-Stat (DL/2) UCL	0.023	
1184												
1185				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
1186	**MLE method failed to converge properly**									Mean in Log Scale	-6.206	
1187										SD in Log Scale	0.832	
1188										Mean in Original Scale	0.00254	
1189										SD in Original Scale	0.00146	
1190										95% Percentile Bootstrap UCL	0.00335	
1191										95% BCA Bootstrap UCL	0.00328	
1192												
1193	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1194				k star (bias corrected)	0.96		**Data appear Normal at 5% Significance Level**					
1195				Theta Star	0.00273							
1196				nu star	9.603							
1197												
1198				A-D Test Statistic	0.663		**Nonparametric Statistics**					
1199				5% A-D Critical Value	0.684					Kaplan-Meier (KM) Method		
1200				K-S Test Statistic	0.684					Mean	0.00262	
1201				5% K-S Critical Value	0.36					SD	0.00135	
1202	**Data follow Appr. Gamma Distribution at 5% Significance Level**									SE of Mean	0.0006741	
1203										95% KM (t) UCL	0.0039	
1204	**Assuming Gamma Distribution**									95% KM (z) UCL	0.00373	
1205				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.00396	
1206				Minimum	0.0004					95% KM (bootstrap t) UCL	0.00371	
1207				Maximum	0.00392					95% KM (BCA) UCL	0.00364	
1208				Mean	0.00262					95% KM (Percentile Bootstrap) UCL	0.00367	
1209				Median	0.00309					95% KM (Chebyshev) UCL	0.00556	
1210				SD	0.00133					97.5% KM (Chebyshev) UCL	0.00683	
1211				k star	1.759					99% KM (Chebyshev) UCL	0.00933	
1212				Theta star	0.00149							
1213				Nu star	28.14		**Potential UCLs to Use**					
1214				AppChi2	17.04					95% KM (t) UCL	0.0039	
1215				95% Gamma Approximate UCL	0.00432					95% KM (Percentile Bootstrap) UCL	0.00367	
1216				95% Adjusted Gamma UCL	0.00494							
1217	**Warning: Recommended UCL exceeds the maximum observation**											
1218	**Note: DL/2 is not a recommended method.**											
1219												

1220												
1221	**1,2,4-TCB (mg/kg)**											
1222												
1223	**General Statistics**											
1224	Number of Valid Samples				8	Number of Detected Data						4
1225	Number of Unique Samples				4	Number of Non-Detect Data						4
1226						Percent Non-Detects						50.00%
1227												
1228	**Raw Statistics**					**Log-transformed Statistics**						
1229	Minimum Detected				0.0003	Minimum Detected						-8.112
1230	Maximum Detected				0.0044	Maximum Detected						-5.426
1231	Mean of Detected				0.00315	Mean of Detected						-6.153
1232	SD of Detected				0.00193	SD of Detected						1.309
1233	Minimum Non-Detect				0.005	Minimum Non-Detect						-5.298
1234	Maximum Non-Detect				0.005	Maximum Non-Detect						-5.298
1235												
1236												
1237	**UCL Statistics**											
1238	**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**						
1239	Shapiro Wilk Test Statistic				0.768	Shapiro Wilk Test Statistic						0.685
1240	5% Shapiro Wilk Critical Value				0.748	5% Shapiro Wilk Critical Value						0.748
1241	**Data appear Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**						
1242												
1243	**Assuming Normal Distribution**					**Assuming Lognormal Distribution**						
1244	DL/2 Substitution Method					DL/2 Substitution Method						
1245	Mean				0.00283	Mean						-6.072
1246	SD				0.00131	SD						0.861
1247	95% DL/2 (t) UCL				0.0037	95% H-Stat (DL/2) UCL						0.0108
1248												
1249	Maximum Likelihood Estimate(MLE) Method				N/A	Log ROS Method						
1250	**MLE method failed to converge properly**					Mean in Log Scale						-6.153
1251						SD in Log Scale						1.107
1252						Mean in Original Scale						0.00315
1253						SD in Original Scale						0.00237
1254						95% Percentile Bootstrap UCL						0.00442
1255						95% BCA Bootstrap UCL						0.00447
1256												
1257	**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**						
1258	k star (bias corrected)				0.521	**Data appear Normal at 5% Significance Level**						
1259	Theta Star				0.00605							
1260	nu star				4.164							
1261												
1262	A-D Test Statistic				0.789	**Nonparametric Statistics**						
1263	5% A-D Critical Value				0.663	Kaplan-Meier (KM) Method						
1264	K-S Test Statistic				0.663	Mean						0.00315
1265	5% K-S Critical Value				0.4	SD						0.00167
1266	**Data not Gamma Distributed at 5% Significance Level**					SE of Mean						0.0009665
1267						95% KM (t) UCL						0.00498
1268	**Assuming Gamma Distribution**					95% KM (z) UCL						0.00474
1269	Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL						0.00513
1270	Minimum				0.0003	95% KM (bootstrap t) UCL						0.0046
1271	Maximum				0.00509	95% KM (BCA) UCL						0.00435
1272	Mean				0.00315	95% KM (Percentile Bootstrap) UCL						0.00435

1273					Median	0.00356				95% KM (Chebyshev) UCL		0.00736
1274					SD	0.0016				97.5% KM (Chebyshev) UCL		0.00919
1275					k star	1.478				99% KM (Chebyshev) UCL		0.0128
1276					Theta star	0.00213						
1277					Nu star	23.65				**Potential UCLs to Use**		
1278					AppChi2	13.58				95% KM (t) UCL		0.00498
1279				95% Gamma Approximate UCL		0.00549				95% KM (Percentile Bootstrap) UCL		0.00435
1280				95% Adjusted Gamma UCL		N/A						
1281	**Warning: Recommended UCL exceeds the maximum observation**											
1282	**Note: DL/2 is not a recommended method.**											
1283												
1284												
1285	**2-Butanone (mg/kg)**											
1286												
1287	**General Statistics**											
1288					Number of Valid Samples	8				Number of Unique Samples		8
1289												
1290	**Raw Statistics**						**Log-transformed Statistics**					
1291					Minimum	0.004				Minimum of Log Data		-5.521
1292					Maximum	0.04				Maximum of Log Data		-3.219
1293					Mean	0.0167				Mean of log Data		-4.421
1294					Median	0.00805				SD of log Data		0.87
1295					SD	0.0142						
1296					Coefficient of Variation	0.851						
1297					Skewness	0.835						
1298												
1299	**Relevant UCL Statistics**											
1300	**Normal Distribution Test**						**Lognormal Distribution Test**					
1301					Shapiro Wilk Test Statistic	0.799				Shapiro Wilk Test Statistic		0.866
1302					Shapiro Wilk Critical Value	0.818				Shapiro Wilk Critical Value		0.818
1303	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1304												
1305	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1306					95% Student's-t UCL	0.0263				95% H-UCL		0.0498
1307	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		0.0392
1308					95% Adjusted-CLT UCL	0.0266				97.5% Chebyshev (MVUE) UCL		0.049
1309					95% Modified-t UCL	0.0265				99% Chebyshev (MVUE) UCL		0.0682
1310												
1311	**Gamma Distribution Test**						**Data Distribution**					
1312					k star (bias corrected)	1.119	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
1313					Theta Star	0.015						
1314					nu star	17.9						
1315					Approximate Chi Square Value (.05)	9.322	**Nonparametric Statistics**					
1316					Adjusted Level of Significance	0.0195				95% CLT UCL		0.025
1317					Adjusted Chi Square Value	7.806				95% Jackknife UCL		0.0263
1318										95% Standard Bootstrap UCL		0.0244
1319					Anderson-Darling Test Statistic	0.726				95% Bootstrap-t UCL		0.0309
1320					Anderson-Darling 5% Critical Value	0.727				95% Hall's Bootstrap UCL		0.0226
1321					Kolmogorov-Smirnov Test Statistic	0.308				95% Percentile Bootstrap UCL		0.0251
1322					Kolmogorov-Smirnov 5% Critical Value	0.298				95% BCA Bootstrap UCL		0.0256
1323	**Data follow Appr. Gamma Distribution at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL		0.0387
1324										97.5% Chebyshev(Mean, Sd) UCL		0.0482
1325	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL		0.0668

1326				95% Approximate Gamma UCL	0.0321							
1327				95% Adjusted Gamma UCL	0.0384							
1328												
1329	**Potential UCL to Use**									Use 95% Approximate Gamma UCL	0.0321	
1330												
1331												
1332	**Acetone (mg/kg)**											
1333												
1334	**General Statistics**											
1335				Number of Valid Samples	8					Number of Detected Data	6	
1336				Number of Unique Samples	6					Number of Non-Detect Data	2	
1337										Percent Non-Detects	25.00%	
1338												
1339	**Raw Statistics**						**Log-transformed Statistics**					
1340				Minimum Detected	0.028					Minimum Detected	-3.576	
1341				Maximum Detected	0.073					Maximum Detected	-2.617	
1342				Mean of Detected	0.0418					Mean of Detected	-3.235	
1343				SD of Detected	0.017					SD of Detected	0.36	
1344				Minimum Non-Detect	0.06					Minimum Non-Detect	-2.813	
1345				Maximum Non-Detect	0.06					Maximum Non-Detect	-2.813	
1346												
1347												
1348	**UCL Statistics**											
1349	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1350				Shapiro Wilk Test Statistic	0.821					Shapiro Wilk Test Statistic	0.888	
1351				5% Shapiro Wilk Critical Value	0.788					5% Shapiro Wilk Critical Value	0.788	
1352	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1353												
1354	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1355				DL/2 Substitution Method						DL/2 Substitution Method		
1356				Mean	0.0388					Mean	-3.303	
1357				SD	0.0154					SD	0.329	
1358				95% DL/2 (t) UCL	0.0491					95% H-Stat (DL/2) UCL	0.068	
1359												
1360				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
1361	**MLE method failed to converge properly**									Mean in Log Scale	-3.26	
1362										SD in Log Scale	0.318	
1363										Mean in Original Scale	0.0403	
1364										SD in Original Scale	0.0149	
1365										95% Percentile Bootstrap UCL	0.0494	
1366										95% BCA Bootstrap UCL	0.0527	
1367												
1368	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1369				k star (bias corrected)	4.458		**Data appear Normal at 5% Significance Level**					
1370				Theta Star	0.00936							
1371				nu star	53.5							
1372												
1373				A-D Test Statistic	0.465		**Nonparametric Statistics**					
1374				5% A-D Critical Value	0.698					Kaplan-Meier (KM) Method		
1375				K-S Test Statistic	0.698					Mean	0.0402	
1376				5% K-S Critical Value	0.333					SD	0.0142	
1377	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean	0.00576	
1378										95% KM (t) UCL	0.0511	

1379	**Assuming Gamma Distribution**									95% KM (z) UCL	0.0497	
1380	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL	0.0511	
1381	Minimum	0.028								95% KM (bootstrap t) UCL	0.0755	
1382	Maximum	0.073								95% KM (BCA) UCL	0.0495	
1383	Mean	0.0419								95% KM (Percentile Bootstrap) UCL	0.0492	
1384	Median	0.039								95% KM (Chebyshev) UCL	0.0653	
1385	SD	0.0144								97.5% KM (Chebyshev) UCL	0.0762	
1386	k star	7.256								99% KM (Chebyshev) UCL	0.0975	
1387	Theta star	0.00577										
1388	Nu star	116.1								**Potential UCLs to Use**		
1389	AppChi2	92.23								95% KM (t) UCL	0.0511	
1390	95% Gamma Approximate UCL	0.0527								95% KM (Percentile Bootstrap) UCL	0.0492	
1391	95% Adjusted Gamma UCL	0.056										
1392	**Note: DL/2 is not a recommended method.**											
1393												
1394												
1395	**Benzene (mg/kg)**											
1396												
1397	**General Statistics**											
1398	Number of Valid Samples	8								Number of Unique Samples	7	
1399												
1400	**Raw Statistics**									**Log-transformed Statistics**		
1401	Minimum	0.00026								Minimum of Log Data	-8.255	
1402	Maximum	0.0028								Maximum of Log Data	-5.878	
1403	Mean	0.00122								Mean of log Data	-6.906	
1404	Median	0.0011								SD of log Data	0.71	
1405	SD	0.0007713										
1406	Coefficient of Variation	0.634										
1407	Skewness	1.193										
1408												
1409	**Relevant UCL Statistics**											
1410	**Normal Distribution Test**									**Lognormal Distribution Test**		
1411	Shapiro Wilk Test Statistic	0.919								Shapiro Wilk Test Statistic	0.96	
1412	Shapiro Wilk Critical Value	0.818								Shapiro Wilk Critical Value	0.818	
1413	**Data appear Normal at 5% Significance Level**									**Data appear Lognormal at 5% Significance Level**		
1414												
1415	**Assuming Normal Distribution**									**Assuming Lognormal Distribution**		
1416	95% Student's-t UCL	0.00173								95% H-UCL	0.00274	
1417	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	0.00263	
1418	95% Adjusted-CLT UCL	0.00179								97.5% Chebyshev (MVUE) UCL	0.00323	
1419	95% Modified-t UCL	0.00175								99% Chebyshev (MVUE) UCL	0.0044	
1420												
1421	**Gamma Distribution Test**									**Data Distribution**		
1422	k star (bias corrected)	1.793								**Data appear Normal at 5% Significance Level**		
1423	Theta Star	0.0006784										
1424	nu star	28.68										
1425	Approximate Chi Square Value (.05)	17.46								**Nonparametric Statistics**		
1426	Adjusted Level of Significance	0.0195								95% CLT UCL	0.00166	
1427	Adjusted Chi Square Value	15.29								95% Jackknife UCL	0.00173	
1428										95% Standard Bootstrap UCL	0.00163	
1429	Anderson-Darling Test Statistic	0.191								95% Bootstrap-t UCL	0.00195	
1430	Anderson-Darling 5% Critical Value	0.722								95% Hall's Bootstrap UCL	0.00405	
1431	Kolmogorov-Smirnov Test Statistic	0.141								95% Percentile Bootstrap UCL	0.00165	

1432				Kolmogorov-Smirnov 5% Critical Value	0.297					95% BCA Bootstrap UCL	0.00178	
1433				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	0.0024	
1434										97.5% Chebyshev(Mean, Sd) UCL	0.00292	
1435				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	0.00393	
1436				95% Approximate Gamma UCL	0.002							
1437				95% Adjusted Gamma UCL	0.00228							
1438												
1439				**Potential UCL to Use**						Use 95% Student's-t UCL	0.00173	
1440												
1441												
1442	**DEHP (mg/kg)**											
1443												
1444				**General Statistics**								
1445				Number of Valid Samples	8					Number of Unique Samples	7	
1446												
1447				**Raw Statistics**						**Log-transformed Statistics**		
1448				Minimum	0.016					Minimum of Log Data	-4.135	
1449				Maximum	0.24					Maximum of Log Data	-1.427	
1450				Mean	0.0493					Mean of log Data	-3.557	
1451				Median	0.0198					SD of log Data	0.909	
1452				SD	0.0774							
1453				Coefficient of Variation	1.57							
1454				Skewness	2.776							
1455												
1456				**Relevant UCL Statistics**								
1457				**Normal Distribution Test**						**Lognormal Distribution Test**		
1458				Shapiro Wilk Test Statistic	0.495					Shapiro Wilk Test Statistic	0.677	
1459				Shapiro Wilk Critical Value	0.818					Shapiro Wilk Critical Value	0.818	
1460				**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**		
1461												
1462				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
1463				95% Student's-t UCL	0.101					95% H-UCL	0.133	
1464				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	0.0982	
1465				95% Adjusted-CLT UCL	0.123					97.5% Chebyshev (MVUE) UCL	0.123	
1466				95% Modified-t UCL	0.106					99% Chebyshev (MVUE) UCL	0.172	
1467												
1468				**Gamma Distribution Test**						**Data Distribution**		
1469				k star (bias corrected)	0.739					**Data do not follow a Discernable Distribution (0.05)**		
1470				Theta Star	0.0668							
1471				nu star	11.82							
1472				Approximate Chi Square Value (.05)	5.109					**Nonparametric Statistics**		
1473				Adjusted Level of Significance	0.0195					95% CLT UCL	0.0943	
1474				Adjusted Chi Square Value	4.05					95% Jackknife UCL	0.101	
1475										95% Standard Bootstrap UCL	0.0905	
1476				Anderson-Darling Test Statistic	1.548					95% Bootstrap-t UCL	0.763	
1477				Anderson-Darling 5% Critical Value	0.735					95% Hall's Bootstrap UCL	0.436	
1478				Kolmogorov-Smirnov Test Statistic	0.349					95% Percentile Bootstrap UCL	0.103	
1479				Kolmogorov-Smirnov 5% Critical Value	0.301					95% BCA Bootstrap UCL	0.13	
1480				**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	0.169	
1481										97.5% Chebyshev(Mean, Sd) UCL	0.22	
1482				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	0.322	
1483				95% Approximate Gamma UCL	0.114							
1484				95% Adjusted Gamma UCL	0.144							

1485												
1486	**Potential UCL to Use**									Use 95% Chebyshev (Mean, Sd) UCL		0.169
1487												
1488												
1489	**Bromomethane (mg/kg)**											
1490												
1491	**General Statistics**											
1492						Number of Valid Samples	8			Number of Detected Data		4
1493						Number of Unique Samples	3			Number of Non-Detect Data		4
1494										Percent Non-Detects		50.00%
1495												
1496	**Raw Statistics**									**Log-transformed Statistics**		
1497						Minimum Detected	0.0017			Minimum Detected		-6.377
1498						Maximum Detected	0.0019			Maximum Detected		-6.266
1499						Mean of Detected	0.00178			Mean of Detected		-6.335
1500						SD of Detected	9.574E-05			SD of Detected		0.0534
1501						Minimum Non-Detect	0.005			Minimum Non-Detect		-5.298
1502						Maximum Non-Detect	0.005			Maximum Non-Detect		-5.298
1503												
1504												
1505	**UCL Statistics**											
1506	**Normal Distribution Test with Detected Values Only**									**Lognormal Distribution Test with Detected Values Only**		
1507						Shapiro Wilk Test Statistic	0.865			Shapiro Wilk Test Statistic		0.865
1508						5% Shapiro Wilk Critical Value	0.748			5% Shapiro Wilk Critical Value		0.748
1509	**Data appear Normal at 5% Significance Level**									**Data appear Lognormal at 5% Significance Level**		
1510												
1511	**Assuming Normal Distribution**									**Assuming Lognormal Distribution**		
1512						DL/2 Substitution Method				DL/2 Substitution Method		
1513						Mean	0.00214			Mean		-6.163
1514						SD	0.0003926			SD		0.187
1515						95% DL/2 (t) UCL	0.0024			95% H-Stat (DL/2) UCL		0.0103
1516												
1517						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
1518	**MLE method failed to converge properly**									Mean in Log Scale		-6.335
1519										SD in Log Scale		0.048
1520										Mean in Original Scale		0.00177
1521										SD in Original Scale		8.561E-05
1522										95% Percentile Bootstrap UCL		0.00182
1523										95% BCA Bootstrap UCL		0.00182
1524												
1525	**Gamma Distribution Test with Detected Values Only**									**Data Distribution Test with Detected Values Only**		
1526						k star (bias corrected)	116.4			**Data appear Normal at 5% Significance Level**		
1527						Theta Star	1.525E-05					
1528						nu star	930.9					
1529												
1530						A-D Test Statistic	0.427			**Nonparametric Statistics**		
1531						5% A-D Critical Value	0.657			Kaplan-Meier (KM) Method		
1532						K-S Test Statistic	0.657			Mean		0.00178
1533						5% K-S Critical Value	0.394			SD		8.292E-05
1534	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		4.787E-05
1535										95% KM (t) UCL		0.00187
1536	**Assuming Gamma Distribution**									95% KM (z) UCL		0.00185
1537	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.00187

1538					Minimum	0.00167				95% KM (bootstrap t) UCL		0.00191
1539					Maximum	0.0019				95% KM (BCA) UCL		0.00185
1540					Mean	0.00178				95% KM (Percentile Bootstrap) UCL		0.00185
1541					Median	0.00178				95% KM (Chebyshev) UCL		0.00198
1542					SD	8.369E-05				97.5% KM (Chebyshev) UCL		0.00207
1543					k star	322.3				99% KM (Chebyshev) UCL		0.00225
1544					Theta star	0						
1545					Nu star	5157				**Potential UCLs to Use**		
1546					AppChi2	4992				95% KM (t) UCL		0.00187
1547					95% Gamma Approximate UCL	0.00183				95% KM (Percentile Bootstrap) UCL		0.00185
1548					95% Adjusted Gamma UCL	N/A						
1549	**Note: DL/2 is not a recommended method.**											
1550												
1551												
1552	**CS2 (mg/kg)**											
1553												
1554						**General Statistics**						
1555					Number of Valid Samples	8				Number of Detected Data		7
1556					Number of Unique Samples	7				Number of Non-Detect Data		1
1557										Percent Non-Detects		12.50%
1558												
1559					**Raw Statistics**					**Log-transformed Statistics**		
1560					Minimum Detected	0.001				Minimum Detected		-6.908
1561					Maximum Detected	0.006				Maximum Detected		-5.116
1562					Mean of Detected	0.00247				Mean of Detected		-6.234
1563					SD of Detected	0.00193				SD of Detected		0.709
1564					Minimum Non-Detect	0.005				Minimum Non-Detect		-5.298
1565					Maximum Non-Detect	0.005				Maximum Non-Detect		-5.298
1566												
1567												
1568						**UCL Statistics**						
1569					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
1570					Shapiro Wilk Test Statistic	0.802				Shapiro Wilk Test Statistic		0.871
1571					5% Shapiro Wilk Critical Value	0.803				5% Shapiro Wilk Critical Value		0.803
1572					**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
1573												
1574					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
1575					DL/2 Substitution Method					DL/2 Substitution Method		
1576					Mean	0.00248				Mean		-6.204
1577					SD	0.00178				SD		0.662
1578					95% DL/2 (t) UCL	0.00367				95% H-Stat (DL/2) UCL		0.00629
1579												
1580					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
1581					**MLE method failed to converge properly**					Mean in Log Scale		-6.254
1582										SD in Log Scale		0.659
1583										Mean in Original Scale		0.00237
1584										SD in Original Scale		0.00181
1585										95% Percentile Bootstrap UCL		0.00347
1586										95% BCA Bootstrap UCL		0.00377
1587												
1588					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
1589					k star (bias corrected)	1.419				**Data appear Gamma Distributed at 5% Significance Level**		
1590					Theta Star	0.00174						

1591					nu star	19.87						
1592												
1593					A-D Test Statistic	0.564	**Nonparametric Statistics**					
1594					5% A-D Critical Value	0.714					Kaplan-Meier (KM) Method	
1595					K-S Test Statistic	0.714					Mean	0.0024
1596					5% K-S Critical Value	0.315					SD	0.00173
1597	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0006798
1598											95% KM (t) UCL	0.00369
1599	**Assuming Gamma Distribution**										95% KM (z) UCL	0.00352
1600	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.00369
1601					Minimum	0.001					95% KM (bootstrap t) UCL	0.00546
1602					Maximum	0.006					95% KM (BCA) UCL	0.00355
1603					Mean	0.00248					95% KM (Percentile Bootstrap) UCL	0.00351
1604					Median	0.0019					95% KM (Chebyshev) UCL	0.00536
1605					SD	0.00178					97.5% KM (Chebyshev) UCL	0.00664
1606					k star	1.726					99% KM (Chebyshev) UCL	0.00916
1607					Theta star	0.00144						
1608					Nu star	27.61	**Potential UCLs to Use**					
1609					AppChi2	16.63					95% KM (BCA) UCL	0.00355
1610					95% Gamma Approximate UCL	0.00411						
1611					95% Adjusted Gamma UCL	0.00471						
1612	**Note: DL/2 is not a recommended method.**											
1613												
1614												
1615	**Cyclohexane (mg/kg)**											
1616												
1617	**General Statistics**											
1618					Number of Valid Samples	8					Number of Detected Data	4
1619					Number of Unique Samples	4					Number of Non-Detect Data	4
1620											Percent Non-Detects	50.00%
1621												
1622	**Raw Statistics**						**Log-transformed Statistics**					
1623					Minimum Detected	0.00065					Minimum Detected	-7.339
1624					Maximum Detected	0.0032					Maximum Detected	-5.745
1625					Mean of Detected	0.00166					Mean of Detected	-6.578
1626					SD of Detected	0.00113					SD of Detected	0.695
1627					Minimum Non-Detect	0.01					Minimum Non-Detect	-4.605
1628					Maximum Non-Detect	0.01					Maximum Non-Detect	-4.605
1629												
1630												
1631	**UCL Statistics**											
1632	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1633					Shapiro Wilk Test Statistic	0.925					Shapiro Wilk Test Statistic	0.984
1634					5% Shapiro Wilk Critical Value	0.748					5% Shapiro Wilk Critical Value	0.748
1635	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1636												
1637	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1638					DL/2 Substitution Method						DL/2 Substitution Method	
1639					Mean	0.00333					Mean	-5.938
1640					SD	0.00193					SD	0.821
1641					95% DL/2 (t) UCL	0.00463					95% H-Stat (DL/2) UCL	0.0242
1642												
1643					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	

1644	MLE method failed to converge properly									Mean in Log Scale		-6.578
1645										SD in Log Scale		0.642
1646										Mean in Original Scale		0.00166
1647										SD in Original Scale		0.00103
1648										95% Percentile Bootstrap UCL		0.00224
1649										95% BCA Bootstrap UCL		0.00234
1650												
1651	Gamma Distribution Test with Detected Values Only									Data Distribution Test with Detected Values Only		
1652				k star (bias corrected)		0.907				Data appear Normal at 5% Significance Level		
1653				Theta Star		0.00183						
1654				nu star		7.255						
1655												
1656				A-D Test Statistic		0.236				Nonparametric Statistics		
1657				5% A-D Critical Value		0.659				Kaplan-Meier (KM) Method		
1658				K-S Test Statistic		0.659				Mean		0.00166
1659				5% K-S Critical Value		0.397				SD		0.0009807
1660	Data appear Gamma Distributed at 5% Significance Level									SE of Mean		0.0005662
1661										95% KM (t) UCL		0.00274
1662	Assuming Gamma Distribution									95% KM (z) UCL		0.00259
1663				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		0.00282
1664				Minimum		0.0004143				95% KM (bootstrap t) UCL		0.0038
1665				Maximum		0.0032				95% KM (BCA) UCL		0.0025
1666				Mean		0.00166				95% KM (Percentile Bootstrap) UCL		0.0025
1667				Median		0.0015				95% KM (Chebyshev) UCL		0.00413
1668				SD		0.00103				97.5% KM (Chebyshev) UCL		0.0052
1669				k star		1.715				99% KM (Chebyshev) UCL		0.0073
1670				Theta star		0.0009691						
1671				Nu star		27.45				Potential UCLs to Use		
1672				AppChi2		16.5				95% KM (t) UCL		0.00274
1673				95% Gamma Approximate UCL		0.00277				95% KM (Percentile Bootstrap) UCL		0.0025
1674				95% Adjusted Gamma UCL		N/A						
1675	Note: DL/2 is not a recommended method.											
1676												
1677												
1678	DNBP (mg/kg)											
1679												
1680	General Statistics											
1681				Number of Valid Samples		8				Number of Unique Samples		6
1682												
1683	Raw Statistics									Log-transformed Statistics		
1684				Minimum		0.024				Minimum of Log Data		-3.73
1685				Maximum		0.4				Maximum of Log Data		-0.916
1686				Mean		0.0844				Mean of log Data		-3.001
1687				Median		0.0375				SD of log Data		0.912
1688				SD		0.128						
1689				Coefficient of Variation		1.521						
1690				Skewness		2.761						
1691												
1692	Relevant UCL Statistics											
1693	Normal Distribution Test									Lognormal Distribution Test		
1694				Shapiro Wilk Test Statistic		0.516				Shapiro Wilk Test Statistic		0.747
1695				Shapiro Wilk Critical Value		0.818				Shapiro Wilk Critical Value		0.818
1696	Data not Normal at 5% Significance Level									Data not Lognormal at 5% Significance Level		

1697												
1698	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1699	95% Student's-t UCL				0.17		95% H-UCL					0.233
1700	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					0.172
1701	95% Adjusted-CLT UCL				0.206		97.5% Chebyshev (MVUE) UCL					0.216
1702	95% Modified-t UCL				0.178		99% Chebyshev (MVUE) UCL					0.302
1703												
1704	**Gamma Distribution Test**						**Data Distribution**					
1705	k star (bias corrected)				0.759		**Data do not follow a Discernable Distribution (0.05)**					
1706	Theta Star				0.111							
1707	nu star				12.15							
1708	Approximate Chi Square Value (.05)				5.325		**Nonparametric Statistics**					
1709	Adjusted Level of Significance				0.0195		95% CLT UCL					0.159
1710	Adjusted Chi Square Value				4.239		95% Jackknife UCL					0.17
1711							95% Standard Bootstrap UCL					0.154
1712	Anderson-Darling Test Statistic				1.309		95% Bootstrap-t UCL					0.614
1713	Anderson-Darling 5% Critical Value				0.734		95% Hall's Bootstrap UCL					0.547
1714	Kolmogorov-Smirnov Test Statistic				0.359		95% Percentile Bootstrap UCL					0.172
1715	Kolmogorov-Smirnov 5% Critical Value				0.301		95% BCA Bootstrap UCL					0.184
1716	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					0.282
1717							97.5% Chebyshev(Mean, Sd) UCL					0.368
1718	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					0.536
1719	95% Approximate Gamma UCL				0.192							
1720	95% Adjusted Gamma UCL				0.242							
1721												
1722	**Potential UCL to Use**						Use 95% Chebyshev (Mean, Sd) UCL					0.282
1723												
1724												
1725	**Methylcyclohexane (mg/kg)**											
1726												
1727	**General Statistics**											
1728	Number of Valid Samples				8		Number of Detected Data					7
1729	Number of Unique Samples				7		Number of Non-Detect Data					1
1730							Percent Non-Detects					12.50%
1731												
1732	**Raw Statistics**						**Log-transformed Statistics**					
1733	Minimum Detected				0.00042		Minimum Detected					-7.775
1734	Maximum Detected				0.0032		Maximum Detected					-5.745
1735	Mean of Detected				0.0016		Mean of Detected					-6.651
1736	SD of Detected				0.00109		SD of Detected					0.732
1737	Minimum Non-Detect				0.01		Minimum Non-Detect					-4.605
1738	Maximum Non-Detect				0.01		Maximum Non-Detect					-4.605
1739												
1740												
1741	**UCL Statistics**											
1742	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1743	Shapiro Wilk Test Statistic				0.878		Shapiro Wilk Test Statistic					0.948
1744	5% Shapiro Wilk Critical Value				0.803		5% Shapiro Wilk Critical Value					0.803
1745	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1746												
1747	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1748	DL/2 Substitution Method						DL/2 Substitution Method					
1749	Mean				0.00203		Mean					-6.482

1750					SD	0.00157					SD	0.829
1751					95% DL/2 (t) UCL	0.00308					95% H-Stat (DL/2) UCL	0.00991
1752												
1753					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1754					**MLE method failed to converge properly**						Mean in Log Scale	-6.651
1755											SD in Log Scale	0.677
1756											Mean in Original Scale	0.00157
1757											SD in Original Scale	0.00101
1758											95% Percentile Bootstrap UCL	0.00215
1759											95% BCA Bootstrap UCL	0.00224
1760												
1761					**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**	
1762					k star (bias corrected)	1.509					**Data appear Normal at 5% Significance Level**	
1763					Theta Star	0.00106						
1764					nu star	21.13						
1765												
1766					A-D Test Statistic	0.305					**Nonparametric Statistics**	
1767					5% A-D Critical Value	0.714					Kaplan-Meier (KM) Method	
1768					K-S Test Statistic	0.714					Mean	0.0016
1769					5% K-S Critical Value	0.314					SD	0.00101
1770					**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean	0.0004114
1771											95% KM (t) UCL	0.00238
1772					**Assuming Gamma Distribution**						95% KM (z) UCL	0.00228
1773					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.00239
1774					Minimum	0.00042					95% KM (bootstrap t) UCL	0.00295
1775					Maximum	0.0032					95% KM (BCA) UCL	0.00225
1776					Mean	0.00161					95% KM (Percentile Bootstrap) UCL	0.00227
1777					Median	0.00138					95% KM (Chebyshev) UCL	0.0034
1778					SD	0.00101					97.5% KM (Chebyshev) UCL	0.00417
1779					k star	1.837					99% KM (Chebyshev) UCL	0.0057
1780					Theta star	0.0008773						
1781					Nu star	29.39					**Potential UCLs to Use**	
1782					AppChi2	18.02					95% KM (t) UCL	0.00238
1783					95% Gamma Approximate UCL	0.00263					95% KM (Percentile Bootstrap) UCL	0.00227
1784					95% Adjusted Gamma UCL	0.003						
1785	**Note: DL/2 is not a recommended method.**											
1786												
1787												
1788	**Toluene (mg/kg)**											
1789												
1790						**General Statistics**							
1791					Number of Valid Samples	8					Number of Unique Samples	8
1792												
1793					**Raw Statistics**						**Log-transformed Statistics**	
1794					Minimum	0.00023					Minimum of Log Data	-8.377
1795					Maximum	0.0033					Maximum of Log Data	-5.714
1796					Mean	0.00127					Mean of log Data	-6.918
1797					Median	0.0011					SD of log Data	0.804
1798					SD	0.0009477						
1799					Coefficient of Variation	0.744						
1800					Skewness	1.494						
1801												
1802						**Relevant UCL Statistics**							

1803	**Normal Distribution Test**						**Lognormal Distribution Test**					
1804	Shapiro Wilk Test Statistic				0.878		Shapiro Wilk Test Statistic					0.974
1805	Shapiro Wilk Critical Value				0.818		Shapiro Wilk Critical Value					0.818
1806	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1807												
1808	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1809	95% Student's-t UCL				0.00191		95% H-UCL					0.00342
1810	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					0.00295
1811	95% Adjusted-CLT UCL				0.00201		97.5% Chebyshev (MVUE) UCL					0.00366
1812	95% Modified-t UCL				0.00194		99% Chebyshev (MVUE) UCL					0.00505
1813												
1814	**Gamma Distribution Test**						**Data Distribution**					
1815	k star (bias corrected)				1.417		**Data appear Normal at 5% Significance Level**					
1816	Theta Star				0.0008987							
1817	nu star				22.68							
1818	Approximate Chi Square Value (.05)				12.85		**Nonparametric Statistics**					
1819	Adjusted Level of Significance				0.0195		95% CLT UCL					0.00182
1820	Adjusted Chi Square Value				11.02		95% Jackknife UCL					0.00191
1821							95% Standard Bootstrap UCL					0.00178
1822	Anderson-Darling Test Statistic				0.176		95% Bootstrap-t UCL					0.00219
1823	Anderson-Darling 5% Critical Value				0.724		95% Hall's Bootstrap UCL					0.00443
1824	Kolmogorov-Smirnov Test Statistic				0.159		95% Percentile Bootstrap UCL					0.00181
1825	Kolmogorov-Smirnov 5% Critical Value				0.297		95% BCA Bootstrap UCL					0.00191
1826	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					0.00273
1827							97.5% Chebyshev(Mean, Sd) UCL					0.00337
1828	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					0.00461
1829	95% Approximate Gamma UCL				0.00225							
1830	95% Adjusted Gamma UCL				0.00262							
1831												
1832	**Potential UCL to Use**						Use 95% Student's-t UCL					0.00191
1833												
1834												
1835	**Xylenes (total) (mg/kg)**											
1836												
1837	**General Statistics**											
1838	Number of Valid Samples				8		Number of Detected Data					7
1839	Number of Unique Samples				7		Number of Non-Detect Data					1
1840							Percent Non-Detects					12.50%
1841												
1842	**Raw Statistics**						**Log-transformed Statistics**					
1843	Minimum Detected				0.00054		Minimum Detected					-7.524
1844	Maximum Detected				0.0019		Maximum Detected					-6.266
1845	Mean of Detected				0.0009364		Mean of Detected					-7.049
1846	SD of Detected				0.0004472		SD of Detected					0.395
1847	Minimum Non-Detect				0.005		Minimum Non-Detect					-5.298
1848	Maximum Non-Detect				0.005		Maximum Non-Detect					-5.298
1849												
1850												
1851	**UCL Statistics**											
1852	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1853	Shapiro Wilk Test Statistic				0.75		Shapiro Wilk Test Statistic					0.883
1854	5% Shapiro Wilk Critical Value				0.803		5% Shapiro Wilk Critical Value					0.803
1855	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					

1856												
1857	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1858				DL/2 Substitution Method						DL/2 Substitution Method		
1859				Mean		0.00113				Mean		-6.917
1860				SD		0.0006907				SD		0.523
1861				95% DL/2 (t) UCL		0.00159				95% H-Stat (DL/2) UCL		0.00253
1862												
1863				Maximum Likelihood Estimate(MLE) Method		N/A				Log ROS Method		
1864	**MLE method failed to converge properly**									Mean in Log Scale		-7.049
1865										SD in Log Scale		0.365
1866										Mean in Original Scale		0.000928
1867										SD in Original Scale		0.0004147
1868										95% Percentile Bootstrap UCL		0.00121
1869										95% BCA Bootstrap UCL		0.00134
1870												
1871	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1872				k star (bias corrected)		3.987	**Data appear Gamma Distributed at 5% Significance Level**					
1873				Theta Star		0.0002349						
1874				nu star		55.82						
1875												
1876				A-D Test Statistic		0.594	**Nonparametric Statistics**					
1877				5% A-D Critical Value		0.709				Kaplan-Meier (KM) Method		
1878				K-S Test Statistic		0.709				Mean		0.0009364
1879				5% K-S Critical Value		0.313				SD		0.0004141
1880	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.000169
1881										95% KM (t) UCL		0.00126
1882	**Assuming Gamma Distribution**									95% KM (z) UCL		0.00121
1883				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		0.00126
1884				Minimum		0.00054				95% KM (bootstrap t) UCL		0.00168
1885				Maximum		0.0019				95% KM (BCA) UCL		0.00127
1886				Mean		0.0009424				95% KM (Percentile Bootstrap) UCL		0.00124
1887				Median		0.00088				95% KM (Chebyshev) UCL		0.00167
1888				SD		0.0004144				97.5% KM (Chebyshev) UCL		0.00199
1889				k star		4.924				99% KM (Chebyshev) UCL		0.00262
1890				Theta star		0.0001914						
1891				Nu star		78.78	**Potential UCLs to Use**					
1892				AppChi2		59.33				95% KM (BCA) UCL		0.00127
1893				95% Gamma Approximate UCL		0.00125						
1894				95% Adjusted Gamma UCL		0.00135						
1895	**Note: DL/2 is not a recommended method.**											
1896												
1897												
1898	**Methylene chloride (mg/kg)**											
1899												
1900	**General Statistics**											
1901				Number of Valid Samples		8				Number of Detected Data		3
1902				Number of Unique Samples		3				Number of Non-Detect Data		5
1903										Percent Non-Detects		62.50%
1904												
1905	**Raw Statistics**						**Log-transformed Statistics**					
1906				Minimum Detected		0.0028				Minimum Detected		-5.878
1907				Maximum Detected		0.0047				Maximum Detected		-5.36
1908				Mean of Detected		0.00397				Mean of Detected		-5.555

1909					SD of Detected	0.00102					SD of Detected	0.282
1910					Minimum Non-Detect	0.005					Minimum Non-Detect	-5.298
1911					Maximum Non-Detect	0.005					Maximum Non-Detect	-5.298
1912												
1913												
1914	**UCL Statistics**											
1915	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1916					Shapiro Wilk Test Statistic	0.865					Shapiro Wilk Test Statistic	0.844
1917					5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767
1918	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1919												
1920	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1921					DL/2 Substitution Method						DL/2 Substitution Method	
1922					Mean	0.00305					Mean	-5.828
1923					SD	0.000935					SD	0.272
1924					95% DL/2 (t) UCL	0.00368					95% H-Stat (DL/2) UCL	0.00397
1925												
1926					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1927	**MLE method failed to converge properly**										Mean in Log Scale	-5.555
1928											SD in Log Scale	0.264
1929											Mean in Original Scale	0.00399
1930											SD in Original Scale	0.00102
1931											95% Percentile Bootstrap UCL	0.00452
1932											95% BCA Bootstrap UCL	0.00454
1933												
1934	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1935					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
1936					Theta Star	N/A						
1937					nu star	N/A						
1938												
1939					A-D Test Statistic	0.463	**Nonparametric Statistics**					
1940					5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method					
1941					K-S Test Statistic	N/A	Mean					0.00397
1942					5% K-S Critical Value	N/A	SD					0.000834
1943	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.0005897
1944							95% KM (t) UCL					0.00508
1945	**Assuming Gamma Distribution**						95% KM (z) UCL					0.00494
1946					Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL					0.00525
1947					Minimum	N/A	95% KM (bootstrap t) UCL					0.00489
1948					Maximum	N/A	95% KM (BCA) UCL					0.0047
1949					Mean	N/A	95% KM (Percentile Bootstrap) UCL					0.0047
1950					Median	N/A	95% KM (Chebyshev) UCL					0.00654
1951					SD	N/A	97.5% KM (Chebyshev) UCL					0.00765
1952					k star	N/A	99% KM (Chebyshev) UCL					0.00983
1953					Theta star	N/A						
1954					Nu star	N/A	**Potential UCLs to Use**					
1955					AppChi2	N/A	95% KM (t) UCL					0.00508
1956					95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL					0.0047
1957					95% Adjusted Gamma UCL	N/A						
1958	**Warning: Recommended UCL exceeds the maximum observation**											
1959	**Note: DL/2 is not a recommended method.**											
1960												
1961												

1962	**Trichlorofluoromethane (mg/kg)**											
1963												
1964	**General Statistics**											
1965					Number of Valid Samples	8			Number of Detected Data	3		
1966					Number of Unique Samples	3			Number of Non-Detect Data	5		
1967									Percent Non-Detects	62.50%		
1968												
1969	**Raw Statistics**						**Log-transformed Statistics**					
1970					Minimum Detected	0.00017			Minimum Detected	-8.68		
1971					Maximum Detected	0.00052			Maximum Detected	-7.562		
1972					Mean of Detected	0.0003767			Mean of Detected	-7.99		
1973					SD of Detected	0.0001834			SD of Detected	0.603		
1974					Minimum Non-Detect	0.005			Minimum Non-Detect	-5.298		
1975					Maximum Non-Detect	0.005			Maximum Non-Detect	-5.298		
1976												
1977												
1978	**UCL Statistics**											
1979	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1980					Shapiro Wilk Test Statistic	0.911			Shapiro Wilk Test Statistic	0.859		
1981					5% Shapiro Wilk Critical Value	0.767			5% Shapiro Wilk Critical Value	0.767		
1982	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1983												
1984	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1985					DL/2 Substitution Method				DL/2 Substitution Method			
1986					Mean	0.0017			Mean	-6.741		
1987					SD	0.0011			SD	1.083		
1988					95% DL/2 (t) UCL	0.00244			95% H-Stat (DL/2) UCL	0.0215		
1989												
1990					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1991	**MLE method failed to converge properly**								Mean in Log Scale	-7.99		
1992									SD in Log Scale	0.569		
1993									Mean in Original Scale	0.0003872		
1994									SD in Original Scale	0.0002045		
1995									95% Percentile Bootstrap UCL	0.0005018		
1996									95% BCA Bootstrap UCL	0.0005026		
1997												
1998	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1999					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
2000					Theta Star	N/A						
2001					nu star	N/A						
2002												
2003					A-D Test Statistic	0.426	**Nonparametric Statistics**					
2004					5% A-D Critical Value	N/A			Kaplan-Meier (KM) Method			
2005					K-S Test Statistic	N/A			Mean	0.0003767		
2006					5% K-S Critical Value	N/A			SD	0.0001497		
2007	**Data not Gamma Distributed at 5% Significance Level**								SE of Mean	0.0001059		
2008									95% KM (t) UCL	0.0005773		
2009	**Assuming Gamma Distribution**								95% KM (z) UCL	0.0005508		
2010					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL	0.0006065		
2011					Minimum	N/A			95% KM (bootstrap t) UCL	0.0005834		
2012					Maximum	N/A			95% KM (BCA) UCL	0.00052		
2013					Mean	N/A			95% KM (Percentile Bootstrap) UCL	0.00052		
2014					Median	N/A			95% KM (Chebyshev) UCL	0.0008382		

	A	B	C	D	E	F	G	H	I	J	K	L
2015					SD	N/A				97.5% KM (Chebyshev) UCL		0.00104
2016					k star	N/A				99% KM (Chebyshev) UCL		0.00143
2017					Theta star	N/A						
2018					Nu star	N/A				**Potential UCLs to Use**		
2019					AppChi2	N/A				95% KM (t) UCL		0.0005773
2020				95% Gamma Approximate UCL		N/A				95% KM (Percentile Bootstrap) UCL		0.00052
2021				95% Adjusted Gamma UCL		N/A						
2022	**Warning: Recommended UCL exceeds the maximum observation**											
2023	**Note: DL/2 is not a recommended method.**											
2024												

	General UCL Statistics for Data Sets with Non-Detects	
User Selected Options		
From File	H:\Risk DB\Radford\SWMU 41\Area-B\ProUCL\41_B_ProUCL_input_TS.wst	
Full Precision	OFF	
Confidence Coefficient	95%	
Number of Bootstrap Operations	2000	

Lead (mg/kg)

General Statistics

Number of Valid Samples	18	Number of Unique Samples	17

Raw Statistics		**Log-transformed Statistics**	
Minimum	21	Minimum of Log Data	3.045
Maximum	143	Maximum of Log Data	4.963
Mean	57.19	Mean of log Data	3.904
Median	43.25	SD of log Data	0.53
SD	34.81		
Coefficient of Variation	0.609		
Skewness	1.624		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.8	Shapiro Wilk Test Statistic	0.943
Shapiro Wilk Critical Value	0.897	Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	71.47	95% H-UCL	74.39
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	88.6
95% Adjusted-CLT UCL	74.05	97.5% Chebyshev (MVUE) UCL	102.4
95% Modified-t UCL	71.99	99% Chebyshev (MVUE) UCL	129.7
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.097	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	18.47		
nu star	111.5		
Approximate Chi Square Value (.05)	88.12	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0357	95% CLT UCL	70.69
Adjusted Chi Square Value	86.13	95% Jackknife UCL	71.47
		95% Standard Bootstrap UCL	70.68
Anderson-Darling Test Statistic	0.685	95% Bootstrap-t UCL	80.53
Anderson-Darling 5% Critical Value	0.744	95% Hall's Bootstrap UCL	87.97
Kolmogorov-Smirnov Test Statistic	0.215	95% Percentile Bootstrap UCL	71
Kolmogorov-Smirnov 5% Critical Value	0.205	95% BCA Bootstrap UCL	73.42
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	92.96
		97.5% Chebyshev(Mean, Sd) UCL	108.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	138.8
95% Approximate Gamma UCL	72.36		
95% Adjusted Gamma UCL	74.04		
Potential UCL to Use		Use 95% Approximate Gamma UCL	72.36

54												
55												
56	**Aluminum (mg/kg)**											
57												
58					**General Statistics**							
59				Number of Valid Samples	18				Number of Unique Samples	17		
60												
61			**Raw Statistics**					**Log-transformed Statistics**				
62				Minimum	2770				Minimum of Log Data	7.927		
63				Maximum	42400				Maximum of Log Data	10.65		
64				Mean	22962				Mean of log Data	9.928		
65				Median	22850				SD of log Data	0.581		
66				SD	9210							
67				Coefficient of Variation	0.401							
68				Skewness	0.297							
69												
70					**Relevant UCL Statistics**							
71			**Normal Distribution Test**					**Lognormal Distribution Test**				
72				Shapiro Wilk Test Statistic	0.933				Shapiro Wilk Test Statistic	0.746		
73				Shapiro Wilk Critical Value	0.897				Shapiro Wilk Critical Value	0.897		
74			**Data appear Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**				
75												
76			**Assuming Normal Distribution**					**Assuming Lognormal Distribution**				
77				95% Student's-t UCL	26739				95% H-UCL	32689		
78			**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	38999		
79				95% Adjusted-CLT UCL	26696				97.5% Chebyshev (MVUE) UCL	45481		
80				95% Modified-t UCL	26764				99% Chebyshev (MVUE) UCL	58215		
81												
82			**Gamma Distribution Test**					**Data Distribution**				
83				k star (bias corrected)	3.853			**Data appear Normal at 5% Significance Level**				
84				Theta Star	5960							
85				nu star	138.7							
86				Approximate Chi Square Value (.05)	112.5			**Nonparametric Statistics**				
87				Adjusted Level of Significance	0.0357				95% CLT UCL	26533		
88				Adjusted Chi Square Value	110.2				95% Jackknife UCL	26739		
89									95% Standard Bootstrap UCL	26446		
90				Anderson-Darling Test Statistic	0.903				95% Bootstrap-t UCL	27147		
91				Anderson-Darling 5% Critical Value	0.743				95% Hall's Bootstrap UCL	27559		
92				Kolmogorov-Smirnov Test Statistic	0.168				95% Percentile Bootstrap UCL	26464		
93				Kolmogorov-Smirnov 5% Critical Value	0.204				95% BCA Bootstrap UCL	26617		
94			**Data follow Appr. Gamma Distribution at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	32425		
95									97.5% Chebyshev(Mean, Sd) UCL	36519		
96			**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	44562		
97				95% Approximate Gamma UCL	28313							
98				95% Adjusted Gamma UCL	28895							
99												
100			**Potential UCL to Use**						Use 95% Student's-t UCL	26739		
101												
102												
103	**Antimony (mg/kg)**											
104												
105					**General Statistics**							
106				Number of Valid Samples	18				Number of Unique Samples	18		

107												
108	**Raw Statistics**						**Log-transformed Statistics**					
109					Minimum	0.11					Minimum of Log Data	-2.207
110					Maximum	1.3					Maximum of Log Data	0.262
111					Mean	0.667					Mean of log Data	-0.517
112					Median	0.575					SD of log Data	0.538
113					SD	0.298						
114					Coefficient of Variation	0.447						
115					Skewness	0.759						
116												
117	**Relevant UCL Statistics**											
118	**Normal Distribution Test**						**Lognormal Distribution Test**					
119					Shapiro Wilk Test Statistic	0.89					Shapiro Wilk Test Statistic	0.824
120					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
121	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
122												
123	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
124					95% Student's-t UCL	0.789					95% H-UCL	0.902
125	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	1.075
126					95% Adjusted-CLT UCL	0.796					97.5% Chebyshev (MVUE) UCL	1.245
127					95% Modified-t UCL	0.791					99% Chebyshev (MVUE) UCL	1.578
128												
129	**Gamma Distribution Test**						**Data Distribution**					
130					k star (bias corrected)	3.896	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
131					Theta Star	0.171						
132					nu star	140.2						
133					Approximate Chi Square Value (.05)	113.9	**Nonparametric Statistics**					
134					Adjusted Level of Significance	0.0357					95% CLT UCL	0.783
135					Adjusted Chi Square Value	111.6					95% Jackknife UCL	0.789
136											95% Standard Bootstrap UCL	0.781
137					Anderson-Darling Test Statistic	0.839					95% Bootstrap-t UCL	0.813
138					Anderson-Darling 5% Critical Value	0.743					95% Hall's Bootstrap UCL	0.809
139					Kolmogorov-Smirnov Test Statistic	0.179					95% Percentile Bootstrap UCL	0.781
140					Kolmogorov-Smirnov 5% Critical Value	0.204					95% BCA Bootstrap UCL	0.79
141	**Data follow Appr. Gamma Distribution at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	0.973
142											97.5% Chebyshev(Mean, Sd) UCL	1.106
143	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	1.366
144					95% Approximate Gamma UCL	0.821						
145					95% Adjusted Gamma UCL	0.838						
146												
147	**Potential UCL to Use**										Use 95% Approximate Gamma UCL	0.821
148												
149												
150	**Arsenic (mg/kg)**											
151												
152	**General Statistics**											
153					Number of Valid Samples	18					Number of Unique Samples	15
154												
155	**Raw Statistics**						**Log-transformed Statistics**					
156					Minimum	3.2					Minimum of Log Data	1.163
157					Maximum	32					Maximum of Log Data	3.466
158					Mean	18.47					Mean of log Data	2.799
159					Median	19.25					SD of log Data	0.563

160					SD	7.752						
161					Coefficient of Variation	0.42						
162					Skewness	-0.0294						
163												
164					**Relevant UCL Statistics**							
165					**Normal Distribution Test**					**Lognormal Distribution Test**		
166					Shapiro Wilk Test Statistic	0.967				Shapiro Wilk Test Statistic	0.854	
167					Shapiro Wilk Critical Value	0.897				Shapiro Wilk Critical Value	0.897	
168					**Data appear Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**		
169												
170					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
171					95% Student's-t UCL	21.65				95% H-UCL	25.62	
172					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	30.56	
173					95% Adjusted-CLT UCL	21.46				97.5% Chebyshev (MVUE) UCL	35.54	
174					95% Modified-t UCL	21.65				99% Chebyshev (MVUE) UCL	45.31	
175												
176					**Gamma Distribution Test**					**Data Distribution**		
177					k star (bias corrected)	3.722				**Data appear Normal at 5% Significance Level**		
178					Theta Star	4.962						
179					nu star	134						
180					Approximate Chi Square Value (.05)	108.3				**Nonparametric Statistics**		
181					Adjusted Level of Significance	0.0357				95% CLT UCL	21.47	
182					Adjusted Chi Square Value	106				95% Jackknife UCL	21.65	
183										95% Standard Bootstrap UCL	21.34	
184					Anderson-Darling Test Statistic	0.543				95% Bootstrap-t UCL	21.47	
185					Anderson-Darling 5% Critical Value	0.743				95% Hall's Bootstrap UCL	21.45	
186					Kolmogorov-Smirnov Test Statistic	0.153				95% Percentile Bootstrap UCL	21.39	
187					Kolmogorov-Smirnov 5% Critical Value	0.204				95% BCA Bootstrap UCL	21.21	
188					**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	26.43	
189										97.5% Chebyshev(Mean, Sd) UCL	29.88	
190					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	36.65	
191					95% Approximate Gamma UCL	22.86						
192					95% Adjusted Gamma UCL	23.34						
193												
194					**Potential UCL to Use**					Use 95% Student's-t UCL	21.65	
195												
196												
197	**Barium (mg/kg)**											
198												
199					**General Statistics**							
200					Number of Valid Samples	18				Number of Unique Samples	18	
201												
202					**Raw Statistics**					**Log-transformed Statistics**		
203					Minimum	35				Minimum of Log Data	3.555	
204					Maximum	366.5				Maximum of Log Data	5.904	
205					Mean	137.1				Mean of log Data	4.762	
206					Median	116				SD of log Data	0.582	
207					SD	83.28						
208					Coefficient of Variation	0.607						
209					Skewness	1.459						
210												
211					**Relevant UCL Statistics**							
212					**Normal Distribution Test**					**Lognormal Distribution Test**		

213					Shapiro Wilk Test Statistic	0.874					Shapiro Wilk Test Statistic	0.985
214					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
215					**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
216												
217					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
218					95% Student's-t UCL	171.3					95% H-UCL	186.8
219					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	222.9
220					95% Adjusted-CLT UCL	176.6					97.5% Chebyshev (MVUE) UCL	260
221					95% Modified-t UCL	172.4					99% Chebyshev (MVUE) UCL	332.8
222												
223					**Gamma Distribution Test**						**Data Distribution**	
224					k star (bias corrected)	2.794					**Data appear Gamma Distributed at 5% Significance Level**	
225					Theta Star	49.07						
226					nu star	100.6						
227					Approximate Chi Square Value (.05)	78.46					**Nonparametric Statistics**	
228					Adjusted Level of Significance	0.0357					95% CLT UCL	169.4
229					Adjusted Chi Square Value	76.58					95% Jackknife UCL	171.3
230											95% Standard Bootstrap UCL	169.4
231					Anderson-Darling Test Statistic	0.269					95% Bootstrap-t UCL	186.2
232					Anderson-Darling 5% Critical Value	0.745					95% Hall's Bootstrap UCL	204
233					Kolmogorov-Smirnov Test Statistic	0.127					95% Percentile Bootstrap UCL	170.1
234					Kolmogorov-Smirnov 5% Critical Value	0.205					95% BCA Bootstrap UCL	175.3
235					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	222.7
236											97.5% Chebyshev(Mean, Sd) UCL	259.7
237					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	332.4
238					95% Approximate Gamma UCL	175.8						
239					95% Adjusted Gamma UCL	180.1						
240												
241					**Potential UCL to Use**						Use 95% Approximate Gamma UCL	175.8
242												
243												
244	**Beryllium (mg/kg)**											
245												
246					**General Statistics**							
247					Number of Valid Samples	18					Number of Unique Samples	17
248												
249					**Raw Statistics**						**Log-transformed Statistics**	
250					Minimum	0.057					Minimum of Log Data	-2.865
251					Maximum	1.35					Maximum of Log Data	0.3
252					Mean	0.736					Mean of log Data	-0.538
253					Median	0.788					SD of log Data	0.875
254					SD	0.355						
255					Coefficient of Variation	0.483						
256					Skewness	-0.62						
257												
258					**Relevant UCL Statistics**							
259					**Normal Distribution Test**						**Lognormal Distribution Test**	
260					Shapiro Wilk Test Statistic	0.931					Shapiro Wilk Test Statistic	0.744
261					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
262					**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**	
263												
264					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
265					95% Student's-t UCL	0.882					95% H-UCL	1.447

266	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	1.648	
267				95% Adjusted-CLT UCL	0.861					97.5% Chebyshev (MVUE) UCL	2.001	
268				95% Modified-t UCL	0.88					99% Chebyshev (MVUE) UCL	2.694	
269												
270	**Gamma Distribution Test**									**Data Distribution**		
271				k star (bias corrected)	1.961					**Data appear Normal at 5% Significance Level**		
272				Theta Star	0.375							
273				nu star	70.61							
274				Approximate Chi Square Value (.05)	52.27					**Nonparametric Statistics**		
275				Adjusted Level of Significance	0.0357					95% CLT UCL	0.874	
276				Adjusted Chi Square Value	50.75					95% Jackknife UCL	0.882	
277										95% Standard Bootstrap UCL	0.871	
278				Anderson-Darling Test Statistic	1.473					95% Bootstrap-t UCL	0.869	
279				Anderson-Darling 5% Critical Value	0.751					95% Hall's Bootstrap UCL	0.861	
280				Kolmogorov-Smirnov Test Statistic	0.242					95% Percentile Bootstrap UCL	0.865	
281				Kolmogorov-Smirnov 5% Critical Value	0.206					95% BCA Bootstrap UCL	0.86	
282	**Data not Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL	1.101	
283										97.5% Chebyshev(Mean, Sd) UCL	1.259	
284	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL	1.569	
285				95% Approximate Gamma UCL	0.994							
286				95% Adjusted Gamma UCL	1.024							
287												
288	**Potential UCL to Use**									Use 95% Student's-t UCL	0.882	
289												
290												
291	**Cadmium (mg/kg)**											
292												
293	**General Statistics**											
294				Number of Valid Samples	18					Number of Unique Samples	14	
295												
296	**Raw Statistics**									**Log-transformed Statistics**		
297				Minimum	0.6					Minimum of Log Data	-0.511	
298				Maximum	3.5					Maximum of Log Data	1.253	
299				Mean	2.381					Mean of log Data	0.806	
300				Median	2.4					SD of log Data	0.402	
301				SD	0.72							
302				Coefficient of Variation	0.302							
303				Skewness	-0.576							
304												
305	**Relevant UCL Statistics**											
306	**Normal Distribution Test**									**Lognormal Distribution Test**		
307				Shapiro Wilk Test Statistic	0.963					Shapiro Wilk Test Statistic	0.808	
308				Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897	
309	**Data appear Normal at 5% Significance Level**									**Data not Lognormal at 5% Significance Level**		
310												
311	**Assuming Normal Distribution**									**Assuming Lognormal Distribution**		
312				95% Student's-t UCL	2.676					95% H-UCL	2.934	
313	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	3.439	
314				95% Adjusted-CLT UCL	2.635					97.5% Chebyshev (MVUE) UCL	3.881	
315				95% Modified-t UCL	2.672					99% Chebyshev (MVUE) UCL	4.75	
316												
317	**Gamma Distribution Test**									**Data Distribution**		
318				k star (bias corrected)	7.013					**Data appear Normal at 5% Significance Level**		

319					Theta Star	0.339						
320					nu star	252.5						
321					Approximate Chi Square Value (.05)	216.7				**Nonparametric Statistics**		
322					Adjusted Level of Significance	0.0357				95% CLT UCL	2.66	
323					Adjusted Chi Square Value	213.5				95% Jackknife UCL	2.676	
324										95% Standard Bootstrap UCL	2.649	
325					Anderson-Darling Test Statistic	0.567				95% Bootstrap-t UCL	2.658	
326					Anderson-Darling 5% Critical Value	0.74				95% Hall's Bootstrap UCL	2.651	
327					Kolmogorov-Smirnov Test Statistic	0.128				95% Percentile Bootstrap UCL	2.658	
328					Kolmogorov-Smirnov 5% Critical Value	0.204				95% BCA Bootstrap UCL	2.631	
329					**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	3.12	
330										97.5% Chebyshev(Mean, Sd) UCL	3.44	
331					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	4.068	
332					95% Approximate Gamma UCL	2.774						
333					95% Adjusted Gamma UCL	2.815						
334												
335					**Potential UCL to Use**					Use 95% Student's-t UCL	2.676	
336												
337												
338	**Calcium (mg/kg)**											
339												
340						**General Statistics**						
341					Number of Valid Samples	18				Number of Unique Samples	18	
342												
343					**Raw Statistics**					**Log-transformed Statistics**		
344					Minimum	751				Minimum of Log Data	6.621	
345					Maximum	185000				Maximum of Log Data	12.13	
346					Mean	68530				Mean of log Data	10.5	
347					Median	60150				SD of log Data	1.577	
348					SD	55840						
349					Coefficient of Variation	0.815						
350					Skewness	0.683						
351												
352						**Relevant UCL Statistics**						
353					**Normal Distribution Test**					**Lognormal Distribution Test**		
354					Shapiro Wilk Test Statistic	0.924				Shapiro Wilk Test Statistic	0.826	
355					Shapiro Wilk Critical Value	0.897				Shapiro Wilk Critical Value	0.897	
356					**Data appear Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**		
357												
358					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
359					95% Student's-t UCL	91426				95% H-UCL	495321	
360					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	320103	
361					95% Adjusted-CLT UCL	92442				97.5% Chebyshev (MVUE) UCL	411132	
362					95% Modified-t UCL	91779				99% Chebyshev (MVUE) UCL	589942	
363												
364					**Gamma Distribution Test**					**Data Distribution**		
365					k star (bias corrected)	0.797				**Data appear Normal at 5% Significance Level**		
366					Theta Star	85985						
367					nu star	28.69						
368					Approximate Chi Square Value (.05)	17.47				**Nonparametric Statistics**		
369					Adjusted Level of Significance	0.0357				95% CLT UCL	90179	
370					Adjusted Chi Square Value	16.63				95% Jackknife UCL	91426	
371										95% Standard Bootstrap UCL	89434	

372					Anderson-Darling Test Statistic	0.491				95% Bootstrap-t UCL	95125	
373					Anderson-Darling 5% Critical Value	0.771				95% Hall's Bootstrap UCL	92536	
374					Kolmogorov-Smirnov Test Statistic	0.139				95% Percentile Bootstrap UCL	89817	
375					Kolmogorov-Smirnov 5% Critical Value	0.21				95% BCA Bootstrap UCL	90422	
376					**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	125900	
377										97.5% Chebyshev(Mean, Sd) UCL	150724	
378					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	199487	
379					95% Approximate Gamma UCL	112565						
380					95% Adjusted Gamma UCL	118241						
381												
382					**Potential UCL to Use**					Use 95% Student's-t UCL	91426	
383												
384												
385	**Chromium (mg/kg)**											
386												
387					**General Statistics**							
388					Number of Valid Samples	18				Number of Detected Data	17	
389					Number of Unique Samples	12				Number of Non-Detect Data	1	
390										Percent Non-Detects	5.56%	
391												
392					**Raw Statistics**					**Log-transformed Statistics**		
393					Minimum Detected	12				Minimum Detected	2.485	
394					Maximum Detected	30				Maximum Detected	3.401	
395					Mean of Detected	20.53				Mean of Detected	2.995	
396					SD of Detected	4.735				SD of Detected	0.242	
397					Minimum Non-Detect	5				Minimum Non-Detect	1.609	
398					Maximum Non-Detect	5				Maximum Non-Detect	1.609	
399												
400												
401					**UCL Statistics**							
402					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
403					Shapiro Wilk Test Statistic	0.956				Shapiro Wilk Test Statistic	0.946	
404					5% Shapiro Wilk Critical Value	0.892				5% Shapiro Wilk Critical Value	0.892	
405					**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
406												
407					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
408					DL/2 Substitution Method					DL/2 Substitution Method		
409					Mean	19.53				Mean	2.88	
410					SD	6.258				SD	0.543	
411					95% DL/2 (t) UCL	22.09				95% H-Stat (DL/2) UCL	23.18	
412												
413					Maximum Likelihood Estimate(MLE) Method					Log ROS Method		
414					Mean	19.56				Mean in Log Scale	2.963	
415					SD	6.018				SD in Log Scale	0.272	
416					95% MLE (t) UCL	22.02				Mean in Original Scale	20.01	
417					95% MLE (Tiku) UCL	22.09				SD in Original Scale	5.095	
418										95% Percentile Bootstrap UCL	21.89	
419										95% BCA Bootstrap UCL	21.97	
420												
421					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
422					k star (bias corrected)	15.67				**Data appear Normal at 5% Significance Level**		
423					Theta Star	1.31						
424					nu star	532.8						

425												
426					A-D Test Statistic	0.472	**Nonparametric Statistics**					
427					5% A-D Critical Value	0.738					Kaplan-Meier (KM) Method	
428					K-S Test Statistic	0.738					Mean	20.06
429					5% K-S Critical Value	0.209					SD	4.873
430	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	1.184
431											95% KM (t) UCL	22.12
432	**Assuming Gamma Distribution**										95% KM (z) UCL	22
433					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	22.09
434					Minimum	9.162					95% KM (bootstrap t) UCL	22.16
435					Maximum	30					95% KM (BCA) UCL	22.14
436					Mean	19.9					95% KM (Percentile Bootstrap) UCL	21.92
437					Median	21					95% KM (Chebyshev) UCL	25.22
438					SD	5.318					97.5% KM (Chebyshev) UCL	27.45
439					k star	10.95					99% KM (Chebyshev) UCL	31.84
440					Theta star	1.818						
441					Nu star	394.1	**Potential UCLs to Use**					
442					AppChi2	349.1					95% KM (t) UCL	22.12
443					95% Gamma Approximate UCL	22.46					95% KM (Percentile Bootstrap) UCL	21.92
444					95% Adjusted Gamma UCL	22.73						
445	**Note: DL/2 is not a recommended method.**											
446												
447												
448	**Cobalt (mg/kg)**											
449												
450	**General Statistics**											
451					Number of Valid Samples	18					Number of Unique Samples	13
452												
453	**Raw Statistics**						**Log-transformed Statistics**					
454					Minimum	5.8					Minimum of Log Data	1.758
455					Maximum	20					Maximum of Log Data	2.996
456					Mean	11.61					Mean of log Data	2.4
457					Median	11.5					SD of log Data	0.335
458					SD	3.878						
459					Coefficient of Variation	0.334						
460					Skewness	0.673						
461												
462	**Relevant UCL Statistics**											
463	**Normal Distribution Test**						**Lognormal Distribution Test**					
464					Shapiro Wilk Test Statistic	0.927					Shapiro Wilk Test Statistic	0.955
465					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
466	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
467												
468	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
469					95% Student's-t UCL	13.2					95% H-UCL	13.58
470	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	15.68
471					95% Adjusted-CLT UCL	13.27					97.5% Chebyshev (MVUE) UCL	17.44
472					95% Modified-t UCL	13.23					99% Chebyshev (MVUE) UCL	20.89
473												
474	**Gamma Distribution Test**						**Data Distribution**					
475					k star (bias corrected)	8.138	**Data appear Normal at 5% Significance Level**					
476					Theta Star	1.427						
477					nu star	293						

478				Approximate Chi Square Value (.05)	254.3			**Nonparametric Statistics**				
479				Adjusted Level of Significance	0.0357					95% CLT UCL	13.11	
480				Adjusted Chi Square Value	250.9					95% Jackknife UCL	13.2	
481										95% Standard Bootstrap UCL	13.03	
482				Anderson-Darling Test Statistic	0.442					95% Bootstrap-t UCL	13.37	
483				Anderson-Darling 5% Critical Value	0.739					95% Hall's Bootstrap UCL	13.32	
484				Kolmogorov-Smirnov Test Statistic	0.143					95% Percentile Bootstrap UCL	13.12	
485				Kolmogorov-Smirnov 5% Critical Value	0.203					95% BCA Bootstrap UCL	13.16	
486				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	15.6	
487										97.5% Chebyshev(Mean, Sd) UCL	17.32	
488				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	20.71	
489				95% Approximate Gamma UCL	13.38							
490				95% Adjusted Gamma UCL	13.56							
491												
492				**Potential UCL to Use**						Use 95% Student's-t UCL	13.2	
493												
494												
495	**Copper (mg/kg)**											
496												
497					**General Statistics**							
498				Number of Valid Samples	18					Number of Unique Samples	16	
499												
500				**Raw Statistics**				**Log-transformed Statistics**				
501				Minimum	12					Minimum of Log Data	2.485	
502				Maximum	66					Maximum of Log Data	4.19	
503				Mean	41.08					Mean of log Data	3.653	
504				Median	39.5					SD of log Data	0.395	
505				SD	13.3							
506				Coefficient of Variation	0.324							
507				Skewness	-0.213							
508												
509					**Relevant UCL Statistics**							
510				**Normal Distribution Test**				**Lognormal Distribution Test**				
511				Shapiro Wilk Test Statistic	0.984					Shapiro Wilk Test Statistic	0.889	
512				Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897	
513				**Data appear Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**				
514												
515				**Assuming Normal Distribution**				**Assuming Lognormal Distribution**				
516				95% Student's-t UCL	46.54					95% H-UCL	50.21	
517				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	58.76	
518				95% Adjusted-CLT UCL	46.07					97.5% Chebyshev (MVUE) UCL	66.21	
519				95% Modified-t UCL	46.51					99% Chebyshev (MVUE) UCL	80.86	
520												
521				**Gamma Distribution Test**				**Data Distribution**				
522				k star (bias corrected)	6.812			**Data appear Normal at 5% Significance Level**				
523				Theta Star	6.031							
524				nu star	245.2							
525				Approximate Chi Square Value (.05)	210			**Nonparametric Statistics**				
526				Adjusted Level of Significance	0.0357					95% CLT UCL	46.24	
527				Adjusted Chi Square Value	206.8					95% Jackknife UCL	46.54	
528										95% Standard Bootstrap UCL	45.97	
529				Anderson-Darling Test Statistic	0.362					95% Bootstrap-t UCL	46.25	
530				Anderson-Darling 5% Critical Value	0.741					95% Hall's Bootstrap UCL	46.09	

531				Kolmogorov-Smirnov Test Statistic	0.153					95% Percentile Bootstrap UCL	45.89	
532				Kolmogorov-Smirnov 5% Critical Value	0.204					95% BCA Bootstrap UCL	45.97	
533				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	54.75	
534										97.5% Chebyshev(Mean, Sd) UCL	60.66	
535				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	72.27	
536				95% Approximate Gamma UCL	47.98							
537				95% Adjusted Gamma UCL	48.71							
538												
539				**Potential UCL to Use**						Use 95% Student's-t UCL	46.54	
540												
541												
542	**Iron (mg/kg)**											
543												
544				**General Statistics**								
545				Number of Valid Samples	18					Number of Unique Samples	18	
546												
547				**Raw Statistics**						**Log-transformed Statistics**		
548				Minimum	12500					Minimum of Log Data	9.433	
549				Maximum	66200					Maximum of Log Data	11.1	
550				Mean	37594					Mean of log Data	10.48	
551				Median	36225					SD of log Data	0.365	
552				SD	12529							
553				Coefficient of Variation	0.333							
554				Skewness	0.61							
555												
556				**Relevant UCL Statistics**								
557				**Normal Distribution Test**						**Lognormal Distribution Test**		
558				Shapiro Wilk Test Statistic	0.944					Shapiro Wilk Test Statistic	0.915	
559				Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897	
560				**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**		
561												
562				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
563				95% Student's-t UCL	42732					95% H-UCL	44938	
564				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	52258	
565				95% Adjusted-CLT UCL	42906					97.5% Chebyshev (MVUE) UCL	58513	
566				95% Modified-t UCL	42803					99% Chebyshev (MVUE) UCL	70799	
567												
568				**Gamma Distribution Test**						**Data Distribution**		
569				k star (bias corrected)	7.451					**Data appear Normal at 5% Significance Level**		
570				Theta Star	5046							
571				nu star	268.2							
572				Approximate Chi Square Value (.05)	231.3					**Nonparametric Statistics**		
573				Adjusted Level of Significance	0.0357					95% CLT UCL	42452	
574				Adjusted Chi Square Value	228					95% Jackknife UCL	42732	
575										95% Standard Bootstrap UCL	42355	
576				Anderson-Darling Test Statistic	0.396					95% Bootstrap-t UCL	43419	
577				Anderson-Darling 5% Critical Value	0.74					95% Hall's Bootstrap UCL	44996	
578				Kolmogorov-Smirnov Test Statistic	0.127					95% Percentile Bootstrap UCL	42383	
579				Kolmogorov-Smirnov 5% Critical Value	0.204					95% BCA Bootstrap UCL	42683	
580				**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	50467	
581										97.5% Chebyshev(Mean, Sd) UCL	56037	
582				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	66978	
583				95% Approximate Gamma UCL	43596							

584					95% Adjusted Gamma UCL	44225						
585												
586					**Potential UCL to Use**						Use 95% Student's-t UCL	42732
587												
588												
589	**Magnesium (mg/kg)**											
590												
591					**General Statistics**							
592					Number of Valid Samples	18					Number of Unique Samples	18
593												
594					**Raw Statistics**						**Log-transformed Statistics**	
595					Minimum	1970					Minimum of Log Data	7.586
596					Maximum	107000					Maximum of Log Data	11.58
597					Mean	32466					Mean of log Data	10.05
598					Median	27700					SD of log Data	0.982
599					SD	24582						
600					Coefficient of Variation	0.757						
601					Skewness	1.645						
602												
603					**Relevant UCL Statistics**							
604					**Normal Distribution Test**						**Lognormal Distribution Test**	
605					Shapiro Wilk Test Statistic	0.869					Shapiro Wilk Test Statistic	0.896
606					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
607					**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**	
608												
609					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
610					95% Student's-t UCL	42545					95% H-UCL	70373
611					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	76762
612					95% Adjusted-CLT UCL	44397					97.5% Chebyshev (MVUE) UCL	94288
613					95% Modified-t UCL	42920					99% Chebyshev (MVUE) UCL	128713
614												
615					**Gamma Distribution Test**						**Data Distribution**	
616					k star (bias corrected)	1.404					**Data appear Gamma Distributed at 5% Significance Level**	
617					Theta Star	23118						
618					nu star	50.56						
619					Approximate Chi Square Value (.05)	35.23					**Nonparametric Statistics**	
620					Adjusted Level of Significance	0.0357					95% CLT UCL	41996
621					Adjusted Chi Square Value	34					95% Jackknife UCL	42545
622											95% Standard Bootstrap UCL	41692
623					Anderson-Darling Test Statistic	0.379					95% Bootstrap-t UCL	46694
624					Anderson-Darling 5% Critical Value	0.755					95% Hall's Bootstrap UCL	60139
625					Kolmogorov-Smirnov Test Statistic	0.174					95% Percentile Bootstrap UCL	42835
626					Kolmogorov-Smirnov 5% Critical Value	0.207					95% BCA Bootstrap UCL	44369
627					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	57722
628											97.5% Chebyshev(Mean, Sd) UCL	68650
629					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	90117
630					95% Approximate Gamma UCL	46591						
631					95% Adjusted Gamma UCL	48272						
632												
633					**Potential UCL to Use**						Use 95% Approximate Gamma UCL	46591
634												
635												
636	**Manganese (mg/kg)**											

637												
638	**General Statistics**											
639					Number of Valid Samples	18				Number of Unique Samples	18	
640												
641	**Raw Statistics**						**Log-transformed Statistics**					
642					Minimum	99				Minimum of Log Data	4.595	
643					Maximum	2905				Maximum of Log Data	7.974	
644					Mean	1189				Mean of log Data	6.898	
645					Median	1075				SD of log Data	0.726	
646					SD	654.7						
647					Coefficient of Variation	0.551						
648					Skewness	1.091						
649												
650	**Relevant UCL Statistics**											
651	**Normal Distribution Test**						**Lognormal Distribution Test**					
652					Shapiro Wilk Test Statistic	0.922				Shapiro Wilk Test Statistic	0.845	
653					Shapiro Wilk Critical Value	0.897				Shapiro Wilk Critical Value	0.897	
654	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
655												
656	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
657					95% Student's-t UCL	1457				95% H-UCL	1924	
658	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	2272	
659					95% Adjusted-CLT UCL	1485				97.5% Chebyshev (MVUE) UCL	2707	
660					95% Modified-t UCL	1464				99% Chebyshev (MVUE) UCL	3562	
661												
662	**Gamma Distribution Test**						**Data Distribution**					
663					k star (bias corrected)	2.443	**Data appear Normal at 5% Significance Level**					
664					Theta Star	486.6						
665					nu star	87.96						
666					Approximate Chi Square Value (.05)	67.34	**Nonparametric Statistics**					
667					Adjusted Level of Significance	0.0357				95% CLT UCL	1443	
668					Adjusted Chi Square Value	65.6				95% Jackknife UCL	1457	
669										95% Standard Bootstrap UCL	1434	
670					Anderson-Darling Test Statistic	0.444				95% Bootstrap-t UCL	1537	
671					Anderson-Darling 5% Critical Value	0.747				95% Hall's Bootstrap UCL	1664	
672					Kolmogorov-Smirnov Test Statistic	0.14				95% Percentile Bootstrap UCL	1452	
673					Kolmogorov-Smirnov 5% Critical Value	0.205				95% BCA Bootstrap UCL	1486	
674	**Data appear Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL	1862	
675										97.5% Chebyshev(Mean, Sd) UCL	2153	
676	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL	2724	
677					95% Approximate Gamma UCL	1553						
678					95% Adjusted Gamma UCL	1594						
679												
680	**Potential UCL to Use**									Use 95% Student's-t UCL	1457	
681												
682												
683	**Mercury (mg/kg)**											
684												
685	**General Statistics**											
686					Number of Valid Samples	18				Number of Unique Samples	17	
687												
688	**Raw Statistics**						**Log-transformed Statistics**					
689					Minimum	0.036				Minimum of Log Data	-3.324	

690					Maximum	0.65					Maximum of Log Data	-0.431
691					Mean	0.135					Mean of log Data	-2.336
692					Median	0.088					SD of log Data	0.764
693					SD	0.147						
694					Coefficient of Variation	1.09						
695					Skewness	2.854						
696												
697					**Relevant UCL Statistics**							
698					**Normal Distribution Test**						**Lognormal Distribution Test**	
699					Shapiro Wilk Test Statistic	0.64					Shapiro Wilk Test Statistic	0.929
700					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
701					**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
702												
703					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
704					95% Student's-t UCL	0.195					95% H-UCL	0.199
705					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	0.234
706					95% Adjusted-CLT UCL	0.217					97.5% Chebyshev (MVUE) UCL	0.28
707					95% Modified-t UCL	0.199					99% Chebyshev (MVUE) UCL	0.37
708												
709					**Gamma Distribution Test**						**Data Distribution**	
710					k star (bias corrected)	1.409					**Data appear Lognormal at 5% Significance Level**	
711					Theta Star	0.0958						
712					nu star	50.71						
713					Approximate Chi Square Value (.05)	35.36					**Nonparametric Statistics**	
714					Adjusted Level of Significance	0.0357					95% CLT UCL	0.192
715					Adjusted Chi Square Value	34.13					95% Jackknife UCL	0.195
716											95% Standard Bootstrap UCL	0.19
717					Anderson-Darling Test Statistic	0.918					95% Bootstrap-t UCL	0.264
718					Anderson-Darling 5% Critical Value	0.755					95% Hall's Bootstrap UCL	0.411
719					Kolmogorov-Smirnov Test Statistic	0.231					95% Percentile Bootstrap UCL	0.197
720					Kolmogorov-Smirnov 5% Critical Value	0.207					95% BCA Bootstrap UCL	0.221
721					**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	0.286
722											97.5% Chebyshev(Mean, Sd) UCL	0.352
723					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	0.48
724					95% Approximate Gamma UCL	0.194						
725					95% Adjusted Gamma UCL	0.201						
726												
727					**Potential UCL to Use**						Use 95% H-UCL	0.199
728												
729												
730	**Nickel (mg/kg)**											
731												
732					**General Statistics**							
733					Number of Valid Samples	18					Number of Unique Samples	10
734												
735					**Raw Statistics**						**Log-transformed Statistics**	
736					Minimum	8.4					Minimum of Log Data	2.128
737					Maximum	27.5					Maximum of Log Data	3.314
738					Mean	19.36					Mean of log Data	2.935
739					Median	19					SD of log Data	0.257
740					SD	4.349						
741					Coefficient of Variation	0.225						
742					Skewness	-0.222						

743												
744	**Relevant UCL Statistics**											
745	**Normal Distribution Test**						**Lognormal Distribution Test**					
746				Shapiro Wilk Test Statistic	0.91					Shapiro Wilk Test Statistic	0.831	
747				Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897	
748	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
749												
750	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
751				95% Student's-t UCL	21.14					95% H-UCL	21.8	
752	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL	24.59	
753				95% Adjusted-CLT UCL	20.98					97.5% Chebyshev (MVUE) UCL	26.83	
754				95% Modified-t UCL	21.13					99% Chebyshev (MVUE) UCL	31.22	
755												
756	**Gamma Distribution Test**						**Data Distribution**					
757				k star (bias corrected)	15.11		**Data appear Normal at 5% Significance Level**					
758				Theta Star	1.281							
759				nu star	544.1							
760				Approximate Chi Square Value (.05)	491		**Nonparametric Statistics**					
761				Adjusted Level of Significance	0.0357					95% CLT UCL	21.04	
762				Adjusted Chi Square Value	486.1					95% Jackknife UCL	21.14	
763										95% Standard Bootstrap UCL	20.99	
764				Anderson-Darling Test Statistic	0.831					95% Bootstrap-t UCL	21.14	
765				Anderson-Darling 5% Critical Value	0.739					95% Hall's Bootstrap UCL	21.29	
766				Kolmogorov-Smirnov Test Statistic	0.191					95% Percentile Bootstrap UCL	21	
767				Kolmogorov-Smirnov 5% Critical Value	0.203					95% BCA Bootstrap UCL	21	
768	**Data follow Appr. Gamma Distribution at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL	23.82	
769										97.5% Chebyshev(Mean, Sd) UCL	25.76	
770	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL	29.56	
771				95% Approximate Gamma UCL	21.45							
772				95% Adjusted Gamma UCL	21.66							
773												
774	**Potential UCL to Use**									Use 95% Student's-t UCL	21.14	
775												
776												
777	**Potassium (mg/kg)**											
778												
779	**General Statistics**											
780				Number of Valid Samples	18					Number of Unique Samples	17	
781												
782	**Raw Statistics**						**Log-transformed Statistics**					
783				Minimum	198					Minimum of Log Data	5.288	
784				Maximum	3500					Maximum of Log Data	8.161	
785				Mean	1255					Mean of log Data	6.973	
786				Median	1125					SD of log Data	0.617	
787				SD	750.5							
788				Coefficient of Variation	0.598							
789				Skewness	1.708							
790												
791	**Relevant UCL Statistics**											
792	**Normal Distribution Test**						**Lognormal Distribution Test**					
793				Shapiro Wilk Test Statistic	0.856					Shapiro Wilk Test Statistic	0.936	
794				Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897	
795	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					

796												
797	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
798					95% Student's-t UCL	1562					95% H-UCL	1781
799	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	2124
800					95% Adjusted-CLT UCL	1622					97.5% Chebyshev (MVUE) UCL	2491
801					95% Modified-t UCL	1574					99% Chebyshev (MVUE) UCL	3212
802												
803	**Gamma Distribution Test**						**Data Distribution**					
804					k star (bias corrected)	2.745	**Data appear Gamma Distributed at 5% Significance Level**					
805					Theta Star	457						
806					nu star	98.83						
807					Approximate Chi Square Value (.05)	76.9	**Nonparametric Statistics**					
808					Adjusted Level of Significance	0.0357					95% CLT UCL	1546
809					Adjusted Chi Square Value	75.04					95% Jackknife UCL	1562
810											95% Standard Bootstrap UCL	1533
811					Anderson-Darling Test Statistic	0.392					95% Bootstrap-t UCL	1689
812					Anderson-Darling 5% Critical Value	0.745					95% Hall's Bootstrap UCL	1989
813					Kolmogorov-Smirnov Test Statistic	0.164					95% Percentile Bootstrap UCL	1554
814					Kolmogorov-Smirnov 5% Critical Value	0.205					95% BCA Bootstrap UCL	1628
815	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	2026
816											97.5% Chebyshev(Mean, Sd) UCL	2359
817	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	3015
818					95% Approximate Gamma UCL	1613						
819					95% Adjusted Gamma UCL	1652						
820												
821	**Potential UCL to Use**										Use 95% Approximate Gamma UCL	1613
822												
823												
824	**Selenium (mg.kg)**											
825												
826	**General Statistics**											
827					Number of Valid Samples	18					Number of Unique Samples	16
828												
829	**Raw Statistics**						**Log-transformed Statistics**					
830					Minimum	0.42					Minimum of Log Data	-0.868
831					Maximum	0.96					Maximum of Log Data	-0.0408
832					Mean	0.659					Mean of log Data	-0.444
833					Median	0.615					SD of log Data	0.241
834					SD	0.16						
835					Coefficient of Variation	0.243						
836					Skewness	0.497						
837												
838	**Relevant UCL Statistics**											
839	**Normal Distribution Test**						**Lognormal Distribution Test**					
840					Shapiro Wilk Test Statistic	0.943					Shapiro Wilk Test Statistic	0.964
841					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
842	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
843												
844	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
845					95% Student's-t UCL	0.725					95% H-UCL	0.734
846	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	0.824
847					95% Adjusted-CLT UCL	0.726					97.5% Chebyshev (MVUE) UCL	0.895
848					95% Modified-t UCL	0.726					99% Chebyshev (MVUE) UCL	1.035

849												
850	**Gamma Distribution Test**						**Data Distribution**					
851					k star (bias corrected)	15.35	**Data appear Normal at 5% Significance Level**					
852					Theta Star	0.0429						
853					nu star	552.6						
854					Approximate Chi Square Value (.05)	499.1	**Nonparametric Statistics**					
855					Adjusted Level of Significance	0.0357					95% CLT UCL	0.721
856					Adjusted Chi Square Value	494.2					95% Jackknife UCL	0.725
857											95% Standard Bootstrap UCL	0.72
858					Anderson-Darling Test Statistic	0.321					95% Bootstrap-t UCL	0.732
859					Anderson-Darling 5% Critical Value	0.739					95% Hall's Bootstrap UCL	0.727
860					Kolmogorov-Smirnov Test Statistic	0.128					95% Percentile Bootstrap UCL	0.719
861					Kolmogorov-Smirnov 5% Critical Value	0.203					95% BCA Bootstrap UCL	0.723
862	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	0.824
863											97.5% Chebyshev(Mean, Sd) UCL	0.895
864	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	1.035
865					95% Approximate Gamma UCL	0.73						
866					95% Adjusted Gamma UCL	0.737						
867												
868	**Potential UCL to Use**										Use 95% Student's-t UCL	0.725
869												
870												
871	**Silver (mg/kg)**											
872												
873	**General Statistics**											
874					Number of Valid Samples	18					Number of Unique Samples	16
875												
876	**Raw Statistics**						**Log-transformed Statistics**					
877					Minimum	0.05					Minimum of Log Data	-2.996
878					Maximum	0.325					Maximum of Log Data	-1.124
879					Mean	0.11					Mean of log Data	-2.335
880					Median	0.083					SD of log Data	0.483
881					SD	0.0691						
882					Coefficient of Variation	0.627						
883					Skewness	2.17						
884												
885	**Relevant UCL Statistics**											
886	**Normal Distribution Test**						**Lognormal Distribution Test**					
887					Shapiro Wilk Test Statistic	0.72					Shapiro Wilk Test Statistic	0.872
888					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
889	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
890												
891	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
892					95% Student's-t UCL	0.138					95% H-UCL	0.138
893	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	0.163
894					95% Adjusted-CLT UCL	0.146					97.5% Chebyshev (MVUE) UCL	0.187
895					95% Modified-t UCL	0.14					99% Chebyshev (MVUE) UCL	0.234
896												
897	**Gamma Distribution Test**						**Data Distribution**					
898					k star (bias corrected)	3.388	**Data do not follow a Discernable Distribution (0.05)**					
899					Theta Star	0.0325						
900					nu star	122						
901					Approximate Chi Square Value (.05)	97.47	**Nonparametric Statistics**					

902				Adjusted Level of Significance	0.0357					95% CLT UCL	0.137
903				Adjusted Chi Square Value	95.37					95% Jackknife UCL	0.138
904										95% Standard Bootstrap UCL	0.137
905				Anderson-Darling Test Statistic	1.353					95% Bootstrap-t UCL	0.163
906				Anderson-Darling 5% Critical Value	0.743					95% Hall's Bootstrap UCL	0.192
907				Kolmogorov-Smirnov Test Statistic	0.286					95% Percentile Bootstrap UCL	0.141
908				Kolmogorov-Smirnov 5% Critical Value	0.205					95% BCA Bootstrap UCL	0.148
909				**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	0.181
910										97.5% Chebyshev(Mean, Sd) UCL	0.212
911				**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	0.272
912				95% Approximate Gamma UCL	0.138						
913				95% Adjusted Gamma UCL	0.141						
914											
915				**Potential UCL to Use**						Use 95% Student's-t UCL	0.138
916										or 95% Modified-t UCL	0.14
917											
918											
919	**Sodium (mg/kg)**										
920											
921				**General Statistics**							
922				Number of Valid Samples	18					Number of Unique Samples	18
923											
924				**Raw Statistics**						**Log-transformed Statistics**	
925				Minimum	86					Minimum of Log Data	4.454
926				Maximum	24200					Maximum of Log Data	10.09
927				Mean	2769					Mean of log Data	6.657
928				Median	1410					SD of log Data	1.73
929				SD	5597						
930				Coefficient of Variation	2.021						
931				Skewness	3.676						
932											
933				**Relevant UCL Statistics**							
934				**Normal Distribution Test**						**Lognormal Distribution Test**	
935				Shapiro Wilk Test Statistic	0.489					Shapiro Wilk Test Statistic	0.901
936				Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
937				**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
938											
939				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
940				95% Student's-t UCL	5064					95% H-UCL	17566
941				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	9126
942				95% Adjusted-CLT UCL	6161					97.5% Chebyshev (MVUE) UCL	11810
943				95% Modified-t UCL	5255					99% Chebyshev (MVUE) UCL	17082
944											
945				**Gamma Distribution Test**						**Data Distribution**	
946				k star (bias corrected)	0.454					**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
947				Theta Star	6099						
948				nu star	16.35						
949				Approximate Chi Square Value (.05)	8.207					**Nonparametric Statistics**	
950				Adjusted Level of Significance	0.0357					95% CLT UCL	4939
951				Adjusted Chi Square Value	7.657					95% Jackknife UCL	5064
952										95% Standard Bootstrap UCL	4825
953				Anderson-Darling Test Statistic	0.824					95% Bootstrap-t UCL	10837
954				Anderson-Darling 5% Critical Value	0.8					95% Hall's Bootstrap UCL	13600

955					Kolmogorov-Smirnov Test Statistic	0.178				95% Percentile Bootstrap UCL		5178
956					Kolmogorov-Smirnov 5% Critical Value	0.215				95% BCA Bootstrap UCL		6658
957					**Data follow Appr. Gamma Distribution at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL		8520
958										97.5% Chebyshev(Mean, Sd) UCL		11008
959					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL		15895
960					95% Approximate Gamma UCL	5516						
961					95% Adjusted Gamma UCL	5912						
962												
963					**Potential UCL to Use**					Use 95% Approximate Gamma UCL		5516
964												
965												
966	**Thallium (mg/kg)**											
967												
968						**General Statistics**						
969					Number of Valid Samples	18				Number of Detected Data		16
970					Number of Unique Samples	11				Number of Non-Detect Data		2
971										Percent Non-Detects		11.11%
972												
973					**Raw Statistics**					**Log-transformed Statistics**		
974					Minimum Detected	0.092				Minimum Detected		-2.386
975					Maximum Detected	0.325				Maximum Detected		-1.124
976					Mean of Detected	0.197				Mean of Detected		-1.706
977					SD of Detected	0.0784				SD of Detected		0.43
978					Minimum Non-Detect	0.5				Minimum Non-Detect		-0.693
979					Maximum Non-Detect	0.5				Maximum Non-Detect		-0.693
980												
981												
982						**UCL Statistics**						
983					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
984					Shapiro Wilk Test Statistic	0.925				Shapiro Wilk Test Statistic		0.917
985					5% Shapiro Wilk Critical Value	0.887				5% Shapiro Wilk Critical Value		0.887
986					**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
987												
988					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
989					DL/2 Substitution Method					DL/2 Substitution Method		
990					Mean	0.203				Mean		-1.67
991					SD	0.0756				SD		0.417
992					95% DL/2 (t) UCL	0.234				95% H-Stat (DL/2) UCL		0.275
993												
994					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
995					**MLE method failed to converge properly**					Mean in Log Scale		-1.706
996										SD in Log Scale		0.41
997										Mean in Original Scale		0.196
998										SD in Original Scale		0.0748
999										95% Percentile Bootstrap UCL		0.225
1000										95% BCA Bootstrap UCL		0.227
1001												
1002					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
1003					k star (bias corrected)	5.151				**Data appear Normal at 5% Significance Level**		
1004					Theta Star	0.0383						
1005					nu star	164.8						
1006												
1007					A-D Test Statistic	0.444				**Nonparametric Statistics**		

1008				5% A-D Critical Value	0.741					Kaplan-Meier (KM) Method		
1009				K-S Test Statistic	0.741					Mean		0.197
1010				5% K-S Critical Value	0.216					SD		0.0759
1011				**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean		0.0196
1012										95% KM (t) UCL		0.231
1013				**Assuming Gamma Distribution**						95% KM (z) UCL		0.229
1014				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		0.231
1015				Minimum	0.092					95% KM (bootstrap t) UCL		0.231
1016				Maximum	0.325					95% KM (BCA) UCL		0.23
1017				Mean	0.198					95% KM (Percentile Bootstrap) UCL		0.228
1018				Median	0.185					95% KM (Chebyshev) UCL		0.283
1019				SD	0.0748					97.5% KM (Chebyshev) UCL		0.319
1020				k star	5.761					99% KM (Chebyshev) UCL		0.392
1021				Theta star	0.0344							
1022				Nu star	207.4					**Potential UCLs to Use**		
1023				AppChi2	175.1					95% KM (t) UCL		0.231
1024				95% Gamma Approximate UCL	0.235					95% KM (Percentile Bootstrap) UCL		0.228
1025				95% Adjusted Gamma UCL	0.239							
1026	**Note: DL/2 is not a recommended method.**											
1027												
1028												
1029	**Vanadium (mg/kg)**											
1030												
1031					**General Statistics**							
1032				Number of Valid Samples	18					Number of Unique Samples		16
1033												
1034				**Raw Statistics**						**Log-transformed Statistics**		
1035				Minimum	16					Minimum of Log Data		2.773
1036				Maximum	70					Maximum of Log Data		4.248
1037				Mean	42.75					Mean of log Data		3.698
1038				Median	42.75					SD of log Data		0.364
1039				SD	14.08							
1040				Coefficient of Variation	0.329							
1041				Skewness	0.18							
1042												
1043					**Relevant UCL Statistics**							
1044				**Normal Distribution Test**						**Lognormal Distribution Test**		
1045				Shapiro Wilk Test Statistic	0.985					Shapiro Wilk Test Statistic		0.957
1046				Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value		0.897
1047				**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**		
1048												
1049				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
1050				95% Student's-t UCL	48.52					95% H-UCL		51.03
1051				**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL		59.33
1052				95% Adjusted-CLT UCL	48.36					97.5% Chebyshev (MVUE) UCL		66.41
1053				95% Modified-t UCL	48.55					99% Chebyshev (MVUE) UCL		80.32
1054												
1055				**Gamma Distribution Test**						**Data Distribution**		
1056				k star (bias corrected)	7.422					**Data appear Normal at 5% Significance Level**		
1057				Theta Star	5.76							
1058				nu star	267.2							
1059				Approximate Chi Square Value (.05)	230.3					**Nonparametric Statistics**		
1060				Adjusted Level of Significance	0.0357					95% CLT UCL		48.21

1061					Adjusted Chi Square Value	227.1					95% Jackknife UCL	48.52
1062											95% Standard Bootstrap UCL	48.18
1063					Anderson-Darling Test Statistic	0.173					95% Bootstrap-t UCL	48.83
1064					Anderson-Darling 5% Critical Value	0.74					95% Hall's Bootstrap UCL	48.8
1065					Kolmogorov-Smirnov Test Statistic	0.107					95% Percentile Bootstrap UCL	48.11
1066					Kolmogorov-Smirnov 5% Critical Value	0.204					95% BCA Bootstrap UCL	48.19
1067					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	57.22
1068											97.5% Chebyshev(Mean, Sd) UCL	63.48
1069					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	75.78
1070					95% Approximate Gamma UCL	49.59						
1071					95% Adjusted Gamma UCL	50.31						
1072												
1073					**Potential UCL to Use**						Use 95% Student's-t UCL	48.52
1074												
1075												
1076	**Zinc (mg/kg)**											
1077												
1078					**General Statistics**							
1079					Number of Valid Samples	18					Number of Unique Samples	17
1080												
1081					**Raw Statistics**						**Log-transformed Statistics**	
1082					Minimum	81					Minimum of Log Data	4.394
1083					Maximum	380					Maximum of Log Data	5.94
1084					Mean	198.9					Mean of log Data	5.197
1085					Median	176.5					SD of log Data	0.449
1086					SD	91.78						
1087					Coefficient of Variation	0.461						
1088					Skewness	0.887						
1089												
1090					**Relevant UCL Statistics**							
1091					**Normal Distribution Test**						**Lognormal Distribution Test**	
1092					Shapiro Wilk Test Statistic	0.893					Shapiro Wilk Test Statistic	0.966
1093					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
1094					**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
1095												
1096					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
1097					95% Student's-t UCL	236.6					95% H-UCL	248
1098					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	293
1099					95% Adjusted-CLT UCL	239.4					97.5% Chebyshev (MVUE) UCL	333.8
1100					95% Modified-t UCL	237.3					99% Chebyshev (MVUE) UCL	413.9
1101												
1102					**Gamma Distribution Test**						**Data Distribution**	
1103					k star (bias corrected)	4.522					**Data appear Gamma Distributed at 5% Significance Level**	
1104					Theta Star	44						
1105					nu star	162.8						
1106					Approximate Chi Square Value (.05)	134.3					**Nonparametric Statistics**	
1107					Adjusted Level of Significance	0.0357					95% CLT UCL	234.5
1108					Adjusted Chi Square Value	131.8					95% Jackknife UCL	236.6
1109											95% Standard Bootstrap UCL	233.9
1110					Anderson-Darling Test Statistic	0.364					95% Bootstrap-t UCL	243.1
1111					Anderson-Darling 5% Critical Value	0.743					95% Hall's Bootstrap UCL	237.2
1112					Kolmogorov-Smirnov Test Statistic	0.125					95% Percentile Bootstrap UCL	232.6
1113					Kolmogorov-Smirnov 5% Critical Value	0.204					95% BCA Bootstrap UCL	235.2

1114	Data appear Gamma Distributed at 5% Significance Level									95% Chebyshev(Mean, Sd) UCL		293.2
1115										97.5% Chebyshev(Mean, Sd) UCL		334
1116	Assuming Gamma Distribution									99% Chebyshev(Mean, Sd) UCL		414.2
1117				95% Approximate Gamma UCL	241.2							
1118				95% Adjusted Gamma UCL	245.7							
1119												
1120	Potential UCL to Use									Use 95% Approximate Gamma UCL		241.2
1121												
1122												
1123	Total Cyanide											
1124												
1125	General Statistics											
1126				Number of Valid Samples	18					Number of Unique Samples		16
1127												
1128	Raw Statistics									Log-transformed Statistics		
1129				Minimum	0.04					Minimum of Log Data		-3.219
1130				Maximum	4.9					Maximum of Log Data		1.589
1131				Mean	0.474					Mean of log Data		-1.794
1132				Median	0.115					SD of log Data		1.209
1133				SD	1.134							
1134				Coefficient of Variation	2.391							
1135				Skewness	3.907							
1136												
1137	Relevant UCL Statistics											
1138	Normal Distribution Test									Lognormal Distribution Test		
1139				Shapiro Wilk Test Statistic	0.402					Shapiro Wilk Test Statistic		0.864
1140				Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value		0.897
1141	Data not Normal at 5% Significance Level									Data not Lognormal at 5% Significance Level		
1142												
1143	Assuming Normal Distribution									Assuming Lognormal Distribution		
1144				95% Student's-t UCL	0.94					95% H-UCL		0.826
1145	95% UCLs (Adjusted for Skewness)									95% Chebyshev (MVUE) UCL		0.783
1146				95% Adjusted-CLT UCL	1.177					97.5% Chebyshev (MVUE) UCL		0.982
1147				95% Modified-t UCL	0.981					99% Chebyshev (MVUE) UCL		1.372
1148												
1149	Gamma Distribution Test									Data Distribution		
1150				k star (bias corrected)	0.529					Data do not follow a Discernable Distribution (0.05)		
1151				Theta Star	0.896							
1152				nu star	19.06							
1153				Approximate Chi Square Value (.05)	10.16					Nonparametric Statistics		
1154				Adjusted Level of Significance	0.0357					95% CLT UCL		0.914
1155				Adjusted Chi Square Value	9.542					95% Jackknife UCL		0.94
1156										95% Standard Bootstrap UCL		0.907
1157				Anderson-Darling Test Statistic	2.11					95% Bootstrap-t UCL		3.225
1158				Anderson-Darling 5% Critical Value	0.792					95% Hall's Bootstrap UCL		2.484
1159				Kolmogorov-Smirnov Test Statistic	0.26					95% Percentile Bootstrap UCL		0.988
1160				Kolmogorov-Smirnov 5% Critical Value	0.214					95% BCA Bootstrap UCL		1.307
1161	Data not Gamma Distributed at 5% Significance Level									95% Chebyshev(Mean, Sd) UCL		1.64
1162										97.5% Chebyshev(Mean, Sd) UCL		2.144
1163	Assuming Gamma Distribution									99% Chebyshev(Mean, Sd) UCL		3.135
1164				95% Approximate Gamma UCL	0.89							
1165				95% Adjusted Gamma UCL	0.948							
1166												

1167	**Potential UCL to Use**								Use 99% Chebyshev (Mean, Sd) UCL			3.135
1168												
1169												
1170	**1,2,3-TCB (mg/kg)**											
1171												
1172	**General Statistics**											
1173					Number of Valid Samples	18			Number of Detected Data			10
1174					Number of Unique Samples	8			Number of Non-Detect Data			8
1175									Percent Non-Detects			44.44%
1176												
1177	**Raw Statistics**								**Log-transformed Statistics**			
1178					Minimum Detected	0.0004			Minimum Detected			-7.824
1179					Maximum Detected	0.0038			Maximum Detected			-5.573
1180					Mean of Detected	0.00236			Mean of Detected			-6.353
1181					SD of Detected	0.00148			SD of Detected			0.94
1182					Minimum Non-Detect	0.005			Minimum Non-Detect			-5.298
1183					Maximum Non-Detect	0.0565			Maximum Non-Detect			-2.874
1184												
1185	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			18
1186	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
1187	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
1188												
1189	**UCL Statistics**											
1190	**Normal Distribution Test with Detected Values Only**								**Lognormal Distribution Test with Detected Values Only**			
1191					Shapiro Wilk Test Statistic	0.797			Shapiro Wilk Test Statistic			0.77
1192					5% Shapiro Wilk Critical Value	0.842			5% Shapiro Wilk Critical Value			0.842
1193	**Data not Normal at 5% Significance Level**								**Data not Lognormal at 5% Significance Level**			
1194												
1195	**Assuming Normal Distribution**								**Assuming Lognormal Distribution**			
1196					DL/2 Substitution Method				DL/2 Substitution Method			
1197					Mean	0.00385			Mean			-6.057
1198					SD	0.00618			SD			0.941
1199					95% DL/2 (t) UCL	0.00639			95% H-Stat (DL/2) UCL			0.00965
1200												
1201					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1202	**MLE method failed to converge properly**								Mean in Log Scale			-6.353
1203									SD in Log Scale			0.834
1204									Mean in Original Scale			0.00229
1205									SD in Original Scale			0.00151
1206									95% Percentile Bootstrap UCL			0.00287
1207									95% BCA Bootstrap UCL			0.00291
1208												
1209	**Gamma Distribution Test with Detected Values Only**								**Data Distribution Test with Detected Values Only**			
1210					k star (bias corrected)	1.322			**Data do not follow a Discernable Distribution (0.05)**			
1211					Theta Star	0.00179						
1212					nu star	26.44						
1213												
1214					A-D Test Statistic	1.037			**Nonparametric Statistics**			
1215					5% A-D Critical Value	0.737			Kaplan-Meier (KM) Method			
1216					K-S Test Statistic	0.737			Mean			0.00236
1217					5% K-S Critical Value	0.27			SD			0.0014
1218	**Data not Gamma Distributed at 5% Significance Level**								SE of Mean			0.0004667
1219									95% KM (t) UCL			0.00317

1220	**Assuming Gamma Distribution**									95% KM (z) UCL	0.00313
1221	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL	0.00319
1222	Minimum	0.000375								95% KM (bootstrap t) UCL	0.00314
1223	Maximum	0.00418								95% KM (BCA) UCL	0.00316
1224	Mean	0.00237								95% KM (Percentile Bootstrap) UCL	0.00309
1225	Median	0.00244								95% KM (Chebyshev) UCL	0.0044
1226	SD	0.00134								97.5% KM (Chebyshev) UCL	0.00528
1227	k star	1.784								99% KM (Chebyshev) UCL	0.007
1228	Theta star	0.00133									
1229	Nu star	64.23								**Potential UCLs to Use**	
1230	AppChi2	46.79								95% KM (t) UCL	0.00317
1231	95% Gamma Approximate UCL	0.00325								95% KM (% Bootstrap) UCL	0.00309
1232	95% Adjusted Gamma UCL	0.00335									
1233	**Note: DL/2 is not a recommended method.**										
1234											
1235											
1236	**1,2,4-TCB (mg/kg)**										
1237											
1238	**General Statistics**										
1239	Number of Valid Samples	18								Number of Detected Data	8
1240	Number of Unique Samples	7								Number of Non-Detect Data	10
1241										Percent Non-Detects	55.56%
1242											
1243	**Raw Statistics**									**Log-transformed Statistics**	
1244	Minimum Detected	0.0003								Minimum Detected	-8.112
1245	Maximum Detected	0.25								Maximum Detected	-1.386
1246	Mean of Detected	0.0341								Mean of Detected	-5.373
1247	SD of Detected	0.0872								SD of Detected	1.842
1248	Minimum Non-Detect	0.005								Minimum Non-Detect	-5.298
1249	Maximum Non-Detect	0.005								Maximum Non-Detect	-5.298
1250											
1251											
1252	**UCL Statistics**										
1253	**Normal Distribution Test with Detected Values Only**									**Lognormal Distribution Test with Detected Values Only**	
1254	Shapiro Wilk Test Statistic	0.432								Shapiro Wilk Test Statistic	0.752
1255	5% Shapiro Wilk Critical Value	0.818								5% Shapiro Wilk Critical Value	0.818
1256	**Data not Normal at 5% Significance Level**									**Data not Lognormal at 5% Significance Level**	
1257											
1258	**Assuming Normal Distribution**									**Assuming Lognormal Distribution**	
1259	DL/2 Substitution Method									DL/2 Substitution Method	
1260	Mean	0.0166								Mean	-5.717
1261	SD	0.0583								SD	1.224
1262	95% DL/2 (t) UCL	0.0405								95% H-Stat (DL/2) UCL	0.0161
1263											
1264	Maximum Likelihood Estimate(MLE) Method	N/A								Log ROS Method	
1265	**MLE method failed to converge properly**									Mean in Log Scale	-5.607
1266										SD in Log Scale	1.515
1267										Mean in Original Scale	0.0184
1268										SD in Original Scale	0.058
1269										95% Percentile Bootstrap UCL	0.0452
1270										95% BCA Bootstrap UCL	0.0594
1271											
1272	**Gamma Distribution Test with Detected Values Only**									**Data Distribution Test with Detected Values Only**	

1273				k star (bias corrected)	0.295	**Data do not follow a Discernable Distribution (0.05)**						
1274				Theta Star	0.116							
1275				nu star	4.721							
1276												
1277				A-D Test Statistic	1.723	**Nonparametric Statistics**						
1278				5% A-D Critical Value	0.79	Kaplan-Meier (KM) Method						
1279				K-S Test Statistic	0.79	Mean	0.017					
1280				5% K-S Critical Value	0.315	SD	0.0565					
1281	**Data not Gamma Distributed at 5% Significance Level**					SE of Mean	0.0142					
1282						95% KM (t) UCL	0.0418					
1283	**Assuming Gamma Distribution**					95% KM (z) UCL	0.0404					
1284				Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0409					
1285				Minimum	0	95% KM (bootstrap t) UCL	1.205					
1286				Maximum	0.25	95% KM (BCA) UCL	0.0448					
1287				Mean	0.0338	95% KM (Percentile Bootstrap) UCL	0.0443					
1288				Median	0.00989	95% KM (Chebyshev) UCL	0.0791					
1289				SD	0.0581	97.5% KM (Chebyshev) UCL	0.106					
1290				k star	0.252	99% KM (Chebyshev) UCL	0.159					
1291				Theta star	0.134							
1292				Nu star	9.066	**Potential UCLs to Use**						
1293				AppChi2	3.367	97.5% KM (Chebyshev) UCL	0.106					
1294				95% Gamma Approximate UCL	0.0909							
1295				95% Adjusted Gamma UCL	0.101							
1296	**Note: DL/2 is not a recommended method.**											
1297												
1298												
1299	**1,3-DCB (mg/kg)**											
1300												
1301	**General Statistics**											
1302				Number of Valid Samples	18	Number of Detected Data	4					
1303				Number of Unique Samples	3	Number of Non-Detect Data	14					
1304						Percent Non-Detects	77.78%					
1305												
1306	**Raw Statistics**					**Log-transformed Statistics**						
1307				Minimum Detected	0.00365	Minimum Detected	-5.613					
1308				Maximum Detected	0.34	Maximum Detected	-1.079					
1309				Mean of Detected	0.0885	Mean of Detected	-4.303					
1310				SD of Detected	0.168	SD of Detected	2.156					
1311				Minimum Non-Detect	0.005	Minimum Non-Detect	-5.298					
1312				Maximum Non-Detect	0.005	Maximum Non-Detect	-5.298					
1313												
1314												
1315	**UCL Statistics**											
1316	**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**						
1317				Shapiro Wilk Test Statistic	0.634	Shapiro Wilk Test Statistic	0.696					
1318				5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748					
1319	**Data not Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**						
1320												
1321	**Assuming Normal Distribution**					**Assuming Lognormal Distribution**						
1322				DL/2 Substitution Method		DL/2 Substitution Method						
1323				Mean	0.0216	Mean	-5.616					
1324				SD	0.0795	SD	1.158					
1325				95% DL/2 (t) UCL	0.0542	95% H-Stat (DL/2) UCL	0.0116					

1326												
1327					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1328					**MLE yields a negative mean**						Mean in Log Scale	-5.884
1329											SD in Log Scale	1.586
1330											Mean in Original Scale	0.0219
1331											SD in Original Scale	0.0794
1332											95% Percentile Bootstrap UCL	0.0591
1333											95% BCA Bootstrap UCL	0.0788
1334												
1335					**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**	
1336					k star (bias corrected)	0.256					**Data do not follow a Discernable Distribution (0.05)**	
1337					Theta Star	0.346						
1338					nu star	2.047						
1339												
1340					A-D Test Statistic	0.852					**Nonparametric Statistics**	
1341					5% A-D Critical Value	0.698					Kaplan-Meier (KM) Method	
1342					K-S Test Statistic	0.698					Mean	0.0225
1343					5% K-S Critical Value	0.416					SD	0.077
1344					**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	0.021
1345											95% KM (t) UCL	0.059
1346					**Assuming Gamma Distribution**						95% KM (z) UCL	0.057
1347					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.054
1348					Minimum	0					95% KM (bootstrap t) UCL	4.094
1349					Maximum	0.34					95% KM (BCA) UCL	0.34
1350					Mean	0.0559					95% KM (Percentile Bootstrap) UCL	0.061
1351					Median	0.0052					95% KM (Chebyshev) UCL	0.114
1352					SD	0.086					97.5% KM (Chebyshev) UCL	0.153
1353					k star	0.131					99% KM (Chebyshev) UCL	0.231
1354					Theta star	0.426						
1355					Nu star	4.721					**Potential UCLs to Use**	
1356					AppChi2	1.025					99% KM (Chebyshev) UCL	0.231
1357					95% Gamma Approximate UCL	0.257						
1358					95% Adjusted Gamma UCL	N/A						
1359	**Note: DL/2 is not a recommended method.**											
1360												
1361												
1362	**1,4-DCB (mg/kg)**											
1363												
1364						**General Statistics**							
1365					Number of Valid Samples	18					Number of Detected Data	3
1366					Number of Unique Samples	3					Number of Non-Detect Data	15
1367											Percent Non-Detects	83.33%
1368												
1369					**Raw Statistics**						**Log-transformed Statistics**	
1370					Minimum Detected	0.00026					Minimum Detected	-8.255
1371					Maximum Detected	0.0293					Maximum Detected	-3.532
1372					Mean of Detected	0.0101					Mean of Detected	-6.332
1373					SD of Detected	0.0166					SD of Detected	2.481
1374					Minimum Non-Detect	0.005					Minimum Non-Detect	-5.298
1375					Maximum Non-Detect	0.005					Maximum Non-Detect	-5.298
1376												
1377												
1378						**UCL Statistics**							

1379	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1380	Shapiro Wilk Test Statistic				0.762		Shapiro Wilk Test Statistic					0.906
1381	5% Shapiro Wilk Critical Value				0.767		5% Shapiro Wilk Critical Value					0.767
1382	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1383												
1384	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1385	DL/2 Substitution Method						DL/2 Substitution Method					
1386	Mean				0.00376		Mean					-6.048
1387	SD				0.00639		SD					0.861
1388	95% DL/2 (t) UCL				0.00639		95% H-Stat (DL/2) UCL					0.00737
1389												
1390	Maximum Likelihood Estimate(MLE) Method				N/A		Log ROS Method					
1391	**MLE method failed to converge properly**						Mean in Log Scale					-7.487
1392							SD in Log Scale					1.774
1393							Mean in Original Scale					0.00268
1394							SD in Original Scale					0.00681
1395							95% Percentile Bootstrap UCL					0.00575
1396							95% BCA Bootstrap UCL					0.00764
1397												
1398	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1399	k star (bias corrected)				N/A		**Data appear Lognormal at 5% Significance Level**					
1400	Theta Star				N/A							
1401	nu star				N/A							
1402												
1403	A-D Test Statistic				0.443		**Nonparametric Statistics**					
1404	5% A-D Critical Value				N/A		Kaplan-Meier (KM) Method					
1405	K-S Test Statistic				N/A		Mean					0.0021
1406	5% K-S Critical Value				N/A		SD					0.00659
1407	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.00191
1408							95% KM (t) UCL					0.00542
1409	**Assuming Gamma Distribution**						95% KM (z) UCL					0.00524
1410	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.00493
1411	Minimum				N/A		95% KM (bootstrap t) UCL					0.0294
1412	Maximum				N/A		95% KM (BCA) UCL					0.0293
1413	Mean				N/A		95% KM (Percentile Bootstrap) UCL					0.0293
1414	Median				N/A		95% KM (Chebyshev) UCL					0.0104
1415	SD				N/A		97.5% KM (Chebyshev) UCL					0.014
1416	k star				N/A		99% KM (Chebyshev) UCL					0.0211
1417	Theta star				N/A							
1418	Nu star				N/A		**Potential UCLs to Use**					
1419	AppChi2				N/A		99% KM (Chebyshev) UCL					0.0211
1420	95% Gamma Approximate UCL				N/A							
1421	95% Adjusted Gamma UCL				N/A							
1422	**Note: DL/2 is not a recommended method.**											
1423												
1424												
1425	**2-Butanone (mg/kg)**											
1426												
1427	**General Statistics**											
1428	Number of Valid Samples				18		Number of Unique Samples					16
1429												
1430	**Raw Statistics**						**Log-transformed Statistics**					
1431	Minimum				0.0029		Minimum of Log Data					-5.843

1432					Maximum	0.04					Maximum of Log Data	-3.219
1433					Mean	0.0158					Mean of log Data	-4.394
1434					Median	0.0143					SD of log Data	0.753
1435					SD	0.011						
1436					Coefficient of Variation	0.697						
1437					Skewness	0.848						
1438												
1439	**Relevant UCL Statistics**											
1440	**Normal Distribution Test**						**Lognormal Distribution Test**					
1441					Shapiro Wilk Test Statistic	0.888					Shapiro Wilk Test Statistic	0.955
1442					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
1443	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1444												
1445	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1446					95% Student's-t UCL	0.0203					95% H-UCL	0.025
1447	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	0.0294
1448					95% Adjusted-CLT UCL	0.0207					97.5% Chebyshev (MVUE) UCL	0.0352
1449					95% Modified-t UCL	0.0204					99% Chebyshev (MVUE) UCL	0.0465
1450												
1451	**Gamma Distribution Test**						**Data Distribution**					
1452					k star (bias corrected)	1.845	**Data appear Gamma Distributed at 5% Significance Level**					
1453					Theta Star	0.00858						
1454					nu star	66.43						
1455					Approximate Chi Square Value (.05)	48.67	**Nonparametric Statistics**					
1456					Adjusted Level of Significance	0.0357					95% CLT UCL	0.0201
1457					Adjusted Chi Square Value	47.21					95% Jackknife UCL	0.0203
1458											95% Standard Bootstrap UCL	0.0199
1459					Anderson-Darling Test Statistic	0.436					95% Bootstrap-t UCL	0.0207
1460					Anderson-Darling 5% Critical Value	0.751					95% Hall's Bootstrap UCL	0.0202
1461					Kolmogorov-Smirnov Test Statistic	0.153					95% Percentile Bootstrap UCL	0.0202
1462					Kolmogorov-Smirnov 5% Critical Value	0.206					95% BCA Bootstrap UCL	0.0205
1463	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	0.0272
1464											97.5% Chebyshev(Mean, Sd) UCL	0.0321
1465	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	0.0417
1466					95% Approximate Gamma UCL	0.0216						
1467					95% Adjusted Gamma UCL	0.0223						
1468												
1469	**Potential UCL to Use**										Use 95% Approximate Gamma UCL	0.0216
1470												
1471												
1472	**Acetone (mg/kg)**											
1473												
1474	**General Statistics**											
1475					Number of Valid Samples	18					Number of Detected Data	14
1476					Number of Unique Samples	14					Number of Non-Detect Data	4
1477											Percent Non-Detects	22.22%
1478												
1479	**Raw Statistics**						**Log-transformed Statistics**					
1480					Minimum Detected	0.028					Minimum Detected	-3.576
1481					Maximum Detected	0.12					Maximum Detected	-2.12
1482					Mean of Detected	0.0623					Mean of Detected	-2.877
1483					SD of Detected	0.0289					SD of Detected	0.472
1484					Minimum Non-Detect	0.06					Minimum Non-Detect	-2.813

1485				Maximum Non-Detect	0.06					Maximum Non-Detect	-2.813	
1486												
1487												
1488	**UCL Statistics**											
1489	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1490				Shapiro Wilk Test Statistic	0.917					Shapiro Wilk Test Statistic	0.941	
1491				5% Shapiro Wilk Critical Value	0.874					5% Shapiro Wilk Critical Value	0.874	
1492	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1493												
1494	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1495				DL/2 Substitution Method						DL/2 Substitution Method		
1496				Mean	0.0551					Mean	-3.017	
1497				SD	0.0288					SD	0.493	
1498				95% DL/2 (t) UCL	0.0669					95% H-Stat (DL/2) UCL	0.0759	
1499												
1500				Maximum Likelihood Estimate(MLE) Method						Log ROS Method		
1501				Mean	0.0922					Mean in Log Scale	-2.948	
1502				SD	0.0151					SD in Log Scale	0.448	
1503				95% MLE (t) UCL	0.0984					Mean in Original Scale	0.0578	
1504				95% MLE (Tiku) UCL	0.103					SD in Original Scale	0.0271	
1505										95% Percentile Bootstrap UCL	0.0687	
1506										95% BCA Bootstrap UCL	0.0704	
1507												
1508	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1509				k star (bias corrected)	4.04		**Data appear Normal at 5% Significance Level**					
1510				Theta Star	0.0154							
1511				nu star	113.1							
1512												
1513				A-D Test Statistic	0.404		**Nonparametric Statistics**					
1514				5% A-D Critical Value	0.738					Kaplan-Meier (KM) Method		
1515				K-S Test Statistic	0.738					Mean	0.0575	
1516				5% K-S Critical Value	0.229					SD	0.0265	
1517	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean	0.0066	
1518										95% KM (t) UCL	0.069	
1519	**Assuming Gamma Distribution**									95% KM (z) UCL	0.0683	
1520				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0689	
1521				Minimum	0.028					95% KM (bootstrap t) UCL	0.071	
1522				Maximum	0.12					95% KM (BCA) UCL	0.0686	
1523				Mean	0.0615					95% KM (Percentile Bootstrap) UCL	0.0683	
1524				Median	0.0534					95% KM (Chebyshev) UCL	0.0863	
1525				SD	0.0261					97.5% KM (Chebyshev) UCL	0.0987	
1526				k star	5.023					99% KM (Chebyshev) UCL	0.123	
1527				Theta star	0.0122							
1528				Nu star	180.8		**Potential UCLs to Use**					
1529				AppChi2	150.7					95% KM (t) UCL	0.069	
1530				95% Gamma Approximate UCL	0.0738					95% KM (Percentile Bootstrap) UCL	0.0683	
1531				95% Adjusted Gamma UCL	0.0751							
1532	**Note: DL/2 is not a recommended method.**											
1533												
1534												
1535	**Benzene (mg/kg)**											
1536												
1537	**General Statistics**											

1538					Number of Valid Samples	18					Number of Detected Data	17
1539					Number of Unique Samples	16					Number of Non-Detect Data	1
1540											Percent Non-Detects	5.56%
1541												
1542					**Raw Statistics**						**Log-transformed Statistics**	
1543					Minimum Detected	0.00026					Minimum Detected	-8.255
1544					Maximum Detected	0.012					Maximum Detected	-4.423
1545					Mean of Detected	0.00179					Mean of Detected	-6.829
1546					SD of Detected	0.00274					SD of Detected	0.909
1547					Minimum Non-Detect	0.005					Minimum Non-Detect	-5.298
1548					Maximum Non-Detect	0.005					Maximum Non-Detect	-5.298
1549												
1550												
1551					**UCL Statistics**							
1552					**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**	
1553					Shapiro Wilk Test Statistic	0.499					Shapiro Wilk Test Statistic	0.94
1554					5% Shapiro Wilk Critical Value	0.892					5% Shapiro Wilk Critical Value	0.892
1555					**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
1556												
1557					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
1558					DL/2 Substitution Method						DL/2 Substitution Method	
1559					Mean	0.00183					Mean	-6.783
1560					SD	0.00267					SD	0.904
1561					95% DL/2 (t) UCL	0.00292					95% H-Stat (DL/2) UCL	0.00361
1562												
1563					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1564					**MLE method failed to converge properly**						Mean in Log Scale	-6.834
1565											SD in Log Scale	0.882
1566											Mean in Original Scale	0.00175
1567											SD in Original Scale	0.00267
1568											95% Percentile Bootstrap UCL	0.00287
1569											95% BCA Bootstrap UCL	0.00351
1570												
1571					**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**	
1572					k star (bias corrected)	0.97					**Data appear Lognormal at 5% Significance Level**	
1573					Theta Star	0.00185						
1574					nu star	32.99						
1575												
1576					A-D Test Statistic	1.101					**Nonparametric Statistics**	
1577					5% A-D Critical Value	0.763					Kaplan-Meier (KM) Method	
1578					K-S Test Statistic	0.763					Mean	0.00175
1579					5% K-S Critical Value	0.215					SD	0.0026
1580					**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	0.0006325
1581											95% KM (t) UCL	0.00285
1582					**Assuming Gamma Distribution**						95% KM (z) UCL	0.00279
1583					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.00285
1584					Minimum	0.00026					95% KM (bootstrap t) UCL	0.00522
1585					Maximum	0.012					95% KM (BCA) UCL	0.00293
1586					Mean	0.00179					95% KM (Percentile Bootstrap) UCL	0.00295
1587					Median	0.0011					95% KM (Chebyshev) UCL	0.00451
1588					SD	0.00266					97.5% KM (Chebyshev) UCL	0.0057
1589					k star	1.029					99% KM (Chebyshev) UCL	0.00805
1590					Theta star	0.00174						

1591					Nu star	37.04	**Potential UCLs to Use**					
1592					AppChi2	24.11					95% KM (Chebyshev) UCL	0.00451
1593					95% Gamma Approximate UCL	0.00275						
1594					95% Adjusted Gamma UCL	0.00287						
1595	**Note: DL/2 is not a recommended method.**											
1596												
1597												
1598	**DEHP (mg/kg)**											
1599												
1600	**General Statistics**											
1601					Number of Valid Samples	18					Number of Unique Samples	15
1602												
1603	**Raw Statistics**						**Log-transformed Statistics**					
1604					Minimum	0.01					Minimum of Log Data	-4.605
1605					Maximum	0.46					Maximum of Log Data	-0.777
1606					Mean	0.0597					Mean of log Data	-3.531
1607					Median	0.0208					SD of log Data	0.968
1608					SD	0.113						
1609					Coefficient of Variation	1.885						
1610					Skewness	3.203						
1611												
1612	**Relevant UCL Statistics**											
1613	**Normal Distribution Test**						**Lognormal Distribution Test**					
1614					Shapiro Wilk Test Statistic	0.448					Shapiro Wilk Test Statistic	0.73
1615					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
1616	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1617												
1618	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1619					95% Student's-t UCL	0.106					95% H-UCL	0.0862
1620	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	0.0947
1621					95% Adjusted-CLT UCL	0.125					97.5% Chebyshev (MVUE) UCL	0.116
1622					95% Modified-t UCL	0.109					99% Chebyshev (MVUE) UCL	0.158
1623												
1624	**Gamma Distribution Test**						**Data Distribution**					
1625					k star (bias corrected)	0.728	**Data do not follow a Discernable Distribution (0.05)**					
1626					Theta Star	0.0821						
1627					nu star	26.2						
1628					Approximate Chi Square Value (.05)	15.53	**Nonparametric Statistics**					
1629					Adjusted Level of Significance	0.0357					95% CLT UCL	0.103
1630					Adjusted Chi Square Value	14.75					95% Jackknife UCL	0.106
1631											95% Standard Bootstrap UCL	0.103
1632					Anderson-Darling Test Statistic	3.115					95% Bootstrap-t UCL	0.482
1633					Anderson-Darling 5% Critical Value	0.774					95% Hall's Bootstrap UCL	0.326
1634					Kolmogorov-Smirnov Test Statistic	0.332					95% Percentile Bootstrap UCL	0.108
1635					Kolmogorov-Smirnov 5% Critical Value	0.211					95% BCA Bootstrap UCL	0.131
1636	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	0.175
1637											97.5% Chebyshev(Mean, Sd) UCL	0.225
1638	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	0.324
1639					95% Approximate Gamma UCL	0.101						
1640					95% Adjusted Gamma UCL	0.106						
1641												
1642	**Potential UCL to Use**										Use 95% Chebyshev (Mean, Sd) UCL	0.175
1643												

1644												
1645	**Bromomethane (mg/kg)**											
1646												
1647						**General Statistics**						
1648					Number of Valid Samples	18			Number of Detected Data		11	
1649					Number of Unique Samples	7			Number of Non-Detect Data		7	
1650									Percent Non-Detects		38.89%	
1651												
1652					**Raw Statistics**				**Log-transformed Statistics**			
1653					Minimum Detected	0.0015			Minimum Detected		-6.502	
1654					Maximum Detected	0.0021			Maximum Detected		-6.166	
1655					Mean of Detected	0.00181			Mean of Detected		-6.317	
1656					SD of Detected	0.0001872			SD of Detected		0.104	
1657					Minimum Non-Detect	0.005			Minimum Non-Detect		-5.298	
1658					Maximum Non-Detect	0.005			Maximum Non-Detect		-5.298	
1659												
1660												
1661					**UCL Statistics**							
1662					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1663					Shapiro Wilk Test Statistic	0.957			Shapiro Wilk Test Statistic		0.96	
1664					5% Shapiro Wilk Critical Value	0.85			5% Shapiro Wilk Critical Value		0.85	
1665					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1666												
1667					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1668					DL/2 Substitution Method				DL/2 Substitution Method			
1669					Mean	0.00208			Mean		-6.191	
1670					SD	0.000373			SD		0.182	
1671					95% DL/2 (t) UCL	0.00223			95% H-Stat (DL/2) UCL		0.00334	
1672												
1673					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1674					**MLE method failed to converge properly**				Mean in Log Scale		-6.317	
1675									SD in Log Scale		0.0979	
1676									Mean in Original Scale		0.00181	
1677									SD in Original Scale		0.0001769	
1678									95% Percentile Bootstrap UCL		0.00188	
1679									95% BCA Bootstrap UCL		0.00188	
1680												
1681					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1682					k star (bias corrected)	74.8			**Data appear Normal at 5% Significance Level**			
1683					Theta Star	2.425E-05						
1684					nu star	1646						
1685												
1686					A-D Test Statistic	0.238			**Nonparametric Statistics**			
1687					5% A-D Critical Value	0.726			Kaplan-Meier (KM) Method			
1688					K-S Test Statistic	0.726			Mean		0.00181	
1689					5% K-S Critical Value	0.254			SD		0.0001785	
1690					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean		5.644E-05	
1691									95% KM (t) UCL		0.00191	
1692					**Assuming Gamma Distribution**				95% KM (z) UCL		0.00191	
1693					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL		0.00191	
1694					Minimum	0.0015			95% KM (bootstrap t) UCL		0.00192	
1695					Maximum	0.0021			95% KM (BCA) UCL		0.00191	
1696					Mean	0.00182			95% KM (Percentile Bootstrap) UCL		0.0019	

1697					Median	0.00183				95% KM (Chebyshev) UCL		0.00206
1698					SD	0.0001745				97.5% KM (Chebyshev) UCL		0.00217
1699					k star	93.99				99% KM (Chebyshev) UCL		0.00238
1700					Theta star	1.932E-05						
1701					Nu star	3384				**Potential UCLs to Use**		
1702					AppChi2	3249				95% KM (t) UCL		0.00191
1703				95% Gamma Approximate UCL		0.00189				95% KM (Percentile Bootstrap) UCL		0.0019
1704				95% Adjusted Gamma UCL		0.0019						
1705	**Note: DL/2 is not a recommended method.**											
1706												
1707												
1708	**CS2 (mg/kg)**											
1709												
1710	**General Statistics**											
1711					Number of Valid Samples	18				Number of Detected Data		15
1712					Number of Unique Samples	14				Number of Non-Detect Data		3
1713										Percent Non-Detects		16.67%
1714												
1715	**Raw Statistics**						**Log-transformed Statistics**					
1716					Minimum Detected	0.00096				Minimum Detected		-6.949
1717					Maximum Detected	0.017				Maximum Detected		-4.075
1718					Mean of Detected	0.00457				Mean of Detected		-5.799
1719					SD of Detected	0.00442				SD of Detected		0.952
1720					Minimum Non-Detect	0.005				Minimum Non-Detect		-5.298
1721					Maximum Non-Detect	0.005				Maximum Non-Detect		-5.298
1722												
1723												
1724	**UCL Statistics**											
1725	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1726					Shapiro Wilk Test Statistic	0.801				Shapiro Wilk Test Statistic		0.909
1727					5% Shapiro Wilk Critical Value	0.881				5% Shapiro Wilk Critical Value		0.881
1728	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1729												
1730	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1731					DL/2 Substitution Method					DL/2 Substitution Method		
1732					Mean	0.00423				Mean		-5.831
1733					SD	0.00409				SD		0.867
1734					95% DL/2 (t) UCL	0.00591				95% H-Stat (DL/2) UCL		0.00772
1735												
1736					Maximum Likelihood Estimate(MLE) Method					Log ROS Method		
1737					Mean	0.00198				Mean in Log Scale		-5.896
1738					SD	0.00635				SD in Log Scale		0.907
1739					95% MLE (t) UCL	0.00458				Mean in Original Scale		0.00412
1740					95% MLE (Tiku) UCL	0.00621				SD in Original Scale		0.00416
1741										95% Percentile Bootstrap UCL		0.00578
1742										95% BCA Bootstrap UCL		0.00632
1743												
1744	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1745					k star (bias corrected)	1.13	**Data appear Gamma Distributed at 5% Significance Level**					
1746					Theta Star	0.00405						
1747					nu star	33.9						
1748												
1749					A-D Test Statistic	0.55	**Nonparametric Statistics**					

1750				5% A-D Critical Value	0.756					Kaplan-Meier (KM) Method		
1751				K-S Test Statistic	0.756					Mean	0.00413	
1752				5% K-S Critical Value	0.226					SD	0.00405	
1753				**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean	0.0009978	
1754										95% KM (t) UCL	0.00586	
1755				**Assuming Gamma Distribution**						95% KM (z) UCL	0.00577	
1756				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.00586	
1757				Minimum	0.0009199					95% KM (bootstrap t) UCL	0.00677	
1758				Maximum	0.017					95% KM (BCA) UCL	0.00573	
1759				Mean	0.00438					95% KM (Percentile Bootstrap) UCL	0.00589	
1760				Median	0.00351					95% KM (Chebyshev) UCL	0.00848	
1761				SD	0.00412					97.5% KM (Chebyshev) UCL	0.0104	
1762				k star	1.223					99% KM (Chebyshev) UCL	0.0141	
1763				Theta star	0.00358							
1764				Nu star	44.03					**Potential UCLs to Use**		
1765				AppChi2	29.82					95% KM (BCA) UCL	0.00573	
1766				95% Gamma Approximate UCL	0.00646							
1767				95% Adjusted Gamma UCL	0.00671							
1768	**Note: DL/2 is not a recommended method.**											
1769												
1770												
1771	**Cyclohexane (mg/kg)**											
1772												
1773					**General Statistics**							
1774				Number of Valid Samples	18					Number of Detected Data	9	
1775				Number of Unique Samples	8					Number of Non-Detect Data	9	
1776										Percent Non-Detects	50.00%	
1777												
1778				**Raw Statistics**						**Log-transformed Statistics**		
1779				Minimum Detected	0.00065					Minimum Detected	-7.339	
1780				Maximum Detected	0.023					Maximum Detected	-3.772	
1781				Mean of Detected	0.00435					Mean of Detected	-6.101	
1782				SD of Detected	0.00712					SD of Detected	1.061	
1783				Minimum Non-Detect	0.01					Minimum Non-Detect	-4.605	
1784				Maximum Non-Detect	0.01					Maximum Non-Detect	-4.605	
1785												
1786												
1787					**UCL Statistics**							
1788				**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**		
1789				Shapiro Wilk Test Statistic	0.546					Shapiro Wilk Test Statistic	0.893	
1790				5% Shapiro Wilk Critical Value	0.829					5% Shapiro Wilk Critical Value	0.829	
1791				**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**		
1792												
1793				**Assuming Normal Distribution**						**Assuming Lognormal Distribution**		
1794				DL/2 Substitution Method						DL/2 Substitution Method		
1795				Mean	0.00468					Mean	-5.7	
1796				SD	0.00489					SD	0.837	
1797				95% DL/2 (t) UCL	0.00668					95% H-Stat (DL/2) UCL	0.012	
1798												
1799				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
1800				**MLE method failed to converge properly**						Mean in Log Scale	-6.22	
1801										SD in Log Scale	0.923	
1802										Mean in Original Scale	0.00333	

1803											SD in Original Scale	0.00514
1804											95% Percentile Bootstrap UCL	0.0056
1805											95% BCA Bootstrap UCL	0.00695
1806												
1807	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1808					k star (bias corrected)	0.663	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
1809					Theta Star	0.00656						
1810					nu star	11.94						
1811												
1812					A-D Test Statistic	0.94	**Nonparametric Statistics**					
1813					5% A-D Critical Value	0.747					Kaplan-Meier (KM) Method	
1814					K-S Test Statistic	0.747					Mean	0.00318
1815					5% K-S Critical Value	0.288					SD	0.00497
1816	**Data follow Appr. Gamma Distribution at 5% Significance Level**										SE of Mean	0.00129
1817											95% KM (t) UCL	0.00542
1818	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0053
1819					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.00538
1820					Minimum	0.00065					95% KM (bootstrap t) UCL	0.0105
1821					Maximum	0.023					95% KM (BCA) UCL	0.0057
1822					Mean	0.00423					95% KM (Percentile Bootstrap) UCL	0.00544
1823					Median	0.00308					95% KM (Chebyshev) UCL	0.0088
1824					SD	0.00502					97.5% KM (Chebyshev) UCL	0.0112
1825					k star	1.249					99% KM (Chebyshev) UCL	0.016
1826					Theta star	0.00339						
1827					Nu star	44.96	**Potential UCLs to Use**					
1828					AppChi2	30.58					95% KM (t) UCL	0.00542
1829					95% Gamma Approximate UCL	0.00622						
1830					95% Adjusted Gamma UCL	0.00646						
1831	**Note: DL/2 is not a recommended method.**											
1832												
1833												
1834	**DEP (mg/kg)**											
1835												
1836	**General Statistics**											
1837					Number of Valid Samples	18					Number of Detected Data	6
1838					Number of Unique Samples	5					Number of Non-Detect Data	12
1839											Percent Non-Detects	66.67%
1840												
1841	**Raw Statistics**						**Log-transformed Statistics**					
1842					Minimum Detected	0.013					Minimum Detected	-4.343
1843					Maximum Detected	0.0495					Maximum Detected	-3.006
1844					Mean of Detected	0.0243					Mean of Detected	-3.857
1845					SD of Detected	0.0147					SD of Detected	0.561
1846					Minimum Non-Detect	0.17					Minimum Non-Detect	-1.772
1847					Maximum Non-Detect	0.17					Maximum Non-Detect	-1.772
1848												
1849												
1850	**UCL Statistics**											
1851	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1852					Shapiro Wilk Test Statistic	0.831					Shapiro Wilk Test Statistic	0.863
1853					5% Shapiro Wilk Critical Value	0.788					5% Shapiro Wilk Critical Value	0.788
1854	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1855												

1856	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1857				DL/2 Substitution Method						DL/2 Substitution Method		
1858				Mean	0.0648					Mean	-2.929	
1859				SD	0.0305					SD	0.741	
1860				95% DL/2 (t) UCL	0.0773					95% H-Stat (DL/2) UCL	0.195	
1861												
1862				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
1863	**MLE method failed to converge properly**									Mean in Log Scale	-3.857	
1864										SD in Log Scale	0.558	
1865										Mean in Original Scale	0.0245	
1866										SD in Original Scale	0.014	
1867										95% Percentile Bootstrap UCL	0.0303	
1868										95% BCA Bootstrap UCL	0.031	
1869												
1870	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1871				k star (bias corrected)	2.003		**Data appear Normal at 5% Significance Level**					
1872				Theta Star	0.0121							
1873				nu star	24.04							
1874												
1875				A-D Test Statistic	0.487		**Nonparametric Statistics**					
1876				5% A-D Critical Value	0.7					Kaplan-Meier (KM) Method		
1877				K-S Test Statistic	0.7					Mean	0.0243	
1878				5% K-S Critical Value	0.334					SD	0.0134	
1879	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean	0.00598	
1880										95% KM (t) UCL	0.0347	
1881	**Assuming Gamma Distribution**									95% KM (z) UCL	0.0341	
1882				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0353	
1883				Minimum	0					95% KM (bootstrap t) UCL	0.0516	
1884				Maximum	0.0495					95% KM (BCA) UCL	0.0337	
1885				Mean	0.0241					95% KM (Percentile Bootstrap) UCL	0.0346	
1886				Median	0.0234					95% KM (Chebyshev) UCL	0.0503	
1887				SD	0.0135					97.5% KM (Chebyshev) UCL	0.0616	
1888				k star	0.543					99% KM (Chebyshev) UCL	0.0838	
1889				Theta star	0.0443							
1890				Nu star	19.55		**Potential UCLs to Use**					
1891				AppChi2	10.52					95% KM (t) UCL	0.0347	
1892				95% Gamma Approximate UCL	0.0447					95% KM (Percentile Bootstrap) UCL	0.0346	
1893				95% Adjusted Gamma UCL	0.0476							
1894	**Note: DL/2 is not a recommended method.**											
1895												
1896												
1897	**DNBP (mg/kg)**											
1898												
1899	**General Statistics**											
1900				Number of Valid Samples	18					Number of Unique Samples	14	
1901												
1902	**Raw Statistics**						**Log-transformed Statistics**					
1903				Minimum	0.019					Minimum of Log Data	-3.963	
1904				Maximum	0.4					Maximum of Log Data	-0.916	
1905				Mean	0.0958					Mean of log Data	-2.886	
1906				Median	0.047					SD of log Data	0.933	
1907				SD	0.129							
1908				Coefficient of Variation	1.342							

1909					Skewness	1.973						
1910												
1911	**Relevant UCL Statistics**											
1912	**Normal Distribution Test**						**Lognormal Distribution Test**					
1913					Shapiro Wilk Test Statistic	0.564					Shapiro Wilk Test Statistic	0.786
1914					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
1915	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1916												
1917	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1918					95% Student's-t UCL	0.148					95% H-UCL	0.154
1919	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	0.171
1920					95% Adjusted-CLT UCL	0.161					97.5% Chebyshev (MVUE) UCL	0.209
1921					95% Modified-t UCL	0.151					99% Chebyshev (MVUE) UCL	0.284
1922												
1923	**Gamma Distribution Test**						**Data Distribution**					
1924					k star (bias corrected)	0.921	**Data do not follow a Discernable Distribution (0.05)**					
1925					Theta Star	0.104						
1926					nu star	33.17						
1927					Approximate Chi Square Value (.05)	21	**Nonparametric Statistics**					
1928					Adjusted Level of Significance	0.0357					95% CLT UCL	0.146
1929					Adjusted Chi Square Value	20.07					95% Jackknife UCL	0.148
1930											95% Standard Bootstrap UCL	0.144
1931					Anderson-Darling Test Statistic	2.509					95% Bootstrap-t UCL	0.174
1932					Anderson-Darling 5% Critical Value	0.765					95% Hall's Bootstrap UCL	0.132
1933					Kolmogorov-Smirnov Test Statistic	0.36					95% Percentile Bootstrap UCL	0.148
1934					Kolmogorov-Smirnov 5% Critical Value	0.209					95% BCA Bootstrap UCL	0.156
1935	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	0.228
1936											97.5% Chebyshev(Mean, Sd) UCL	0.285
1937	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	0.397
1938					95% Approximate Gamma UCL	0.151						
1939					95% Adjusted Gamma UCL	0.158						
1940												
1941	**Potential UCL to Use**										Use 95% Chebyshev (Mean, Sd) UCL	0.228
1942												
1943												
1944	**Ethylbenzene (mg/kg)**											
1945												
1946	**General Statistics**											
1947					Number of Valid Samples	18					Number of Detected Data	5
1948					Number of Unique Samples	5					Number of Non-Detect Data	13
1949											Percent Non-Detects	72.22%
1950												
1951	**Raw Statistics**						**Log-transformed Statistics**					
1952					Minimum Detected	0.00015					Minimum Detected	-8.805
1953					Maximum Detected	0.0017					Maximum Detected	-6.377
1954					Mean of Detected	0.000747					Mean of Detected	-7.679
1955					SD of Detected	0.0007367					SD of Detected	1.124
1956					Minimum Non-Detect	0.005					Minimum Non-Detect	-5.298
1957					Maximum Non-Detect	0.005					Maximum Non-Detect	-5.298
1958												
1959												
1960	**UCL Statistics**											
1961	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					

1962					Shapiro Wilk Test Statistic	0.798					Shapiro Wilk Test Statistic	0.856
1963					5% Shapiro Wilk Critical Value	0.762					5% Shapiro Wilk Critical Value	0.762
1964	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1965												
1966	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1967					DL/2 Substitution Method						DL/2 Substitution Method	
1968					Mean	0.00201					Mean	-6.46
1969					SD	0.0008834					SD	0.95
1970					95% DL/2 (t) UCL	0.00238					95% H-Stat (DL/2) UCL	0.0107
1971												
1972					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1973	**MLE method failed to converge properly**										Mean in Log Scale	-7.679
1974											SD in Log Scale	1.157
1975											Mean in Original Scale	0.0008323
1976											SD in Original Scale	0.000944
1977											95% Percentile Bootstrap UCL	0.0012
1978											95% BCA Bootstrap UCL	0.00131
1979												
1980	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1981					k star (bias corrected)	0.606	**Data appear Normal at 5% Significance Level**					
1982					Theta Star	0.00123						
1983					nu star	6.063						
1984												
1985					A-D Test Statistic	0.537	**Nonparametric Statistics**					
1986					5% A-D Critical Value	0.69	Kaplan-Meier (KM) Method					
1987					K-S Test Statistic	0.69					Mean	0.000747
1988					5% K-S Critical Value	0.363					SD	0.0006589
1989	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0003294
1990											95% KM (t) UCL	0.00132
1991	**Assuming Gamma Distribution**										95% KM (z) UCL	0.00129
1992					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.00137
1993					Minimum	0					95% KM (bootstrap t) UCL	0.00556
1994					Maximum	0.00209					95% KM (BCA) UCL	0.0013
1995					Mean	0.0007783					95% KM (Percentile Bootstrap) UCL	0.00127
1996					Median	0.0005576					95% KM (Chebyshev) UCL	0.00218
1997					SD	0.000702					97.5% KM (Chebyshev) UCL	0.0028
1998					k star	0.345					99% KM (Chebyshev) UCL	0.00402
1999					Theta star	0.00226						
2000					Nu star	12.42	**Potential UCLs to Use**					
2001					AppChi2	5.502					95% KM (t) UCL	0.00132
2002					95% Gamma Approximate UCL	0.00176					95% KM (Percentile Bootstrap) UCL	0.00127
2003					95% Adjusted Gamma UCL	0.00191						
2004	**Note: DL/2 is not a recommended method.**											
2005												
2006												
2007	**Fluoranthene (mg/kg)**											
2008												
2009					**General Statistics**							
2010					Number of Valid Samples	18					Number of Detected Data	4
2011					Number of Unique Samples	4					Number of Non-Detect Data	14
2012											Percent Non-Detects	77.78%
2013												
2014	**Raw Statistics**						**Log-transformed Statistics**					

2015				Minimum Detected	0.005					Minimum Detected	-5.298	
2016				Maximum Detected	0.033					Maximum Detected	-3.411	
2017				Mean of Detected	0.0132					Mean of Detected	-4.632	
2018				SD of Detected	0.0133					SD of Detected	0.841	
2019				Minimum Non-Detect	0.021					Minimum Non-Detect	-3.863	
2020				Maximum Non-Detect	0.021					Maximum Non-Detect	-3.863	
2021												
2022												
2023	**UCL Statistics**											
2024	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2025				Shapiro Wilk Test Statistic	0.727					Shapiro Wilk Test Statistic	0.848	
2026				5% Shapiro Wilk Critical Value	0.748					5% Shapiro Wilk Critical Value	0.748	
2027	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2028												
2029	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2030				DL/2 Substitution Method						DL/2 Substitution Method		
2031				Mean	0.0111					Mean	-4.573	
2032				SD	0.00569					SD	0.355	
2033				95% DL/2 (t) UCL	0.0134					95% H-Stat (DL/2) UCL	0.0136	
2034												
2035				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
2036	**MLE method failed to converge properly**									Mean in Log Scale	-4.925	
2037										SD in Log Scale	0.639	
2038										Mean in Original Scale	0.00897	
2039										SD in Original Scale	0.00712	
2040										95% Percentile Bootstrap UCL	0.0119	
2041										95% BCA Bootstrap UCL	0.013	
2042												
2043	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2044				k star (bias corrected)	0.612		**Data appear Gamma Distributed at 5% Significance Level**					
2045				Theta Star	0.0216							
2046				nu star	4.898							
2047												
2048				A-D Test Statistic	0.567		**Nonparametric Statistics**					
2049				5% A-D Critical Value	0.661					Kaplan-Meier (KM) Method		
2050				K-S Test Statistic	0.661					Mean	0.0081	
2051				5% K-S Critical Value	0.399					SD	0.00619	
2052	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean	0.00187	
2053										95% KM (t) UCL	0.0114	
2054	**Assuming Gamma Distribution**									95% KM (z) UCL	0.0112	
2055				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0113	
2056				Minimum	0					95% KM (bootstrap t) UCL	0.0139	
2057				Maximum	0.033					95% KM (BCA) UCL	0.0122	
2058				Mean	0.0113					95% KM (Percentile Bootstrap) UCL	0.0117	
2059				Median	0.00985					95% KM (Chebyshev) UCL	0.0162	
2060				SD	0.00841					97.5% KM (Chebyshev) UCL	0.0198	
2061				k star	0.335					99% KM (Chebyshev) UCL	0.0267	
2062				Theta star	0.0337							
2063				Nu star	12.05		**Potential UCLs to Use**					
2064				AppChi2	5.258					95% KM (t) UCL	0.0114	
2065				95% Gamma Approximate UCL	0.0258							
2066				95% Adjusted Gamma UCL	N/A							
2067	**Note: DL/2 is not a recommended method.**											

	A	B	C	D	E	F	G	H	I	J	K	L
2068												
2069												
2070	**Isopropylbenzene (mg/kg)**											
2071												
2072	**General Statistics**											
2073	Number of Valid Samples					18	Number of Detected Data					3
2074	Number of Unique Samples					3	Number of Non-Detect Data					15
2075							Percent Non-Detects					83.33%
2076												
2077	**Raw Statistics**						**Log-transformed Statistics**					
2078	Minimum Detected					0.00023	Minimum Detected					-8.377
2079	Maximum Detected					0.00145	Maximum Detected					-6.536
2080	Mean of Detected					0.0007	Mean of Detected					-7.563
2081	SD of Detected					0.0006564	SD of Detected					0.939
2082	Minimum Non-Detect					0.005	Minimum Non-Detect					-5.298
2083	Maximum Non-Detect					0.005	Maximum Non-Detect					-5.298
2084												
2085												
2086	**UCL Statistics**											
2087	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2088	Shapiro Wilk Test Statistic					0.864	Shapiro Wilk Test Statistic					0.962
2089	5% Shapiro Wilk Critical Value					0.767	5% Shapiro Wilk Critical Value					0.767
2090	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2091												
2092	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2093	DL/2 Substitution Method						DL/2 Substitution Method					
2094	Mean					0.0022	Mean					-6.253
2095	SD					0.0007261	SD					0.683
2096	95% DL/2 (t) UCL					0.0025	95% H-Stat (DL/2) UCL					0.00617
2097												
2098	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
2099	**MLE method failed to converge properly**						Mean in Log Scale					-7.563
2100							SD in Log Scale					1.123
2101							Mean in Original Scale					0.0009107
2102							SD in Original Scale					0.00106
2103							95% Percentile Bootstrap UCL					0.00131
2104							95% BCA Bootstrap UCL					0.00142
2105												
2106	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2107	k star (bias corrected)					N/A	**Data appear Normal at 5% Significance Level**					
2108	Theta Star					N/A						
2109	nu star					N/A						
2110												
2111	A-D Test Statistic					0.342	**Nonparametric Statistics**					
2112	5% A-D Critical Value					N/A	Kaplan-Meier (KM) Method					
2113	K-S Test Statistic					N/A	Mean					0.0007
2114	5% K-S Critical Value					N/A	SD					0.000536
2115	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.000379
2116							95% KM (t) UCL					0.00136
2117	**Assuming Gamma Distribution**						95% KM (z) UCL					0.00132
2118	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.00148
2119	Minimum					N/A	95% KM (bootstrap t) UCL					0.00407
2120	Maximum					N/A	95% KM (BCA) UCL					0.00145

2121					Mean	N/A				95% KM (Percentile Bootstrap) UCL		0.00145
2122					Median	N/A				95% KM (Chebyshev) UCL		0.00235
2123					SD	N/A				97.5% KM (Chebyshev) UCL		0.00307
2124					k star	N/A				99% KM (Chebyshev) UCL		0.00447
2125					Theta star	N/A						
2126					Nu star	N/A				**Potential UCLs to Use**		
2127					AppChi2	N/A				95% KM (t) UCL		0.00136
2128					95% Gamma Approximate UCL	N/A				95% KM (Percentile Bootstrap) UCL		0.00145
2129					95% Adjusted Gamma UCL	N/A						
2130	**Note: DL/2 is not a recommended method.**											
2131												
2132												
2133	**Methyl acetate (mg/kg)**											
2134												
2135						**General Statistics**						
2136					Number of Valid Samples	18				Number of Detected Data		6
2137					Number of Unique Samples	6				Number of Non-Detect Data		12
2138										Percent Non-Detects		66.67%
2139												
2140					**Raw Statistics**					**Log-transformed Statistics**		
2141					Minimum Detected	0.00055				Minimum Detected		-7.506
2142					Maximum Detected	0.005				Maximum Detected		-5.298
2143					Mean of Detected	0.00188				Mean of Detected		-6.597
2144					SD of Detected	0.00173				SD of Detected		0.858
2145					Minimum Non-Detect	0.01				Minimum Non-Detect		-4.605
2146					Maximum Non-Detect	0.01				Maximum Non-Detect		-4.605
2147												
2148												
2149						**UCL Statistics**						
2150					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
2151					Shapiro Wilk Test Statistic	0.816				Shapiro Wilk Test Statistic		0.933
2152					5% Shapiro Wilk Critical Value	0.788				5% Shapiro Wilk Critical Value		0.788
2153					**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
2154												
2155					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
2156					DL/2 Substitution Method					DL/2 Substitution Method		
2157					Mean	0.00396				Mean		-5.731
2158					SD	0.00178				SD		0.783
2159					95% DL/2 (t) UCL	0.00469				95% H-Stat (DL/2) UCL		0.0139
2160												
2161					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
2162					**MLE method failed to converge properly**					Mean in Log Scale		-6.597
2163										SD in Log Scale		0.874
2164										Mean in Original Scale		0.00194
2165										SD in Original Scale		0.00172
2166										95% Percentile Bootstrap UCL		0.00262
2167										95% BCA Bootstrap UCL		0.00271
2168												
2169					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
2170					k star (bias corrected)	0.963				**Data appear Normal at 5% Significance Level**		
2171					Theta Star	0.00195						
2172					nu star	11.56						
2173												

2174				A-D Test Statistic	0.369		**Nonparametric Statistics**					
2175				5% A-D Critical Value	0.706					Kaplan-Meier (KM) Method		
2176				K-S Test Statistic	0.706					Mean		0.00188
2177				5% K-S Critical Value	0.337					SD		0.00158
2178	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0007056
2179										95% KM (t) UCL		0.00311
2180	**Assuming Gamma Distribution**									95% KM (z) UCL		0.00304
2181	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.00319
2182				Minimum	0					95% KM (bootstrap t) UCL		0.00622
2183				Maximum	0.005					95% KM (BCA) UCL		0.00307
2184				Mean	0.00192					95% KM (Percentile Bootstrap) UCL		0.00316
2185				Median	0.00152					95% KM (Chebyshev) UCL		0.00496
2186				SD	0.00155					97.5% KM (Chebyshev) UCL		0.00629
2187				k star	0.353					99% KM (Chebyshev) UCL		0.0089
2188				Theta star	0.00543							
2189				Nu star	12.73		**Potential UCLs to Use**					
2190				AppChi2	5.708					95% KM (t) UCL		0.00311
2191				95% Gamma Approximate UCL	0.00428					95% KM (Percentile Bootstrap) UCL		0.00316
2192				95% Adjusted Gamma UCL	0.00464							
2193	**Note: DL/2 is not a recommended method.**											
2194												
2195												
2196	**Methylcyclohexane (mg/kg)**											
2197												
2198	**General Statistics**											
2199				Number of Valid Samples	18					Number of Detected Data		13
2200				Number of Unique Samples	13					Number of Non-Detect Data		5
2201										Percent Non-Detects		27.78%
2202												
2203	**Raw Statistics**						**Log-transformed Statistics**					
2204				Minimum Detected	0.00042					Minimum Detected		-7.775
2205				Maximum Detected	0.037					Maximum Detected		-3.297
2206				Mean of Detected	0.00474					Mean of Detected		-6.216
2207				SD of Detected	0.00979					SD of Detected		1.174
2208				Minimum Non-Detect	0.01					Minimum Non-Detect		-4.605
2209				Maximum Non-Detect	0.01					Maximum Non-Detect		-4.605
2210												
2211												
2212	**UCL Statistics**											
2213	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2214				Shapiro Wilk Test Statistic	0.439					Shapiro Wilk Test Statistic		0.917
2215				5% Shapiro Wilk Critical Value	0.866					5% Shapiro Wilk Critical Value		0.866
2216	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2217												
2218	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2219				DL/2 Substitution Method						DL/2 Substitution Method		
2220				Mean	0.00481					Mean		-5.961
2221				SD	0.00823					SD		1.073
2222				95% DL/2 (t) UCL	0.00819					95% H-Stat (DL/2) UCL		0.0208
2223												
2224				Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method		
2225	**MLE method failed to converge properly**									Mean in Log Scale		-6.265
2226										SD in Log Scale		1.073

2227											Mean in Original Scale	0.00404
2228											SD in Original Scale	0.00835
2229											95% Percentile Bootstrap UCL	0.00772
2230											95% BCA Bootstrap UCL	0.00996
2231												
2232				Gamma Distribution Test with Detected Values Only							Data Distribution Test with Detected Values Only	
2233						k star (bias corrected)	0.589				Data appear Lognormal at 5% Significance Level	
2234						Theta Star	0.00805					
2235						nu star	15.32					
2236												
2237						A-D Test Statistic	1.221				Nonparametric Statistics	
2238						5% A-D Critical Value	0.774				Kaplan-Meier (KM) Method	
2239						K-S Test Statistic	0.774				Mean	0.004
2240						5% K-S Critical Value	0.247				SD	0.00812
2241				Data not Gamma Distributed at 5% Significance Level							SE of Mean	0.002
2242											95% KM (t) UCL	0.00748
2243				Assuming Gamma Distribution							95% KM (z) UCL	0.00729
2244						Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL	0.00745
2245						Minimum	0.00042				95% KM (bootstrap t) UCL	0.02
2246						Maximum	0.037				95% KM (BCA) UCL	0.00797
2247						Mean	0.00472				95% KM (Percentile Bootstrap) UCL	0.00775
2248						Median	0.00276				95% KM (Chebyshev) UCL	0.0127
2249						SD	0.00826				97.5% KM (Chebyshev) UCL	0.0165
2250						k star	0.799				99% KM (Chebyshev) UCL	0.0239
2251						Theta star	0.00591					
2252						Nu star	28.78				Potential UCLs to Use	
2253						AppChi2	17.54				97.5% KM (Chebyshev) UCL	0.0165
2254						95% Gamma Approximate UCL	0.00775					
2255						95% Adjusted Gamma UCL	0.00814					
2256	Note: DL/2 is not a recommended method.											
2257												
2258												
2259	Methylene chloride (mg/kg)											
2260												
2261							General Statistics					
2262						Number of Valid Samples	18				Number of Detected Data	7
2263						Number of Unique Samples	7				Number of Non-Detect Data	11
2264											Percent Non-Detects	61.11%
2265												
2266				Raw Statistics							Log-transformed Statistics	
2267						Minimum Detected	0.00098				Minimum Detected	-6.928
2268						Maximum Detected	0.0047				Maximum Detected	-5.36
2269						Mean of Detected	0.00257				Mean of Detected	-6.119
2270						SD of Detected	0.00149				SD of Detected	0.611
2271						Minimum Non-Detect	0.005				Minimum Non-Detect	-5.298
2272						Maximum Non-Detect	0.005				Maximum Non-Detect	-5.298
2273												
2274												
2275							UCL Statistics					
2276				Normal Distribution Test with Detected Values Only							Lognormal Distribution Test with Detected Values Only	
2277						Shapiro Wilk Test Statistic	0.895				Shapiro Wilk Test Statistic	0.938
2278						5% Shapiro Wilk Critical Value	0.803				5% Shapiro Wilk Critical Value	0.803
2279				Data appear Normal at 5% Significance Level							Data appear Lognormal at 5% Significance Level	

2280												
2281	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2282				DL/2 Substitution Method						DL/2 Substitution Method		
2283				Mean		0.00253				Mean		-6.041
2284				SD		0.0008871				SD		0.369
2285				95% DL/2 (t) UCL		0.00289				95% H-Stat (DL/2) UCL		0.00442
2286												
2287				Maximum Likelihood Estimate(MLE) Method		N/A				Log ROS Method		
2288	**MLE method failed to converge properly**									Mean in Log Scale		-6.119
2289										SD in Log Scale		0.61
2290										Mean in Original Scale		0.00261
2291										SD in Original Scale		0.00156
2292										95% Percentile Bootstrap UCL		0.00321
2293										95% BCA Bootstrap UCL		0.00327
2294												
2295	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2296				k star (bias corrected)		2.038	**Data appear Normal at 5% Significance Level**					
2297				Theta Star		0.00126						
2298				nu star		28.53						
2299												
2300				A-D Test Statistic		0.285	**Nonparametric Statistics**					
2301				5% A-D Critical Value		0.711				Kaplan-Meier (KM) Method		
2302				K-S Test Statistic		0.711				Mean		0.00257
2303				5% K-S Critical Value		0.313				SD		0.00138
2304	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.000564
2305										95% KM (t) UCL		0.00355
2306	**Assuming Gamma Distribution**									95% KM (z) UCL		0.0035
2307				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		0.0036
2308				Minimum		0				95% KM (bootstrap t) UCL		0.0042
2309				Maximum		0.0047				95% KM (BCA) UCL		0.0036
2310				Mean		0.00256				95% KM (Percentile Bootstrap) UCL		0.00353
2311				Median		0.00251				95% KM (Chebyshev) UCL		0.00503
2312				SD		0.00143				97.5% KM (Chebyshev) UCL		0.00609
2313				k star		0.602				99% KM (Chebyshev) UCL		0.00818
2314				Theta star		0.00424						
2315				Nu star		21.68	**Potential UCLs to Use**					
2316				AppChi2		12.1				95% KM (t) UCL		0.00355
2317				95% Gamma Approximate UCL		0.00458				95% KM (Percentile Bootstrap) UCL		0.00353
2318				95% Adjusted Gamma UCL		0.00485						
2319	**Note: DL/2 is not a recommended method.**											
2320												
2321												
2322	**Toluene (mg/kg)**											
2323												
2324	**General Statistics**											
2325				Number of Valid Samples		18				Number of Detected Data		16
2326				Number of Unique Samples		15				Number of Non-Detect Data		2
2327										Percent Non-Detects		11.11%
2328												
2329	**Raw Statistics**						**Log-transformed Statistics**					
2330				Minimum Detected		0.00023				Minimum Detected		-8.377
2331				Maximum Detected		0.058				Maximum Detected		-2.847
2332				Mean of Detected		0.00643				Mean of Detected		-6.315

2333					SD of Detected	0.0144					SD of Detected	1.483
2334					Minimum Non-Detect	0.005					Minimum Non-Detect	-5.298
2335					Maximum Non-Detect	0.005					Maximum Non-Detect	-5.298
2336												
2337												
2338	**UCL Statistics**											
2339	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2340					Shapiro Wilk Test Statistic	0.465					Shapiro Wilk Test Statistic	0.932
2341					5% Shapiro Wilk Critical Value	0.887					5% Shapiro Wilk Critical Value	0.887
2342	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2343												
2344	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2345					DL/2 Substitution Method						DL/2 Substitution Method	
2346					Mean	0.00599					Mean	-6.279
2347					SD	0.0136					SD	1.397
2348					95% DL/2 (t) UCL	0.0116					95% H-Stat (DL/2) UCL	0.0204
2349												
2350					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
2351					Mean	0.0352					Mean in Log Scale	-6.362
2352					SD	0.021					SD in Log Scale	1.414
2353					95% MLE (t) UCL	0.0438					Mean in Original Scale	0.00587
2354					95% MLE (Tiku) UCL	0.0556					SD in Original Scale	0.0136
2355											95% Percentile Bootstrap UCL	0.0117
2356											95% BCA Bootstrap UCL	0.0162
2357												
2358	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2359					k star (bias corrected)	0.449	**Data appear Lognormal at 5% Significance Level**					
2360					Theta Star	0.0143						
2361					nu star	14.36						
2362												
2363					A-D Test Statistic	1.422	**Nonparametric Statistics**					
2364					5% A-D Critical Value	0.796	Kaplan-Meier (KM) Method					
2365					K-S Test Statistic	0.796					Mean	0.00587
2366					5% K-S Critical Value	0.227					SD	0.0132
2367	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.00323
2368											95% KM (t) UCL	0.0115
2369	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0112
2370					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0115
2371					Minimum	0					95% KM (bootstrap t) UCL	0.0259
2372					Maximum	0.058					95% KM (BCA) UCL	0.012
2373					Mean	0.00617					95% KM (Percentile Bootstrap) UCL	0.0117
2374					Median	0.00139					95% KM (Chebyshev) UCL	0.0199
2375					SD	0.0136					97.5% KM (Chebyshev) UCL	0.026
2376					k star	0.326					99% KM (Chebyshev) UCL	0.038
2377					Theta star	0.0189						
2378					Nu star	11.73	**Potential UCLs to Use**					
2379					AppChi2	5.05					97.5% KM (Chebyshev) UCL	0.026
2380					95% Gamma Approximate UCL	0.0143						
2381					95% Adjusted Gamma UCL	0.0156						
2382	**Note: DL/2 is not a recommended method.**											
2383												
2384												
2385	**4-Chloro-3-Methylphenol (mg/kg)**											

2386												
2387	**General Statistics**											
2388					Number of Valid Samples	18				Number of Detected Data		3
2389					Number of Unique Samples	3				Number of Non-Detect Data		15
2390										Percent Non-Detects		83.33%
2391												
2392	**Raw Statistics**							**Log-transformed Statistics**				
2393					Minimum Detected	0.01				Minimum Detected		-4.605
2394					Maximum Detected	0.02				Maximum Detected		-3.912
2395					Mean of Detected	0.0137				Mean of Detected		-4.342
2396					SD of Detected	0.00551				SD of Detected		0.376
2397					Minimum Non-Detect	0.17				Minimum Non-Detect		-1.772
2398					Maximum Non-Detect	0.17				Maximum Non-Detect		-1.772
2399												
2400												
2401	**UCL Statistics**											
2402	**Normal Distribution Test with Detected Values Only**							**Lognormal Distribution Test with Detected Values Only**				
2403					Shapiro Wilk Test Statistic	0.824				Shapiro Wilk Test Statistic		0.851
2404					5% Shapiro Wilk Critical Value	0.767				5% Shapiro Wilk Critical Value		0.767
2405	**Data appear Normal at 5% Significance Level**							**Data appear Lognormal at 5% Significance Level**				
2406												
2407	**Assuming Normal Distribution**							**Assuming Lognormal Distribution**				
2408					DL/2 Substitution Method					DL/2 Substitution Method		
2409					Mean	0.0731				Mean		-2.778
2410					SD	0.0274				SD		0.731
2411					95% DL/2 (t) UCL	0.0844				95% H-Stat (DL/2) UCL		0.182
2412												
2413					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
2414	**MLE method failed to converge properly**									Mean in Log Scale		-4.342
2415										SD in Log Scale		0.425
2416										Mean in Original Scale		0.0142
2417										SD in Original Scale		0.00609
2418										95% Percentile Bootstrap UCL		0.0165
2419										95% BCA Bootstrap UCL		0.0167
2420												
2421	**Gamma Distribution Test with Detected Values Only**							**Data Distribution Test with Detected Values Only**				
2422					k star (bias corrected)	N/A		**Data appear Normal at 5% Significance Level**				
2423					Theta Star	N/A						
2424					nu star	N/A						
2425												
2426					A-D Test Statistic	0.476		**Nonparametric Statistics**				
2427					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
2428					K-S Test Statistic	N/A				Mean		0.0137
2429					5% K-S Critical Value	N/A				SD		0.0045
2430	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.00318
2431										95% KM (t) UCL		0.0192
2432	**Assuming Gamma Distribution**									95% KM (z) UCL		0.0189
2433					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.0203
2434					Minimum	N/A				95% KM (bootstrap t) UCL		0.0571
2435					Maximum	N/A				95% KM (BCA) UCL		0.02
2436					Mean	N/A				95% KM (Percentile Bootstrap) UCL		0.02
2437					Median	N/A				95% KM (Chebyshev) UCL		0.0275
2438					SD	N/A				97.5% KM (Chebyshev) UCL		0.0335

2439					k star	N/A					99% KM (Chebyshev) UCL	0.0453
2440					Theta star	N/A						
2441					Nu star	N/A	**Potential UCLs to Use**					
2442					AppChi2	N/A					95% KM (t) UCL	0.0192
2443					95% Gamma Approximate UCL	N/A					95% KM (Percentile Bootstrap) UCL	0.02
2444					95% Adjusted Gamma UCL	N/A						
2445	**Note: DL/2 is not a recommended method.**											
2446												
2447												
2448	**Phenanthrene (mg/kg)**											
2449												
2450					**General Statistics**							
2451					Number of Valid Samples	18					Number of Detected Data	5
2452					Number of Unique Samples	4					Number of Non-Detect Data	13
2453											Percent Non-Detects	72.22%
2454												
2455					**Raw Statistics**						**Log-transformed Statistics**	
2456					Minimum Detected	0.0017					Minimum Detected	-6.377
2457					Maximum Detected	0.012					Maximum Detected	-4.423
2458					Mean of Detected	0.00629					Mean of Detected	-5.369
2459					SD of Detected	0.00456					SD of Detected	0.94
2460					Minimum Non-Detect	0.021					Minimum Non-Detect	-3.863
2461					Maximum Non-Detect	0.021					Maximum Non-Detect	-3.863
2462												
2463												
2464					**UCL Statistics**							
2465					**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**	
2466					Shapiro Wilk Test Statistic	0.897					Shapiro Wilk Test Statistic	0.822
2467					5% Shapiro Wilk Critical Value	0.762					5% Shapiro Wilk Critical Value	0.762
2468					**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
2469												
2470					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
2471					DL/2 Substitution Method						DL/2 Substitution Method	
2472					Mean	0.00933					Mean	-4.782
2473					SD	0.00294					SD	0.59
2474					95% DL/2 (t) UCL	0.0105					95% H-Stat (DL/2) UCL	0.016
2475												
2476					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
2477					**MLE method failed to converge properly**						Mean in Log Scale	-5.369
2478											SD in Log Scale	0.955
2479											Mean in Original Scale	0.00694
2480											SD in Original Scale	0.0064
2481											95% Percentile Bootstrap UCL	0.00956
2482											95% BCA Bootstrap UCL	0.00998
2483												
2484					**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**	
2485					k star (bias corrected)	0.858					**Data appear Normal at 5% Significance Level**	
2486					Theta Star	0.00733						
2487					nu star	8.58						
2488												
2489					A-D Test Statistic	0.494					**Nonparametric Statistics**	
2490					5% A-D Critical Value	0.685					Kaplan-Meier (KM) Method	
2491					K-S Test Statistic	0.685					Mean	0.00629

2492				5% K-S Critical Value	0.361					SD	0.00408
2493	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean	0.00204
2494										95% KM (t) UCL	0.00984
2495	**Assuming Gamma Distribution**									95% KM (z) UCL	0.00965
2496	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL	0.0101
2497	Minimum	0								95% KM (bootstrap t) UCL	0.0111
2498	Maximum	0.0139								95% KM (BCA) UCL	0.00935
2499	Mean	0.00635								95% KM (Percentile Bootstrap) UCL	0.00945
2500	Median	0.0065								95% KM (Chebyshev) UCL	0.0152
2501	SD	0.00448								97.5% KM (Chebyshev) UCL	0.019
2502	k star	0.507								99% KM (Chebyshev) UCL	0.0266
2503	Theta star	0.0125									
2504	Nu star	18.25								**Potential UCLs to Use**	
2505	AppChi2	9.573								95% KM (t) UCL	0.00984
2506	95% Gamma Approximate UCL	0.0121								95% KM (Percentile Bootstrap) UCL	0.00945
2507	95% Adjusted Gamma UCL	0.0129									
2508	**Note: DL/2 is not a recommended method.**										
2509											
2510											
2511	**Pyrene (mg/kg)**										
2512											
2513	**General Statistics**										
2514	Number of Valid Samples	18								Number of Detected Data	3
2515	Number of Unique Samples	3								Number of Non-Detect Data	15
2516										Percent Non-Detects	83.33%
2517											
2518	**Raw Statistics**					**Log-transformed Statistics**					
2519	Minimum Detected	0.0032				Minimum Detected	-5.745				
2520	Maximum Detected	0.008				Maximum Detected	-4.828				
2521	Mean of Detected	0.005				Mean of Detected	-5.382				
2522	SD of Detected	0.00262				SD of Detected	0.487				
2523	Minimum Non-Detect	0.021				Minimum Non-Detect	-3.863				
2524	Maximum Non-Detect	0.021				Maximum Non-Detect	-3.863				
2525											
2526											
2527	**UCL Statistics**										
2528	**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**					
2529	Shapiro Wilk Test Statistic	0.842				Shapiro Wilk Test Statistic	0.885				
2530	5% Shapiro Wilk Critical Value	0.767				5% Shapiro Wilk Critical Value	0.767				
2531	**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**					
2532											
2533	**Assuming Normal Distribution**					**Assuming Lognormal Distribution**					
2534	DL/2 Substitution Method					DL/2 Substitution Method					
2535	Mean	0.00958				Mean	-4.694				
2536	SD	0.00229				SD	0.358				
2537	95% DL/2 (t) UCL	0.0105				95% H-Stat (DL/2) UCL	0.0173				
2538											
2539	Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method					
2540	**MLE method failed to converge properly**					Mean in Log Scale	-5.382				
2541						SD in Log Scale	0.561				
2542						Mean in Original Scale	0.00533				
2543						SD in Original Scale	0.00304				
2544						95% Percentile Bootstrap UCL	0.0065				

2545											95% BCA Bootstrap UCL	0.00675
2546												
2547	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
2548					k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level					
2549					Theta Star	N/A						
2550					nu star	N/A						
2551												
2552					A-D Test Statistic	0.434	Nonparametric Statistics					
2553					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
2554					K-S Test Statistic	N/A					Mean	0.005
2555					5% K-S Critical Value	N/A					SD	0.00214
2556	Data not Gamma Distributed at 5% Significance Level										SE of Mean	0.00151
2557											95% KM (t) UCL	0.00763
2558	Assuming Gamma Distribution										95% KM (z) UCL	0.00748
2559					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.00813
2560					Minimum	N/A					95% KM (bootstrap t) UCL	0.0216
2561					Maximum	N/A					95% KM (BCA) UCL	0.008
2562					Mean	N/A					95% KM (Percentile Bootstrap) UCL	0.008
2563					Median	N/A					95% KM (Chebyshev) UCL	0.0116
2564					SD	N/A					97.5% KM (Chebyshev) UCL	0.0144
2565					k star	N/A					99% KM (Chebyshev) UCL	0.02
2566					Theta star	N/A						
2567					Nu star	N/A	Potential UCLs to Use					
2568					AppChi2	N/A					95% KM (t) UCL	0.00763
2569					95% Gamma Approximate UCL	N/A					95% KM (Percentile Bootstrap) UCL	0.008
2570					95% Adjusted Gamma UCL	N/A						
2571	Note: DL/2 is not a recommended method.											
2572												
2573												
2574	TCE (mg/kg)											
2575												
2576	General Statistics											
2577					Number of Valid Samples	18					Number of Detected Data	4
2578					Number of Unique Samples	4					Number of Non-Detect Data	14
2579											Percent Non-Detects	77.78%
2580												
2581	Raw Statistics						Log-transformed Statistics					
2582					Minimum Detected	0.00136					Minimum Detected	-6.6
2583					Maximum Detected	0.0043					Maximum Detected	-5.449
2584					Mean of Detected	0.00254					Mean of Detected	-6.064
2585					SD of Detected	0.00126					SD of Detected	0.481
2586					Minimum Non-Detect	0.005					Minimum Non-Detect	-5.298
2587					Maximum Non-Detect	0.005					Maximum Non-Detect	-5.298
2588												
2589												
2590	UCL Statistics											
2591	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
2592					Shapiro Wilk Test Statistic	0.926					Shapiro Wilk Test Statistic	0.99
2593					5% Shapiro Wilk Critical Value	0.748					5% Shapiro Wilk Critical Value	0.748
2594	Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
2595												
2596	Assuming Normal Distribution						Assuming Lognormal Distribution					
2597					DL/2 Substitution Method						DL/2 Substitution Method	

2598					Mean	0.00251					Mean	-6.008
2599					SD	0.0005307					SD	0.204
2600					95% DL/2 (t) UCL	0.00273					95% H-Stat (DL/2) UCL	0.00343
2601												
2602					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
2603					**MLE method failed to converge properly**						Mean in Log Scale	-6.064
2604											SD in Log Scale	0.54
2605											Mean in Original Scale	0.00266
2606											SD in Original Scale	0.00146
2607											95% Percentile Bootstrap UCL	0.00324
2608											95% BCA Bootstrap UCL	0.00329
2609												
2610					**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**	
2611					k star (bias corrected)	1.623					**Data appear Normal at 5% Significance Level**	
2612					Theta Star	0.00156						
2613					nu star	12.98						
2614												
2615					A-D Test Statistic	0.24					**Nonparametric Statistics**	
2616					5% A-D Critical Value	0.659					Kaplan-Meier (KM) Method	
2617					K-S Test Statistic	0.659					Mean	0.00254
2618					5% K-S Critical Value	0.396					SD	0.00109
2619					**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean	0.0006314
2620											95% KM (t) UCL	0.00364
2621					**Assuming Gamma Distribution**						95% KM (z) UCL	0.00358
2622					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.00377
2623					Minimum	0.0001594					95% KM (bootstrap t) UCL	0.00494
2624					Maximum	0.00435					95% KM (BCA) UCL	0.00353
2625					Mean	0.0025					95% KM (Percentile Bootstrap) UCL	0.00357
2626					Median	0.00248					95% KM (Chebyshev) UCL	0.00529
2627					SD	0.00127					97.5% KM (Chebyshev) UCL	0.00648
2628					k star	2.157					99% KM (Chebyshev) UCL	0.00882
2629					Theta star	0.00116						
2630					Nu star	77.67					**Potential UCLs to Use**	
2631					AppChi2	58.36					95% KM (t) UCL	0.00364
2632					95% Gamma Approximate UCL	0.00333					95% KM (Percentile Bootstrap) UCL	0.00357
2633					95% Adjusted Gamma UCL	N/A						
2634	**Note: DL/2 is not a recommended method.**											
2635												
2636												
2637	**Trichlorofluoromethane (mg/kg)**											
2638												
2639							**General Statistics**					
2640					Number of Valid Samples	18					Number of Detected Data	8
2641					Number of Unique Samples	8					Number of Non-Detect Data	10
2642											Percent Non-Detects	55.56%
2643												
2644					**Raw Statistics**						**Log-transformed Statistics**	
2645					Minimum Detected	0.00017					Minimum Detected	-8.68
2646					Maximum Detected	0.00149					Maximum Detected	-6.512
2647					Mean of Detected	0.0007313					Mean of Detected	-7.417
2648					SD of Detected	0.0004699					SD of Detected	0.7
2649					Minimum Non-Detect	0.005					Minimum Non-Detect	-5.298
2650					Maximum Non-Detect	0.005					Maximum Non-Detect	-5.298

2651												
2652												
2653	**UCL Statistics**											
2654	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2655	Shapiro Wilk Test Statistic				0.876		Shapiro Wilk Test Statistic					0.931
2656	5% Shapiro Wilk Critical Value				0.818		5% Shapiro Wilk Critical Value					0.818
2657	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2658												
2659	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2660	DL/2 Substitution Method						DL/2 Substitution Method					
2661	Mean				0.00171		Mean					-6.625
2662	SD				0.0009533		SD					0.856
2663	95% DL/2 (t) UCL				0.0021		95% H-Stat (DL/2) UCL					0.00568
2664												
2665	Maximum Likelihood Estimate(MLE) Method				N/A		Log ROS Method					
2666	**MLE method failed to converge properly**						Mean in Log Scale					-7.417
2667							SD in Log Scale					0.676
2668							Mean in Original Scale					0.0007366
2669							SD in Original Scale					0.0004772
2670							95% Percentile Bootstrap UCL					0.0009168
2671							95% BCA Bootstrap UCL					0.0009398
2672												
2673	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2674	k star (bias corrected)				1.771		**Data appear Normal at 5% Significance Level**					
2675	Theta Star				0.000413							
2676	nu star				28.33							
2677												
2678	A-D Test Statistic				0.36		**Nonparametric Statistics**					
2679	5% A-D Critical Value				0.722		Kaplan-Meier (KM) Method					
2680	K-S Test Statistic				0.722		Mean					0.0007313
2681	5% K-S Critical Value				0.297		SD					0.0004395
2682	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.0001661
2683							95% KM (t) UCL					0.00102
2684	**Assuming Gamma Distribution**						95% KM (z) UCL					0.001
2685	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.00103
2686	Minimum				0		95% KM (bootstrap t) UCL					0.00127
2687	Maximum				0.00149		95% KM (BCA) UCL					0.00102
2688	Mean				0.00073		95% KM (Percentile Bootstrap) UCL					0.0009925
2689	Median				0.0006308		95% KM (Chebyshev) UCL					0.00146
2690	SD				0.000437		97.5% KM (Chebyshev) UCL					0.00177
2691	k star				0.629		99% KM (Chebyshev) UCL					0.00238
2692	Theta star				0.00116							
2693	Nu star				22.65		**Potential UCLs to Use**					
2694	AppChi2				12.83		95% KM (t) UCL					0.00102
2695	95% Gamma Approximate UCL				0.00129		95% KM (Percentile Bootstrap) UCL					0.0009925
2696	95% Adjusted Gamma UCL				0.00136							
2697	**Note: DL/2 is not a recommended method.**											
2698												
2699												
2700	**Xylenes (total) (mg/kg)**											
2701												
2702	**General Statistics**											
2703	Number of Valid Samples				18		Number of Detected Data					12

2704					Number of Unique Samples	12					Number of Non-Detect Data	6
2705											Percent Non-Detects	33.33%
2706												
2707					**Raw Statistics**						**Log-transformed Statistics**	
2708					Minimum Detected	0.00051					Minimum Detected	-7.581
2709					Maximum Detected	0.0063					Maximum Detected	-5.067
2710					Mean of Detected	0.00147					Mean of Detected	-6.853
2711					SD of Detected	0.00165					SD of Detected	0.75
2712					Minimum Non-Detect	0.005					Minimum Non-Detect	-5.298
2713					Maximum Non-Detect	0.005					Maximum Non-Detect	-5.298
2714												
2715												
2716					**UCL Statistics**							
2717					**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**	
2718					Shapiro Wilk Test Statistic	0.613					Shapiro Wilk Test Statistic	0.851
2719					5% Shapiro Wilk Critical Value	0.859					5% Shapiro Wilk Critical Value	0.859
2720					**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**	
2721												
2722					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
2723					DL/2 Substitution Method						DL/2 Substitution Method	
2724					Mean	0.00181					Mean	-6.566
2725					SD	0.00142					SD	0.734
2726					95% DL/2 (t) UCL	0.00239					95% H-Stat (DL/2) UCL	0.00634
2727												
2728					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
2729					**MLE method failed to converge properly**						Mean in Log Scale	-6.894
2730											SD in Log Scale	0.675
2731											Mean in Original Scale	0.00133
2732											SD in Original Scale	0.00137
2733											95% Percentile Bootstrap UCL	0.00192
2734											95% BCA Bootstrap UCL	0.00217
2735												
2736					**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**	
2737					k star (bias corrected)	1.294					**Data do not follow a Discernable Distribution (0.05)**	
2738					Theta Star	0.00114						
2739					nu star	31.07						
2740												
2741					A-D Test Statistic	1.101					**Nonparametric Statistics**	
2742					5% A-D Critical Value	0.744					Kaplan-Meier (KM) Method	
2743					K-S Test Statistic	0.744					Mean	0.00133
2744					5% K-S Critical Value	0.249					SD	0.00135
2745					**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	0.0003515
2746											95% KM (t) UCL	0.00194
2747					**Assuming Gamma Distribution**						95% KM (z) UCL	0.0019
2748					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.00193
2749					Minimum	0.00051					95% KM (bootstrap t) UCL	0.0029
2750					Maximum	0.0063					95% KM (BCA) UCL	0.00197
2751					Mean	0.00147					95% KM (Percentile Bootstrap) UCL	0.00193
2752					Median	0.00123					95% KM (Chebyshev) UCL	0.00286
2753					SD	0.00133					97.5% KM (Chebyshev) UCL	0.00352
2754					k star	2.042					99% KM (Chebyshev) UCL	0.00482
2755					Theta star	0.0007191						
2756					Nu star	73.52					**Potential UCLs to Use**	

	A	B	C	D	E	F	G	H	I	J	K	L
2757					AppChi2	54.77				95% KM (BCA) UCL		0.00197
2758				95% Gamma Approximate UCL		0.00197						
2759				95% Adjusted Gamma UCL		0.00203						
2760	**Note: DL/2 is not a recommended method.**											
2761												

Appendix E-6

Johnson & Ettinger Model - Input and Output - SWMU 41B Groundwater

DATA ENTRY SHEET

GW-SCREEN Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
67663	4.70E+00	Chloroform

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	975	SIC	10.6	5

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)		ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
SIC			SIC	1.38	0.481	0.216

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

END

CHEMICAL PROPERTIES SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	0.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
775	0.265	0.284	1.48E-09	0.844	1.25E-09	192.31	0.481	0.057	0.424	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,548	1.92E-03	8.24E-02	1.76E-04	5.40E-03	6.31E-05	2.46E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
775	200	3.87E+02	0.10	8.33E+01	5.40E-03	4.00E+02	3.52E+167	2.23E-05	8.63E-03	2.3E-05	NA

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	7.92E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
8.2E-08	NA

MESSAGE SUMMARY BELOW:

END

]

DATA ENTRY SHEET

GW-SCREEN Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	1.70E+00	Tetrachloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	1158	S	11	5

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)		ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.66	0.375	0.054

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

END

CHEMICAL PROPERTIES SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	6.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
958	0.321	0.003	9.94E-08	0.998	9.92E-08	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,543	8.30E-03	3.56E-01	1.76E-04	1.16E-02	4.63E-04	8.14E-03

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
958	200	6.05E+02	0.10	8.33E+01	1.16E-02	4.00E+02	5.42E+77	5.08E-04	3.08E-01	5.9E-06	6.0E-01

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	2.00E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
7.5E-07	4.9E-04

MESSAGE SUMMARY BELOW:

END

]

Appendix E-7

Background Comparisons – ProUCL 4.0 Output - SWMU 41A

Goodness-of-Fit Test Statistics for Data Sets with Non-Detects

User Selected Options **mg/kg**

From File H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst

Full Precision OFF

Confidence Coefficient 0.95

Aluminum (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	3620	20100	8300	6705	4279

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.541	4.078	1828	8.91	0.477	0.0535

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.935	0.935	0.935	0.935

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.871	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.208	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.982	0.982	0.982	0.982

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.741	0.749	
Kolmogorov-Smirnov (Full: no NDs)	0.171	0.166	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.98	0.98	0.98	0.98

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.948	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.142	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Aluminum (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	18800	31100	25800	25900	4909

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	32.41	13.1	796.2	10.14	0.2	0.0198

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.984	0.984	0.984	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.961	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.181	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.969	0.969	0.969	0.969

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.249	0.679	
Kolmogorov-Smirnov (Full: no NDs)	0.205	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.973	0.973	0.973	0.973

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.942	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.177	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Antimony (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	14	14	0	14	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Antimony (rfaap bkgrd-ss) was not processed!

Antimony (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	0.21	1.5	0.568	0.36	0.528

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	2.107	0.976	0.27	-0.821	0.737	-0.898

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.825	0.825	0.825	0.825

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.702	0.762	Data Not Normal
Lilliefors (Full: no NDs)	0.396	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.941	0.941	0.941	0.941

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.611	0.684	
Kolmogorov-Smirnov (Full: no NDs)	0.348	0.36	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.922	0.922	0.922	0.922

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.871	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.3	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Arsenic (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	1.5	10.2	3.732	2.75	2.33

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	3.494	3.143	1.068	1.167	0.532	0.456

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.898	0.898	0.898	0.898

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.803	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.203	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.969	0.969	0.969	0.969

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	1.02	0.752	
Kolmogorov-Smirnov (Full: no NDs)	0.165	0.166	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.972	0.972	0.972	0.972

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.932	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.138	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Arsenic (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	6	12	8.44	7.5	2.436

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	15.84	6.471	0.533	2.101	0.279	0.133

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.966	0.966	0.966	0.966

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.926	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.25	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.984	0.984	0.984	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.281	0.679	
Kolmogorov-Smirnov (Full: no NDs)	0.247	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.981	0.981	0.981	0.981

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.953	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.221	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Barium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	24	4	14.29%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	4	0.36	1	0.683	0.685	0.367
Statistics (Detects Only)	24	23.4	174	75.55	61.85	43.2
Statistics (All: NDs treated as DL value)	28	0.36	174	64.85	58.65	47.97
Statistics (All: NDs treated as DL/2 value)	28	0.18	174	64.8	58.65	48.04
Statistics (Normal ROS Estimated Data)	28	-33.62	174	61.51	58.65	53.13
Statistics (Gamma ROS Estimated Data)	28	1E-09	174	66.05	58.65	46.43
Statistics (Lognormal ROS Estimated Data)	28	14.2	174	67.13	58.65	45.07

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	3.215	2.894	23.5	4.161	0.597	0.144
Statistics (NDs = DL)	0.867	0.798	74.79	3.495	1.762	0.504
Statistics (NDs = DL/2)	0.769	0.711	84.25	3.396	1.997	0.588
Statistics (Gamma ROS Estimates)	0.566	0.529	116.7	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	3.967	0.734	0.185

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.963	0.976	0.976	0.989

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.917	0.916	Data Appear Normal
Lilliefors (Detects Only)	0.192	0.181	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.941	0.924	Data Appear Normal
Lilliefors (NDs = DL)	0.153	0.167	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.941	0.924	Data Appear Normal
Lilliefors (NDs = DL/2)	0.153	0.167	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.971	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.127	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.986	0.947	0.939	0.927

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.354	0.751	
Kolmogorov-Smirnov (Detects Only)	0.127	0.179	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.516	0.78	
Kolmogorov-Smirnov (NDs = DL)	0.191	0.171	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.873	0.784	
Kolmogorov-Smirnov (NDs = DL/2)	0.217	0.172	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	3.326	0.804	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.279	0.174	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.987	0.853	0.833	0.985

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.959	0.916	Data Appear Lognormal
Lilliefors (Detects Only)	0.104	0.181	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.725	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.28	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.691	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.309	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.955	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.11	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Barium (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	110	553	266.4	124	210.9

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	2.085	0.967	127.8	5.326	0.796	0.149

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.892	0.892	0.892	0.892

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.776	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.35	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.94	0.94	0.94	0.94

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.713	0.684	
Kolmogorov-Smirnov (Full: no NDs)	0.369	0.36	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.892	0.892	0.892	0.892

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.77	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.338	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Beryllium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	15	13	46.43%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	13	0.022	0.03	0.0278	0.03	0.00339
Statistics (Detects Only)	15	0.61	1.5	0.887	0.87	0.246
Statistics (All: NDs treated as DL value)	28	0.022	1.5	0.488	0.615	0.471
Statistics (All: NDs treated as DL/2 value)	28	0.011	1.5	0.481	0.615	0.477
Statistics (Normal ROS Estimated Data)	28	-0.178	1.5	0.577	0.615	0.402
Statistics (Gamma ROS Estimated Data)	28	0.498	1.5	0.87	0.879	0.206
Statistics (Lognormal ROS Estimated Data)	28	0.276	1.5	0.674	0.615	0.297

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	15.44	13.81	0.0574	-0.153	0.26	-1.698
Statistics (NDs = DL)	0.6	0.559	0.814	-1.748	1.757	-1.005
Statistics (NDs = DL/2)	0.478	0.45	1.008	-2.07	2.107	-1.018
Statistics (Gamma ROS Estimates)	19.32	17.28	0.045	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.483	0.427	-0.884

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.952	0.917	0.916	0.993

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.908	0.881	Data Appear Normal
Lilliefors (Detects Only)	0.151	0.229	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.826	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.299	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.823	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.3	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.984	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.0906	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.978	0.872	0.849	0.982

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.307	0.736	
Kolmogorov-Smirnov (Detects Only)	0.159	0.221	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	3.179	0.8	
Kolmogorov-Smirnov (NDs = DL)	0.312	0.174	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	3.391	0.815	
Kolmogorov-Smirnov (NDs = DL/2)	0.314	0.175	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.229	0.745	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.102	0.165	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.98	0.868	0.86	0.994

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.953	0.881	Data Appear Lognormal
Lilliefors (Detects Only)	0.15	0.229	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.731	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.306	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.715	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.308	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.981	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0909	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Beryllium (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	0.34	1.2	0.656	0.57	0.337

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	5.302	2.254	0.124	-0.519	0.485	-0.934

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.948	0.948	0.948	0.948

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.904	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.213	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.991	0.991	0.991	0.991

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.23	0.681	
Kolmogorov-Smirnov (Full: no NDs)	0.167	0.358	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.991	0.991	0.991	0.991

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.981	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.137	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cadmium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	2	26	92.86%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	26	N/A	N/A	N/A	N/A	N/A
Statistics (Detects Only)	2	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL value)	28	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL/2 value)	28	N/A	N/A	N/A	N/A	N/A
Statistics (Normal ROS Estimated Data)	28	N/A	N/A	N/A	N/A	N/A

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	N/A	N/A	
Lilliefors (Detects Only)	N/A	N/A	
Shapiro-Wilks (NDs = DL)	N/A	N/A	
Lilliefors (NDs = DL)	N/A	N/A	
Shapiro-Wilks (NDs = DL/2)	N/A	N/A	
Lilliefors (NDs = DL/2)	N/A	N/A	
Shapiro-Wilks (Normal ROS Estimates)	N/A	N/A	
Lilliefors (Normal ROS Estimates)	N/A	N/A	

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	N/A	N/A	
Kolmogorov-Smirnov (Detects Only)	N/A	N/A	
Anderson-Darling (NDs = DL)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL)	N/A	N/A	
Anderson-Darling (NDs = DL/2)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL/2)	N/A	N/A	
Anderson-Darling (Gamma ROS Estimates)	N/A	N/A	
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	N/A	

Note: Substitution methods such as DL or DL/2 are not recommended.

Cadmium (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	2.2	2.9	2.54	2.6	0.261

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	118.3	47.46	0.0215	0.928	0.103	0.111

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.98	0.98	0.98	0.98

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.969	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.209	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.981	0.981	0.981	0.981

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.248	0.678	
Kolmogorov-Smirnov (Full: no NDs)	0.212	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.981	0.981	0.981	0.981

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.97	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.206	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Calcium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	23	5	17.86%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	5	4.6	6.6	5.12	4.8	0.844
Statistics (Detects Only)	23	116	7340	1197	885	1440
Statistics (All: NDs treated as DL value)	28	4.6	7340	983.9	761.5	1380
Statistics (All: NDs treated as DL/2 value)	28	2.3	7340	983.5	761.5	1380
Statistics (Normal ROS Estimated Data)	28	-1605	7340	751.5	761.5	1625
Statistics (Gamma ROS Estimated Data)	28	1E-09	7340	984.5	761.5	1380
Statistics (Lognormal ROS Estimated Data)	28	104.3	7340	1007	761.5	1364

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.506	1.368	794.6	6.72	0.84	0.125
Statistics (NDs = DL)	0.575	0.537	1712	5.81	2.128	0.366
Statistics (NDs = DL/2)	0.523	0.491	1879	5.686	2.383	0.419
Statistics (Gamma ROS Estimates)	0.178	0.183	5519	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	6.391	1.047	0.164

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.724	0.745	0.746	0.855

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.553	0.914	Data Not Normal
Lilliefors (Detects Only)	0.275	0.185	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.587	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.244	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.587	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.244	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.761	0.924	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.207	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.866	0.916	0.919	0.944

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.694	0.76	
Kolmogorov-Smirnov (Detects Only)	0.152	0.185	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.232	0.803	
Kolmogorov-Smirnov (NDs = DL)	0.192	0.174	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.47	0.808	
Kolmogorov-Smirnov (NDs = DL/2)	0.211	0.175	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	6.572	0.907	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.417	0.184	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.974	0.886	0.869	0.976

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.967	0.914	Data Appear Lognormal
Lilliefors (Detects Only)	0.0979	0.185	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.779	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.279	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.75	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.296	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.949	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.114	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Calcium (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	33100	156000	83480	59600	50616

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	3.457	1.516	24145	11.18	0.621	0.0555

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.957	0.957	0.957	0.957

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.908	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.281	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.982	0.982	0.982	0.982

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.293	0.682	
Kolmogorov-Smirnov (Full: no NDs)	0.259	0.359	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.982	0.982	0.982	0.982

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.955	0.762	Data Appear Lognormal

Lilliefors (Full: no NDs)	0.217	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Chromium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	6.3	53.3	21.09	22.4	10.5

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.111	3.695	5.13	2.922	0.529	0.181

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.956	0.956	0.956	0.956

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.92	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.11	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.974	0.974	0.974	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.612	0.75	
Kolmogorov-Smirnov (Full: no NDs)	0.145	0.166	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.974	0.974	0.974	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.946	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.17	0.167	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Chromium (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	13	25	20.2	23	5.02

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV

Statistics (Full: no NDs)	17.97	7.323	1.124	2.978	0.273	0.0919

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.943	0.943	0.943	0.943

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.881	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.312	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.912	0.912	0.912	0.912

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.474	0.679	
Kolmogorov-Smirnov (Full: no NDs)	0.339	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.931	0.931	0.931	0.931

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.861	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.318	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cobalt (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	20	8	28.57%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	8	0.11	0.75	0.501	0.72	0.319
Statistics (Detects Only)	20	5.9	45.4	15.95	12.1	10.07
Statistics (All: NDs treated as DL value)	28	0.11	45.4	11.53	10.15	11.04
Statistics (All: NDs treated as DL/2 value)	28	0.055	45.4	11.46	10.15	11.11
Statistics (Normal ROS Estimated Data)	28	-10.02	45.4	9.494	10.15	13.45
Statistics (Gamma ROS Estimated Data)	28	3.774	45.4	13.39	10.15	9.473
Statistics (Lognormal ROS Estimated Data)	28	3.134	45.4	12.48	10.15	10.13

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	3.439	3.095	4.636	2.617	0.545	0.208
Statistics (NDs = DL)	0.701	0.65	16.45	1.583	1.793	1.132
Statistics (NDs = DL/2)	0.588	0.549	19.49	1.385	2.092	1.51
Statistics (Gamma ROS Estimates)	2.851	2.569	4.697	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	2.25	0.749	0.333

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.901	0.93	0.93	0.968

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.819	0.905	Data Not Normal
Lilliefors (Detects Only)	0.236	0.198	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.867	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.158	0.167	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.867	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.156	0.167	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.936	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.128	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.973	0.98	0.973	0.967

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.596	0.747	
Kolmogorov-Smirnov (Detects Only)	0.167	0.195	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.122	0.79	
Kolmogorov-Smirnov (NDs = DL)	0.195	0.172	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.507	0.801	
Kolmogorov-Smirnov (NDs = DL/2)	0.221	0.174	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.785	0.754	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.155	0.167	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.982	0.918	0.903	0.983

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.96	0.905	Data Appear Lognormal
Lilliefors (Detects Only)	0.132	0.198	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.831	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.257	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.802	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.288	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.954	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.126	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cobalt (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	7.8	14	10.5	11	2.412

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	24.07	9.761	0.436	2.33	0.228	0.098

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.968	0.968	0.968	0.968

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.939	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.218	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.976	0.976	0.976	0.976

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.291	0.679	
Kolmogorov-Smirnov (Full: no NDs)	0.217	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.975	0.975	0.975	0.975

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.951	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.216	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Copper (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	26	2	7.14%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.17	0.17	0.17	0.17	0
Statistics (Detects Only)	26	2.2	13.6	6.919	5.35	3.696
Statistics (All: NDs treated as DL value)	28	0.17	13.6	6.437	5.2	3.973
Statistics (All: NDs treated as DL/2 value)	28	0.085	13.6	6.431	5.2	3.983
Statistics (Normal ROS Estimated Data)	28	-2.356	13.6	6.306	5.2	4.214
Statistics (Gamma ROS Estimated Data)	28	1E-09	13.6	6.44	5.2	3.969
Statistics (Lognormal ROS Estimated Data)	28	1.502	13.6	6.545	5.2	3.814

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	3.738	3.361	1.851	1.795	0.544	0.303
Statistics (NDs = DL)	1.699	1.541	3.788	1.54	1.072	0.696

Statistics (NDs = DL/2)	1.493	1.357	4.307	1.49	1.234	0.828
Statistics (Gamma ROS Estimates)	0.633	0.589	10.17	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	1.703	0.623	0.366

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.947	0.966	0.967	0.973

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.88	0.92	Data Not Normal
Lilliefors (Detects Only)	0.206	0.174	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.919	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.181	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.92	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.18	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.939	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.164	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.96	0.946	0.941	0.888

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.717	0.749	
Kolmogorov-Smirnov (Detects Only)	0.151	0.172	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.918	0.761	
Kolmogorov-Smirnov (NDs = DL)	0.152	0.168	Data appear Approximate Gamma Distribution
Anderson-Darling (NDs = DL/2)	1.191	0.763	
Kolmogorov-Smirnov (NDs = DL/2)	0.177	0.168	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	3.942	0.797	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.345	0.173	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.861	0.825	0.983

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.939	0.92	Data Appear Lognormal
Lilliefors (Detects Only)	0.135	0.174	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.748	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.222	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.69	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.258	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.952	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.118	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Copper (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	26	69	39.4	35	17.53

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	7.591	3.17	5.19	3.606	0.394	0.109

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.901	0.901	0.901	0.901

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.818	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.286	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.956	0.956	0.956	0.956

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.421	0.68	
Kolmogorov-Smirnov (Full: no NDs)	0.235	0.358	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.944	0.944	0.944	0.944

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.89	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.217	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Iron (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	7250	63000	20108	19750	11869

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	3.411	3.069	5895	9.755	0.57	0.0584

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.912	0.912	0.912	0.912

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.846	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.139	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.961	0.961	0.961	0.961

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.612	0.752	
Kolmogorov-Smirnov (Full: no NDs)	0.151	0.166	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.97	0.97	0.97	0.97

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.932	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.153	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Iron (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	24300	43200	32920	30600	7564

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	24.04	9.748	1370	10.38	0.228	0.022

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.983	0.983	0.983	0.983

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.958	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.22	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.989	0.989	0.989	0.989

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.233	0.679	
Kolmogorov-Smirnov (Full: no NDs)	0.212	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.99	0.99	0.99	0.99

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.971	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.19	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Lead (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	8.9	225	26.96	15.15	41.34

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.456	1.324	18.52	2.913	0.702	0.241

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.619	0.619	0.619	0.619

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.416	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.375	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.807	0.807	0.807	0.807

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	3.163	0.764	
Kolmogorov-Smirnov (Full: no NDs)	0.253	0.169	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.886	0.886	0.886	0.886

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.798	0.924	Data Not Lognormal
Lilliefors (Full: no NDs)	0.192	0.167	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Lead (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	89	143	116.2	125	21.84

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	34.26	13.84	3.392	4.741	0.193	0.0408

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.969	0.969	0.969	0.969

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.931	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.256	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.962	0.962	0.962	0.962

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.352	0.678	
Kolmogorov-Smirnov (Full: no NDs)	0.288	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.965	0.965	0.965	0.965

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.923	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.275	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Magnesium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	25	3	10.71%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	3	4.7	5	4.833	4.8	0.153
Statistics (Detects Only)	25	158	20400	2498	913	4334
Statistics (All: NDs treated as DL value)	28	4.7	20400	2231	741	4161
Statistics (All: NDs treated as DL/2 value)	28	2.35	20400	2230	741	4161

Statistics (Normal ROS Estimated Data)	28	-5148	20400	1678	741	4743
Statistics (Gamma ROS Estimated Data)	28	1E-09	20400	2230	741	4161
Statistics (Lognormal ROS Estimated Data)	28	56.13	20400	2236	741	4158

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	0.694	0.643	3600	6.951	1.272	0.183
Statistics (NDs = DL)	0.479	0.451	4657	6.375	2.075	0.325
Statistics (NDs = DL/2)	0.457	0.432	4879	6.301	2.257	0.358
Statistics (Gamma ROS Estimates)	0.198	0.201	11267	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	6.638	1.512	0.228

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.731	0.721	0.721	0.836

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.558	0.918	Data Not Normal
Lilliefors (Detects Only)	0.303	0.177	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.546	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.299	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.546	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.299	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.729	0.924	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.267	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.946	0.959	0.961	0.987

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	1.247	0.789	
Kolmogorov-Smirnov (Detects Only)	0.183	0.182	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	0.674	0.815	
Kolmogorov-Smirnov (NDs = DL)	0.131	0.175	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.681	0.82	
Kolmogorov-Smirnov (NDs = DL/2)	0.141	0.176	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	3.847	0.898	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.366	0.183	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.978	0.943	0.925	0.99

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.95	0.918	Data Appear Lognormal
Lilliefors (Detects Only)	0.107	0.177	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.889	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.195	0.167	Data Not Lognormal

Shapiro-Wilks (NDs = DL/2)	0.856	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.22	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.973	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0849	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Magnesium (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	23000	82800	46640	34000	24420

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.856	2.076	9605	10.64	0.512	0.0481

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.949	0.949	0.949	0.949

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.895	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.298	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.981	0.981	0.981	0.981

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.34	0.681	
Kolmogorov-Smirnov (Full: no NDs)	0.294	0.358	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.973	0.973	0.973	0.973

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.94	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.259	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Manganese (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD

Statistics (Full: no NDs)	28	43	2040	695.9	490	591.5

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.442	1.311	482.6	6.16	0.971	0.158

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.923	0.923	0.923	0.923

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.84	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.197	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.971	0.971	0.971	0.971

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.306	0.764	
Kolmogorov-Smirnov (Full: no NDs)	0.102	0.169	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.983	0.983	0.983	0.983

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.962	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.106	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Manganese (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	517	918	749	826	162.6

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	24.21	9.815	30.94	6.598	0.234	0.0354

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.961	0.961	0.961	0.961

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.917	0.762	Data Appear Normal

Lilliefors (Full: no NDs)	0.282	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.938	0.938	0.938	0.938

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.389	0.679	
Kolmogorov-Smirnov (Full: no NDs)	0.311	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.948	0.948	0.948	0.948

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.895	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.294	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Mercury (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	3	25	89.29%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	25	0.019	0.06	0.0466	0.05	0.017
Statistics (Detects Only)	3	0.07	1.2	0.467	0.13	0.636
Statistics (All: NDs treated as DL value)	28	0.019	1.2	0.0916	0.06	0.218
Statistics (All: NDs treated as DL/2 value)	28	0.0095	1.2	0.0708	0.03	0.223
Statistics (Normal ROS Estimated Data)	28	-6.561	1.2	-3.164	-3.255	1.837
Statistics (Gamma ROS Estimated Data)	28	1E-09	1.2	0.05	1E-09	0.227
Statistics (Lognormal ROS Estimated Data)	28	6.8748E-09	1.2	0.0503	2.3931E-05	0.227

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	0.798	0.737	0.585	-1.506	1.494	-0.992
Statistics (NDs = DL)	0.982	0.901	0.0933	-2.979	0.795	-0.267
Statistics (NDs = DL/2)	0.644	0.598	0.11	-3.598	0.952	-0.265
Statistics (Gamma ROS Estimates)	0.0553	0.0732	0.904	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-10.44	4.519	-0.433

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.889	0.485	0.471	0.987

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.79	0.767	Data Appear Normal
Lilliefors (Detects Only)	0.368	0.512	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.268	0.924	Data Not Normal

Lilliefors (NDs = DL)	0.468	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.253	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.466	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.974	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.0965	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	N/A	0.694	0.731	0.95

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.439	N/A	
Kolmogorov-Smirnov (Detects Only)	0.373	N/A	
Anderson-Darling (NDs = DL)	4.794	0.775	
Kolmogorov-Smirnov (NDs = DL)	0.41	0.17	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	5.507	0.796	
Kolmogorov-Smirnov (NDs = DL/2)	0.458	0.173	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	9.082	1.229	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.564	0.206	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.951	0.826	0.826	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.904	0.767	Data Appear Lognormal
Lilliefors (Detects Only)	0.306	0.512	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.71	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.31	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.708	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.355	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.974	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0964	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Mercury (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	0.047	0.086	0.0626	0.061	0.0152

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	22.38	9.087	0.0028	-2.793	0.235	-0.084

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS

Correlation Coefficient R	0.971	0.971	0.971	0.971

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.943	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.186	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.988	0.988	0.988	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.223	0.679	
Kolmogorov-Smirnov (Full: no NDs)	0.182	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.987	0.987	0.987	0.987

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.972	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.156	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Nickel (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	17	11	39.29%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	11	0.21	1.3	1.005	1.3	0.504
Statistics (Detects Only)	17	4.6	18.1	9.935	9.4	4.294
Statistics (All: NDs treated as DL value)	28	0.21	18.1	6.427	5.55	5.545
Statistics (All: NDs treated as DL/2 value)	28	0.105	18.1	6.23	5.55	5.741
Statistics (Normal ROS Estimated Data)	28	-7.045	18.1	5.574	5.55	6.652
Statistics (Gamma ROS Estimated Data)	28	1.974	18.1	9.082	8.465	3.849
Statistics (Lognormal ROS Estimated Data)	28	1.602	18.1	7.218	5.55	4.794

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	5.612	5.034	1.77	2.204	0.448	0.203
Statistics (NDs = DL)	0.953	0.874	6.748	1.251	1.353	1.082
Statistics (NDs = DL/2)	0.709	0.657	8.784	0.979	1.668	1.704
Statistics (Gamma ROS Estimates)	5.329	4.782	1.704	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	1.759	0.683	0.388

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.977	0.953	0.948	0.993

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.938	0.892	Data Appear Normal
Lilliefors (Detects Only)	0.12	0.215	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.891	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.215	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.88	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.227	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.977	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.0932	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.986	0.947	0.923	0.993

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.276	0.741	
Kolmogorov-Smirnov (Detects Only)	0.133	0.21	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.909	0.776	
Kolmogorov-Smirnov (NDs = DL)	0.199	0.171	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.342	0.789	
Kolmogorov-Smirnov (NDs = DL/2)	0.225	0.172	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.176	0.748	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.0785	0.166	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.984	0.942	0.929	0.986

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.949	0.892	Data Appear Lognormal
Lilliefors (Detects Only)	0.125	0.215	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.872	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.188	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.847	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.236	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.959	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.107	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Nickel (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	17	26	20.6	21	3.507

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	45.03	18.14	0.458	3.014	0.165	0.0549

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.954	0.954	0.954	0.954

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.914	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.255	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.966	0.966	0.966	0.966

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.325	0.678	
Kolmogorov-Smirnov (Full: no NDs)	0.229	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.965	0.965	0.965	0.965

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.933	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.227	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Potassium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	22	6	21.43%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	6	201	271	220	213	25.92
Statistics (Detects Only)	22	166	2350	735.4	509.5	632.6
Statistics (All: NDs treated as DL value)	28	166	2350	625	317.5	598.1
Statistics (All: NDs treated as DL/2 value)	28	100.5	2350	601.4	317.5	616.1
Statistics (Normal ROS Estimated Data)	28	-180.2	2350	544.7	317.5	671
Statistics (Gamma ROS Estimated Data)	28	135.6	2350	613.1	326.6	607.5
Statistics (Lognormal ROS Estimated Data)	28	142.4	2350	609.6	317.5	609.5

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.634	1.482	450.2	6.264	0.838	0.134
Statistics (NDs = DL)	1.53	1.39	408.6	6.076	0.826	0.136
Statistics (NDs = DL/2)	1.2	1.095	501.1	5.928	0.989	0.167
Statistics (Gamma ROS Estimates)	1.347	1.226	455.3	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	5.992	0.91	0.152

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.914	0.87	0.889	0.938

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.83	0.911	Data Not Normal
Lilliefors (Detects Only)	0.222	0.189	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.756	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.239	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.787	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.22	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.874	0.924	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.176	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.987	0.977	0.987	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.667	0.758	
Kolmogorov-Smirnov (Detects Only)	0.154	0.188	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.637	0.762	
Kolmogorov-Smirnov (NDs = DL)	0.21	0.168	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.858	0.769	
Kolmogorov-Smirnov (NDs = DL/2)	0.151	0.169	Data appear Approximate Gamma Distribution
Anderson-Darling (Gamma ROS Estimates)	1.093	0.766	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.171	0.169	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.948	0.977	0.959

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.939	0.911	Data Appear Lognormal
Lilliefors (Detects Only)	0.123	0.189	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.882	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.187	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.934	0.924	Data Appear Lognormal
Lilliefors (NDs = DL/2)	0.102	0.167	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.9	0.924	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.138	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Potassium (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD

Statistics (Full: no NDs)	5	1890	2680	2194	2200	306.2

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	67.41	27.1	32.55	7.686	0.135	0.0175

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.948	0.948	0.948	0.948

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.906	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.266	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.961	0.961	0.961	0.961

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.33	0.678	
Kolmogorov-Smirnov (Full: no NDs)	0.245	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.961	0.961	0.961	0.961

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.928	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.243	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Selenium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	2	26	92.86%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	26	N/A	N/A	N/A	N/A	N/A
Statistics (Detects Only)	2	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL value)	28	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL/2 value)	28	N/A	N/A	N/A	N/A	N/A
Statistics (Normal ROS Estimated Data)	28	N/A	N/A	N/A	N/A	N/A

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Shapiro-Wilks (Detects Only)	N/A	N/A
Lilliefors (Detects Only)	N/A	N/A
Shapiro-Wilks (NDs = DL)	N/A	N/A
Lilliefors (NDs = DL)	N/A	N/A
Shapiro-Wilks (NDs = DL/2)	N/A	N/A
Lilliefors (NDs = DL/2)	N/A	N/A
Shapiro-Wilks (Normal ROS Estimates)	N/A	N/A
Lilliefors (Normal ROS Estimates)	N/A	N/A

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	N/A	N/A	
Kolmogorov-Smirnov (Detects Only)	N/A	N/A	
Anderson-Darling (NDs = DL)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL)	N/A	N/A	
Anderson-Darling (NDs = DL/2)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL/2)	N/A	N/A	
Anderson-Darling (Gamma ROS Estimates)	N/A	N/A	
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	N/A	

Note: Substitution methods such as DL or DL/2 are not recommended.

Selenium (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	0.52	0.8	0.708	0.77	0.116

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	41.27	16.64	0.0172	-0.357	0.18	-0.502

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.913	0.913	0.913	0.913

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.833	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.303	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.884	0.884	0.884	0.884

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Anderson-Darling (Full: no NDs)	0.561	0.678	
Kolmogorov-Smirnov (Full: no NDs)	0.325	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.898	0.898	0.898	0.898

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.809	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.304	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Silver (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	1	27	96.43%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver (rfaap bkgrd-ss) was not processed!

Silver (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	0.086	0.77	0.249	0.13	0.292

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.464	0.719	0.17	-1.768	0.863	-0.488

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.773	0.773	0.773	0.773

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.62	0.762	Data Not Normal
Lilliefors (Full: no NDs)	0.446	0.396	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.927	0.927	0.927	0.927

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Anderson-Darling (Full: no NDs)	0.918	0.687	
Kolmogorov-Smirnov (Full: no NDs)	0.436	0.362	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.852	0.852	0.852	0.852

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.75	0.762	Data Not Lognormal
Lilliefors (Full: no NDs)	0.391	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Sodium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	1	27	96.43%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Sodium (rfaap bkgrd-ss) was not processed!

Sodium (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	50	1730	518.2	196	702.7

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	0.775	0.444	668.3	5.482	1.412	0.258

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.864	0.864	0.864	0.864

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.756	0.762	Data Not Normal
Lilliefors (Full: no NDs)	0.296	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.996	0.996	0.996	0.996

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Anderson-Darling (Full: no NDs)	0.311	0.698	
Kolmogorov-Smirnov (Full: no NDs)	0.231	0.366	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.989	0.989	0.989	0.989

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.969	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.157	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Thallium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	4	24	85.71%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	24	0.13	0.41	0.195	0.14	0.102
Statistics (Detects Only)	4	1.3	2.1	1.85	2	0.37
Statistics (All: NDs treated as DL value)	28	0.13	2.1	0.431	0.14	0.61
Statistics (All: NDs treated as DL/2 value)	28	0.065	2.1	0.348	0.07	0.638
Statistics (Normal ROS Estimated Data)	28	-1.016	2.1	0.463	0.263	0.766
Statistics (Gamma ROS Estimated Data)	28	1.3	2.1	1.854	1.856	0.123
Statistics (Lognormal ROS Estimated Data)	28	0.329	2.1	0.886	0.706	0.466

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	28.68	25.63	0.0645	0.598	0.225	0.376
Statistics (NDs = DL)	1.025	0.939	0.421	-1.403	0.921	-0.657
Statistics (NDs = DL/2)	0.649	0.604	0.535	-1.997	1.149	-0.575
Statistics (Gamma ROS Estimates)	199.2	177.9	0.00931	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.229	0.457	-1.992

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.85	0.729	0.691	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.737	0.748	Data Not Normal
Lilliefors (Detects Only)	0.408	0.443	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.532	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.371	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.481	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.446	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.952	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.138	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.806	0.898	0.892	0.668

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.755	0.657	
Kolmogorov-Smirnov (Detects Only)	0.436	0.394	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	4.636	0.773	
Kolmogorov-Smirnov (NDs = DL)	0.342	0.17	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	5.51	0.795	
Kolmogorov-Smirnov (NDs = DL/2)	0.351	0.173	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	6.198	0.743	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.415	0.165	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.838	0.829	0.804	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.717	0.748	Data Not Lognormal
Lilliefors (Detects Only)	0.415	0.443	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.678	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.311	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.639	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.318	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.951	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.138	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Thallium (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	0.15	0.26	0.21	0.22	0.0418

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	29.41	11.9	0.00714	-1.578	0.211	-0.134

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.988	0.988	0.988	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.978	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.194	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.976	0.976	0.976	0.976

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.242	0.679	
Kolmogorov-Smirnov (Full: no NDs)	0.224	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.974	0.974	0.974	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.953	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.219	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Vanadium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	12.2	101	33.89	33.8	17.78

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.392	3.946	7.716	3.405	0.497	0.146

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.902	0.902	0.902	0.902

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.832	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.141	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.943	0.943	0.943	0.943

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.622	0.749	
Kolmogorov-Smirnov (Full: no NDs)	0.111	0.166	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.969	0.969	0.969	0.969

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.939	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.138	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Vanadium (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	29	51	43.2	49	9.757

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	21.84	8.871	1.978	3.743	0.247	0.0661

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.918	0.918	0.918	0.918

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.828	0.762	Data Appear Normal
Lilliefors (Full: no NDs)	0.324	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.881	0.881	0.881	0.881

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.569	0.679	
Kolmogorov-Smirnov (Full: no NDs)	0.349	0.357	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.91	0.91	0.91	0.91

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.819	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.327	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Zinc (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	7.1	216	41.21	29.7	40.24

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.826	1.654	22.56	3.421	0.761	0.223

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.798	0.798	0.798	0.798

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.665	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.203	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.913	0.913	0.913	0.913

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.54	0.76	
Kolmogorov-Smirnov (Full: no NDs)	0.105	0.168	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.985	0.985	0.985	0.985

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.975	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.1	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Zinc (swmu41a-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	5	0	5	5	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	5	242	1490	578.6	357	516.6

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	2.28	1.045	253.8	6.126	0.704	0.115

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.828	0.828	0.828	0.828

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.704	0.762	Data Not Normal
Lilliefors (Full: no NDs)	0.376	0.396	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.944	0.944	0.944	0.944

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.615	0.684	
Kolmogorov-Smirnov (Full: no NDs)	0.319	0.36	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.918	0.918	0.918	0.918

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.856	0.762	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.273	0.396	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Aluminum(swmu41a-ss)
Background Data: Aluminum(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	0
Number of Detect Data	5	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	18800	3620
Maximum Detected	31100	20100
Mean of Detected Data	25800	8300
Median of Detected Data	**25900**	**6705**
SD of Detected Data	4909	4279

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.464
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	5.31E-04

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Antimony(swmu41a-ss)
Background Data: Antimony(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	14
Number of Missing Values	0	14
Number of Non-Detect Data	0	14
Number of Detect Data	5	0
Minimum Non-Detect	N/A	0.24
Maximum Non-Detect	N/A	0.36
Percent Non detects	0.00%	100.00%
Minimum Detected	0.21	N/A
Maximum Detected	1.5	N/A
Mean of Detected Data	0.568	N/A
Median of Detected Data	**0.36**	**N/A**
SD of Detected Data	0.528	N/A

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.616
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	2.99E-04

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Arsenic(swmu41a-ss)
Background Data: Arsenic(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	0
Number of Detect Data	5	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	6	1.5
Maximum Detected	12	10.2

Mean of Detected Data	8.44	3.732
Median of Detected Data	**7.5**	**2.75**
SD of Detected Data	2.436	2.33

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	2.862
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.00421

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Barium(swmu41a-ss)
Background Data: Barium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	4
Number of Detect Data	5	24
Minimum Non-Detect	N/A	0.36
Maximum Non-Detect	N/A	1
Percent Non detects	0.00%	14.29%
Minimum Detected	110	23.4
Maximum Detected	553	174
Mean of Detected Data	266.4	75.55
Median of Detected Data	**124**	**61.85**
SD of Detected Data	210.9	43.2

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	2.714
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.00666

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Beryllium(swmu41a-ss)
Background Data: Beryllium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	13
Number of Detect Data	5	15
Minimum Non-Detect	N/A	0.022
Maximum Non-Detect	N/A	0.03
Percent Non detects	0.00%	46.43%
Minimum Detected	0.34	0.61
Maximum Detected	1.2	1.5
Mean of Detected Data	0.656	0.887
Median of Detected Data	0.57	0.87
SD of Detected Data	0.337	0.246

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	0.777
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.437

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)

Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Cadmium(swmu41a-ss)
Background Data: Cadmium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	26
Number of Detect Data	5	2
Minimum Non-Detect	N/A	0.02
Maximum Non-Detect	N/A	0.05
Percent Non detects	0.00%	92.86%
Minimum Detected	2.2	0.67
Maximum Detected	2.9	0.82
Mean of Detected Data	2.54	0.745
Median of Detected Data	**2.6**	**0.745**
SD of Detected Data	0.261	0.106

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.916
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	8.84E-07

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Chromium(swmu41a-ss)
Background Data: Chromium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	0
Number of Detect Data	5	28
Minimum Non-Detect	N/A	N/A

Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	13	6.3
Maximum Detected	25	53.3
Mean of Detected Data	20.2	21.09
Median of Detected Data	23	22.4
SD of Detected Data	5.02	10.5

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	-0.251
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	1.198

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Cobalt(swmu41a-ss)
Background Data: Cobalt(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	8
Number of Detect Data	5	20
Minimum Non-Detect	N/A	0.11
Maximum Non-Detect	N/A	0.75
Percent Non detects	0.00%	28.57%
Minimum Detected	7.8	5.9
Maximum Detected	14	45.4
Mean of Detected Data	10.5	15.95
Median of Detected Data	11	12.1
SD of Detected Data	2.412	10.07

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	0.152
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.879

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Copper(swmu41a-ss)
Background Data: Copper(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	2
Number of Detect Data	5	26
Minimum Non-Detect	N/A	0.17
Maximum Non-Detect	N/A	0.17
Percent Non detects	0.00%	7.14%
Minimum Detected	26	2.2
Maximum Detected	69	13.6
Mean of Detected Data	39.4	6.919
Median of Detected Data	**35**	**5.35**
SD of Detected Data	17.53	3.696

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.515
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	4.40E-04

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst

Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Iron(swmu41a-ss)
Background Data: Iron(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	0
Number of Detect Data	5	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	24300	7250
Maximum Detected	43200	63000
Mean of Detected Data	32920	20108
Median of Detected Data	**30600**	**19750**
SD of Detected Data	7564	11869

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	2.561
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.0104

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Lead(swmu41a-ss)
Background Data: Lead(rfaap bkgrd-ss)

Raw Statistics

	Site	Background

Number of Valid Data	5	28
Number of Non-Detect Data	0	0
Number of Detect Data	5	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	89	8.9
Maximum Detected	143	225
Mean of Detected Data	116.2	26.96
Median of Detected Data	**125**	**15.15**
SD of Detected Data	21.84	41.34

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.264
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.0011

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Magnesium(swmu41a-ss)
Background Data: Magnesium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	3
Number of Detect Data	5	25
Minimum Non-Detect	N/A	4.7
Maximum Non-Detect	N/A	5
Percent Non detects	0.00%	10.71%
Minimum Detected	23000	158
Maximum Detected	82800	20400
Mean of Detected Data	46640	2498
Median of Detected Data	**34000**	**913**
SD of Detected Data	24420	4334

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.516
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	4.38E-04

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Manganese(swmu41a-ss)
Background Data: Manganese(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	0
Number of Detect Data	5	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	517	43
Maximum Detected	918	2040
Mean of Detected Data	749	695.9
Median of Detected Data	826	490
SD of Detected Data	162.6	591.5

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	1.305
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.192

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site = Background
P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Mercury(swmu41a-ss)
Background Data: Mercury(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	25
Number of Detect Data	5	3
Minimum Non-Detect	N/A	0.019
Maximum Non-Detect	N/A	0.06
Percent Non detects	**0.00%**	**89.29%**
Minimum Detected	0.047	0.07
Maximum Detected	0.086	1.2
Mean of Detected Data	0.0626	0.467
Median of Detected Data	**0.061**	**0.13**
SD of Detected Data	0.0152	0.636

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	2.988
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.00281

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Mercury(swmu41a-ss)

Background Data: Mercury(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	25
Number of Detect Data	5	3
Minimum Non-Detect	N/A	0.019
Maximum Non-Detect	N/A	0.06
Percent Non detects	0.00%	89.29%
Minimum Detected	0.047	0.07
Maximum Detected	0.086	1.2
Mean of Detected Data	0.0626	0.467
Median of Detected Data	0.061	0.13
SD of Detected Data	0.0152	0.636

Site vs Background Gehan Test

H0: Mean/Median of Site or AOC <= Mean/Median of background

Gehan z Test Value	2.988
Critical z (0.95)	1.645
P-Value	0.00141

Conclusion with Alpha = 0.05

Reject H0, Conclude Site > Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Nickel(swmu41a-ss)
Background Data: Nickel(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	11
Number of Detect Data	5	17
Minimum Non-Detect	N/A	0.21
Maximum Non-Detect	N/A	1.3
Percent Non detects	0.00%	39.29%
Minimum Detected	17	4.6
Maximum Detected	26	18.1
Mean of Detected Data	20.6	9.935

Median of Detected Data	**21**	**9.4**
SD of Detected Data	3.507	4.294

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.479
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	5.04E-04

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Potassium(swmu41a-ss)
Background Data: Potassium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	6
Number of Detect Data	5	22
Minimum Non-Detect	N/A	201
Maximum Non-Detect	N/A	271
Percent Non detects	0.00%	21.43%
Minimum Detected	1890	166
Maximum Detected	2680	2350
Mean of Detected Data	2194	735.4
Median of Detected Data	**2200**	**509.5**
SD of Detected Data	306.2	632.6

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.253
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.00114

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Selenium(swmu41a-ss)
Background Data: Selenium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	26
Number of Detect Data	5	2
Minimum Non-Detect	N/A	0.14
Maximum Non-Detect	N/A	0.36
Percent Non detects	0.00%	92.86%
Minimum Detected	0.52	0.64
Maximum Detected	0.8	0.77
Mean of Detected Data	0.708	0.705
Median of Detected Data	**0.77**	**0.705**
SD of Detected Data	0.116	0.0919

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.705
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	2.54E-06

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Selenium(swmu41a-ss)
Background Data: Selenium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	26
Number of Detect Data	5	2
Minimum Non-Detect	N/A	0.14
Maximum Non-Detect	N/A	0.36
Percent Non detects	0.00%	92.86%
Minimum Detected	0.52	0.64
Maximum Detected	0.8	0.77
Mean of Detected Data	0.708	0.705
Median of Detected Data	**0.77**	**0.705**
SD of Detected Data	0.116	0.0919

Site vs Background Gehan Test

H0: Mean/Median of Site or AOC <= Mean/Median of background

Gehan z Test Value	4.705
Critical z (0.95)	1.645
P-Value	1.27E-06

Conclusion with Alpha = 0.05
Reject H0, Conclude Site > Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Silver(swmu41a-ss)
Background Data: Silver(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	27
Number of Detect Data	5	1
Minimum Non-Detect	N/A	0.16
Maximum Non-Detect	N/A	0.38
Percent Non detects	0.00%	96.43%

Minimum Detected	0.086	4.3
Maximum Detected	0.77	4.3
Mean of Detected Data	0.249	4.3
Median of Detected Data	0.13	4.3
SD of Detected Data	0.292	N/A

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	1.329
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.184

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Sodium(swmu41a-ss)
Background Data: Sodium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	27
Number of Detect Data	5	1
Minimum Non-Detect	N/A	10.8
Maximum Non-Detect	N/A	25.9
Percent Non detects	0.00%	96.43%
Minimum Detected	50	124
Maximum Detected	1730	124
Mean of Detected Data	518.2	124
Median of Detected Data	**196**	**124**
SD of Detected Data	702.7	N/A

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	5.075
Lower Critical z (0.025)	-1.96

Upper Critical z (0.975)	1.96
P-Value	3.87E-07

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Thallium(swmu41a-ss)
Background Data: Thallium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	24
Number of Detect Data	5	4
Minimum Non-Detect	N/A	0.13
Maximum Non-Detect	N/A	0.41
Percent Non detects	0.00%	85.71%
Minimum Detected	0.15	1.3
Maximum Detected	0.26	2.1
Mean of Detected Data	0.21	1.85
Median of Detected Data	**0.22**	**2**
SD of Detected Data	0.0418	0.37

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	2.54
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.0111

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%

Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Thallium(swmu41a-ss)
Background Data: Thallium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	24
Number of Detect Data	5	4
Minimum Non-Detect	N/A	0.13
Maximum Non-Detect	N/A	0.41
Percent Non detects	0.00%	85.71%
Minimum Detected	0.15	1.3
Maximum Detected	0.26	2.1
Mean of Detected Data	0.21	1.85
Median of Detected Data	0.22	2
SD of Detected Data	0.0418	0.37

Site vs Background Gehan Test

H0: Mean/Median of Site or AOC <= Mean/Median of background

Gehan z Test Value	2.54
Critical z (0.95)	1.645
P-Value	0.00554

Conclusion with Alpha = 0.05
Reject H0, Conclude Site > Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Vanadium(swmu41a-ss)
Background Data: Vanadium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	0
Number of Detect Data	5	28

Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	29	12.2
Maximum Detected	51	101
Mean of Detected Data	43.2	33.89
Median of Detected Data	49	33.8
SD of Detected Data	9.757	17.78

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	1.707
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.0878

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Zinc(swmu41a-ss)
Background Data: Zinc(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	5	28
Number of Non-Detect Data	0	0
Number of Detect Data	5	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	242	7.1
Maximum Detected	1490	216
Mean of Detected Data	578.6	41.21
Median of Detected Data	357	29.7
SD of Detected Data	516.6	40.24

Site vs Background Gehan Test

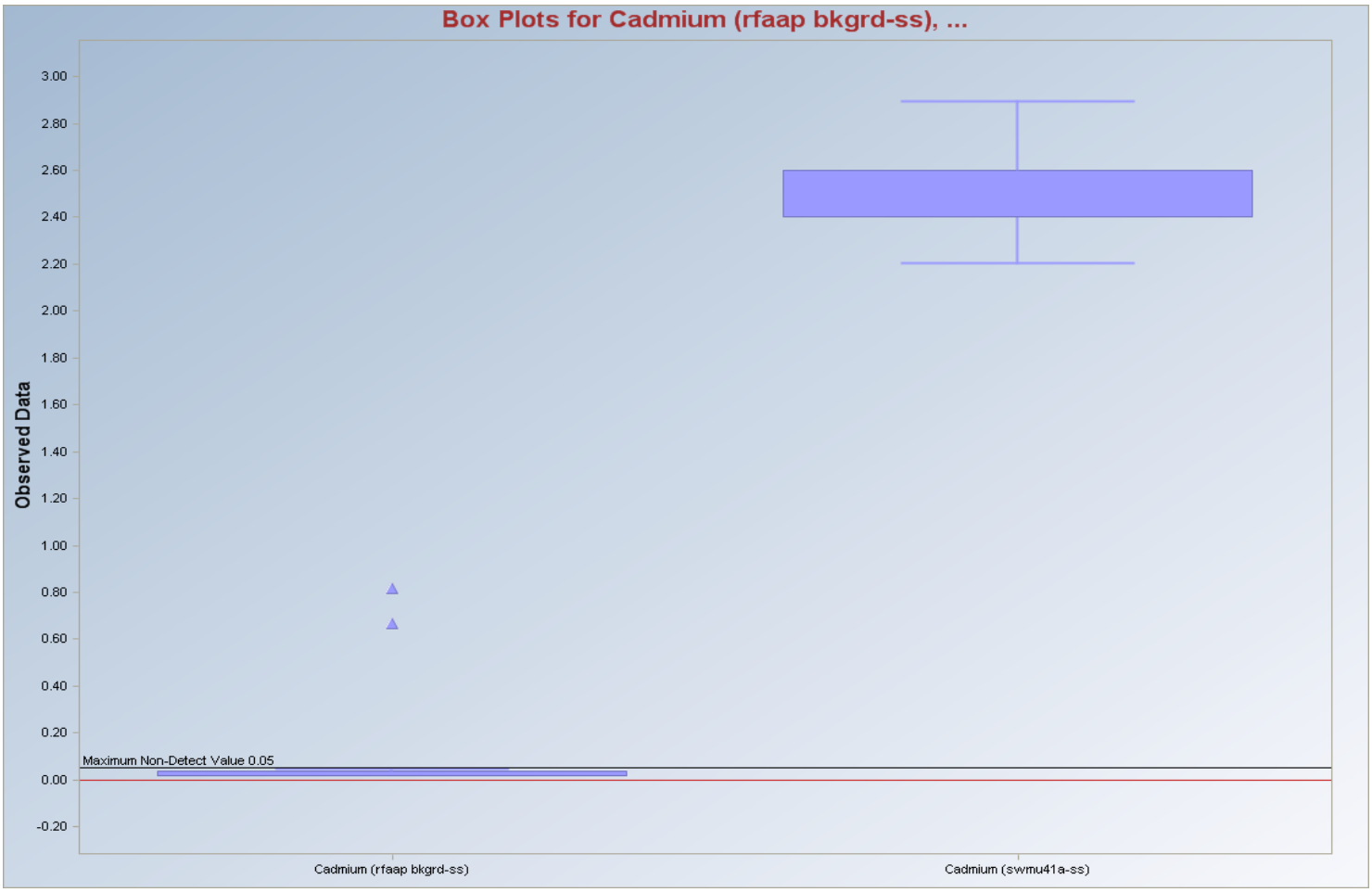
H0: Mu of Site or AOC = Mu of background

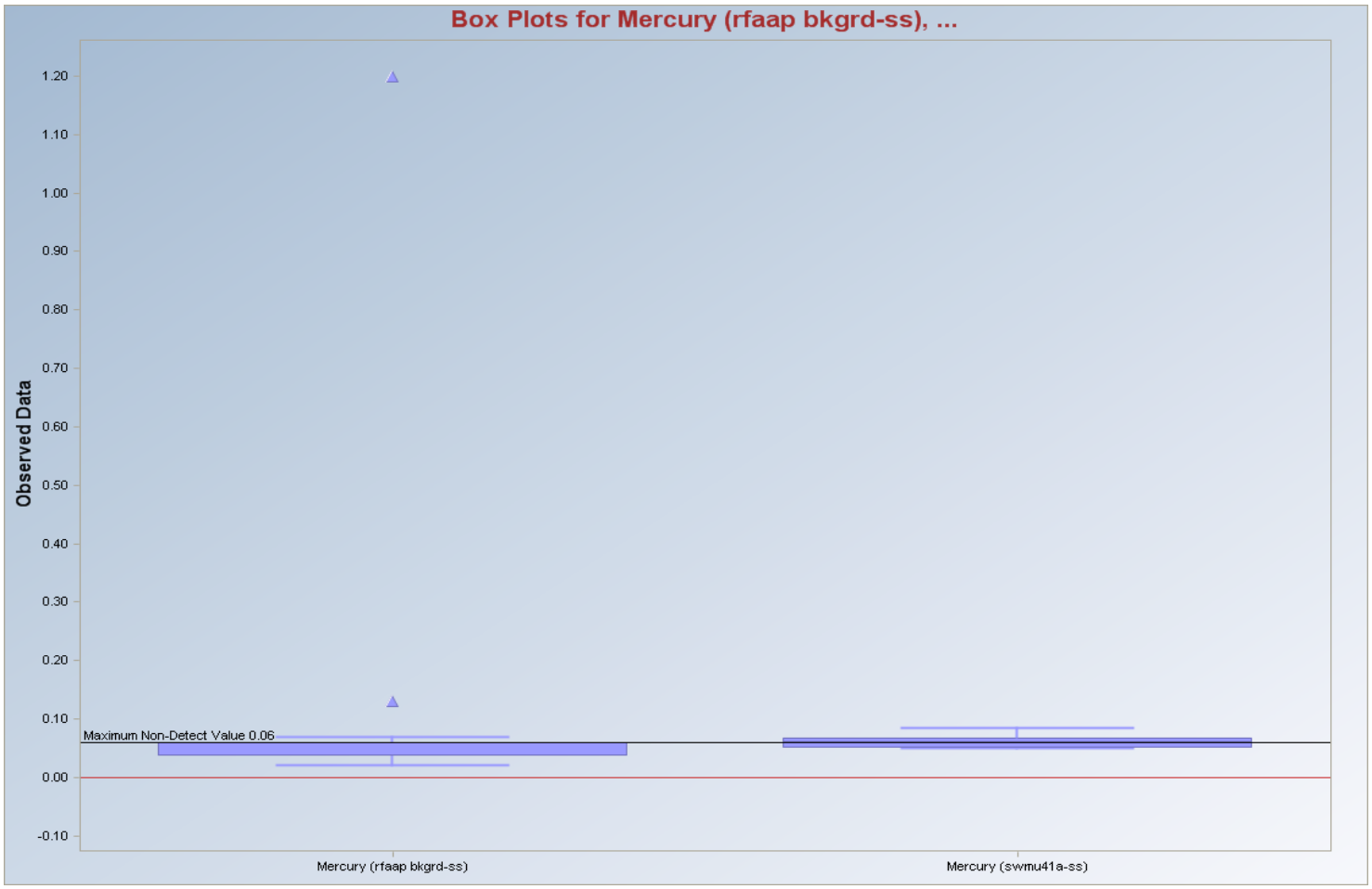
Gehan z Test Value	3.515
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	4.40E-04

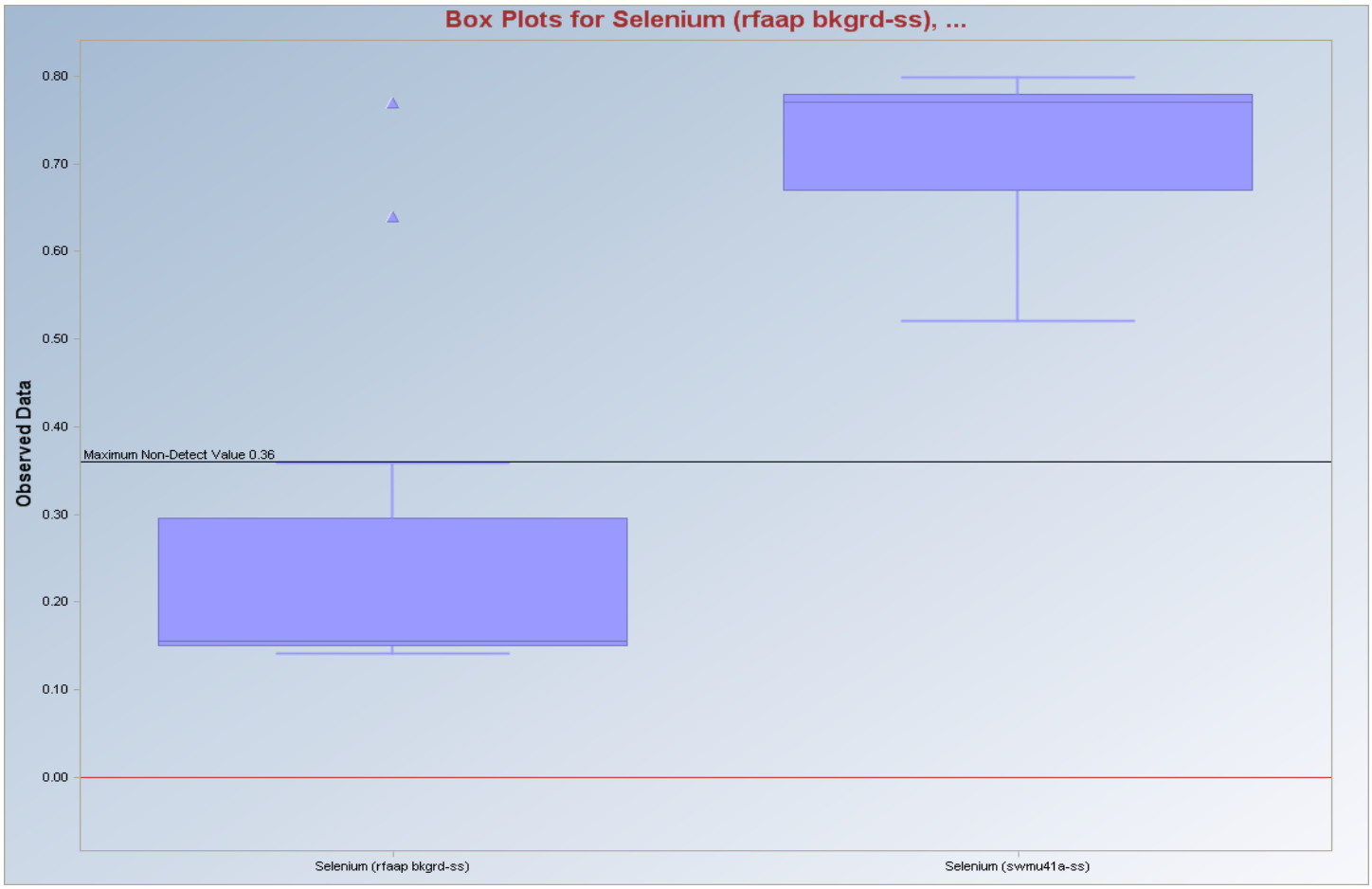
Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)


Box Plots for Cadmium (rfaap bkgrd-ss), ...
Observed Data
3.00
2.80
2.60
2.40
2.20
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
-0.20
Maximum Non-Detect Value 0.05
Cadmium (rfaap bkgrd-ss)
Cadmium (swmu41a-ss)


Box Plots for Mercury (rfaap bkgrd-ss), ...
Observed Data
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
Maximum Non-Detect Value 0.06
Mercury (rfaap bkgrd-ss)
Mercury (swmu41a-ss)


Box Plots for Selenium (rfaap bkgrd-ss), ...
Observed Data
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Maximum Non-Detect Value 0.36
Selenium (rfaap bkgrd-ss)
Selenium (swmu41a-ss)

Goodness-of-Fit Test Statistics for Data Sets with Non-Detects

User Selected Options **Units = mg/kg**

From File H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area A_TS_stats.wst

Full Precision OFF

Confidence Coefficient 0.95

Lead (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	2.1	256	22.04	12	39.85

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.186	1.149	18.59	2.615	0.783	0.299

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.597	0.597	0.597	0.597

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.344	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.803	0.803	0.803	0.803

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	7.671	0.777	
Kolmogorov-Smirnov (Full: no NDs)	0.245	0.103	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.929	0.929	0.929	0.929

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.147	0.0997	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Lead (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	33.5	234	91.27	82	56.15

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	3.242	2.545	28.15	4.352	0.593	0.136

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.933	0.933	0.933	0.933

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.876	0.866	Data Appear Normal
Lilliefors (Full: no NDs)	0.152	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.984	0.984	0.984	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.252	0.739	
Kolmogorov-Smirnov (Full: no NDs)	0.117	0.238	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.984	0.984	0.984	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.959	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.123	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Aluminum (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	3620	47900	14204	12100	9433

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	2.787	2.689	5097	9.371	0.618	0.0659

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.923	0.923	0.923	0.923

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.15	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.988	0.988	0.988	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.604	0.76	
Kolmogorov-Smirnov (Full: no NDs)	0.0772	0.101	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.995	0.995	0.995	0.995

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0626	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Aluminum (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	18800	40600	25408	24400	5890

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	22.9	17.67	1110	10.12	0.213	0.021

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.936	0.936	0.936	0.936

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.886	0.866	Data Appear Normal
Lilliefors (Full: no NDs)	0.159	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.962	0.962	0.962	0.962

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.302	0.733	
Kolmogorov-Smirnov (Full: no NDs)	0.128	0.236	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.972	0.972	0.972	0.972

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.949	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.116	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Antimony (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	41	38	0	38	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Antimony (mg/kg) (rfaap bkgrd ts) was not processed!

Antimony (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	11	2	15.38%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	7.14	7.14	7.14	7.14	0
Statistics (Detects Only)	11	0.21	1.5	0.486	0.36	0.363
Statistics (All: NDs treated as DL value)	13	0.21	7.14	1.51	0.4	2.521
Statistics (All: NDs treated as DL/2 value)	13	0.21	3.57	0.96	0.4	1.205
Statistics (Normal ROS Estimated Data)	13	0.21	1.5	0.486	0.36	0.337
Statistics (Gamma ROS Estimated Data)	13	0.21	1.5	0.489	0.364	0.337
Statistics (Lognormal ROS Estimated Data)	13	0.21	1.5	0.477	0.36	0.335

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	3.193	2.508	0.152	-0.886	0.549	-0.62
Statistics (NDs = DL)	0.703	0.592	2.148	-0.448	1.183	-2.642
Statistics (NDs = DL/2)	1.11	0.905	0.865	-0.554	0.953	-1.72
Statistics (Gamma ROS Estimates)	3.583	2.808	0.137	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.886	0.513	-0.579

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.812	0.729	0.788	0.818

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.683	0.85	Data Not Normal
Lilliefors (Detects Only)	0.278	0.267	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.535	0.866	Data Not Normal
Lilliefors (NDs = DL)	0.404	0.246	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.621	0.866	Data Not Normal

Lilliefors (NDs = DL/2)	0.374	0.246	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.694	0.866	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.247	0.246	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.911	0.901	0.921	0.911

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.688	0.733	
Kolmogorov-Smirnov (Detects Only)	0.221	0.257	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.93	0.774	
Kolmogorov-Smirnov (NDs = DL)	0.352	0.247	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.436	0.756	
Kolmogorov-Smirnov (NDs = DL/2)	0.298	0.243	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.681	0.738	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.2	0.238	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.946	0.884	0.916	0.948

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.906	0.85	Data Appear Lognormal
Lilliefors (Detects Only)	0.18	0.267	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.777	0.866	Data Not Lognormal
Lilliefors (NDs = DL)	0.269	0.246	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.83	0.866	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.226	0.246	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.912	0.866	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.142	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Arsenic (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	76	3	3.80%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	3	0.09	0.12	0.103	0.1	0.0153
Statistics (Detects Only)	76	1.2	35.9	4.989	3.2	5.36
Statistics (All: NDs treated as DL value)	79	0.09	35.9	4.804	3.1	5.339
Statistics (All: NDs treated as DL/2 value)	79	0.045	35.9	4.802	3.1	5.341
Statistics (Normal ROS Estimated Data)	79	-5.169	35.9	4.604	3.1	5.608
Statistics (Gamma ROS Estimated Data)	79	1E-09	35.9	4.8	3.1	5.343
Statistics (Lognormal ROS Estimated Data)	79	0.728	35.9	4.828	3.1	5.32

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.819	1.759	2.742	1.308	0.692	0.529

Statistics (NDs = DL)	1.401	1.356	3.429	1.172	0.968	0.826
Statistics (NDs = DL/2)	1.323	1.281	3.631	1.146	1.067	0.932
Statistics (Gamma ROS Estimates)	0.568	0.555	8.454	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	1.246	0.748	0.6

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.765	0.778	0.778	0.817

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.282	0.102	Data Not Normal
Lilliefors (NDs = DL)	0.279	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.279	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.263	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.916	0.932	0.935	0.972

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	4.409	0.766	
Kolmogorov-Smirnov (Detects Only)	0.213	0.104	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	3.469	0.772	
Kolmogorov-Smirnov (NDs = DL)	0.182	0.102	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	3.587	0.774	
Kolmogorov-Smirnov (NDs = DL/2)	0.176	0.103	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	10.23	0.812	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.332	0.106	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.958	0.919	0.886	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.151	0.102	Data Not Lognormal
Lilliefors (NDs = DL)	0.159	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.187	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.134	0.0997	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Arsenic (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	4.3	19	9.177	8.1	3.744

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	7.578	5.881	1.211	2.149	0.375	0.175

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.925	0.925	0.925	0.925

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.875	0.866	Data Appear Normal
Lilliefors (Full: no NDs)	0.218	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.963	0.963	0.963	0.963

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.327	0.735	
Kolmogorov-Smirnov (Full: no NDs)	0.187	0.237	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.979	0.979	0.979	0.979

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.972	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.163	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Barium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	63	16	20.25%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	16	0.36	1.1	0.821	1	0.3
Statistics (Detects Only)	63	23.4	174	68.4	56.7	40.39
Statistics (All: NDs treated as DL value)	79	0.36	174	54.71	45.5	45.21
Statistics (All: NDs treated as DL/2 value)	79	0.18	174	54.63	45.5	45.31
Statistics (Normal ROS Estimated Data)	79	-54.83	174	50.41	45.5	51.24
Statistics (Gamma ROS Estimated Data)	79	1E-09	174	58.64	45.5	41.27
Statistics (Lognormal ROS Estimated Data)	79	10.45	174	58.03	45.5	41.56

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	3.354	3.236	20.39	4.069	0.555	0.136
Statistics (NDs = DL)	0.737	0.717	74.26	3.188	1.839	0.577
Statistics (NDs = DL/2)	0.642	0.626	85.13	3.047	2.109	0.692
Statistics (Gamma ROS Estimates)	1.061	1.029	55.28	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	3.817	0.71	0.186

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.932	0.955	0.955	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.211	0.112	Data Not Normal
Lilliefors (NDs = DL)	0.154	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.153	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.13	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.977	0.947	0.938	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	1.567	0.757	
Kolmogorov-Smirnov (Detects Only)	0.142	0.113	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	4.488	0.794	
Kolmogorov-Smirnov (NDs = DL)	0.207	0.105	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	5.552	0.804	
Kolmogorov-Smirnov (NDs = DL/2)	0.235	0.105	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	3.925	0.78	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.215	0.103	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.98	0.875	0.857	0.99

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.114	0.112	Data Not Lognormal
Lilliefors (NDs = DL)	0.29	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.317	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0679	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Barium (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	72	553	194	124	153.6

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	2.276	1.802	85.27	5.032	0.678	0.135

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.878	0.878	0.878	0.878

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.77	0.866	Data Not Normal
Lilliefors (Full: no NDs)	0.33	0.246	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.965	0.965	0.965	0.965

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.926	0.742	
Kolmogorov-Smirnov (Full: no NDs)	0.287	0.239	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.945	0.945	0.945	0.945

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.881	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.246	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Beryllium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	40	39	49.37%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	39	0.022	0.03	0.0286	0.03	0.00265
Statistics (Detects Only)	40	0.61	5.4	1.449	1.1	1.086
Statistics (All: NDs treated as DL value)	79	0.022	5.4	0.748	0.61	1.049
Statistics (All: NDs treated as DL/2 value)	79	0.011	5.4	0.74	0.61	1.054
Statistics (Normal ROS Estimated Data)	79	-3.53	5.4	0.149	0.61	1.644
Statistics (Gamma ROS Estimated Data)	79	1E-09	5.4	1.439	1.3	0.88
Statistics (Lognormal ROS Estimated Data)	79	0.0819	5.4	0.892	0.61	0.959

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	3.116	3.006	0.465	0.202	0.533	2.643
Statistics (NDs = DL)	0.47	0.461	1.589	-1.654	1.93	-1.167
Statistics (NDs = DL/2)	0.39	0.383	1.9	-1.996	2.273	-1.138
Statistics (Gamma ROS Estimates)	1.38	1.336	1.043	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.504	0.875	-1.735

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS

Correlation Coefficient R	0.81	0.829	0.83	0.978

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.666	0.94	Data Not Normal
Lilliefors (Detects Only)	0.256	0.14	Data Not Normal
Lilliefors (NDs = DL)	0.247	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.248	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.117	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.915	0.976	0.973	0.959

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	2.172	0.754	
Kolmogorov-Smirnov (Detects Only)	0.198	0.14	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	6.807	0.826	
Kolmogorov-Smirnov (NDs = DL)	0.32	0.107	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	7.311	0.844	
Kolmogorov-Smirnov (NDs = DL/2)	0.323	0.108	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	5.881	0.773	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.232	0.103	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.947	0.883	0.873	0.996

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.891	0.94	Data Not Lognormal
Lilliefors (Detects Only)	0.155	0.14	Data Not Lognormal
Lilliefors (NDs = DL)	0.325	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.328	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0541	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Beryllium (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	11	2	15.38%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.5	0.5	0.5	0.5	0
Statistics (Detects Only)	11	0.34	1.8	0.8	0.73	0.44
Statistics (All: NDs treated as DL value)	13	0.34	1.8	0.753	0.57	0.417
Statistics (All: NDs treated as DL/2 value)	13	0.25	1.8	0.715	0.57	0.451
Statistics (Normal ROS Estimated Data)	13	0.266	1.8	0.736	0.57	0.433
Statistics (Gamma ROS Estimated Data)	13	0.34	1.8	0.757	0.677	0.419
Statistics (Lognormal ROS Estimated Data)	13	0.34	1.8	0.742	0.57	0.426

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	4.279	3.343	0.187	-0.345	0.505	-1.464
Statistics (NDs = DL)	4.487	3.503	0.168	-0.399	0.479	-1.203
Statistics (NDs = DL/2)	3.101	2.437	0.231	-0.505	0.605	-1.197
Statistics (Gamma ROS Estimates)	4.325	3.378	0.175	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.424	0.503	-1.187

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.927	0.899	0.933	0.922

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.863	0.85	Data Appear Normal
Lilliefors (Detects Only)	0.236	0.267	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.815	0.866	Data Not Normal
Lilliefors (NDs = DL)	0.234	0.246	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.872	0.866	Data Appear Normal
Lilliefors (NDs = DL/2)	0.203	0.246	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.856	0.866	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.219	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.977	0.961	0.985	0.973

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.375	0.732	
Kolmogorov-Smirnov (Detects Only)	0.173	0.256	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.656	0.737	
Kolmogorov-Smirnov (NDs = DL)	0.204	0.238	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.283	0.739	
Kolmogorov-Smirnov (NDs = DL/2)	0.128	0.238	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.411	0.737	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.171	0.238	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.981	0.962	0.987	0.97

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.958	0.85	Data Appear Lognormal
Lilliefors (Detects Only)	0.142	0.267	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.924	0.866	Data Appear Lognormal
Lilliefors (NDs = DL)	0.192	0.246	Data Appear Lognormal
Shapiro-Wilks (NDs = DL/2)	0.964	0.866	Data Appear Lognormal
Lilliefors (NDs = DL/2)	0.103	0.246	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.934	0.866	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.178	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cadmium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	13	66	83.54%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	66	0.02	0.05	0.0256	0.02	0.00861
Statistics (Detects Only)	13	0.57	2.5	1.152	1.1	0.585
Statistics (All: NDs treated as DL value)	79	0.02	2.5	0.211	0.02	0.479
Statistics (All: NDs treated as DL/2 value)	79	0.01	2.5	0.2	0.01	0.483
Statistics (Normal ROS Estimated Data)	79	-4.148	2.5	-1.016	-1.143	1.342
Statistics (Gamma ROS Estimated Data)	79	0.197	2.987	1.943	2.175	0.717
Statistics (Lognormal ROS Estimated Data)	79	0.0167	2.5	0.338	0.174	0.444

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	5.194	5.005	0.222	0.0424	0.448	10.55
Statistics (NDs = DL)	0.424	0.416	0.498	-3.093	1.437	-0.465
Statistics (NDs = DL/2)	0.329	0.325	0.609	-3.672	1.69	-0.46
Statistics (Gamma ROS Estimates)	5.206	5.016	0.373	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-1.649	1.046	-0.634

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.905	0.675	0.671	0.995

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.82	0.866	Data Not Normal
Lilliefors (Detects Only)	0.246	0.246	Data Not Normal
Lilliefors (NDs = DL)	0.467	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.477	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.0689	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.955	0.948	0.957	0.92

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.512	0.736	
Kolmogorov-Smirnov (Detects Only)	0.181	0.237	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	17.17	0.836	
Kolmogorov-Smirnov (NDs = DL)	0.422	0.107	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	18.08	0.858	
Kolmogorov-Smirnov (NDs = DL/2)	0.448	0.109	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	2.804	0.754	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.164	0.101	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.969	0.778	0.764	0.995

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.934	0.866	Data Appear Lognormal
Lilliefors (Detects Only)	0.158	0.246	Data Appear Lognormal
Lilliefors (NDs = DL)	0.327	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.348	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0689	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cadmium (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	11	2	15.38%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.7	0.7	0.7	0.7	0
Statistics (Detects Only)	11	1.5	3	2.295	2.4	0.487
Statistics (All: NDs treated as DL value)	13	0.7	3	2.05	2.2	0.746
Statistics (All: NDs treated as DL/2 value)	13	0.35	3	1.996	2.2	0.855
Statistics (Normal ROS Estimated Data)	13	1.002	3	2.116	2.2	0.627
Statistics (Gamma ROS Estimated Data)	13	1.343	3	2.172	2.2	0.541
Statistics (Lognormal ROS Estimated Data)	13	1.255	3	2.147	2.2	0.574

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	23.09	17.81	0.0994	0.809	0.223	0.275
Statistics (NDs = DL)	5.839	4.543	0.351	0.63	0.483	0.767
Statistics (NDs = DL/2)	3.131	2.46	0.637	0.523	0.727	1.39
Statistics (Gamma ROS Estimates)	16.72	12.92	0.13	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	0.728	0.284	0.39

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.987	0.964	0.942	0.987

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.961	0.85	Data Appear Normal
Lilliefors (Detects Only)	0.13	0.267	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.916	0.866	Data Appear Normal
Lilliefors (NDs = DL)	0.142	0.246	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.879	0.866	Data Appear Normal
Lilliefors (NDs = DL/2)	0.148	0.246	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.961	0.866	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.136	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS

Correlation Coefficient R	0.977	0.915	0.856	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.272	0.729	
Kolmogorov-Smirnov (Detects Only)	0.158	0.255	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.801	0.736	
Kolmogorov-Smirnov (NDs = DL)	0.176	0.237	Data appear Approximate Gamma Distribution
Anderson-Darling (NDs = DL/2)	1.35	0.739	
Kolmogorov-Smirnov (NDs = DL/2)	0.235	0.238	Data appear Approximate Gamma Distribution
Anderson-Darling (Gamma ROS Estimates)	0.299	0.733	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.152	0.236	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.979	0.9	0.835	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.948	0.85	Data Appear Lognormal
Lilliefors (Detects Only)	0.162	0.267	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.803	0.866	Data Not Lognormal
Lilliefors (NDs = DL)	0.202	0.246	Data Appear Lognormal
Shapiro-Wilks (NDs = DL/2)	0.696	0.866	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.282	0.246	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.939	0.866	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.159	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Chromium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	6.3	75.8	26.86	26	12.51

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.546	4.382	5.91	3.177	0.501	0.158

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.971	0.971	0.971	0.971

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0734	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.99	0.99	0.99	0.99

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.591	0.755	
Kolmogorov-Smirnov (Full: no NDs)	0.0909	0.101	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.984	0.984	0.984	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.122	0.0997	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Chromium (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	13	60	25.55	23	11.97

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	6.734	5.231	3.794	3.164	0.383	0.121

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.864	0.864	0.864	0.864

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.77	0.866	Data Not Normal
Lilliefors (Full: no NDs)	0.287	0.246	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.925	0.925	0.925	0.925

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.609	0.735	
Kolmogorov-Smirnov (Full: no NDs)	0.24	0.237	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.954	0.954	0.954	0.954

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.929	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.213	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cobalt (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	56	23	29.11%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	23	0.11	0.84	0.587	0.73	0.286
Statistics (Detects Only)	56	5.9	130	22.23	13.3	23.94
Statistics (All: NDs treated as DL value)	79	0.11	130	15.93	11.4	22.41
Statistics (All: NDs treated as DL/2 value)	79	0.055	130	15.84	11.4	22.47
Statistics (Normal ROS Estimated Data)	79	-40.83	130	8.784	11.4	29.44
Statistics (Gamma ROS Estimated Data)	79	1E-09	130	17.57	11.9	21.54
Statistics (Lognormal ROS Estimated Data)	79	1.86	130	16.76	11.4	21.87

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.78	1.721	12.49	2.795	0.701	0.251
Statistics (NDs = DL)	0.61	0.595	26.11	1.758	1.787	1.017
Statistics (NDs = DL/2)	0.523	0.511	30.31	1.556	2.08	1.337
Statistics (Gamma ROS Estimates)	0.504	0.494	34.83	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	2.331	0.947	0.406

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.767	0.788	0.789	0.923

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.263	0.118	Data Not Normal
Lilliefors (NDs = DL)	0.24	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.241	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.17	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.914	0.965	0.969	0.961

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	3.203	0.765	
Kolmogorov-Smirnov (Detects Only)	0.162	0.121	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	2.127	0.807	
Kolmogorov-Smirnov (NDs = DL)	0.155	0.105	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.851	0.816	
Kolmogorov-Smirnov (NDs = DL/2)	0.171	0.106	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	9.036	0.818	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.36	0.106	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.956	0.941	0.924	0.986

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.13	0.118	Data Not Lognormal
Lilliefors (NDs = DL)	0.213	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.251	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0915	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cobalt (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	7.8	15.9	12.32	12	2.346

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	27.22	20.99	0.453	2.493	0.206	0.0825

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.978	0.978	0.978	0.978

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.953	0.866	Data Appear Normal
Lilliefors (Full: no NDs)	0.147	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.965	0.965	0.965	0.965

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.413	0.733	
Kolmogorov-Smirnov (Full: no NDs)	0.163	0.236	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.958	0.958	0.958	0.958

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.918	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.177	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Copper (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	77	2	2.53%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.17	0.17	0.17	0.17	0
Statistics (Detects Only)	77	1.6	38.7	12.25	9.1	9.397
Statistics (All: NDs treated as DL value)	79	0.17	38.7	11.95	9	9.47
Statistics (All: NDs treated as DL/2 value)	79	0.085	38.7	11.94	9	9.473
Statistics (Normal ROS Estimated Data)	79	-11.93	38.7	11.67	9	9.957
Statistics (Gamma ROS Estimated Data)	79	1E-09	38.7	11.94	9	9.475
Statistics (Lognormal ROS Estimated Data)	79	0.988	38.7	11.97	9	9.441

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.754	1.696	6.985	2.194	0.828	0.378
Statistics (NDs = DL)	1.438	1.391	8.31	2.094	1.03	0.492
Statistics (NDs = DL/2)	1.381	1.337	8.649	2.076	1.101	0.53
Statistics (Gamma ROS Estimates)	0.698	0.68	17.1	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	2.141	0.882	0.412

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.941	0.944	0.944	0.961

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.152	0.101	Data Not Normal
Lilliefors (NDs = DL)	0.155	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.155	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.136	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.982	0.98	0.979	0.955

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.936	0.767	
Kolmogorov-Smirnov (Detects Only)	0.117	0.103	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	0.591	0.772	
Kolmogorov-Smirnov (NDs = DL)	0.0861	0.102	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.619	0.773	
Kolmogorov-Smirnov (NDs = DL/2)	0.0788	0.103	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	4.964	0.798	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.209	0.105	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.988	0.951	0.927	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Lilliefors (Detects Only)	0.082	0.101	Data Appear Lognormal
Lilliefors (NDs = DL)	0.0741	0.0997	Data Appear Lognormal
Lilliefors (NDs = DL/2)	0.0933	0.0997	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0707	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Copper (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	16	69	30.92	26	17.15

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.524	3.531	6.835	3.317	0.474	0.143

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.89	0.89	0.89	0.89

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.789	0.866	Data Not Normal
Lilliefors (Full: no NDs)	0.225	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.953	0.953	0.953	0.953

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.716	0.737	
Kolmogorov-Smirnov (Full: no NDs)	0.169	0.238	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.952	0.952	0.952	0.952

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.894	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.152	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Iron (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD

Statistics (Full: no NDs)	79	7250	67700	26963	25200	11990

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.607	4.441	5852	10.09	0.508	0.0503

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.979	0.979	0.979	0.979

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0648	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.984	0.984	0.984	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.831	0.755	
Kolmogorov-Smirnov (Full: no NDs)	0.082	0.101	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.97	0.97	0.97	0.97

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.115	0.0997	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Iron (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	21100	75500	34942	30600	13795

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	9.361	7.252	3733	10.41	0.324	0.0311

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.859	0.859	0.859	0.859

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.762	0.866	Data Not Normal
Lilliefors (Full: no NDs)	0.203	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.911	0.911	0.911	0.911

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.573	0.734	
Kolmogorov-Smirnov (Full: no NDs)	0.151	0.237	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.946	0.946	0.946	0.946

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.912	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.134	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Magnesium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	72	7	8.86%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	7	3.8	5	4.686	4.8	0.402
Statistics (Detects Only)	72	139	58100	6394	1270	12925
Statistics (All: NDs treated as DL value)	79	3.8	58100	5828	1080	12466
Statistics (All: NDs treated as DL/2 value)	79	1.9	58100	5827	1080	12466
Statistics (Normal ROS Estimated Data)	79	-19110	58100	4438	1080	13862
Statistics (Gamma ROS Estimated Data)	79	1E-09	58100	5827	1080	12466
Statistics (Lognormal ROS Estimated Data)	79	28.2	58100	5832	1080	12464

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	0.484	0.474	13216	7.443	1.571	0.211
Statistics (NDs = DL)	0.379	0.373	15366	6.92	2.257	0.326
Statistics (NDs = DL/2)	0.368	0.363	15828	6.859	2.409	0.351
Statistics (Gamma ROS Estimates)	0.198	0.199	29431	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	7.129	1.812	0.254

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.71	0.697	0.697	0.812

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.323	0.104	Data Not Normal
Lilliefors (NDs = DL)	0.321	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.321	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.29	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.943	0.948	0.949	0.956

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	4.255	0.821	
Kolmogorov-Smirnov (Detects Only)	0.17	0.111	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	2.668	0.847	
Kolmogorov-Smirnov (NDs = DL)	0.136	0.108	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.542	0.849	
Kolmogorov-Smirnov (NDs = DL/2)	0.129	0.108	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	7.068	0.912	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.298	0.111	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.962	0.948	0.992

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.0868	0.104	Data Appear Lognormal
Lilliefors (NDs = DL)	0.135	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.157	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0546	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Magnesium (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	2700	82800	28335	23000	23000

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.533	1.23	18484	9.891	0.974	0.0985

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.943	0.943	0.943	0.943

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.892	0.866	Data Appear Normal
Lilliefors (Full: no NDs)	0.172	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.992	0.992	0.992	0.992

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.169	0.75	
Kolmogorov-Smirnov (Full: no NDs)	0.135	0.241	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.98	0.98	0.98	0.98

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.96	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.159	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Manganese (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	16.7	2040	471.4	359	467.1

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.121	1.087	420.6	5.647	1.118	0.198

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.894	0.894	0.894	0.894

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.165	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.982	0.982	0.982	0.982

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.359	0.779	
Kolmogorov-Smirnov (Full: no NDs)	0.0515	0.103	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.985	0.985	0.985	0.985

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.093	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Manganese (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	517	1700	1003	918	352.9

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	9.178	7.111	109.3	6.856	0.346	0.0505

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.971	0.971	0.971	0.971

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.937	0.866	Data Appear Normal
Lilliefors (Full: no NDs)	0.163	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.988	0.988	0.988	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.222	0.734	
Kolmogorov-Smirnov (Full: no NDs)	0.123	0.237	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.991	0.991	0.991	0.991

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.977	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.113	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Mercury (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	18	61	77.22%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	61	0.019	0.06	0.0484	0.06	0.0158
Statistics (Detects Only)	18	0.038	1.2	0.187	0.125	0.259
Statistics (All: NDs treated as DL value)	79	0.019	1.2	0.0799	0.06	0.135
Statistics (All: NDs treated as DL/2 value)	79	0.0095	1.2	0.0612	0.03	0.139
Statistics (Normal ROS Estimated Data)	79	-1.214	1.2	-0.361	-0.372	0.403

Statistics (Gamma ROS Estimated Data)	79	0.038	1.2	0.173	0.156	0.138
Statistics (Lognormal ROS Estimated Data)	79	0.0007952	1.2	0.0541	0.0171	0.141

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.552	1.501	0.12	-2.035	0.727	-0.358
Statistics (NDs = DL)	1.645	1.591	0.0485	-2.861	0.681	-0.238
Statistics (NDs = DL/2)	0.962	0.934	0.0636	-3.396	0.902	-0.266
Statistics (Gamma ROS Estimates)	3.073	2.965	0.0563	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-4.029	1.44	-0.357

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.64	0.523	0.527	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.442	0.897	Data Not Normal
Lilliefors (Detects Only)	0.384	0.209	Data Not Normal
Lilliefors (NDs = DL)	0.356	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.361	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.067	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.801	0.683	0.741	0.816

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	1.702	0.756	
Kolmogorov-Smirnov (Detects Only)	0.274	0.207	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	6.715	0.768	
Kolmogorov-Smirnov (NDs = DL)	0.33	0.102	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	8.44	0.784	
Kolmogorov-Smirnov (NDs = DL/2)	0.377	0.104	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.725	0.759	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.0728	0.101	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.919	0.916	0.914	0.994

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.871	0.897	Data Not Lognormal
Lilliefors (Detects Only)	0.193	0.209	Data Appear Lognormal
Lilliefors (NDs = DL)	0.269	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.321	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.062	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Mercury (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	11	2	15.38%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.05	0.05	0.05	0.05	0
Statistics (Detects Only)	11	0.0345	0.088	0.0586	0.052	0.0208
Statistics (All: NDs treated as DL value)	13	0.0345	0.088	0.0573	0.05	0.0193
Statistics (All: NDs treated as DL/2 value)	13	0.025	0.088	0.0534	0.047	0.0228
Statistics (Normal ROS Estimated Data)	13	0.0345	0.088	0.056	0.0477	0.0202
Statistics (Gamma ROS Estimated Data)	13	0.0345	0.088	0.0571	0.052	0.0197
Statistics (Lognormal ROS Estimated Data)	13	0.0345	0.088	0.0559	0.047	0.0201

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	9.009	6.981	0.0065	-2.894	0.351	-0.121
Statistics (NDs = DL)	10.28	7.962	0.00557	-2.909	0.323	-0.111
Statistics (NDs = DL/2)	5.94	4.621	0.00899	-3.016	0.438	-0.145
Statistics (Gamma ROS Estimates)	9.721	7.529	0.00587	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-2.939	0.342	-0.116

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.947	0.942	0.96	0.936

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.869	0.85	Data Appear Normal
Lilliefors (Detects Only)	0.179	0.267	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.867	0.866	Data Appear Normal
Lilliefors (NDs = DL)	0.223	0.246	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.899	0.866	Data Appear Normal
Lilliefors (NDs = DL/2)	0.154	0.246	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.852	0.866	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.198	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.951	0.955	0.963	0.957

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.488	0.73	
Kolmogorov-Smirnov (Detects Only)	0.182	0.256	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.53	0.734	
Kolmogorov-Smirnov (NDs = DL)	0.195	0.237	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.34	0.736	
Kolmogorov-Smirnov (NDs = DL/2)	0.149	0.237	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.52	0.734	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.161	0.237	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.965	0.968	0.977	0.957

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.905	0.85	Data Appear Lognormal
Lilliefors (Detects Only)	0.168	0.267	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.918	0.866	Data Appear Lognormal
Lilliefors (NDs = DL)	0.173	0.246	Data Appear Lognormal
Shapiro-Wilks (NDs = DL/2)	0.933	0.866	Data Appear Lognormal
Lilliefors (NDs = DL/2)	0.131	0.246	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.892	0.866	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.174	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Nickel (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	61	18	22.78%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	18	0.21	1.4	1.066	1.3	0.466
Statistics (Detects Only)	61	4.6	94.2	17.95	13.2	15.68
Statistics (All: NDs treated as DL value)	79	0.21	94.2	14.1	9.4	15.49
Statistics (All: NDs treated as DL/2 value)	79	0.105	94.2	13.98	9.4	15.59
Statistics (Normal ROS Estimated Data)	79	-32.3	94.2	10.45	9.4	19.82
Statistics (Gamma ROS Estimated Data)	79	1E-09	94.2	14.69	9.8	15.1
Statistics (Lognormal ROS Estimated Data)	79	1.082	94.2	14.48	9.4	15.18

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.974	1.908	9.092	2.614	0.722	0.276
Statistics (NDs = DL)	0.89	0.865	15.85	1.989	1.367	0.687
Statistics (NDs = DL/2)	0.743	0.723	18.82	1.831	1.622	0.886
Statistics (Gamma ROS Estimates)	0.377	0.371	38.92	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	2.235	0.959	0.429

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.86	0.87	0.874	0.961

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.197	0.113	Data Not Normal
Lilliefors (NDs = DL)	0.185	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.187	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.156	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.969	0.99	0.992	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.996	0.763	
Kolmogorov-Smirnov (Detects Only)	0.096	0.115	Data appear Approximate Gamma Distribution
Anderson-Darling (NDs = DL)	0.633	0.787	
Kolmogorov-Smirnov (NDs = DL)	0.112	0.104	Data appear Approximate Gamma Distribution
Anderson-Darling (NDs = DL/2)	1.261	0.794	
Kolmogorov-Smirnov (NDs = DL/2)	0.135	0.104	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	11.39	0.847	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.343	0.108	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.986	0.963	0.942	0.997

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.087	0.113	Data Appear Lognormal
Lilliefors (NDs = DL)	0.14	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.198	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0586	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Nickel (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	15	34	22	21	5.625

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	18.2	14.05	1.209	3.063	0.241	0.0785

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.948	0.948	0.948	0.948

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.898	0.866	Data Appear Normal
Lilliefors (Full: no NDs)	0.263	0.246	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.97	0.97	0.97	0.97

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.445	0.733	
Kolmogorov-Smirnov (Full: no NDs)	0.239	0.236	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.974	0.974	0.974	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.944	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.223	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Potassium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	67	12	15.19%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	12	201	271	223.1	217	20.78
Statistics (Detects Only)	67	123	10900	1690	694	2232
Statistics (All: NDs treated as DL value)	79	123	10900	1467	618	2120
Statistics (All: NDs treated as DL/2 value)	79	100.5	10900	1450	618	2131
Statistics (Normal ROS Estimated Data)	79	-1878	10900	1235	618	2322
Statistics (Gamma ROS Estimated Data)	79	1E-09	10900	1433	618	2142
Statistics (Lognormal ROS Estimated Data)	79	104.7	10900	1456	618	2127

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	0.92	0.893	1837	6.798	1.115	0.164
Statistics (NDs = DL)	0.837	0.814	1752	6.586	1.143	0.174
Statistics (NDs = DL/2)	0.75	0.73	1933	6.481	1.273	0.196
Statistics (Gamma ROS Estimates)	0.163	0.165	8778	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	6.525	1.216	0.186

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.813	0.789	0.795	0.88

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.247	0.108	Data Not Normal
Lilliefors (NDs = DL)	0.263	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.263	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.21	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.972	0.968	0.974	0.962

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	1.945	0.784	
Kolmogorov-Smirnov (Detects Only)	0.153	0.112	Data Not Gamma Distributed

Anderson-Darling (NDs = DL)	3.288	0.789	
Kolmogorov-Smirnov (NDs = DL)	0.171	0.104	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.192	0.793	
Kolmogorov-Smirnov (NDs = DL/2)	0.147	0.104	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	14.88	0.944	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.392	0.113	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.989	0.973	0.983	0.98

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.0982	0.108	Data Appear Lognormal
Lilliefors (NDs = DL)	0.106	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.0732	0.0997	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0941	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Potassium (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	1180	3420	2077	2080	589.5

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	13.86	10.71	149.9	7.602	0.282	0.0371

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.975	0.975	0.975	0.975

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.959	0.866	Data Appear Normal
Lilliefors (Full: no NDs)	0.174	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.988	0.988	0.988	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.173	0.734	
Kolmogorov-Smirnov (Full: no NDs)	0.136	0.236	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS

Correlation Coefficient R	0.99	0.99	0.99	0.99

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.987	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.127	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Selenium (mg.kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	2	77	97.47%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	77	N/A	N/A	N/A	N/A	N/A
Statistics (Detects Only)	2	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL value)	79	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL/2 value)	79	N/A	N/A	N/A	N/A	N/A
Statistics (Normal ROS Estimated Data)	79	N/A	N/A	N/A	N/A	N/A

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	N/A	N/A	
Lilliefors (Detects Only)	N/A	N/A	
Lilliefors (NDs = DL)	N/A	N/A	
Lilliefors (NDs = DL/2)	N/A	N/A	
Lilliefors (Normal ROS Estimates)	N/A	N/A	

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	N/A	N/A	
Kolmogorov-Smirnov (Detects Only)	N/A	N/A	
Anderson-Darling (NDs = DL)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL)	N/A	N/A	
Anderson-Darling (NDs = DL/2)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL/2)	N/A	N/A	
Anderson-Darling (Gamma ROS Estimates)	N/A	N/A	
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	N/A	

Note: Substitution methods such as DL or DL/2 are not recommended.

Selenium (mg.kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	11	2	15.38%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.25	0.25	0.25	0.25	0
Statistics (Detects Only)	11	0.51	1.3	0.729	0.67	0.227
Statistics (All: NDs treated as DL value)	13	0.25	1.3	0.655	0.62	0.274
Statistics (All: NDs treated as DL/2 value)	13	0.125	1.3	0.636	0.62	0.307
Statistics (Normal ROS Estimated Data)	13	0.159	1.3	0.649	0.62	0.284
Statistics (Gamma ROS Estimated Data)	13	0.374	1.3	0.682	0.62	0.237
Statistics (Lognormal ROS Estimated Data)	13	0.34	1.3	0.673	0.62	0.248

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	13.59	10.51	0.0536	-0.354	0.276	-0.78
Statistics (NDs = DL)	5.746	4.471	0.114	-0.513	0.462	-0.902
Statistics (NDs = DL/2)	3.162	2.484	0.201	-0.619	0.695	-1.123
Statistics (Gamma ROS Estimates)	10.35	8.013	0.0659	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.455	0.353	-0.777

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.908	0.959	0.958	0.966

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.837	0.85	Data Not Normal
Lilliefors (Detects Only)	0.195	0.267	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.932	0.866	Data Appear Normal
Lilliefors (NDs = DL)	0.145	0.246	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.929	0.866	Data Appear Normal
Lilliefors (NDs = DL/2)	0.187	0.246	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.95	0.866	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.158	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.945	0.971	0.944	0.966

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.416	0.729	
Kolmogorov-Smirnov (Detects Only)	0.148	0.255	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.428	0.736	
Kolmogorov-Smirnov (NDs = DL)	0.178	0.237	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.936	0.739	
Kolmogorov-Smirnov (NDs = DL/2)	0.272	0.238	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.273	0.734	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.117	0.237	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.958	0.95	0.879	0.986

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.92	0.85	Data Appear Lognormal
Lilliefors (Detects Only)	0.136	0.267	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.907	0.866	Data Appear Lognormal
Lilliefors (NDs = DL)	0.21	0.246	Data Appear Lognormal
Shapiro-Wilks (NDs = DL/2)	0.78	0.866	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.315	0.246	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.98	0.866	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.114	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Silver (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	1	78	98.73%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver (mg/kg) (rfaap bkgrd ts) was not processed!

Silver (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	11	2	15.38%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.589	0.589	0.589	0.589	0
Statistics (Detects Only)	11	0.068	1.45	0.293	0.13	0.432
Statistics (All: NDs treated as DL value)	13	0.068	1.45	0.339	0.13	0.41
Statistics (All: NDs treated as DL/2 value)	13	0.068	1.45	0.294	0.13	0.395
Statistics (Normal ROS Estimated Data)	13	0.0615	1.45	0.278	0.13	0.4
Statistics (Gamma ROS Estimated Data)	13	0.068	1.45	0.293	0.13	0.395
Statistics (Lognormal ROS Estimated Data)	13	0.068	1.45	0.269	0.13	0.399

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	0.988	0.812	0.297	-1.811	0.969	-0.535
Statistics (NDs = DL)	1.076	0.879	0.315	-1.614	1.007	-0.624
Statistics (NDs = DL/2)	1.148	0.935	0.256	-1.72	0.912	-0.53
Statistics (Gamma ROS Estimates)	1.145	0.932	0.256	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-1.851	0.901	-0.487

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.738	0.825	0.762	0.748

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Shapiro-Wilks (Detects Only)	0.564	0.85	Data Not Normal
Lilliefors (Detects Only)	0.439	0.267	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.691	0.866	Data Not Normal
Lilliefors (NDs = DL)	0.361	0.246	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.601	0.866	Data Not Normal
Lilliefors (NDs = DL/2)	0.345	0.246	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.58	0.866	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.385	0.246	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.926	0.967	0.936	0.937

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	1.711	0.752	
Kolmogorov-Smirnov (Detects Only)	0.396	0.262	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	1.253	0.756	
Kolmogorov-Smirnov (NDs = DL)	0.33	0.243	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.296	0.755	
Kolmogorov-Smirnov (NDs = DL/2)	0.296	0.242	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	1.298	0.755	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.295	0.242	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.867	0.924	0.924	0.866

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.758	0.85	Data Not Lognormal
Lilliefors (Detects Only)	0.327	0.267	Data Not Lognormal
Shapiro-Wilks (NDs = DL)	0.844	0.866	Data Not Lognormal
Lilliefors (NDs = DL)	0.278	0.246	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.855	0.866	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.241	0.246	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.758	0.866	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.289	0.246	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Sodium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	6	73	92.41%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	73	10.8	25.9	15.02	12	4.717
Statistics (Detects Only)	6	114	151	131.7	127	14.76
Statistics (All: NDs treated as DL value)	79	10.8	151	23.88	12.1	31.65
Statistics (All: NDs treated as DL/2 value)	79	5.4	151	16.94	6.05	33.39
Statistics (Normal ROS Estimated Data)	79	-8.416	151	43.69	36.98	33.18

Statistics (Gamma ROS Estimated Data)	79	114	151	131.6	131.6	3.738
Statistics (Lognormal ROS Estimated Data)	79	45.83	151	70.08	64.41	20.82

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	97.1	93.42	1.356	4.875	0.111	0.0227
Statistics (NDs = DL)	1.618	1.565	14.76	2.833	0.653	0.23
Statistics (NDs = DL/2)	0.916	0.889	18.5	2.193	0.823	0.376
Statistics (Gamma ROS Estimates)	1276	1227	0.103	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	4.216	0.249	0.059

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.957	0.639	0.59	0.936

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.901	0.788	Data Appear Normal
Lilliefors (Detects Only)	0.212	0.362	Data Appear Normal
Lilliefors (NDs = DL)	0.404	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.472	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.2	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.959	0.811	0.809	0.571

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.389	0.696	
Kolmogorov-Smirnov (Detects Only)	0.22	0.332	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	13.6	0.769	
Kolmogorov-Smirnov (NDs = DL)	0.302	0.102	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	17.64	0.786	
Kolmogorov-Smirnov (NDs = DL/2)	0.386	0.104	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	22.97	0.749	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.448	0.1	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.963	0.798	0.753	0.936

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.913	0.788	Data Appear Lognormal
Lilliefors (Detects Only)	0.198	0.362	Data Appear Lognormal
Lilliefors (NDs = DL)	0.246	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.27	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.2	0.0997	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Sodium (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	12	1	7.69%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Detects Only)	12	36	2040	663.8	363	737.2
Statistics (All: NDs treated as DL value)	13	36	2040	620.5	215	722.9
Statistics (All: NDs treated as DL/2 value)	13	36	2040	616.6	215	726.1
Statistics (Normal ROS Estimated Data)	13	-43.12	2040	609.5	215	732.5
Statistics (Gamma ROS Estimated Data)	13	1E-09	2040	612.8	215	729.4
Statistics (Lognormal ROS Estimated Data)	13	36	2040	617.5	215	725.3

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	0.739	0.62	898	5.687	1.488	0.262
Statistics (NDs = DL)	0.727	0.61	853.5	5.603	1.456	0.26
Statistics (NDs = DL/2)	0.692	0.584	890.5	5.55	1.507	0.272
Statistics (Gamma ROS Estimates)	0.256	0.248	2393	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	5.566	1.49	0.268

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.907	0.893	0.893	0.902

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.807	0.859	Data Not Normal
Lilliefors (Detects Only)	0.241	0.256	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.784	0.866	Data Not Normal
Lilliefors (NDs = DL)	0.251	0.246	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.783	0.866	Data Not Normal
Lilliefors (NDs = DL/2)	0.248	0.246	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.801	0.866	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.243	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.946	0.951	0.949	0.89

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.433	0.766	
Kolmogorov-Smirnov (Detects Only)	0.157	0.255	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.511	0.772	
Kolmogorov-Smirnov (NDs = DL)	0.176	0.246	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.574	0.775	
Kolmogorov-Smirnov (NDs = DL/2)	0.168	0.247	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	1.325	0.847	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.299	0.259	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.969	0.972	0.962	0.966

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.913	0.859	Data Appear Lognormal
Lilliefors (Detects Only)	0.144	0.256	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.919	0.866	Data Appear Lognormal
Lilliefors (NDs = DL)	0.138	0.246	Data Appear Lognormal
Shapiro-Wilks (NDs = DL/2)	0.898	0.866	Data Appear Lognormal
Lilliefors (NDs = DL/2)	0.169	0.246	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.906	0.866	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.148	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Thallium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	15	64	81.01%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	64	0.13	0.45	0.189	0.15	0.0931
Statistics (Detects Only)	15	1.3	5	2.527	2.2	0.932
Statistics (All: NDs treated as DL value)	79	0.13	5	0.633	0.16	1.007
Statistics (All: NDs treated as DL/2 value)	79	0.065	5	0.556	0.08	1.039
Statistics (Normal ROS Estimated Data)	79	-4.787	5	-0.573	-0.722	1.972
Statistics (Gamma ROS Estimated Data)	79	1.3	5	2.489	2.468	0.399
Statistics (Lognormal ROS Estimated Data)	79	0.155	5	0.998	0.707	0.884

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	8.698	8.377	0.29	0.868	0.352	0.405
Statistics (NDs = DL)	0.753	0.733	0.841	-1.253	1.097	-0.876
Statistics (NDs = DL/2)	0.515	0.504	1.08	-1.814	1.358	-0.748
Statistics (Gamma ROS Estimates)	44.1	42.44	0.0564	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.291	0.738	-2.538

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.938	0.746	0.729	0.991

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.893	0.881	Data Appear Normal
Lilliefors (Detects Only)	0.17	0.229	Data Appear Normal
Lilliefors (NDs = DL)	0.382	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.435	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.0779	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.964	0.943	0.944	0.777

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.367	0.738	
Kolmogorov-Smirnov (Detects Only)	0.145	0.222	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	12.86	0.793	
Kolmogorov-Smirnov (NDs = DL)	0.361	0.104	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	14.62	0.817	
Kolmogorov-Smirnov (NDs = DL/2)	0.371	0.106	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	10.13	0.749	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.319	0.1	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.835	0.815	0.99

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.959	0.881	Data Appear Lognormal
Lilliefors (Detects Only)	0.134	0.229	Data Appear Lognormal
Lilliefors (NDs = DL)	0.334	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.34	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0779	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Thallium (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	11	2	15.38%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	6.62	6.62	6.62	6.62	0
Statistics (Detects Only)	11	0.15	0.44	0.225	0.22	0.0788
Statistics (All: NDs treated as DL value)	13	0.15	6.62	1.209	0.22	2.402
Statistics (All: NDs treated as DL/2 value)	13	0.15	3.31	0.7	0.22	1.161
Statistics (Normal ROS Estimated Data)	13	0.15	0.44	0.225	0.22	0.0733
Statistics (Gamma ROS Estimated Data)	13	0.15	0.44	0.227	0.22	0.0731
Statistics (Lognormal ROS Estimated Data)	13	0.15	0.44	0.224	0.22	0.073

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	11.79	9.121	0.0191	-1.533	0.291	-0.19
Statistics (NDs = DL)	0.527	0.457	2.295	-1.006	1.312	-1.305
Statistics (NDs = DL/2)	0.787	0.656	0.89	-1.113	1.059	-0.952
Statistics (Gamma ROS Estimates)	13.39	10.35	0.0169	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-1.533	0.271	-0.177

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.856	0.679	0.697	0.862

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Shapiro-Wilks (Detects Only)	0.758	0.85	Data Not Normal
Lilliefors (Detects Only)	0.245	0.267	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.468	0.866	Data Not Normal
Lilliefors (NDs = DL)	0.472	0.246	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.493	0.866	Data Not Normal
Lilliefors (NDs = DL/2)	0.435	0.246	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.768	0.866	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.242	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.903	0.879	0.875	0.909

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.618	0.729	
Kolmogorov-Smirnov (Detects Only)	0.195	0.255	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	2.975	0.788	
Kolmogorov-Smirnov (NDs = DL)	0.425	0.249	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.675	0.768	
Kolmogorov-Smirnov (NDs = DL/2)	0.408	0.245	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.563	0.734	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.177	0.237	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.933	0.782	0.807	0.932

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.887	0.85	Data Appear Lognormal
Lilliefors (Detects Only)	0.177	0.267	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.615	0.866	Data Not Lognormal
Lilliefors (NDs = DL)	0.372	0.246	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.652	0.866	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.357	0.246	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.888	0.866	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.17	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Vanadium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	12.2	114	45.84	41.4	20.38

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.973	4.792	9.218	3.721	0.477	0.128

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.98	0.98	0.98	0.98

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0967	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.997	0.997	0.997	0.997

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.228	0.754	
Kolmogorov-Smirnov (Full: no NDs)	0.054	0.101	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.988	0.988	0.988	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0843	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Vanadium (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	29	69	44.96	48.7	11.36

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	17.19	13.27	2.616	3.776	0.253	0.067

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.969	0.969	0.969	0.969

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.938	0.866	Data Appear Normal
Lilliefors (Full: no NDs)	0.167	0.246	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.975	0.975	0.975	0.975

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.393	0.733	
Kolmogorov-Smirnov (Full: no NDs)	0.2	0.236	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.977	0.977	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.95	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.206	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Zinc (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	4.7	598	54.94	30.2	87.15

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.083	1.05	50.74	3.478	0.93	0.267

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.683	0.683	0.683	0.683

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.291	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.88	0.88	0.88	0.88

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	3.363	0.78	
Kolmogorov-Smirnov (Full: no NDs)	0.145	0.103	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.982	0.982	0.982	0.982

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0696	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Zinc (mg/kg) (swmu 41a - ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	13	0	13	13	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	13	65	1490	309	241	378.9

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.302	1.053	237.3	5.303	0.898	0.169

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.769	0.769	0.769	0.769

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.617	0.866	Data Not Normal
Lilliefors (Full: no NDs)	0.296	0.246	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.918	0.918	0.918	0.918

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.805	0.753	
Kolmogorov-Smirnov (Full: no NDs)	0.236	0.242	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.949	0.949	0.949	0.949

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.901	0.866	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.236	0.246	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Appendix E-8

Background Comparisons – ProUCL 4.0 Output – SWMU 41B

Goodness-of-Fit Test Statistics for Data Sets with Non-Detects

User Selected Options **mg/kg**

From File H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst

Full Precision OFF

Confidence Coefficient 0.95

Aluminum (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	3620	20100	8300	6705	4279

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.541	4.078	1828	8.91	0.477	0.0535

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.935	0.935	0.935	0.935

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.871	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.208	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.982	0.982	0.982	0.982

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.741	0.749	
Kolmogorov-Smirnov (Full: no NDs)	0.171	0.166	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.98	0.98	0.98	0.98

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.948	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.142	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Aluminum (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	14400	27150	20444	21300	4448

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	23.3	14.64	877.6	9.904	0.225	0.0227

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.983	0.983	0.983	0.983

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.954	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.184	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.979	0.979	0.979	0.979

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.293	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.213	0.294	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.977	0.977	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.94	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.219	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Antimony (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	14	14	0	14	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Antimony (rfaap bkgrd-ss) was not processed!

Antimony (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	0.47	0.7	0.566	0.55	0.0776

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	62.99	39.45	0.00899	-0.577	0.134	-0.232

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.979	0.979	0.979	0.979

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.952	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.156	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.987	0.987	0.987	0.987

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.211	0.715	
Kolmogorov-Smirnov (Full: no NDs)	0.143	0.293	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.988	0.988	0.988	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.97	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.134	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Arsenic (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	1.5	10.2	3.732	2.75	2.33

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	3.494	3.143	1.068	1.167	0.532	0.456

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.898	0.898	0.898	0.898

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.803	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.203	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.969	0.969	0.969	0.969

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	1.02	0.752	
Kolmogorov-Smirnov (Full: no NDs)	0.165	0.166	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.972	0.972	0.972	0.972

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.932	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.138	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Arsenic (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	14	23	19.38	20.5	3.543

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	30.59	19.2	0.633	2.948	0.199	0.0677

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.923	0.923	0.923	0.923

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.833	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.208	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.901	0.901	0.901	0.901

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.756	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.231	0.294	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.904	0.904	0.904	0.904

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.799	0.818	Data Not Lognormal
Lilliefors (Full: no NDs)	0.244	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Barium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	24	4	14.29%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	4	0.36	1	0.683	0.685	0.367
Statistics (Detects Only)	24	23.4	174	75.55	61.85	43.2
Statistics (All: NDs treated as DL value)	28	0.36	174	64.85	58.65	47.97
Statistics (All: NDs treated as DL/2 value)	28	0.18	174	64.8	58.65	48.04
Statistics (Normal ROS Estimated Data)	28	-33.62	174	61.51	58.65	53.13
Statistics (Gamma ROS Estimated Data)	28	1E-09	174	66.05	58.65	46.43
Statistics (Lognormal ROS Estimated Data)	28	14.2	174	67.13	58.65	45.07

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	3.215	2.894	23.5	4.161	0.597	0.144
Statistics (NDs = DL)	0.867	0.798	74.79	3.495	1.762	0.504
Statistics (NDs = DL/2)	0.769	0.711	84.25	3.396	1.997	0.588
Statistics (Gamma ROS Estimates)	0.566	0.529	116.7	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	3.967	0.734	0.185

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.963	0.976	0.976	0.989

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.917	0.916	Data Appear Normal
Lilliefors (Detects Only)	0.192	0.181	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.941	0.924	Data Appear Normal
Lilliefors (NDs = DL)	0.153	0.167	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.941	0.924	Data Appear Normal
Lilliefors (NDs = DL/2)	0.153	0.167	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.971	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.127	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.986	0.947	0.939	0.927

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.354	0.751	
Kolmogorov-Smirnov (Detects Only)	0.127	0.179	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.516	0.78	
Kolmogorov-Smirnov (NDs = DL)	0.191	0.171	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.873	0.784	
Kolmogorov-Smirnov (NDs = DL/2)	0.217	0.172	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	3.326	0.804	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.279	0.174	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.987	0.853	0.833	0.985

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.959	0.916	Data Appear Lognormal
Lilliefors (Detects Only)	0.104	0.181	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.725	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.28	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.691	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.309	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.955	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.11	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Barium (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	58	281	109.3	82.5	73.96

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	3.786	2.449	28.86	4.556	0.512	0.112

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.809	0.809	0.809	0.809

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.676	0.818	Data Not Normal
Lilliefors (Full: no NDs)	0.384	0.313	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.906	0.906	0.906	0.906

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.93	0.719	
Kolmogorov-Smirnov (Full: no NDs)	0.373	0.296	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.894	0.894	0.894	0.894

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.813	0.818	Data Not Lognormal
Lilliefors (Full: no NDs)	0.347	0.313	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Beryllium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	15	13	46.43%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	13	0.022	0.03	0.0278	0.03	0.00339
Statistics (Detects Only)	15	0.61	1.5	0.887	0.87	0.246
Statistics (All: NDs treated as DL value)	28	0.022	1.5	0.488	0.615	0.471
Statistics (All: NDs treated as DL/2 value)	28	0.011	1.5	0.481	0.615	0.477
Statistics (Normal ROS Estimated Data)	28	-0.178	1.5	0.577	0.615	0.402
Statistics (Gamma ROS Estimated Data)	28	0.498	1.5	0.87	0.879	0.206
Statistics (Lognormal ROS Estimated Data)	28	0.276	1.5	0.674	0.615	0.297

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	15.44	13.81	0.0574	-0.153	0.26	-1.698
Statistics (NDs = DL)	0.6	0.559	0.814	-1.748	1.757	-1.005
Statistics (NDs = DL/2)	0.478	0.45	1.008	-2.07	2.107	-1.018
Statistics (Gamma ROS Estimates)	19.32	17.28	0.045	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.483	0.427	-0.884

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.952	0.917	0.916	0.993

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.908	0.881	Data Appear Normal
Lilliefors (Detects Only)	0.151	0.229	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.826	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.299	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.823	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.3	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.984	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.0906	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.978	0.872	0.849	0.982

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.307	0.736	
Kolmogorov-Smirnov (Detects Only)	0.159	0.221	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	3.179	0.8	
Kolmogorov-Smirnov (NDs = DL)	0.312	0.174	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	3.391	0.815	
Kolmogorov-Smirnov (NDs = DL/2)	0.314	0.175	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.229	0.745	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.102	0.165	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.98	0.868	0.86	0.994

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.953	0.881	Data Appear Lognormal
Lilliefors (Detects Only)	0.15	0.229	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.731	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.306	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.715	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.308	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.981	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0909	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Beryllium (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	0.097	0.97	0.598	0.668	0.335

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	2.287	1.512	0.261	-0.749	0.846	-1.129

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.968	0.968	0.968	0.968

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.913	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.191	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.885	0.885	0.885	0.885

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.53	0.723	
Kolmogorov-Smirnov (Full: no NDs)	0.228	0.297	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.917	0.917	0.917	0.917

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.833	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.216	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cadmium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	2	26	92.86%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	26	N/A	N/A	N/A	N/A	N/A
Statistics (Detects Only)	2	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL value)	28	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL/2 value)	28	N/A	N/A	N/A	N/A	N/A
Statistics (Normal ROS Estimated Data)	28	N/A	N/A	N/A	N/A	N/A

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	N/A	N/A	
Lilliefors (Detects Only)	N/A	N/A	
Shapiro-Wilks (NDs = DL)	N/A	N/A	
Lilliefors (NDs = DL)	N/A	N/A	
Shapiro-Wilks (NDs = DL/2)	N/A	N/A	
Lilliefors (NDs = DL/2)	N/A	N/A	
Shapiro-Wilks (Normal ROS Estimates)	N/A	N/A	
Lilliefors (Normal ROS Estimates)	N/A	N/A	

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	N/A	N/A	
Kolmogorov-Smirnov (Detects Only)	N/A	N/A	
Anderson-Darling (NDs = DL)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL)	N/A	N/A	
Anderson-Darling (NDs = DL/2)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL/2)	N/A	N/A	
Anderson-Darling (Gamma ROS Estimates)	N/A	N/A	
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	N/A	

Note: Substitution methods such as DL or DL/2 are not recommended.

Cadmium (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	1.6	3.5	2.65	2.75	0.711

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	14.51	9.154	0.183	0.94	0.29	0.308

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.976	0.976	0.976	0.976

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.931	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.153	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.957	0.957	0.957	0.957

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.328	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.188	0.294	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.964	0.964	0.964	0.964

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.912	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.198	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Calcium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	23	5	17.86%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	5	4.6	6.6	5.12	4.8	0.844
Statistics (Detects Only)	23	116	7340	1197	885	1440
Statistics (All: NDs treated as DL value)	28	4.6	7340	983.9	761.5	1380
Statistics (All: NDs treated as DL/2 value)	28	2.3	7340	983.5	761.5	1380
Statistics (Normal ROS Estimated Data)	28	-1605	7340	751.5	761.5	1625
Statistics (Gamma ROS Estimated Data)	28	1E-09	7340	984.5	761.5	1380
Statistics (Lognormal ROS Estimated Data)	28	104.3	7340	1007	761.5	1364

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.506	1.368	794.6	6.72	0.84	0.125
Statistics (NDs = DL)	0.575	0.537	1712	5.81	2.128	0.366
Statistics (NDs = DL/2)	0.523	0.491	1879	5.686	2.383	0.419
Statistics (Gamma ROS Estimates)	0.178	0.183	5519	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	6.391	1.047	0.164

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.724	0.745	0.746	0.855

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.553	0.914	Data Not Normal
Lilliefors (Detects Only)	0.275	0.185	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.587	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.244	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.587	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.244	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.761	0.924	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.207	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.866	0.916	0.919	0.944

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.694	0.76	
Kolmogorov-Smirnov (Detects Only)	0.152	0.185	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.232	0.803	
Kolmogorov-Smirnov (NDs = DL)	0.192	0.174	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.47	0.808	
Kolmogorov-Smirnov (NDs = DL/2)	0.211	0.175	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	6.572	0.907	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.417	0.184	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.974	0.886	0.869	0.976

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.967	0.914	Data Appear Lognormal
Lilliefors (Detects Only)	0.0979	0.185	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.779	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.279	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.75	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.296	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.949	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.114	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Calcium (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	28400	154000	97625	90550	44067

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.466	2.875	21860	11.37	0.559	0.0491

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.967	0.967	0.967	0.967

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.925	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.203	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.936	0.936	0.936	0.936

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.406	0.719	
Kolmogorov-Smirnov (Full: no NDs)	0.199	0.295	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.935	0.935	0.935	0.935

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.878	0.818	Data Appear Lognormal

Lilliefors (Full: no NDs)	0.213	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Chromium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	6.3	53.3	21.09	22.4	10.5

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.111	3.695	5.13	2.922	0.529	0.181

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.956	0.956	0.956	0.956

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.92	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.11	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.974	0.974	0.974	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.612	0.75	
Kolmogorov-Smirnov (Full: no NDs)	0.145	0.166	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.974	0.974	0.974	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.946	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.17	0.167	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Chromium (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	12	23	18.13	18	4.291

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV

Statistics (Full: no NDs)	19.52	12.28	0.928	2.871	0.246	0.0858

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.968	0.968	0.968	0.968

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.911	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.192	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.954	0.954	0.954	0.954

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.346	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.206	0.294	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.969	0.969	0.969	0.969

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.917	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.189	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cobalt (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	20	8	28.57%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	8	0.11	0.75	0.501	0.72	0.319
Statistics (Detects Only)	20	5.9	45.4	15.95	12.1	10.07
Statistics (All: NDs treated as DL value)	28	0.11	45.4	11.53	10.15	11.04
Statistics (All: NDs treated as DL/2 value)	28	0.055	45.4	11.46	10.15	11.11
Statistics (Normal ROS Estimated Data)	28	-10.02	45.4	9.494	10.15	13.45
Statistics (Gamma ROS Estimated Data)	28	3.774	45.4	13.39	10.15	9.473
Statistics (Lognormal ROS Estimated Data)	28	3.134	45.4	12.48	10.15	10.13

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	3.439	3.095	4.636	2.617	0.545	0.208
Statistics (NDs = DL)	0.701	0.65	16.45	1.583	1.793	1.132
Statistics (NDs = DL/2)	0.588	0.549	19.49	1.385	2.092	1.51
Statistics (Gamma ROS Estimates)	2.851	2.569	4.697	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	2.25	0.749	0.333

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.901	0.93	0.93	0.968

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.819	0.905	Data Not Normal
Lilliefors (Detects Only)	0.236	0.198	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.867	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.158	0.167	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.867	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.156	0.167	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.936	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.128	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.973	0.98	0.973	0.967

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.596	0.747	
Kolmogorov-Smirnov (Detects Only)	0.167	0.195	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.122	0.79	
Kolmogorov-Smirnov (NDs = DL)	0.195	0.172	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.507	0.801	
Kolmogorov-Smirnov (NDs = DL/2)	0.221	0.174	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.785	0.754	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.155	0.167	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.982	0.918	0.903	0.983

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.96	0.905	Data Appear Lognormal
Lilliefors (Detects Only)	0.132	0.198	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.831	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.257	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.802	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.288	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.954	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.126	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cobalt (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	7.2	12	9.525	9.45	2.153

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	22.17	13.94	0.43	2.231	0.228	0.102

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.913	0.913	0.913	0.913

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.8	0.818	Data Not Normal
Lilliefors (Full: no NDs)	0.275	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.908	0.908	0.908	0.908

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.843	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.283	0.294	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.913	0.913	0.913	0.913

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.801	0.818	Data Not Lognormal
Lilliefors (Full: no NDs)	0.267	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Copper (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	26	2	7.14%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.17	0.17	0.17	0.17	0
Statistics (Detects Only)	26	2.2	13.6	6.919	5.35	3.696
Statistics (All: NDs treated as DL value)	28	0.17	13.6	6.437	5.2	3.973
Statistics (All: NDs treated as DL/2 value)	28	0.085	13.6	6.431	5.2	3.983
Statistics (Normal ROS Estimated Data)	28	-2.356	13.6	6.306	5.2	4.214
Statistics (Gamma ROS Estimated Data)	28	1E-09	13.6	6.44	5.2	3.969
Statistics (Lognormal ROS Estimated Data)	28	1.502	13.6	6.545	5.2	3.814

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	3.738	3.361	1.851	1.795	0.544	0.303
Statistics (NDs = DL)	1.699	1.541	3.788	1.54	1.072	0.696

Statistics (NDs = DL/2)	1.493	1.357	4.307	1.49	1.234	0.828
Statistics (Gamma ROS Estimates)	0.633	0.589	10.17	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	1.703	0.623	0.366

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.947	0.966	0.967	0.973

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.88	0.92	Data Not Normal
Lilliefors (Detects Only)	0.206	0.174	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.919	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.181	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.92	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.18	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.939	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.164	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.96	0.946	0.941	0.888

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.717	0.749	
Kolmogorov-Smirnov (Detects Only)	0.151	0.172	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.918	0.761	
Kolmogorov-Smirnov (NDs = DL)	0.152	0.168	Data appear Approximate Gamma Distribution
Anderson-Darling (NDs = DL/2)	1.191	0.763	
Kolmogorov-Smirnov (NDs = DL/2)	0.177	0.168	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	3.942	0.797	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.345	0.173	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.861	0.825	0.983

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.939	0.92	Data Appear Lognormal
Lilliefors (Detects Only)	0.135	0.174	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.748	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.222	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.69	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.258	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.952	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.118	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Copper (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	31	57	43.5	40	9.396

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	24.87	15.63	1.749	3.753	0.215	0.0572

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.963	0.963	0.963	0.963

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.912	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.221	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.966	0.966	0.966	0.966

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.391	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.223	0.294	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.97	0.97	0.97	0.97

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.928	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.204	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Iron (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	7250	63000	20108	19750	11869

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	3.411	3.069	5895	9.755	0.57	0.0584

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.912	0.912	0.912	0.912

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.846	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.139	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.961	0.961	0.961	0.961

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.612	0.752	
Kolmogorov-Smirnov (Full: no NDs)	0.151	0.166	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.97	0.97	0.97	0.97

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.932	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.153	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Iron (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	29500	47450	36794	36650	5754

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	48.33	30.29	761.2	10.5	0.153	0.0146

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.96	0.96	0.96	0.96

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.927	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.194	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.968	0.968	0.968	0.968

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.34	0.715	
Kolmogorov-Smirnov (Full: no NDs)	0.195	0.293	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.971	0.971	0.971	0.971

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.945	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.191	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Lead (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	8.9	225	26.96	15.15	41.34

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.456	1.324	18.52	2.913	0.702	0.241

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.619	0.619	0.619	0.619

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.416	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.375	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.807	0.807	0.807	0.807

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	3.163	0.764	
Kolmogorov-Smirnov (Full: no NDs)	0.253	0.169	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.886	0.886	0.886	0.886

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.798	0.924	Data Not Lognormal
Lilliefors (Full: no NDs)	0.192	0.167	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Lead (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	33	75	43.56	41	13.3

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	15.83	9.978	2.752	3.742	0.254	0.068

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.82	0.82	0.82	0.82

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.7	0.818	Data Not Normal
Lilliefors (Full: no NDs)	0.347	0.313	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.867	0.867	0.867	0.867

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.87	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.308	0.294	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.877	0.877	0.877	0.877

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.793	0.818	Data Not Lognormal
Lilliefors (Full: no NDs)	0.292	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Magnesium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	25	3	10.71%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	3	4.7	5	4.833	4.8	0.153
Statistics (Detects Only)	25	158	20400	2498	913	4334
Statistics (All: NDs treated as DL value)	28	4.7	20400	2231	741	4161
Statistics (All: NDs treated as DL/2 value)	28	2.35	20400	2230	741	4161

Statistics (Normal ROS Estimated Data)	28	-5148	20400	1678	741	4743
Statistics (Gamma ROS Estimated Data)	28	1E-09	20400	2230	741	4161
Statistics (Lognormal ROS Estimated Data)	28	56.13	20400	2236	741	4158

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	0.694	0.643	3600	6.951	1.272	0.183
Statistics (NDs = DL)	0.479	0.451	4657	6.375	2.075	0.325
Statistics (NDs = DL/2)	0.457	0.432	4879	6.301	2.257	0.358
Statistics (Gamma ROS Estimates)	0.198	0.201	11267	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	6.638	1.512	0.228

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.731	0.721	0.721	0.836

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.558	0.918	Data Not Normal
Lilliefors (Detects Only)	0.303	0.177	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.546	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.299	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.546	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.299	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.729	0.924	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.267	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.946	0.959	0.961	0.987

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	1.247	0.789	
Kolmogorov-Smirnov (Detects Only)	0.183	0.182	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	0.674	0.815	
Kolmogorov-Smirnov (NDs = DL)	0.131	0.175	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.681	0.82	
Kolmogorov-Smirnov (NDs = DL/2)	0.141	0.176	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	3.847	0.898	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.366	0.183	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.978	0.943	0.925	0.99

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.95	0.918	Data Appear Lognormal
Lilliefors (Detects Only)	0.107	0.177	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.889	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.195	0.167	Data Not Lognormal

Shapiro-Wilks (NDs = DL/2)	0.856	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.22	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.973	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0849	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Magnesium (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	20900	58000	39675	37600	13529

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	9.219	5.845	4304	10.53	0.364	0.0346

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.976	0.976	0.976	0.976

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.935	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.151	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.967	0.967	0.967	0.967

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.283	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.172	0.294	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.973	0.973	0.973	0.973

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.932	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.198	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Manganese (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD

Statistics (Full: no NDs)	28	43	2040	695.9	490	591.5

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.442	1.311	482.6	6.16	0.971	0.158

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.923	0.923	0.923	0.923

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.84	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.197	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.971	0.971	0.971	0.971

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.306	0.764	
Kolmogorov-Smirnov (Full: no NDs)	0.102	0.169	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.983	0.983	0.983	0.983

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.962	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.106	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Manganese (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	912	2340	1364	1275	453.1

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	12.21	7.715	111.7	7.177	0.298	0.0415

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.921	0.921	0.921	0.921

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.86	0.818	Data Appear Normal

Lilliefors (Full: no NDs)	0.192	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.958	0.958	0.958	0.958

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.323	0.715	
Kolmogorov-Smirnov (Full: no NDs)	0.147	0.294	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.968	0.968	0.968	0.968

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.943	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.138	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Mercury (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	3	25	89.29%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	25	0.019	0.06	0.0466	0.05	0.017
Statistics (Detects Only)	3	0.07	1.2	0.467	0.13	0.636
Statistics (All: NDs treated as DL value)	28	0.019	1.2	0.0916	0.06	0.218
Statistics (All: NDs treated as DL/2 value)	28	0.0095	1.2	0.0708	0.03	0.223
Statistics (Normal ROS Estimated Data)	28	-6.561	1.2	-3.164	-3.255	1.837
Statistics (Gamma ROS Estimated Data)	28	1E-09	1.2	0.05	1E-09	0.227
Statistics (Lognormal ROS Estimated Data)	28	6.8748E-09	1.2	0.0503	2.3931E-05	0.227

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	0.798	0.737	0.585	-1.506	1.494	-0.992
Statistics (NDs = DL)	0.982	0.901	0.0933	-2.979	0.795	-0.267
Statistics (NDs = DL/2)	0.644	0.598	0.11	-3.598	0.952	-0.265
Statistics (Gamma ROS Estimates)	0.0553	0.0732	0.904	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-10.44	4.519	-0.433

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.889	0.485	0.471	0.987

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.79	0.767	Data Appear Normal
Lilliefors (Detects Only)	0.368	0.512	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.268	0.924	Data Not Normal

Lilliefors (NDs = DL)	0.468	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.253	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.466	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.974	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.0965	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	N/A	0.694	0.731	0.95

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.439	N/A	
Kolmogorov-Smirnov (Detects Only)	0.373	N/A	
Anderson-Darling (NDs = DL)	4.794	0.775	
Kolmogorov-Smirnov (NDs = DL)	0.41	0.17	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	5.507	0.796	
Kolmogorov-Smirnov (NDs = DL/2)	0.458	0.173	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	9.082	1.229	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.564	0.206	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.951	0.826	0.826	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.904	0.767	Data Appear Lognormal
Lilliefors (Detects Only)	0.306	0.512	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.71	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.31	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.708	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.355	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.974	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0964	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Mercury (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	0.036	0.24	0.0891	0.0733	0.0637

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	3.364	2.186	0.0265	-2.574	0.554	-0.215

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS

Correlation Coefficient R	0.821	0.821	0.821	0.821

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.703	0.818	Data Not Normal
Lilliefors (Full: no NDs)	0.338	0.313	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.91	0.91	0.91	0.91

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.601	0.72	
Kolmogorov-Smirnov (Full: no NDs)	0.256	0.296	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.942	0.942	0.942	0.942

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.912	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.22	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Nickel (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	17	11	39.29%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	11	0.21	1.3	1.005	1.3	0.504
Statistics (Detects Only)	17	4.6	18.1	9.935	9.4	4.294
Statistics (All: NDs treated as DL value)	28	0.21	18.1	6.427	5.55	5.545
Statistics (All: NDs treated as DL/2 value)	28	0.105	18.1	6.23	5.55	5.741
Statistics (Normal ROS Estimated Data)	28	-7.045	18.1	5.574	5.55	6.652
Statistics (Gamma ROS Estimated Data)	28	1.974	18.1	9.082	8.465	3.849
Statistics (Lognormal ROS Estimated Data)	28	1.602	18.1	7.218	5.55	4.794

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	5.612	5.034	1.77	2.204	0.448	0.203
Statistics (NDs = DL)	0.953	0.874	6.748	1.251	1.353	1.082
Statistics (NDs = DL/2)	0.709	0.657	8.784	0.979	1.668	1.704
Statistics (Gamma ROS Estimates)	5.329	4.782	1.704	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	1.759	0.683	0.388

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.977	0.953	0.948	0.993

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.938	0.892	Data Appear Normal
Lilliefors (Detects Only)	0.12	0.215	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.891	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.215	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.88	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.227	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.977	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.0932	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.986	0.947	0.923	0.993

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.276	0.741	
Kolmogorov-Smirnov (Detects Only)	0.133	0.21	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.909	0.776	
Kolmogorov-Smirnov (NDs = DL)	0.199	0.171	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.342	0.789	
Kolmogorov-Smirnov (NDs = DL/2)	0.225	0.172	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.176	0.748	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.0785	0.166	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.984	0.942	0.929	0.986

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.949	0.892	Data Appear Lognormal
Lilliefors (Detects Only)	0.125	0.215	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.872	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.188	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.847	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.236	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.959	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.107	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Nickel (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	16	26	19.13	18	3.482

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	37.53	23.54	0.51	2.938	0.172	0.0584

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.934	0.934	0.934	0.934

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.868	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.229	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.955	0.955	0.955	0.955

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.434	0.715	
Kolmogorov-Smirnov (Full: no NDs)	0.243	0.294	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.95	0.95	0.95	0.95

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.894	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.229	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Potassium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	22	6	21.43%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	6	201	271	220	213	25.92
Statistics (Detects Only)	22	166	2350	735.4	509.5	632.6
Statistics (All: NDs treated as DL value)	28	166	2350	625	317.5	598.1
Statistics (All: NDs treated as DL/2 value)	28	100.5	2350	601.4	317.5	616.1
Statistics (Normal ROS Estimated Data)	28	-180.2	2350	544.7	317.5	671
Statistics (Gamma ROS Estimated Data)	28	135.6	2350	613.1	326.6	607.5
Statistics (Lognormal ROS Estimated Data)	28	142.4	2350	609.6	317.5	609.5

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.634	1.482	450.2	6.264	0.838	0.134
Statistics (NDs = DL)	1.53	1.39	408.6	6.076	0.826	0.136
Statistics (NDs = DL/2)	1.2	1.095	501.1	5.928	0.989	0.167
Statistics (Gamma ROS Estimates)	1.347	1.226	455.3	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	5.992	0.91	0.152

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.914	0.87	0.889	0.938

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.83	0.911	Data Not Normal
Lilliefors (Detects Only)	0.222	0.189	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.756	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.239	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.787	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.22	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.874	0.924	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.176	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.987	0.977	0.987	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.667	0.758	
Kolmogorov-Smirnov (Detects Only)	0.154	0.188	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.637	0.762	
Kolmogorov-Smirnov (NDs = DL)	0.21	0.168	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.858	0.769	
Kolmogorov-Smirnov (NDs = DL/2)	0.151	0.169	Data appear Approximate Gamma Distribution
Anderson-Darling (Gamma ROS Estimates)	1.093	0.766	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.171	0.169	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.948	0.977	0.959

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.939	0.911	Data Appear Lognormal
Lilliefors (Detects Only)	0.123	0.189	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.882	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.187	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.934	0.924	Data Appear Lognormal
Lilliefors (NDs = DL/2)	0.102	0.167	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.9	0.924	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.138	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Potassium (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD

Statistics (Full: no NDs)	8	546	1440	999.4	1037	338.4

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	9.326	5.912	107.2	6.853	0.361	0.0527

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.975	0.975	0.975	0.975

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.928	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.178	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.963	0.963	0.963	0.963

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.327	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.188	0.294	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.972	0.972	0.972	0.972

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.924	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.188	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Selenium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	2	26	92.86%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	26	N/A	N/A	N/A	N/A	N/A
Statistics (Detects Only)	2	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL value)	28	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL/2 value)	28	N/A	N/A	N/A	N/A	N/A
Statistics (Normal ROS Estimated Data)	28	N/A	N/A	N/A	N/A	N/A

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Shapiro-Wilks (Detects Only)	N/A	N/A
Lilliefors (Detects Only)	N/A	N/A
Shapiro-Wilks (NDs = DL)	N/A	N/A
Lilliefors (NDs = DL)	N/A	N/A
Shapiro-Wilks (NDs = DL/2)	N/A	N/A
Lilliefors (NDs = DL/2)	N/A	N/A
Shapiro-Wilks (Normal ROS Estimates)	N/A	N/A
Lilliefors (Normal ROS Estimates)	N/A	N/A

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	N/A	N/A	
Kolmogorov-Smirnov (Detects Only)	N/A	N/A	
Anderson-Darling (NDs = DL)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL)	N/A	N/A	
Anderson-Darling (NDs = DL/2)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL/2)	N/A	N/A	
Anderson-Darling (Gamma ROS Estimates)	N/A	N/A	
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	N/A	

Note: Substitution methods such as DL or DL/2 are not recommended.

Selenium (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	0.5	0.92	0.64	0.595	0.138

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	27.47	17.25	0.0233	-0.465	0.199	-0.429

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.931	0.931	0.931	0.931

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.873	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.221	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.957	0.957	0.957	0.957

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Anderson-Darling (Full: no NDs)	0.409	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.199	0.294	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.958	0.958	0.958	0.958

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.919	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.184	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Silver (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	1	27	96.43%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver (rfaap bkgrd-ss) was not processed!

Silver (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	0.064	0.22	0.101	0.081	0.0528

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	5.835	3.73	0.0174	-2.377	0.417	-0.175

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.839	0.839	0.839	0.839

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.719	0.818	Data Not Normal
Lilliefors (Full: no NDs)	0.35	0.313	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.916	0.916	0.916	0.916

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Anderson-Darling (Full: no NDs)	0.824	0.718	
Kolmogorov-Smirnov (Full: no NDs)	0.327	0.295	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.903	0.903	0.903	0.903

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.821	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.301	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Sodium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	1	27	96.43%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Sodium (rfaap bkgrd-ss) was not processed!

Sodium (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	86	3730	628.1	110.8	1268

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	0.564	0.436	1113	5.337	1.336	0.25

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.693	0.693	0.693	0.693

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.507	0.818	Data Not Normal
Lilliefors (Full: no NDs)	0.399	0.313	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.935	0.935	0.935	0.935

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Anderson-Darling (Full: no NDs)	1.492	0.758	
Kolmogorov-Smirnov (Full: no NDs)	0.413	0.308	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.83	0.83	0.83	0.83

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.699	0.818	Data Not Lognormal
Lilliefors (Full: no NDs)	0.36	0.313	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Thallium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	4	24	85.71%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	24	0.13	0.41	0.195	0.14	0.102
Statistics (Detects Only)	4	1.3	2.1	1.85	2	0.37
Statistics (All: NDs treated as DL value)	28	0.13	2.1	0.431	0.14	0.61
Statistics (All: NDs treated as DL/2 value)	28	0.065	2.1	0.348	0.07	0.638
Statistics (Normal ROS Estimated Data)	28	-1.016	2.1	0.463	0.263	0.766
Statistics (Gamma ROS Estimated Data)	28	1.3	2.1	1.854	1.856	0.123
Statistics (Lognormal ROS Estimated Data)	28	0.329	2.1	0.886	0.706	0.466

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	28.68	25.63	0.0645	0.598	0.225	0.376
Statistics (NDs = DL)	1.025	0.939	0.421	-1.403	0.921	-0.657
Statistics (NDs = DL/2)	0.649	0.604	0.535	-1.997	1.149	-0.575
Statistics (Gamma ROS Estimates)	199.2	177.9	0.00931	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.229	0.457	-1.992

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.85	0.729	0.691	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.737	0.748	Data Not Normal
Lilliefors (Detects Only)	0.408	0.443	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.532	0.924	Data Not Normal
Lilliefors (NDs = DL)	0.371	0.167	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.481	0.924	Data Not Normal
Lilliefors (NDs = DL/2)	0.446	0.167	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.952	0.924	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.138	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.806	0.898	0.892	0.668

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.755	0.657	
Kolmogorov-Smirnov (Detects Only)	0.436	0.394	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	4.636	0.773	
Kolmogorov-Smirnov (NDs = DL)	0.342	0.17	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	5.51	0.795	
Kolmogorov-Smirnov (NDs = DL/2)	0.351	0.173	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	6.198	0.743	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.415	0.165	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.838	0.829	0.804	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.717	0.748	Data Not Lognormal
Lilliefors (Detects Only)	0.415	0.443	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.678	0.924	Data Not Lognormal
Lilliefors (NDs = DL)	0.311	0.167	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.639	0.924	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.318	0.167	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.951	0.924	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.138	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Thallium (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	6	2	25.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.5	0.5	0.5	0.5	0
Statistics (Detects Only)	6	0.092	0.27	0.158	0.15	0.0676
Statistics (All: NDs treated as DL value)	8	0.092	0.5	0.243	0.18	0.168
Statistics (All: NDs treated as DL/2 value)	8	0.092	0.27	0.181	0.18	0.0713
Statistics (Normal ROS Estimated Data)	8	0.092	0.27	0.158	0.15	0.0603
Statistics (Gamma ROS Estimated Data)	8	0.092	0.27	0.159	0.15	0.0603
Statistics (Lognormal ROS Estimated Data)	8	0.092	0.27	0.156	0.15	0.06

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	6.907	4.4	0.0229	-1.92	0.42	-0.219
Statistics (NDs = DL)	2.65	1.74	0.0918	-1.614	0.67	-0.415
Statistics (NDs = DL/2)	6.665	4.249	0.0271	-1.787	0.433	-0.242
Statistics (Gamma ROS Estimates)	8.219	5.22	0.0193	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-1.92	0.376	-0.196

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.961	0.912	0.963	0.963

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.917	0.788	Data Appear Normal
Lilliefors (Detects Only)	0.165	0.362	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.809	0.818	Data Not Normal
Lilliefors (NDs = DL)	0.249	0.313	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.899	0.818	Data Appear Normal
Lilliefors (NDs = DL/2)	0.209	0.313	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.923	0.818	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.178	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.988	0.945	0.943	0.986

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.268	0.698	
Kolmogorov-Smirnov (Detects Only)	0.197	0.333	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.458	0.722	
Kolmogorov-Smirnov (NDs = DL)	0.195	0.297	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.415	0.718	
Kolmogorov-Smirnov (NDs = DL/2)	0.219	0.295	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.258	0.716	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.17	0.295	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.964	0.957	0.978

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.94	0.788	Data Appear Lognormal
Lilliefors (Detects Only)	0.182	0.362	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.902	0.818	Data Appear Lognormal
Lilliefors (NDs = DL)	0.165	0.313	Data Appear Lognormal
Shapiro-Wilks (NDs = DL/2)	0.887	0.818	Data Appear Lognormal
Lilliefors (NDs = DL/2)	0.198	0.313	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.945	0.818	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.154	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Vanadium (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD

Statistics (Full: no NDs)	28	12.2	101	33.89	33.8	17.78

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.392	3.946	7.716	3.405	0.497	0.146

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.902	0.902	0.902	0.902

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.832	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.141	0.167	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.943	0.943	0.943	0.943

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.622	0.749	
Kolmogorov-Smirnov (Full: no NDs)	0.111	0.166	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.969	0.969	0.969	0.969

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.939	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.138	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Vanadium (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	26	47	36.69	38.25	8.362

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	21.16	13.31	1.734	3.579	0.236	0.0659

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.949	0.949	0.949	0.949

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.874	0.818	Data Appear Normal

Lilliefors (Full: no NDs)	0.257	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.938	0.938	0.938	0.938

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.568	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.278	0.294	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.947	0.947	0.947	0.947

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.871	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.266	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Zinc (rfaap bkgrd-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	28	0	28	28	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	28	7.1	216	41.21	29.7	40.24

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.826	1.654	22.56	3.421	0.761	0.223

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.798	0.798	0.798	0.798

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.665	0.924	Data Not Normal
Lilliefors (Full: no NDs)	0.203	0.167	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.913	0.913	0.913	0.913

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.54	0.76	
Kolmogorov-Smirnov (Full: no NDs)	0.105	0.168	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.985	0.985	0.985	0.985

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.975	0.924	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.1	0.167	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Zinc (swmu41b-ss)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	8	0	8	8	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	8	110	234	170.9	166.5	40.24

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	20.24	12.73	8.445	5.116	0.241	0.0471

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.986	0.986	0.986	0.986

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.97	0.818	Data Appear Normal
Lilliefors (Full: no NDs)	0.17	0.313	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.986	0.986	0.986	0.986

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.192	0.716	
Kolmogorov-Smirnov (Full: no NDs)	0.138	0.294	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.986	0.986	0.986	0.986

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.973	0.818	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.142	0.313	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Aluminum(swmu41b-ss)
Background Data: Aluminum(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	0
Number of Detect Data	8	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	14400	3620
Maximum Detected	27150	20100
Mean of Detected Data	20444	8300
Median of Detected Data	**21300**	**6705**
SD of Detected Data	4448	4279

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.957
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	7.58E-05

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Antimony(swmu41b-ss)
Background Data: Antimony(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	14
Number of Missing Values	0	14
Number of Non-Detect Data	0	14
Number of Detect Data	8	0
Minimum Non-Detect	N/A	0.24
Maximum Non-Detect	N/A	0.36
Percent Non detects	0.00%	100.00%
Minimum Detected	0.47	N/A
Maximum Detected	0.7	N/A
Mean of Detected Data	0.566	N/A
Median of Detected Data	**0.55**	**N/A**
SD of Detected Data	0.0776	N/A

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.434
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	9.25E-06

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

	Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects
User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Arsenic(swmu41b-ss)
Background Data: Arsenic(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	0
Number of Detect Data	8	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	14	1.5
Maximum Detected	23	10.2

Mean of Detected Data	19.38	3.732
Median of Detected Data	**20.5**	**2.75**
SD of Detected Data	3.543	2.33

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.262
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	2.03E-05

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Barium(swmu41b-ss)
Background Data: Barium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	4
Number of Detect Data	8	24
Minimum Non-Detect	N/A	0.36
Maximum Non-Detect	N/A	1
Percent Non detects	0.00%	14.29%
Minimum Detected	58	23.4
Maximum Detected	281	174
Mean of Detected Data	109.3	75.55
Median of Detected Data	**82.5**	**61.85**
SD of Detected Data	73.96	43.2

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	2.056
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.0398

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Beryllium(swmu41b-ss)
Background Data: Beryllium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	13
Number of Detect Data	8	15
Minimum Non-Detect	N/A	0.022
Maximum Non-Detect	N/A	0.03
Percent Non detects	0.00%	46.43%
Minimum Detected	0.097	0.61
Maximum Detected	0.97	1.5
Mean of Detected Data	0.598	0.887
Median of Detected Data	0.668	0.87
SD of Detected Data	0.335	0.246

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	0.974
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.33

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site = Background
P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)

Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Cadmium(swmu41b-ss)
Background Data: Cadmium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	26
Number of Detect Data	8	2
Minimum Non-Detect	N/A	0.02
Maximum Non-Detect	N/A	0.05
Percent Non detects	0.00%	92.86%
Minimum Detected	1.6	0.67
Maximum Detected	3.5	0.82
Mean of Detected Data	2.65	0.745
Median of Detected Data	**2.75**	**0.745**
SD of Detected Data	0.711	0.106

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	5.397
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	6.78E-08

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

	Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects
User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Chromium(swmu41b-ss)
Background Data: Chromium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	0
Number of Detect Data	8	28
Minimum Non-Detect	N/A	N/A

Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	12	6.3
Maximum Detected	23	53.3
Mean of Detected Data	18.13	21.09
Median of Detected Data	18	22.4
SD of Detected Data	4.291	10.5

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	-0.723
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	1.53

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Cobalt(swmu41b-ss)
Background Data: Cobalt(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	8
Number of Detect Data	8	20
Minimum Non-Detect	N/A	0.11
Maximum Non-Detect	N/A	0.75
Percent Non detects	0.00%	28.57%
Minimum Detected	7.2	5.9
Maximum Detected	12	45.4
Mean of Detected Data	9.525	15.95
Median of Detected Data	9.45	12.1
SD of Detected Data	2.153	10.07

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	-0.23
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	1.182

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Copper(swmu41b-ss)
Background Data: Copper(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	2
Number of Detect Data	8	26
Minimum Non-Detect	N/A	0.17
Maximum Non-Detect	N/A	0.17
Percent Non detects	0.00%	7.14%
Minimum Detected	31	2.2
Maximum Detected	57	13.6
Mean of Detected Data	43.5	6.919
Median of Detected Data	**40**	**5.35**
SD of Detected Data	9.396	3.696

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.262
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	2.03E-05

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst

Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Iron(swmu41b-ss)
Background Data: Iron(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	0
Number of Detect Data	8	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	29500	7250
Maximum Detected	47450	63000
Mean of Detected Data	36794	20108
Median of Detected Data	**36650**	**19750**
SD of Detected Data	5754	11869

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.653
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	2.59E-04

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Lead(swmu41b-ss)
Background Data: Lead(rfaap bkgrd-ss)

Raw Statistics

	Site	Background

Number of Valid Data	8	28
Number of Non-Detect Data	0	0
Number of Detect Data	8	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	33	8.9
Maximum Detected	75	225
Mean of Detected Data	43.56	26.96
Median of Detected Data	**41**	**15.15**
SD of Detected Data	13.3	41.34

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.387
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	7.08E-04

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Magnesium(swmu41b-ss)
Background Data: Magnesium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	3
Number of Detect Data	8	25
Minimum Non-Detect	N/A	4.7
Maximum Non-Detect	N/A	5
Percent Non detects	0.00%	10.71%
Minimum Detected	20900	158
Maximum Detected	58000	20400
Mean of Detected Data	39675	2498
Median of Detected Data	**37600**	**913**
SD of Detected Data	13529	4334

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.263
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	2.02E-05

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Manganese(swmu41b-ss)
Background Data: Manganese(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	0
Number of Detect Data	8	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	912	43
Maximum Detected	2340	2040
Mean of Detected Data	1364	695.9
Median of Detected Data	**1275**	**490**
SD of Detected Data	453.1	591.5

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	2.816
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.00487

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Mercury(swmu41b-ss)
Background Data: Mercury(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	25
Number of Detect Data	8	3
Minimum Non-Detect	N/A	0.019
Maximum Non-Detect	N/A	0.06
Percent Non detects	**0.00%**	**89.29%**
Minimum Detected	0.036	0.07
Maximum Detected	0.24	1.2
Mean of Detected Data	0.0891	0.467
Median of Detected Data	**0.0733**	**0.13**
SD of Detected Data	0.0637	0.636

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.846
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	1.20E-04

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Mercury(swmu41b-ss)

Background Data: Mercury(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	25
Number of Detect Data	8	3
Minimum Non-Detect	N/A	0.019
Maximum Non-Detect	N/A	0.06
Percent Non detects	0.00%	89.29%
Minimum Detected	0.036	0.07
Maximum Detected	0.24	1.2
Mean of Detected Data	0.0891	0.467
Median of Detected Data	0.0733	0.13
SD of Detected Data	0.0637	0.636

Site vs Background Gehan Test

H0: Mean/Median of Site or AOC <= Mean/Median of background

Gehan z Test Value	3.846
Critical z (0.95)	1.645
P-Value	6.00E-05

Conclusion with Alpha = 0.05

Reject H0, Conclude Site > Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Nickel(swmu41b-ss)
Background Data: Nickel(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	11
Number of Detect Data	8	17
Minimum Non-Detect	N/A	0.21
Maximum Non-Detect	N/A	1.3
Percent Non detects	0.00%	39.29%
Minimum Detected	16	4.6
Maximum Detected	26	18.1
Mean of Detected Data	19.13	9.935

Median of Detected Data	**18**	**9.4**
SD of Detected Data	3.482	4.294

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.092
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	4.28E-05

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Potassium(swmu41b-ss)
Background Data: Potassium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	6
Number of Detect Data	8	22
Minimum Non-Detect	N/A	201
Maximum Non-Detect	N/A	271
Percent Non detects	0.00%	21.43%
Minimum Detected	546	166
Maximum Detected	1440	2350
Mean of Detected Data	999.4	735.4
Median of Detected Data	**1037**	**509.5**
SD of Detected Data	338.4	632.6

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	2.382
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.0172

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Selenium(swmu41b-ss)

Background Data: Selenium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	26
Number of Detect Data	8	2
Minimum Non-Detect	N/A	0.14
Maximum Non-Detect	N/A	36.00%
Percent Non detects	0.00%	92.86%
Minimum Detected	0.5	0.64
Maximum Detected	0.92	0.77
Mean of Detected Data	**0.64**	**0.705**
Median of Detected Data	0.595	0.705
SD of Detected Data	0.138	0.0919

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.819
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96E+00
P-Value	1.45E-06

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)

Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Selenium(swmu41b-ss)
Background Data: Selenium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	26
Number of Detect Data	8	2
Minimum Non-Detect	N/A	0.14
Maximum Non-Detect	N/A	36.00%
Percent Non detects	0.00%	92.86%
Minimum Detected	0.5	0.64
Maximum Detected	0.92	0.77
Mean of Detected Data	**0.64**	**0.705**
Median of Detected Data	0.595	0.705
SD of Detected Data	0.138	0.0919

Site vs Background Gehan Test

H0: Mean/Median of Site or AOC <= Mean/Median of background

Gehan z Test Value	4.819
Critical z (0.95)	1.65E+00
P-Value	7.23E-07

Conclusion with Alpha = 0.05
Reject H0, Conclude Site > Background
P-Value < alpha (0.05)

	Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects
User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Silver(swmu41b-ss)
Background Data: Silver(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	27
Number of Detect Data	8	1
Minimum Non-Detect	N/A	0.16
Maximum Non-Detect	N/A	38.00%

Percent Non detects	0.00%	96.43%
Minimum Detected	0.064	4.3
Maximum Detected	0.22	4.3
Mean of Detected Data	0.101	4.3
Median of Detected Data	0.081	4.3
SD of Detected Data	0.0528	N/A

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	0.855
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.393

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Sodium(swmu41b-ss)

Background Data: Sodium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	27
Number of Detect Data	8	1
Minimum Non-Detect	N/A	10.8
Maximum Non-Detect	N/A	2590.00%
Percent Non detects	0.00%	96.43%
Minimum Detected	86	124
Maximum Detected	3730	124
Mean of Detected Data	**628.1**	**124**
Median of Detected Data	110.8	124
SD of Detected Data	1268	N/A

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	5.354

Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96E+00
P-Value	8.62E-08

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Thallium(swmu41b-ss)

Background Data: Thallium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	2	24
Number of Detect Data	6	4
Minimum Non-Detect	0.5	0.13
Maximum Non-Detect	50.00%	41.00%
Percent Non detects	25.00%	85.71%
Minimum Detected	0.092	1.3
Maximum Detected	0.27	2.1
Mean of Detected Data	**0.158**	**1.85**
Median of Detected Data	0.15	2
SD of Detected Data	0.0676	0.37

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	0.808
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.419

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF

Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Vanadium(swmu41b-ss)
Background Data: Vanadium(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28
Number of Non-Detect Data	0	0
Number of Detect Data	8	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	26	12.2
Maximum Detected	47	101
Mean of Detected Data	36.69	33.89
Median of Detected Data	38.25	33.8
SD of Detected Data	8.362	17.78

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	0.837
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.403

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site = Background
P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_SS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Zinc(swmu41b-ss)
Background Data: Zinc(rfaap bkgrd-ss)

Raw Statistics

	Site	Background
Number of Valid Data	8	28

Number of Non-Detect Data	0	0
Number of Detect Data	8	28
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	110	7.1
Maximum Detected	234	216
Mean of Detected Data	170.9	41.21
Median of Detected Data	**166.5**	**29.7**
SD of Detected Data	40.24	40.24

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.033
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	5.50E-05

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Goodness-of-Fit Test Statistics for Data Sets with Non-Detects

User Selected Options **mg/kg**

From File H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst

Full Precision OFF

Confidence Coefficient 0.95

Lead (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	2.1	256	22.04	12	39.85

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.186	1.149	18.59	2.615	0.783	0.299

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.597	0.597	0.597	0.597

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.344	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.803	0.803	0.803	0.803

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	7.671	0.777	
Kolmogorov-Smirnov (Full: no NDs)	0.245	0.103	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.929	0.929	0.929	0.929

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.147	0.0997	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Lead (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	21	143	57.19	43.25	34.81

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	3.672	3.097	15.58	3.904	0.53	0.136

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.893	0.893	0.893	0.893

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.8	0.897	Data Not Normal
Lilliefors (Full: no NDs)	0.248	0.209	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.957	0.957	0.957	0.957

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.685	0.744	
Kolmogorov-Smirnov (Full: no NDs)	0.215	0.205	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.973	0.973	0.973	0.973

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.943	0.897	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.184	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Aluminum (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	3620	47900	14204	12100	9433

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	2.787	2.689	5097	9.371	0.618	0.0659

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.923	0.923	0.923	0.923

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.15	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.988	0.988	0.988	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.604	0.76	
Kolmogorov-Smirnov (Full: no NDs)	0.0772	0.101	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.995	0.995	0.995	0.995

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0626	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Aluminum (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	2770	42400	22962	22850	9210

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.579	3.853	5015	9.928	0.581	0.0585

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.959	0.959	0.959	0.959

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.933	0.897	Data Appear Normal
Lilliefors (Full: no NDs)	0.22	0.209	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.957	0.957	0.957	0.957

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.903	0.743	
Kolmogorov-Smirnov (Full: no NDs)	0.168	0.204	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.846	0.846	0.846	0.846

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.746	0.897	Data Not Lognormal
Lilliefors (Full: no NDs)	0.216	0.209	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Antimony (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	41	38	0	38	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Antimony (mg/kg) (rfaap bkgrd ts) was not processed!

Antimony (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	0.11	1.3	0.667	0.575	0.298

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.631	3.896	0.144	-0.517	0.538	-1.04

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.939	0.939	0.939	0.939

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.89	0.897	Data Not Normal
Lilliefors (Full: no NDs)	0.214	0.209	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.96	0.96	0.96	0.96

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.839	0.743	
Kolmogorov-Smirnov (Full: no NDs)	0.179	0.204	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS

Correlation Coefficient R	0.894	0.894	0.894	0.894

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.824	0.897	Data Not Lognormal
Lilliefors (Full: no NDs)	0.218	0.209	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Arsenic (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	76	3	3.80%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	3	0.09	0.12	0.103	0.1	0.0153
Statistics (Detects Only)	76	1.2	35.9	4.989	3.2	5.36
Statistics (All: NDs treated as DL value)	79	0.09	35.9	4.804	3.1	5.339
Statistics (All: NDs treated as DL/2 value)	79	0.045	35.9	4.802	3.1	5.341
Statistics (Normal ROS Estimated Data)	79	-5.169	35.9	4.604	3.1	5.608
Statistics (Gamma ROS Estimated Data)	79	1E-09	35.9	4.8	3.1	5.343
Statistics (Lognormal ROS Estimated Data)	79	0.728	35.9	4.828	3.1	5.32

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.819	1.759	2.742	1.308	0.692	0.529
Statistics (NDs = DL)	1.401	1.356	3.429	1.172	0.968	0.826
Statistics (NDs = DL/2)	1.323	1.281	3.631	1.146	1.067	0.932
Statistics (Gamma ROS Estimates)	0.568	0.555	8.454	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	1.246	0.748	0.6

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.765	0.778	0.778	0.817

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.282	0.102	Data Not Normal
Lilliefors (NDs = DL)	0.279	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.279	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.263	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.916	0.932	0.935	0.972

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	4.409	0.766	
Kolmogorov-Smirnov (Detects Only)	0.213	0.104	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	3.469	0.772	
Kolmogorov-Smirnov (NDs = DL)	0.182	0.102	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	3.587	0.774	
Kolmogorov-Smirnov (NDs = DL/2)	0.176	0.103	Data Not Gamma Distributed

Anderson-Darling (Gamma ROS Estimates)	10.23	0.812	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.332	0.106	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.958	0.919	0.886	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.151	0.102	Data Not Lognormal
Lilliefors (NDs = DL)	0.159	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.187	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.134	0.0997	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Arsenic (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	3.2	32	18.47	19.25	7.752

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.422	3.722	4.177	2.799	0.563	0.201

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.985	0.985	0.985	0.985

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.967	0.897	Data Appear Normal
Lilliefors (Full: no NDs)	0.113	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.962	0.962	0.962	0.962

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.543	0.743	
Kolmogorov-Smirnov (Full: no NDs)	0.153	0.204	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.917	0.917	0.917	0.917

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.854	0.897	Data Not Lognormal

Lilliefors (Full: no NDs)	0.19	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Barium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	63	16	20.25%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	16	0.36	1.1	0.821	1	0.3
Statistics (Detects Only)	63	23.4	174	68.4	56.7	40.39
Statistics (All: NDs treated as DL value)	79	0.36	174	54.71	45.5	45.21
Statistics (All: NDs treated as DL/2 value)	79	0.18	174	54.63	45.5	45.31
Statistics (Normal ROS Estimated Data)	79	-54.83	174	50.41	45.5	51.24
Statistics (Gamma ROS Estimated Data)	79	1E-09	174	58.64	45.5	41.27
Statistics (Lognormal ROS Estimated Data)	79	10.45	174	58.03	45.5	41.56

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	3.354	3.236	20.39	4.069	0.555	0.136
Statistics (NDs = DL)	0.737	0.717	74.26	3.188	1.839	0.577
Statistics (NDs = DL/2)	0.642	0.626	85.13	3.047	2.109	0.692
Statistics (Gamma ROS Estimates)	1.061	1.029	55.28	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	3.817	0.71	0.186

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.932	0.955	0.955	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.211	0.112	Data Not Normal
Lilliefors (NDs = DL)	0.154	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.153	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.13	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.977	0.947	0.938	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	1.567	0.757	
Kolmogorov-Smirnov (Detects Only)	0.142	0.113	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	4.488	0.794	
Kolmogorov-Smirnov (NDs = DL)	0.207	0.105	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	5.552	0.804	
Kolmogorov-Smirnov (NDs = DL/2)	0.235	0.105	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	3.925	0.78	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.215	0.103	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.98	0.875	0.857	0.99

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.114	0.112	Data Not Lognormal
Lilliefors (NDs = DL)	0.29	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.317	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0679	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Barium (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	35	366.5	137.1	116	83.28

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	3.309	2.794	41.44	4.762	0.582	0.122

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.931	0.931	0.931	0.931

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.874	0.897	Data Not Normal
Lilliefors (Full: no NDs)	0.163	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.984	0.984	0.984	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.269	0.745	
Kolmogorov-Smirnov (Full: no NDs)	0.127	0.205	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.991	0.991	0.991	0.991

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.985	0.897	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.104	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Beryllium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	40	39	49.37%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	39	0.022	0.03	0.0286	0.03	0.00265
Statistics (Detects Only)	40	0.61	5.4	1.449	1.1	1.086
Statistics (All: NDs treated as DL value)	79	0.022	5.4	0.748	0.61	1.049
Statistics (All: NDs treated as DL/2 value)	79	0.011	5.4	0.74	0.61	1.054
Statistics (Normal ROS Estimated Data)	79	-3.53	5.4	0.149	0.61	1.644
Statistics (Gamma ROS Estimated Data)	79	1E-09	5.4	1.439	1.3	0.88
Statistics (Lognormal ROS Estimated Data)	79	0.0819	5.4	0.892	0.61	0.959

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	3.116	3.006	0.465	0.202	0.533	2.643
Statistics (NDs = DL)	0.47	0.461	1.589	-1.654	1.93	-1.167
Statistics (NDs = DL/2)	0.39	0.383	1.9	-1.996	2.273	-1.138
Statistics (Gamma ROS Estimates)	1.38	1.336	1.043	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.504	0.875	-1.735

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.81	0.829	0.83	0.978

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.666	0.94	Data Not Normal
Lilliefors (Detects Only)	0.256	0.14	Data Not Normal
Lilliefors (NDs = DL)	0.247	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.248	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.117	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.915	0.976	0.973	0.959

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	2.172	0.754	
Kolmogorov-Smirnov (Detects Only)	0.198	0.14	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	6.807	0.826	
Kolmogorov-Smirnov (NDs = DL)	0.32	0.107	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	7.311	0.844	
Kolmogorov-Smirnov (NDs = DL/2)	0.323	0.108	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	5.881	0.773	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.232	0.103	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.947	0.883	0.873	0.996

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.891	0.94	Data Not Lognormal
Lilliefors (Detects Only)	0.155	0.14	Data Not Lognormal
Lilliefors (NDs = DL)	0.325	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.328	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0541	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Beryllium (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	0.057	1.35	0.736	0.788	0.355

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	2.309	1.961	0.319	-0.538	0.875	-1.625

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.967	0.967	0.967	0.967

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.931	0.897	Data Appear Normal
Lilliefors (Full: no NDs)	0.142	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.888	0.888	0.888	0.888

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	1.473	0.751	
Kolmogorov-Smirnov (Full: no NDs)	0.242	0.206	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.859	0.859	0.859	0.859

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.744	0.897	Data Not Lognormal
Lilliefors (Full: no NDs)	0.275	0.209	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cadmium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs

Raw Statistics	79	0	79	13	66	83.54%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	66	0.02	0.05	0.0256	0.02	0.00861
Statistics (Detects Only)	13	0.57	2.5	1.152	1.1	0.585
Statistics (All: NDs treated as DL value)	79	0.02	2.5	0.211	0.02	0.479
Statistics (All: NDs treated as DL/2 value)	79	0.01	2.5	0.2	0.01	0.483
Statistics (Normal ROS Estimated Data)	79	-4.148	2.5	-1.016	-1.143	1.342
Statistics (Gamma ROS Estimated Data)	79	0.197	2.987	1.943	2.175	0.717
Statistics (Lognormal ROS Estimated Data)	79	0.0167	2.5	0.338	0.174	0.444

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	5.194	5.005	0.222	0.0424	0.448	10.55
Statistics (NDs = DL)	0.424	0.416	0.498	-3.093	1.437	-0.465
Statistics (NDs = DL/2)	0.329	0.325	0.609	-3.672	1.69	-0.46
Statistics (Gamma ROS Estimates)	5.206	5.016	0.373	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-1.649	1.046	-0.634

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.905	0.675	0.671	0.995

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.82	0.866	Data Not Normal
Lilliefors (Detects Only)	0.246	0.246	Data Not Normal
Lilliefors (NDs = DL)	0.467	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.477	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.0689	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.955	0.948	0.957	0.92

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.512	0.736	
Kolmogorov-Smirnov (Detects Only)	0.181	0.237	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	17.17	0.836	
Kolmogorov-Smirnov (NDs = DL)	0.422	0.107	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	18.08	0.858	
Kolmogorov-Smirnov (NDs = DL/2)	0.448	0.109	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	2.804	0.754	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.164	0.101	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.969	0.778	0.764	0.995

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Shapiro-Wilks (Detects Only)	0.934	0.866	Data Appear Lognormal
Lilliefors (Detects Only)	0.158	0.246	Data Appear Lognormal
Lilliefors (NDs = DL)	0.327	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.348	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0689	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cadmium (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	0.6	3.5	2.381	2.4	0.72

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	8.372	7.013	0.284	0.806	0.402	0.499

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.979	0.979	0.979	0.979

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.963	0.897	Data Appear Normal
Lilliefors (Full: no NDs)	0.0836	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.951	0.951	0.951	0.951

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.567	0.74	
Kolmogorov-Smirnov (Full: no NDs)	0.128	0.204	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.888	0.888	0.888	0.888

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.808	0.897	Data Not Lognormal
Lilliefors (Full: no NDs)	0.159	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Chromium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	6.3	75.8	26.86	26	12.51

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.546	4.382	5.91	3.177	0.501	0.158

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.971	0.971	0.971	0.971

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0734	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.99	0.99	0.99	0.99

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.591	0.755	
Kolmogorov-Smirnov (Full: no NDs)	0.0909	0.101	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.984	0.984	0.984	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.122	0.0997	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Chromium (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	17	1	5.56%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Detects Only)	17	12	30	20.53	22	4.735
Statistics (All: NDs treated as DL value)	18	5	30	19.67	21	5.874
Statistics (All: NDs treated as DL/2 value)	18	2.5	30	19.53	21	6.258
Statistics (Normal ROS Estimated Data)	18	9.02	30	19.89	21	5.335
Statistics (Gamma ROS Estimated Data)	18	9.162	30	19.9	21	5.318
Statistics (Lognormal ROS Estimated Data)	18	11.18	30	20.01	21	5.095

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	18.98	15.85	1.082	2.995	0.242	0.0809
Statistics (NDs = DL)	8.41	7.045	2.339	2.918	0.402	0.138
Statistics (NDs = DL/2)	5.593	4.698	3.491	2.88	0.543	0.189
Statistics (Gamma ROS Estimates)	13.09	10.95	1.52	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	2.963	0.272	0.0918

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.977	0.966	0.952	0.98

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.956	0.892	Data Appear Normal
Lilliefors (Detects Only)	0.183	0.215	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.945	0.897	Data Appear Normal
Lilliefors (NDs = DL)	0.174	0.209	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.921	0.897	Data Appear Normal
Lilliefors (NDs = DL/2)	0.178	0.209	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.963	0.897	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.169	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.973	0.934	0.903	0.966

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.472	0.738	
Kolmogorov-Smirnov (Detects Only)	0.178	0.209	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.858	0.74	
Kolmogorov-Smirnov (NDs = DL)	0.173	0.204	Data appear Approximate Gamma Distribution
Anderson-Darling (NDs = DL/2)	1.366	0.743	
Kolmogorov-Smirnov (NDs = DL/2)	0.197	0.204	Data appear Approximate Gamma Distribution
Anderson-Darling (Gamma ROS Estimates)	0.522	0.739	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.178	0.203	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.972	0.878	0.793	0.969

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.946	0.892	Data Appear Lognormal
Lilliefors (Detects Only)	0.183	0.215	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.794	0.897	Data Not Lognormal
Lilliefors (NDs = DL)	0.193	0.209	Data Appear Lognormal
Shapiro-Wilks (NDs = DL/2)	0.658	0.897	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.218	0.209	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.936	0.897	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.181	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cobalt (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	56	23	29.11%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	23	0.11	0.84	0.587	0.73	0.286
Statistics (Detects Only)	56	5.9	130	22.23	13.3	23.94
Statistics (All: NDs treated as DL value)	79	0.11	130	15.93	11.4	22.41
Statistics (All: NDs treated as DL/2 value)	79	0.055	130	15.84	11.4	22.47
Statistics (Normal ROS Estimated Data)	79	-40.83	130	8.784	11.4	29.44
Statistics (Gamma ROS Estimated Data)	79	1E-09	130	17.57	11.9	21.54
Statistics (Lognormal ROS Estimated Data)	79	1.86	130	16.76	11.4	21.87

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.78	1.721	12.49	2.795	0.701	0.251
Statistics (NDs = DL)	0.61	0.595	26.11	1.758	1.787	1.017
Statistics (NDs = DL/2)	0.523	0.511	30.31	1.556	2.08	1.337
Statistics (Gamma ROS Estimates)	0.504	0.494	34.83	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	2.331	0.947	0.406

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.767	0.788	0.789	0.923

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.263	0.118	Data Not Normal
Lilliefors (NDs = DL)	0.24	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.241	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.17	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.914	0.965	0.969	0.961

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	3.203	0.765	
Kolmogorov-Smirnov (Detects Only)	0.162	0.121	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	2.127	0.807	
Kolmogorov-Smirnov (NDs = DL)	0.155	0.105	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.851	0.816	
Kolmogorov-Smirnov (NDs = DL/2)	0.171	0.106	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	9.036	0.818	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.36	0.106	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.956	0.941	0.924	0.986

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.13	0.118	Data Not Lognormal
Lilliefors (NDs = DL)	0.213	0.0997	Data Not Lognormal

Lilliefors (NDs = DL/2)	0.251	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0915	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Cobalt (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	5.8	20	11.61	11.5	3.878

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	9.722	8.138	1.194	2.4	0.335	0.14

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.964	0.964	0.964	0.964

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.927	0.897	Data Appear Normal
Lilliefors (Full: no NDs)	0.182	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.977	0.977	0.977	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.442	0.739	
Kolmogorov-Smirnov (Full: no NDs)	0.143	0.203	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.979	0.979	0.979	0.979

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.955	0.897	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.165	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Copper (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	77	2	2.53%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.17	0.17	0.17	0.17	0
Statistics (Detects Only)	77	1.6	38.7	12.25	9.1	9.397

Statistics (All: NDs treated as DL value)	79	0.17	38.7	11.95	9	9.47
Statistics (All: NDs treated as DL/2 value)	79	0.085	38.7	11.94	9	9.473
Statistics (Normal ROS Estimated Data)	79	-11.93	38.7	11.67	9	9.957
Statistics (Gamma ROS Estimated Data)	79	1E-09	38.7	11.94	9	9.475
Statistics (Lognormal ROS Estimated Data)	79	0.988	38.7	11.97	9	9.441

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.754	1.696	6.985	2.194	0.828	0.378
Statistics (NDs = DL)	1.438	1.391	8.31	2.094	1.03	0.492
Statistics (NDs = DL/2)	1.381	1.337	8.649	2.076	1.101	0.53
Statistics (Gamma ROS Estimates)	0.698	0.68	17.1	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	2.141	0.882	0.412

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.941	0.944	0.944	0.961

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.152	0.101	Data Not Normal
Lilliefors (NDs = DL)	0.155	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.155	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.136	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.982	0.98	0.979	0.955

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.936	0.767	
Kolmogorov-Smirnov (Detects Only)	0.117	0.103	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	0.591	0.772	
Kolmogorov-Smirnov (NDs = DL)	0.0861	0.102	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.619	0.773	
Kolmogorov-Smirnov (NDs = DL/2)	0.0788	0.103	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	4.964	0.798	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.209	0.105	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.988	0.951	0.927	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.082	0.101	Data Appear Lognormal
Lilliefors (NDs = DL)	0.0741	0.0997	Data Appear Lognormal
Lilliefors (NDs = DL/2)	0.0933	0.0997	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0707	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Copper (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	12	66	41.08	39.5	13.3

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	8.129	6.812	5.054	3.653	0.395	0.108

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.99	0.99	0.99	0.99

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.984	0.897	Data Appear Normal
Lilliefors (Full: no NDs)	0.102	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.973	0.973	0.973	0.973

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.362	0.741	
Kolmogorov-Smirnov (Full: no NDs)	0.153	0.204	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.935	0.935	0.935	0.935

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.889	0.897	Data Not Lognormal
Lilliefors (Full: no NDs)	0.18	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Iron (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	7250	67700	26963	25200	11990

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.607	4.441	5852	10.09	0.508	0.0503

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.979	0.979	0.979	0.979

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0648	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.984	0.984	0.984	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.831	0.755	
Kolmogorov-Smirnov (Full: no NDs)	0.082	0.101	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.97	0.97	0.97	0.97

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.115	0.0997	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Iron (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	12500	66200	37594	36225	12529

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	8.897	7.451	4226	10.48	0.365	0.0349

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.965	0.965	0.965	0.965

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.944	0.897	Data Appear Normal
Lilliefors (Full: no NDs)	0.162	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.976	0.976	0.976	0.976

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Anderson-Darling (Full: no NDs)	0.396	0.74	
Kolmogorov-Smirnov (Full: no NDs)	0.127	0.204	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.946	0.946	0.946	0.946

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.915	0.897	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.15	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Magnesium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	72	7	8.86%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	7	3.8	5	4.686	4.8	0.402
Statistics (Detects Only)	72	139	58100	6394	1270	12925
Statistics (All: NDs treated as DL value)	79	3.8	58100	5828	1080	12466
Statistics (All: NDs treated as DL/2 value)	79	1.9	58100	5827	1080	12466
Statistics (Normal ROS Estimated Data)	79	-19110	58100	4438	1080	13862
Statistics (Gamma ROS Estimated Data)	79	1E-09	58100	5827	1080	12466
Statistics (Lognormal ROS Estimated Data)	79	28.2	58100	5832	1080	12464

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	0.484	0.474	13216	7.443	1.571	0.211
Statistics (NDs = DL)	0.379	0.373	15366	6.92	2.257	0.326
Statistics (NDs = DL/2)	0.368	0.363	15828	6.859	2.409	0.351
Statistics (Gamma ROS Estimates)	0.198	0.199	29431	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	7.129	1.812	0.254

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.71	0.697	0.697	0.812

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.323	0.104	Data Not Normal
Lilliefors (NDs = DL)	0.321	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.321	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.29	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.943	0.948	0.949	0.956

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Anderson-Darling (Detects Only)	4.255	0.821	
Kolmogorov-Smirnov (Detects Only)	0.17	0.111	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	2.668	0.847	
Kolmogorov-Smirnov (NDs = DL)	0.136	0.108	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.542	0.849	
Kolmogorov-Smirnov (NDs = DL/2)	0.129	0.108	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	7.068	0.912	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.298	0.111	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.962	0.948	0.992

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.0868	0.104	Data Appear Lognormal
Lilliefors (NDs = DL)	0.135	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.157	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0546	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Magnesium (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	1970	107000	32466	27700	24582

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.641	1.404	19787	10.05	0.982	0.0977

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.924	0.924	0.924	0.924

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.869	0.897	Data Not Normal
Lilliefors (Full: no NDs)	0.17	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.978	0.978	0.978	0.978

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.379	0.755	
Kolmogorov-Smirnov (Full: no NDs)	0.174	0.207	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.942	0.942	0.942	0.942

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.896	0.897	Data Not Lognormal
Lilliefors (Full: no NDs)	0.232	0.209	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Manganese (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	16.7	2040	471.4	359	467.1

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.121	1.087	420.6	5.647	1.118	0.198

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.894	0.894	0.894	0.894

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.165	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.982	0.982	0.982	0.982

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.359	0.779	
Kolmogorov-Smirnov (Full: no NDs)	0.0515	0.103	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.985	0.985	0.985	0.985

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.093	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Manganese (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	99	2905	1189	1075	654.7

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	2.887	2.443	411.8	6.898	0.726	0.105

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.953	0.953	0.953	0.953

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.922	0.897	Data Appear Normal
Lilliefors (Full: no NDs)	0.164	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.98	0.98	0.98	0.98

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.444	0.747	
Kolmogorov-Smirnov (Full: no NDs)	0.14	0.205	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.905	0.905	0.905	0.905

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.845	0.897	Data Not Lognormal
Lilliefors (Full: no NDs)	0.189	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Mercury (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	18	61	77.22%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	61	0.019	0.06	0.0484	0.06	0.0158
Statistics (Detects Only)	18	0.038	1.2	0.187	0.125	0.259
Statistics (All: NDs treated as DL value)	79	0.019	1.2	0.0799	0.06	0.135
Statistics (All: NDs treated as DL/2 value)	79	0.0095	1.2	0.0612	0.03	0.139
Statistics (Normal ROS Estimated Data)	79	-1.214	1.2	-0.361	-0.372	0.403
Statistics (Gamma ROS Estimated Data)	79	0.038	1.2	0.173	0.156	0.138
Statistics (Lognormal ROS Estimated Data)	79	0.0007952	1.2	0.0541	0.0171	0.141

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.552	1.501	0.12	-2.035	0.727	-0.358
Statistics (NDs = DL)	1.645	1.591	0.0485	-2.861	0.681	-0.238

Statistics (NDs = DL/2)	0.962	0.934	0.0636	-3.396	0.902	-0.266
Statistics (Gamma ROS Estimates)	3.073	2.965	0.0563	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-4.029	1.44	-0.357

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.64	0.523	0.527	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.442	0.897	Data Not Normal
Lilliefors (Detects Only)	0.384	0.209	Data Not Normal
Lilliefors (NDs = DL)	0.356	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.361	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.067	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.801	0.683	0.741	0.816

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	1.702	0.756	
Kolmogorov-Smirnov (Detects Only)	0.274	0.207	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	6.715	0.768	
Kolmogorov-Smirnov (NDs = DL)	0.33	0.102	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	8.44	0.784	
Kolmogorov-Smirnov (NDs = DL/2)	0.377	0.104	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.725	0.759	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.0728	0.101	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.919	0.916	0.914	0.994

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.871	0.897	Data Not Lognormal
Lilliefors (Detects Only)	0.193	0.209	Data Appear Lognormal
Lilliefors (NDs = DL)	0.269	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.321	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.062	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Mercury (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	0.036	0.65	0.135	0.088	0.147

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.646	1.409	0.082	-2.336	0.764	-0.327

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.786	0.786	0.786	0.786

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.64	0.897	Data Not Normal
Lilliefors (Full: no NDs)	0.318	0.209	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.929	0.929	0.929	0.929

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.918	0.755	
Kolmogorov-Smirnov (Full: no NDs)	0.231	0.207	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.963	0.963	0.963	0.963

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.929	0.897	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.166	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Nickel (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	61	18	22.78%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	18	0.21	1.4	1.066	1.3	0.466
Statistics (Detects Only)	61	4.6	94.2	17.95	13.2	15.68
Statistics (All: NDs treated as DL value)	79	0.21	94.2	14.1	9.4	15.49
Statistics (All: NDs treated as DL/2 value)	79	0.105	94.2	13.98	9.4	15.59
Statistics (Normal ROS Estimated Data)	79	-32.3	94.2	10.45	9.4	19.82
Statistics (Gamma ROS Estimated Data)	79	1E-09	94.2	14.69	9.8	15.1
Statistics (Lognormal ROS Estimated Data)	79	1.082	94.2	14.48	9.4	15.18

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	1.974	1.908	9.092	2.614	0.722	0.276
Statistics (NDs = DL)	0.89	0.865	15.85	1.989	1.367	0.687
Statistics (NDs = DL/2)	0.743	0.723	18.82	1.831	1.622	0.886
Statistics (Gamma ROS Estimates)	0.377	0.371	38.92	--	--	--

Statistics (Lognormal ROS Estimates)	--	--	--	2.235	0.959	0.429

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.86	0.87	0.874	0.961

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.197	0.113	Data Not Normal
Lilliefors (NDs = DL)	0.185	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.187	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.156	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.969	0.99	0.992	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.996	0.763	
Kolmogorov-Smirnov (Detects Only)	0.096	0.115	Data appear Approximate Gamma Distribution
Anderson-Darling (NDs = DL)	0.633	0.787	
Kolmogorov-Smirnov (NDs = DL)	0.112	0.104	Data appear Approximate Gamma Distribution
Anderson-Darling (NDs = DL/2)	1.261	0.794	
Kolmogorov-Smirnov (NDs = DL/2)	0.135	0.104	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	11.39	0.847	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.343	0.108	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.986	0.963	0.942	0.997

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.087	0.113	Data Appear Lognormal
Lilliefors (NDs = DL)	0.14	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.198	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0586	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Nickel (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	8.4	27.5	19.36	19	4.349

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	18.09	15.11	1.07	2.935	0.257	0.0875

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.945	0.945	0.945	0.945

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.91	0.897	Data Appear Normal
Lilliefors (Full: no NDs)	0.219	0.209	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.942	0.942	0.942	0.942

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.831	0.739	
Kolmogorov-Smirnov (Full: no NDs)	0.191	0.203	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.898	0.898	0.898	0.898

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.831	0.897	Data Not Lognormal
Lilliefors (Full: no NDs)	0.208	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Potassium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	67	12	15.19%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	12	201	271	223.1	217	20.78
Statistics (Detects Only)	67	123	10900	1690	694	2232
Statistics (All: NDs treated as DL value)	79	123	10900	1467	618	2120
Statistics (All: NDs treated as DL/2 value)	79	100.5	10900	1450	618	2131
Statistics (Normal ROS Estimated Data)	79	-1878	10900	1235	618	2322
Statistics (Gamma ROS Estimated Data)	79	1E-09	10900	1433	618	2142
Statistics (Lognormal ROS Estimated Data)	79	104.7	10900	1456	618	2127

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	0.92	0.893	1837	6.798	1.115	0.164
Statistics (NDs = DL)	0.837	0.814	1752	6.586	1.143	0.174
Statistics (NDs = DL/2)	0.75	0.73	1933	6.481	1.273	0.196
Statistics (Gamma ROS Estimates)	0.163	0.165	8778	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	6.525	1.216	0.186

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.813	0.789	0.795	0.88

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.247	0.108	Data Not Normal
Lilliefors (NDs = DL)	0.263	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.263	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.21	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.972	0.968	0.974	0.962

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	1.945	0.784	
Kolmogorov-Smirnov (Detects Only)	0.153	0.112	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	3.288	0.789	
Kolmogorov-Smirnov (NDs = DL)	0.171	0.104	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.192	0.793	
Kolmogorov-Smirnov (NDs = DL/2)	0.147	0.104	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	14.88	0.944	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.392	0.113	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.989	0.973	0.983	0.98

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.0982	0.108	Data Appear Lognormal
Lilliefors (NDs = DL)	0.106	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.0732	0.0997	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0941	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Potassium (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	198	3500	1255	1125	750.5

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	3.25	2.745	386.1	6.973	0.617	0.0884

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.915	0.915	0.915	0.915

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.856	0.897	Data Not Normal
Lilliefors (Full: no NDs)	0.236	0.209	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.97	0.97	0.97	0.97

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.392	0.745	
Kolmogorov-Smirnov (Full: no NDs)	0.164	0.205	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.956	0.956	0.956	0.956

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.936	0.897	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.147	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Selenium (mg.kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	2	77	97.47%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	77	N/A	N/A	N/A	N/A	N/A
Statistics (Detects Only)	2	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL value)	79	N/A	N/A	N/A	N/A	N/A
Statistics (All: NDs treated as DL/2 value)	79	N/A	N/A	N/A	N/A	N/A
Statistics (Normal ROS Estimated Data)	79	N/A	N/A	N/A	N/A	N/A

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	N/A	N/A	
Lilliefors (Detects Only)	N/A	N/A	
Lilliefors (NDs = DL)	N/A	N/A	
Lilliefors (NDs = DL/2)	N/A	N/A	
Lilliefors (Normal ROS Estimates)	N/A	N/A	

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS

Correlation Coefficient R	N/A	N/A	N/A	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	N/A	N/A	
Kolmogorov-Smirnov (Detects Only)	N/A	N/A	
Anderson-Darling (NDs = DL)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL)	N/A	N/A	
Anderson-Darling (NDs = DL/2)	N/A	N/A	
Kolmogorov-Smirnov (NDs = DL/2)	N/A	N/A	
Anderson-Darling (Gamma ROS Estimates)	N/A	N/A	
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	N/A	

Note: Substitution methods such as DL or DL/2 are not recommended.

Selenium (mg.kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	0.42	0.96	0.659	0.615	0.16

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	18.38	15.35	0.0359	-0.444	0.241	-0.542

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.977	0.977	0.977	0.977

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.943	0.897	Data Appear Normal
Lilliefors (Full: no NDs)	0.152	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.983	0.983	0.983	0.983

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.321	0.739	
Kolmogorov-Smirnov (Full: no NDs)	0.128	0.203	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.987	0.987	0.987	0.987

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.964	0.897	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.111	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Silver (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	1	78	98.73%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver (mg/kg) (rfaap bkgrd ts) was not processed!

Silver (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	0.05	0.325	0.11	0.083	0.0691

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.022	3.388	0.0274	-2.335	0.483	-0.207

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.84	0.84	0.84	0.84

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.72	0.897	Data Not Normal
Lilliefors (Full: no NDs)	0.32	0.209	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.93	0.93	0.93	0.93

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	1.353	0.743	
Kolmogorov-Smirnov (Full: no NDs)	0.286	0.205	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.931	0.931	0.931	0.931

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.872	0.897	Data Not Lognormal
Lilliefors (Full: no NDs)	0.255	0.209	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Sodium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	6	73	92.41%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	73	10.8	25.9	15.02	12	4.717
Statistics (Detects Only)	6	114	151	131.7	127	14.76
Statistics (All: NDs treated as DL value)	79	10.8	151	23.88	12.1	31.65
Statistics (All: NDs treated as DL/2 value)	79	5.4	151	16.94	6.05	33.39
Statistics (Normal ROS Estimated Data)	79	-8.416	151	43.69	36.98	33.18
Statistics (Gamma ROS Estimated Data)	79	114	151	131.6	131.6	3.738
Statistics (Lognormal ROS Estimated Data)	79	45.83	151	70.08	64.41	20.82

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	97.1	93.42	1.356	4.875	0.111	0.0227
Statistics (NDs = DL)	1.618	1.565	14.76	2.833	0.653	0.23
Statistics (NDs = DL/2)	0.916	0.889	18.5	2.193	0.823	0.376
Statistics (Gamma ROS Estimates)	1276	1227	0.103	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	4.216	0.249	0.059

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.957	0.639	0.59	0.936

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.901	0.788	Data Appear Normal
Lilliefors (Detects Only)	0.212	0.362	Data Appear Normal
Lilliefors (NDs = DL)	0.404	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.472	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.2	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.959	0.811	0.809	0.571

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.389	0.696	
Kolmogorov-Smirnov (Detects Only)	0.22	0.332	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	13.6	0.769	
Kolmogorov-Smirnov (NDs = DL)	0.302	0.102	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	17.64	0.786	
Kolmogorov-Smirnov (NDs = DL/2)	0.386	0.104	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	22.97	0.749	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.448	0.1	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.963	0.798	0.753	0.936

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.913	0.788	Data Appear Lognormal
Lilliefors (Detects Only)	0.198	0.362	Data Appear Lognormal
Lilliefors (NDs = DL)	0.246	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.27	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.2	0.0997	Data Not Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Sodium (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	86	24200	2769	1410	5597

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	0.5	0.454	5534	6.657	1.73	0.26

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.679	0.679	0.679	0.679

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.489	0.897	Data Not Normal
Lilliefors (Full: no NDs)	0.321	0.209	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.918	0.918	0.918	0.918

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.824	0.8	
Kolmogorov-Smirnov (Full: no NDs)	0.178	0.215	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.956	0.956	0.956	0.956

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.901	0.897	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.175	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Thallium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	15	64	81.01%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	64	0.13	0.45	0.189	0.15	0.0931
Statistics (Detects Only)	15	1.3	5	2.527	2.2	0.932
Statistics (All: NDs treated as DL value)	79	0.13	5	0.633	0.16	1.007
Statistics (All: NDs treated as DL/2 value)	79	0.065	5	0.556	0.08	1.039
Statistics (Normal ROS Estimated Data)	79	-4.787	5	-0.573	-0.722	1.972
Statistics (Gamma ROS Estimated Data)	79	1.3	5	2.489	2.468	0.399
Statistics (Lognormal ROS Estimated Data)	79	0.155	5	0.998	0.707	0.884

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	8.698	8.377	0.29	0.868	0.352	0.405
Statistics (NDs = DL)	0.753	0.733	0.841	-1.253	1.097	-0.876
Statistics (NDs = DL/2)	0.515	0.504	1.08	-1.814	1.358	-0.748
Statistics (Gamma ROS Estimates)	44.1	42.44	0.0564	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.291	0.738	-2.538

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.938	0.746	0.729	0.991

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.893	0.881	Data Appear Normal
Lilliefors (Detects Only)	0.17	0.229	Data Appear Normal
Lilliefors (NDs = DL)	0.382	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.435	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.0779	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.964	0.943	0.944	0.777

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.367	0.738	
Kolmogorov-Smirnov (Detects Only)	0.145	0.222	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	12.86	0.793	
Kolmogorov-Smirnov (NDs = DL)	0.361	0.104	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	14.62	0.817	
Kolmogorov-Smirnov (NDs = DL/2)	0.371	0.106	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	10.13	0.749	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.319	0.1	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.977	0.835	0.815	0.99

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.959	0.881	Data Appear Lognormal
Lilliefors (Detects Only)	0.134	0.229	Data Appear Lognormal
Lilliefors (NDs = DL)	0.334	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.34	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0779	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Thallium (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	16	2	11.11%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.5	0.5	0.5	0.5	0
Statistics (Detects Only)	16	0.092	0.325	0.197	0.185	0.0784
Statistics (All: NDs treated as DL value)	18	0.092	0.5	0.231	0.19	0.123
Statistics (All: NDs treated as DL/2 value)	18	0.092	0.325	0.203	0.19	0.0756
Statistics (Normal ROS Estimated Data)	18	0.092	0.325	0.197	0.185	0.0747
Statistics (Gamma ROS Estimated Data)	18	0.092	0.325	0.198	0.185	0.0748
Statistics (Lognormal ROS Estimated Data)	18	0.092	0.325	0.196	0.185	0.0748

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Detects Only)	6.288	5.277	0.0313	-1.706	0.43	-0.252
Statistics (NDs = DL)	4.104	3.457	0.0562	-1.593	0.52	-0.326
Statistics (NDs = DL/2)	6.784	5.69	0.0299	-1.67	0.417	-0.249
Statistics (Gamma ROS Estimates)	6.869	5.761	0.0289	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-1.706	0.41	-0.24

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.972	0.941	0.975	0.978

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.925	0.887	Data Appear Normal
Lilliefors (Detects Only)	0.164	0.222	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.878	0.897	Data Not Normal
Lilliefors (NDs = DL)	0.186	0.209	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.933	0.897	Data Appear Normal
Lilliefors (NDs = DL/2)	0.177	0.209	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.939	0.897	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.149	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.965	0.974	0.959	0.969

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)

Anderson-Darling (Detects Only)	0.444	0.741	
Kolmogorov-Smirnov (Detects Only)	0.18	0.216	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.355	0.743	
Kolmogorov-Smirnov (NDs = DL)	0.14	0.205	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.544	0.742	
Kolmogorov-Smirnov (NDs = DL/2)	0.199	0.204	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.446	0.742	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.148	0.204	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.968	0.981	0.961	0.975

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.917	0.887	Data Appear Lognormal
Lilliefors (Detects Only)	0.173	0.222	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.949	0.897	Data Appear Lognormal
Lilliefors (NDs = DL)	0.126	0.209	Data Appear Lognormal
Shapiro-Wilks (NDs = DL/2)	0.906	0.897	Data Appear Lognormal
Lilliefors (NDs = DL/2)	0.197	0.209	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.933	0.897	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.143	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Vanadium (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	12.2	114	45.84	41.4	20.38

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	4.973	4.792	9.218	3.721	0.477	0.128

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.98	0.98	0.98	0.98

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0967	0.0997	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.997	0.997	0.997	0.997

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.228	0.754	

Kolmogorov-Smirnov (Full: no NDs)	0.054	0.101	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.988	0.988	0.988	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0843	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Vanadium (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	16	70	42.75	42.75	14.08

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	8.862	7.422	4.824	3.698	0.364	0.0984

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.993	0.993	0.993	0.993

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.985	0.897	Data Appear Normal
Lilliefors (Full: no NDs)	0.104	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.989	0.989	0.989	0.989

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.173	0.74	
Kolmogorov-Smirnov (Full: no NDs)	0.107	0.204	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.975	0.975	0.975	0.975

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.957	0.897	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.128	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Zinc (mg/kg) (rfaap bkgrd ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	79	0	79	79	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	79	4.7	598	54.94	30.2	87.15

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	1.083	1.05	50.74	3.478	0.93	0.267

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.683	0.683	0.683	0.683

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.291	0.0997	Data Not Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.88	0.88	0.88	0.88

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	3.363	0.78	
Kolmogorov-Smirnov (Full: no NDs)	0.145	0.103	Data Not Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.982	0.982	0.982	0.982

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0696	0.0997	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Zinc (mg/kg) (swmu 41b-ts)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	0	18	18	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	18	81	380	198.9	176.5	91.78

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log CV
Statistics (Full: no NDs)	5.382	4.522	36.97	5.197	0.449	0.0864

Normal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.951	0.951	0.951	0.951

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.893	0.897	Data Not Normal
Lilliefors (Full: no NDs)	0.182	0.209	Data Appear Normal

Gamma Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.974	0.974	0.974	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.364	0.743	
Kolmogorov-Smirnov (Full: no NDs)	0.125	0.204	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.988	0.988	0.988	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.966	0.897	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.102	0.209	Data Appear Lognormal

Note: Substitution methods such as DL or DL/2 are not recommended.

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Aluminum (mg/kg)(swmu 41b-ts)
Background Data: Aluminum (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	0
Number of Detect Data	18	79
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	2770	3620
Maximum Detected	42400	47900
Mean of Detected Data	22962	14204
Median of Detected Data	**22850**	**12100**
SD of Detected Data	9210	9433

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.777
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	1.59E-04

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Antimony (mg/kg)(swmu 41b-ts)
Background Data: Antimony (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	38
Number of Missing Values	0	41
Number of Non-Detect Data	0	38
Number of Detect Data	18	0
Minimum Non-Detect	N/A	0.23
Maximum Non-Detect	N/A	0.36
Percent Non detects	0.00%	100.00%
Minimum Detected	0.11	N/A
Maximum Detected	1.3	N/A
Mean of Detected Data	0.667	N/A
Median of Detected Data	**0.575**	**N/A**
SD of Detected Data	0.298	N/A

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	6.963
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	3.33E-12

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

	Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects
User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Arsenic (mg/kg)(swmu 41b-ts)
Background Data: Arsenic (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	3
Number of Detect Data	18	76
Minimum Non-Detect	N/A	0.09
Maximum Non-Detect	N/A	0.12
Percent Non detects	0.00%	3.80%
Minimum Detected	3.2	1.2
Maximum Detected	32	35.9

Mean of Detected Data	18.47	4.989
Median of Detected Data	**19.25**	**3.2**
SD of Detected Data	7.752	5.36

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	5.716
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	1.09E-08

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Barium (mg/kg)(swmu 41b-ts)
Background Data: Barium (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	16
Number of Detect Data	18	63
Minimum Non-Detect	N/A	0.36
Maximum Non-Detect	N/A	1.1
Percent Non detects	0.00%	20.25%
Minimum Detected	35	23.4
Maximum Detected	366.5	174
Mean of Detected Data	137.1	68.4
Median of Detected Data	**116**	**56.7**
SD of Detected Data	83.28	40.39

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.613
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	3.97E-06

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Beryllium (mg/kg)(swmu 41b-ts)
Background Data: Beryllium (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	39
Number of Detect Data	18	40
Minimum Non-Detect	N/A	0.022
Maximum Non-Detect	N/A	0.03
Percent Non detects	0.00%	49.37%
Minimum Detected	0.057	0.61
Maximum Detected	1.35	5.4
Mean of Detected Data	0.736	1.449
Median of Detected Data	0.788	1.1
SD of Detected Data	0.355	1.086

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	1.574
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.116

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site = Background
P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)

Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Cadmium (mg/kg)(swmu 41b-ts)
Background Data: Cadmium (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	66
Number of Detect Data	18	13
Minimum Non-Detect	N/A	0.02
Maximum Non-Detect	N/A	0.05
Percent Non detects	0.00%	83.54%
Minimum Detected	0.6	0.57
Maximum Detected	3.5	2.5
Mean of Detected Data	2.381	1.152
Median of Detected Data	**2.4**	**1.1**
SD of Detected Data	0.72	0.585

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	7.68
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	1.59E-14

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

	Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects
User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Chromium (mg/kg)(swmu 41b-ts)
Background Data: Chromium (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	1	0
Number of Detect Data	17	79
Minimum Non-Detect	5	N/A

Maximum Non-Detect	5	N/A
Percent Non detects	5.56%	0.00%
Minimum Detected	12	6.3
Maximum Detected	30	75.8
Mean of Detected Data	20.53	26.86
Median of Detected Data	**22**	**26**
SD of Detected Data	4.735	12.51

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	-2.459
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	1.986

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Cobalt (mg/kg)(swmu 41b-ts)
Background Data: Cobalt (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	23
Number of Detect Data	18	56
Minimum Non-Detect	N/A	0.11
Maximum Non-Detect	N/A	0.84
Percent Non detects	0.00%	29.11%
Minimum Detected	5.8	5.9
Maximum Detected	20	130
Mean of Detected Data	11.61	22.23
Median of Detected Data	11.5	13.3
SD of Detected Data	3.878	23.94

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	0.308
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.758

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Copper (mg/kg)(swmu 41b-ts)
Background Data: Copper (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	2
Number of Detect Data	18	77
Minimum Non-Detect	N/A	0.17
Maximum Non-Detect	N/A	0.17
Percent Non detects	0.00%	2.53%
Minimum Detected	12	1.6
Maximum Detected	66	38.7
Mean of Detected Data	41.08	12.25
Median of Detected Data	**39.5**	**9.1**
SD of Detected Data	13.3	9.397

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	6.032
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	1.62E-09

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst

Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Iron (mg/kg)(swmu 41b-ts)
Background Data: Iron (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	0
Number of Detect Data	18	79
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	12500	7250
Maximum Detected	66200	67700
Mean of Detected Data	37594	26963
Median of Detected Data	**36225**	**25200**
SD of Detected Data	12529	11990

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.248
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.00116

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Lead (mg/kg)(swmu 41b-ts)
Background Data: Lead (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background

Number of Valid Data	18	79
Number of Non-Detect Data	0	0
Number of Detect Data	18	79
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	21	2.1
Maximum Detected	143	256
Mean of Detected Data	57.19	22.04
Median of Detected Data	**43.25**	**12**
SD of Detected Data	34.81	39.85

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	5.633
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	1.77E-08

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Magnesium (mg/kg)(swmu 41b-ts)
Background Data: Magnesium (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	7
Number of Detect Data	18	72
Minimum Non-Detect	N/A	3.8
Maximum Non-Detect	N/A	5
Percent Non detects	0.00%	8.86%
Minimum Detected	1970	139
Maximum Detected	107000	58100
Mean of Detected Data	32466	6394
Median of Detected Data	**27700**	**1270**
SD of Detected Data	24582	12925

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	5.327
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	9.96E-08

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Manganese (mg/kg)(swmu 41b-ts)
Background Data: Manganese (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	0
Number of Detect Data	18	79
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	99	16.7
Maximum Detected	2905	2040
Mean of Detected Data	1189	471.4
Median of Detected Data	**1075**	**359**
SD of Detected Data	654.7	467.1

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.584
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	4.56E-06

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Mercury (mg/kg)(swmu 41b-ts)
Background Data: Mercury (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	61
Number of Detect Data	18	18
Minimum Non-Detect	N/A	0.019
Maximum Non-Detect	N/A	0.06
Percent Non detects	0.00%	77.22%
Minimum Detected	0.036	0.038
Maximum Detected	0.65	1.2
Mean of Detected Data	0.135	0.187
Median of Detected Data	**0.088**	**0.125**
SD of Detected Data	0.147	0.259

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	4.466
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	7.97E-06

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Mercury (mg/kg)(swmu 41b-ts)

Background Data: Mercury (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	61
Number of Detect Data	18	18
Minimum Non-Detect	N/A	0.019
Maximum Non-Detect	N/A	0.06
Percent Non detects	0.00%	77.22%
Minimum Detected	0.036	0.038
Maximum Detected	0.65	1.2
Mean of Detected Data	0.135	0.187
Median of Detected Data	**0.088**	**0.125**
SD of Detected Data	0.147	0.259

Site vs Background Gehan Test

H0: Mean/Median of Site or AOC <= Mean/Median of background

Gehan z Test Value	4.466
Critical z (0.95)	1.645
P-Value	3.99E-06

Conclusion with Alpha = 0.05
Reject H0, Conclude Site > Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Nickel (mg/kg)(swmu 41b-ts)
Background Data: Nickel (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	18
Number of Detect Data	18	61
Minimum Non-Detect	N/A	0.21
Maximum Non-Detect	N/A	1.4
Percent Non detects	0.00%	22.78%
Minimum Detected	8.4	4.6
Maximum Detected	27.5	94.2
Mean of Detected Data	19.36	17.95

Median of Detected Data	**19**	**13.2**
SD of Detected Data	4.349	15.68

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	3.249
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.00116

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Potassium (mg/kg)(swmu 41b-ts)
Background Data: Potassium (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	12
Number of Detect Data	18	67
Minimum Non-Detect	N/A	201
Maximum Non-Detect	N/A	271
Percent Non detects	0.00%	15.19%
Minimum Detected	198	123
Maximum Detected	3500	10900
Mean of Detected Data	1255	1690
Median of Detected Data	1125	694
SD of Detected Data	750.5	2232

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	1.828
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.0675

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Selenium (mg.kg)(swmu 41b-ts)
Background Data: Selenium (mg.kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	77
Number of Detect Data	18	2
Minimum Non-Detect	N/A	0.14
Maximum Non-Detect	N/A	0.93
Percent Non detects	0.00%	97.47%
Minimum Detected	0.42	0.64
Maximum Detected	0.96	0.77
Mean of Detected Data	0.659	0.705
Median of Detected Data	**0.615**	**0.705**
SD of Detected Data	0.16	0.0919

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	8.946
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	3.69E-19

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Selenium (mg.kg)(swmu 41b-ts)
Background Data: Selenium (mg.kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	77
Number of Detect Data	18	2
Minimum Non-Detect	N/A	0.14
Maximum Non-Detect	N/A	0.93
Percent Non detects	0.00%	97.47%
Minimum Detected	0.42	0.64
Maximum Detected	0.96	0.77
Mean of Detected Data	0.659	0.705
Median of Detected Data	0.615	0.705
SD of Detected Data	0.16	0.0919

Site vs Background Gehan Test

H0: Mean/Median of Site or AOC <= Mean/Median of background

Gehan z Test Value	8.946
Critical z (0.95)	1.645
P-Value	1.84E-19

Conclusion with Alpha = 0.05
Reject H0, Conclude Site > Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Silver (mg/kg)(swmu 41b-ts)
Background Data: Silver (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	78
Number of Detect Data	18	1
Minimum Non-Detect	N/A	0.16
Maximum Non-Detect	N/A	0.42
Percent Non detects	0.00%	98.73%

Minimum Detected	0.05	4.3
Maximum Detected	0.325	4.3
Mean of Detected Data	0.11	4.3
Median of Detected Data	**0.083**	**4.3**
SD of Detected Data	0.0691	N/A

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	2.251
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.0244

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Silver (mg/kg)(swmu 41b-ts)
Background Data: Silver (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	78
Number of Detect Data	18	1
Minimum Non-Detect	N/A	0.16
Maximum Non-Detect	N/A	0.42
Percent Non detects	0.00%	98.73%
Minimum Detected	0.05	4.3
Maximum Detected	0.325	4.3
Mean of Detected Data	0.11	4.3
Median of Detected Data	0.083	4.3
SD of Detected Data	0.0691	N/A

Site vs Background Gehan Test

H0: Mean/Median of Site or AOC <= Mean/Median of background

Gehan z Test Value	2.251
Critical z (0.95)	1.645

P-Value	0.0122

Conclusion with Alpha = 0.05
Reject H0, Conclude Site > Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Sodium (mg/kg)(swmu 41b-ts)
Background Data: Sodium (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	73
Number of Detect Data	18	6
Minimum Non-Detect	N/A	10.8
Maximum Non-Detect	N/A	25.9
Percent Non detects	0.00%	92.41%
Minimum Detected	86	114
Maximum Detected	24200	151
Mean of Detected Data	2769	131.7
Median of Detected Data	**1410**	**127**
SD of Detected Data	5597	14.76

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	8.33
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	8.07E-17

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0

Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Thallium (mg/kg)(swmu 41b-ts)
Background Data: Thallium (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	2	64
Number of Detect Data	16	15
Minimum Non-Detect	0.5	0.13
Maximum Non-Detect	0.5	0.45
Percent Non detects	11.11%	81.01%
Minimum Detected	0.092	1.3
Maximum Detected	0.325	5
Mean of Detected Data	0.197	2.527
Median of Detected Data	**0.185**	**2.2**
SD of Detected Data	0.0784	0.932

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	2.163
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	0.0306

Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Thallium (mg/kg)(swmu 41b-ts)
Background Data: Thallium (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	2	64
Number of Detect Data	16	15

Minimum Non-Detect	0.5	0.13
Maximum Non-Detect	0.5	0.45
Percent Non detects	11.11%	81.01%
Minimum Detected	0.092	1.3
Maximum Detected	0.325	5
Mean of Detected Data	0.197	2.527
Median of Detected Data	0.185	2.2
SD of Detected Data	0.0784	0.932

Site vs Background Gehan Test

H0: Mean/Median of Site or AOC <= Mean/Median of background

Gehan z Test Value	2.163
Critical z (0.95)	1.645
P-Value	0.0153

Conclusion with Alpha = 0.05

Reject H0, Conclude Site > Background

P-Value < alpha (0.05)

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0
Selected Null Hypothesis	Site or AOC Mean Equal to Background Mean (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean Not Equal to Background Mean

Area of Concern Data: Vanadium (mg/kg)(swmu 41b-ts)
Background Data: Vanadium (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Observations	18	79
Number of Distinct Observations	16	76
Minimum	16	12.2
Maximum	70	114
Mean	42.75	45.84
Median	42.75	41.4
SD	14.08	20.38
SE of Mean	3.319	2.293

Site vs Background Two-Sample t-Test

H0: Mu of Site = Mu of Background

Method	DF	t-Test Value	Critical - t (0.050)	P-Value
Pooled (Equal Variance)	95	-0.61	1.986	0.544

Satterthwaite (Unequal Variance)	35.3	-0.766	2.03	0.449

Pooled SD: 19.405
Conclusion with Alpha = 0.050
*** Student t (Pooled): Do Not Reject H0, Conclude Site = Background**
*** Satterthwaite: Do Not Reject H0, Conclude Site = Background**

Test of Equality of Variances

Numerator DF	Denominator DF	F-Test Value	P-Value
78	17	2.095	0.088

Conclusion with Alpha = 0.05
* Two variances appear to be equal

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\SWMU 41\Background Stats\41_Area B_TS_stats.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (Two Sided Alternative)
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Zinc (mg/kg)(swmu 41b-ts)
Background Data: Zinc (mg/kg)(rfaap bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Data	18	79
Number of Non-Detect Data	0	0
Number of Detect Data	18	79
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non detects	0.00%	0.00%
Minimum Detected	81	4.7
Maximum Detected	380	598
Mean of Detected Data	198.9	54.94
Median of Detected Data	**176.5**	**30.2**
SD of Detected Data	91.78	87.15

Site vs Background Gehan Test

H0: Mu of Site or AOC = Mu of background

Gehan z Test Value	5.865
Lower Critical z (0.025)	-1.96
Upper Critical z (0.975)	1.96
P-Value	4.50E-09

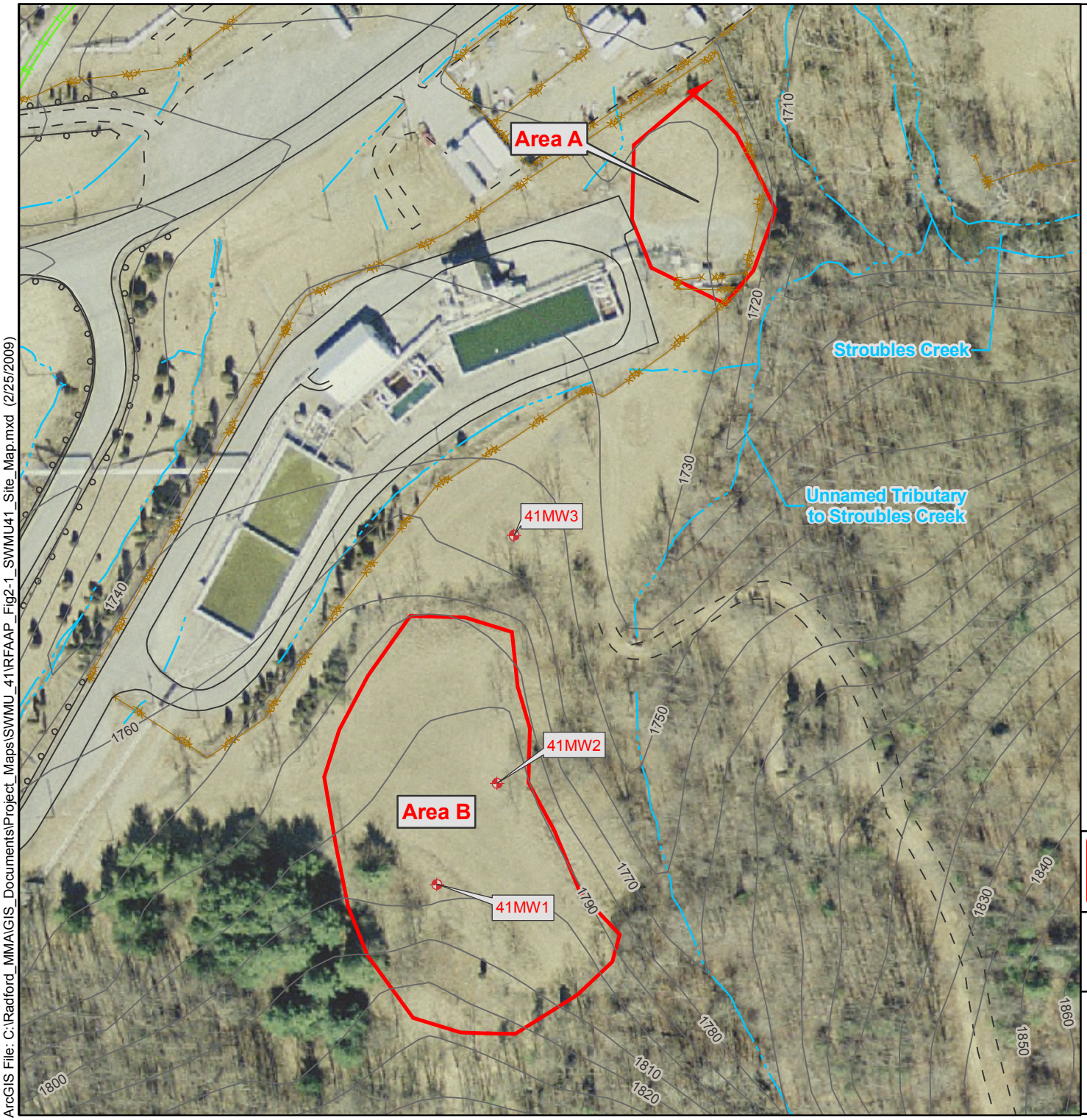
Conclusion with Alpha = 0.05
Reject H0, Conclude Site <> Background
P-Value < alpha (0.05)

Appendix F

SLERA Site Reconnaissance Photographs and Supporting Information

Appendix F-1

SWMU 41 Aerial Photograph



LEGEND

- Monitoring Well
- Dirt Road
- Paved Road
- Railroad
- Water Feature
- Fence
- 10 ft Contour Line
- SWMU 41 Boundary

Notes:
1) Aerial photo, dated 2005, was obtained from Montgomery County, VA Planning & GIS Services.

N

Scale:

0 62.5 125 250 Feet

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 2-1
SWMU 41 Site Map

Radford Army Ammunition Plant,
Radford, VA

ArcGIS File: C:\Radford_MMA\GIS_Documents\Project_Maps\SWMU_41\RFAAP_Fig2-1_SWMU41_Site_Map.mxd (2/25/2009)

Appendix F-2

SLERA Supporting Information

Table F-1
Data Used to Model Exposure[a] in the Indicator Wildlife Species

Indicator Species	Body Weight Range (average) (kg)	Average Home Range (ha) [ac]	Maximum Dietary Intake[b] (kg[dw]/day)	Average Dietary Intake[c] (kg[dw]/day)	Soil/Sed. Intake[d] (%Diet) (Avg – Max) (kg[dw]/day)	Maximum Water Intake[b] (L/day)	Average Water Intake[c] (L/day)	Trophic Level	Dietary Composition
Meadow vole (*Microtus pennsylvanicus*)	0.0170-0.0524 (0.037)	0.036 [0.089]	0.010	0.0080	(2.4%) 0.00019-0.00024	0.0070	0.0051	Herbivore	Plants: 100%
Short-tailed shrew *(Blarina brevicauda)*	0.0125-0.0225 (0.015)	0.39 [0.96]	0.0030	0.0022	(10.4%) 0.00023-0.00031	0.0033	0.0023	Insectivore	Terr. Inverts: 100%
American robin *(Turdus migratorius)*	0.0635-0.103 (0.0773)	0.48 [1.2]	0.020	0.016	(4%) 0.00064-0.00080	0.013	0.011	Omnivore	Plants: 62% Terr Inverts: 38%
Red-tailed hawk (*Buteo jamaicensis*)	0.957-1.235 (1.134)	842 [2081]	0.063	0.059	(0%)	0.068	0.064	Carnivore	Mammals: 76% Birds: 24%
Red fox *(Vulpes vulpes)*	2.95-7.04 (4.53)	892 [2204]	0.34	0.24	(2.8%) 0.0067-0.0095	0.57	0.39	Carnivore	Mammals: 65% Birds: 14% Plants: 17% Terr. Inverts: 4%
Great blue heron (*Ardea herodias*)	2.20-2.58 (2.34)	8.4 [21]	0.11	0.10	(2%) 0.0020-0.0022	0.11	0.10	Piscivore	Fish: 96% Aq. Inverts: 4%
Mink *(Mustela vison)*	0.55-1.73 (1.02)	14.1 [35]	0.11	0.070	(2%) 0.0014-0.0022	0.16	0.10	Omnivore	Plants: 18% Fish: 65% Aq. Inverts: 12% Birds: 2.5% Mammals: 2.5%

[a] From USEPA (1993), except as noted.
[b] Maximum dietary and water intake based on appropriate allometric equation using maximum body weight.
[c] Average dietary and water intake based on appropriate allometric equation using average body weight.
[d] Soil/sediment ingestion rate based on estimated percent soil in diet (dry weight), and maximum or average dietary intake.

Table F-1
Data Used to Model Exposure[a] in the Indicator Wildlife Species

Allometric equations for mammals and birds from USEPA (1993), as follows, where FI = food ingestion (dry weight [dw]), WI = water ingestion, Wt = body weight, kg = kilogram, L = liter, and g = gram:

FI (kg/day) = 0.0687 $Wt^{0.822}$ for mammals (shrew, red fox, and mink),
FI (g/day) = 0.577 $Wt^{0.727}$ for herbivores (meadow vole),
FI (g/day) = 0.301 $Wt^{0.751}$ for non-passerine birds (red-tail hawk, great blue heron),
FI (g/day) = 0.398 $Wt^{0.850}$ for passerine birds (American robin).
WI (L/day) = 0.099 $Wt^{0.90}$ (Wt in kg) for mammals,
WI (L/day) = 0.059 $Wt^{0.67}$ (Wt in kg) for birds.

ha = hectare
ac = acre, and a hectare = 2.471 acres.

Notes:
The soil ingestion rate for the shrew set equal to the rate for the American woodcock (10.4% of diet), as both species feed predominantly on earthworms.
The soil ingestion rate for the American robin set equal to 48% of the American woodcock value (0.38 x 10.4% = 4%), based on a robin diet of 38% invertebrates (earthworms).

Table F-2
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Meadow Voles at SWMU 41 Area A

Hazard Estimate - Tier 1
Meadow Vole

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	2.12E+04	4.21E+01	NA	NA	NA	NA	7.78E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	7.78E-09	4	1.00E-06	2.50E-07	3.11E-02	1.00E-05	2.50E-06	3.11E-03
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.79E+01	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	4.80E-05	NA	0.00E+00	0.00E+00	4.14E-04	0.00E+00	0.00E+00	4.62E-04	4	1.48E+00	3.70E-01	1.25E-03	7.40E+00	1.85E+00	2.50E-04
2,4,6-Trinitrotoluene	1.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	5.35E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	5.35E-04	4	3.47E+01	8.68E+00	6.17E-05	1.74E+02	4.34E+01	1.23E-05
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	4.53E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	4.53E-04	4	2.81E+00	7.03E-01	6.45E-04	1.41E+01	3.51E+00	1.29E-04
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	0.00E+00	1.69E-05	NA	0.00E+00	0.00E+00	3.25E-06	0.00E+00	0.00E+00	2.02E-05	4	8.00E-01	2.00E-01	1.01E-04	4.00E+00	1.00E+00	2.02E-05
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	1.03E-03	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	1.03E-03	4	1.93E+00	4.83E-01	2.13E-03	9.65E+00	2.41E+00	4.27E-04
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.56E+01	1.64E+01	0.00E+00	1.10E+02	2.75E+01	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.12E-05	NA	NA	0.00E+00	8.23E-06	0.00E+00	0.00E+00	2.94E-05	4	4.60E+00	1.15E+00	2.56E-05	9.20E+00	2.30E+00	1.28E-05
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.56E+01	1.64E+01	0.00E+00	1.10E+02	2.75E+01	0.00E+00
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.12E-03	NA	NA	0.00E+00	3.16E-04	0.00E+00	0.00E+00	2.43E-03	8	1.40E-01	1.75E-02	1.39E-01	6.80E-01	8.50E-02	2.86E-02
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	1.00E+00	2.50E-01	0.00E+00	1.00E+01	2.50E+00	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	1.98E-05	NA	NA	0.00E+00	3.38E-04	0.00E+00	0.00E+00	3.57E-04	4	1.50E-02	3.75E-03	9.53E-02	3.00E-02	7.50E-03	4.77E-02
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.41E-05	NA	NA	0.00E+00	2.16E-04	0.00E+00	0.00E+00	2.30E-04	4	1.50E-01	3.75E-02	6.14E-03	7.50E-01	1.88E-01	1.23E-03
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	2.54E+01	2.74E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	9.04E-05	NA	NA	0.00E+00	1.03E-04	0.00E+00	0.00E+00	1.94E-04	4	9.20E-02	2.30E-02	8.41E-03	9.20E-01	2.30E-01	8.41E-04
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	6.78E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	9.20E-02	2.30E-02	0.00E+00	9.20E-01	2.30E-01	0.00E+00
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.40E-05	NA	NA	0.00E+00	5.06E-05	0.00E+00	0.00E+00	7.46E-05	4	9.20E-02	2.30E-02	3.24E-03	9.20E-01	2.30E-01	3.24E-04
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.04E-05	NA	0.00E+00	0.00E+00	1.88E-03	0.00E+00	0.00E+00	1.97E-03	4	6.15E-01	1.54E-01	1.28E-02	3.07E+00	7.68E-01	2.57E-03
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.56E+01	1.64E+01	0.00E+00	1.10E+02	2.75E+01	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.40E-05	NA	NA	0.00E+00	9.33E-06	0.00E+00	0.00E+00	3.33E-05	4	4.60E+00	1.15E+00	2.90E-05	9.20E+00	2.30E+00	1.45E-05
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	8.61E+00	8.96E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.54E-05	NA	NA	0.00E+00	9.49E-05	0.00E+00	0.00E+00	1.20E-04	8	1.00E-01	1.25E-02	9.62E-03	1.00E+00	1.25E-01	9.62E-04
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	7.68E-01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	9.64E+01	2.41E+01	0.00E+00	4.82E+02	1.21E+02	0.00E+00
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.56E+01	1.64E+01	0.00E+00	1.10E+02	2.75E+01	0.00E+00
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.36E-05	NA	0.00E+00	0.00E+00	1.61E-03	0.00E+00	0.00E+00	1.66E-03	4	6.15E-01	1.54E-01	1.08E-02	3.07E+00	7.68E-01	2.17E-03
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	6.90E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	0.00E+00	1.69E-01	NA	0.00E+00	0.00E+00	2.65E-01	0.00E+00	0.00E+00	4.34E-01	4	1.26E-01	3.15E-02	1.38E+01	1.26E+00	3.15E-01	1.38E+00
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	7.99E+00	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	0.00E+00	4.09E-02	NA	0.00E+00	0.00E+00	6.54E-01	0.00E+00	0.00E+00	6.95E-01	4	1.00E+00	2.50E-01	2.78E+00	1.00E+01	2.50E+00	2.78E-01
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	4.04E-04	0.00E+00	3.53E-01	0.00E+00	0.00E+00	0.00E+00	6.03E-01	0.00E+00	0.00E+00	9.56E-01	4	2.74E+03	6.84E+02	1.40E-03	1.37E+04	3.42E+03	2.79E-04
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	5.25E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	0.00E+00	9.74E-01	NA	0.00E+00	0.00E+00	6.08E+00	0.00E+00	0.00E+00	7.06E+00	8	1.17E+01	1.46E+00	4.83E+00	1.51E+01	1.89E+00	3.74E+00
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	8.95E+02	6.07E-01	3.09E-01	3.00E-02	6.77E-02	6.77E-02	1.24E-04	0.00E+00	2.02E+00	0.00E+00	0.00E+00	0.00E+00	2.52E+00	0.00E+00	0.00E+00	4.54E+00	4	8.00E+00	2.00E+00	2.27E+00	8.00E+01	2.00E+01	2.27E-01
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	2.87E+00	3.30E+01	1.14E+00	1.05E+00	1.05E+00	0.00E+00	0.00E+00	1.21E-03	NA	0.00E+00	0.00E+00	5.75E-02	0.00E+00	0.00E+00	5.87E-02	8	1.00E+00	1.25E-01	4.70E-01	5.00E+00	6.25E-01	9.40E-02
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	0.00E+00	0.00E+00	3.67E-01	NA	0.00E+00	0.00E+00	7.29E-01	0.00E+00	0.00E+00	1.10E+00	4	4.00E+01	1.00E+01	1.10E-01	8.00E+01	2.00E+01	5.48E-02
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	2.10E+00	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	0.00E+00	1.13E-02	NA	0.00E+00	0.00E+00	2.34E-01	0.00E+00	0.00E+00	2.45E-01	4	2.00E-01	5.00E-02	4.90E+00	3.30E-01	8.25E-02	2.97E+00
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	1.09E-02	NA	0.00E+00	0.00E+00	6.34E-03	0.00E+00	0.00E+00	1.72E-02	4	2.22E+01	5.55E+00	3.10E-03	2.22E+02	5.55E+01	3.10E-04
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.03E+04	7.53E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	2.76E-03	0.00E+00	2.10E+01	0.00E+00	0.00E+00	0.00E+00	1.63E+02	0.00E+00	0.00E+00	1.84E+02	4	1.60E+02	4.00E+01	4.59E+00	3.20E+02	8.00E+01	2.30E+00

Hazard Index (Total EEQ): 3.4E+01 1.1E+01

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \times Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	1	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.00024	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.01	kg/d
Body weight =	0.017	kg
Home range =	0.089	acres
Water intake rate =	0.007	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-3
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Meadow Voles at SWMU 41 Area A

Hazard Estimate - Tier 2
Meadow Vole

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	7.68E+03	3.95E+00	NA	NA	NA	NA	2.61E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	2.61E-09	4	1.00E-06	2.50E-07	1.04E-02	1.00E-05	2.50E-06	1.04E-03
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.35E+01	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.75E-05	NA	0.00E+00	0.00E+00	1.52E-04	0.00E+00	0.00E+00	1.70E-04	4	1.48E+00	3.70E-01	4.59E-04	7.40E+00	1.85E+00	9.18E-05
2,4,6-Trinitrotoluene	6.22E-04	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	8.58E-05	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	8.58E-05	4	3.47E+01	8.68E+00	9.89E-06	1.74E+02	4.34E+01	1.98E-06
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	1.52E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	1.52E-04	4	2.81E+00	7.03E-01	2.16E-04	1.41E+01	3.51E+00	4.32E-05
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	0.00E+00	6.16E-06	NA	0.00E+00	0.00E+00	1.20E-06	0.00E+00	0.00E+00	7.36E-06	4	8.00E-01	2.00E-01	3.68E-05	4.00E+00	1.00E+00	7.36E-06
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	3.45E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	3.45E-04	4	1.93E+00	4.83E-01	7.14E-04	9.65E+00	2.41E+00	1.43E-04
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.56E+01	1.64E+01	0.00E+00	1.10E+02	2.75E+01	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	7.70E-06	NA	NA	0.00E+00	3.02E-06	0.00E+00	0.00E+00	1.07E-05	4	4.60E+00	1.15E+00	9.33E-06	9.20E+00	2.30E+00	4.66E-06
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.56E+01	1.64E+01	0.00E+00	1.10E+02	2.75E+01	0.00E+00
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	3.46E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	7.70E-04	NA	NA	0.00E+00	1.16E-04	0.00E+00	0.00E+00	8.86E-04	8	1.40E-01	1.75E-02	5.06E-02	6.80E-01	8.50E-02	1.04E-02
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	1.00E+00	2.50E-01	0.00E+00	1.00E+01	2.50E+00	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	7.19E-06	NA	NA	0.00E+00	1.24E-04	0.00E+00	0.00E+00	1.31E-04	4	1.50E-02	3.75E-03	3.50E-02	3.00E-02	7.50E-03	1.75E-02
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.14E-06	NA	NA	0.00E+00	7.94E-05	0.00E+00	0.00E+00	8.45E-05	4	1.50E-01	3.75E-02	2.25E-03	7.50E-01	1.88E-01	4.51E-04
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	1.92E+01	2.74E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.29E-05	NA	NA	0.00E+00	3.79E-05	0.00E+00	0.00E+00	7.08E-05	4	9.20E-02	2.30E-02	3.08E-03	9.20E-01	2.30E-01	3.08E-04
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	5.14E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	9.20E-02	2.30E-02	0.00E+00	9.20E-01	2.30E-01	0.00E+00
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	8.73E-06	NA	NA	0.00E+00	1.86E-05	0.00E+00	0.00E+00	2.73E-05	4	9.20E-02	2.30E-02	1.19E-03	9.20E-01	2.30E-01	1.19E-04
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E-05	NA	0.00E+00	0.00E+00	6.92E-04	0.00E+00	0.00E+00	7.25E-04	4	6.15E-01	1.54E-01	4.71E-03	3.07E+00	7.68E-01	9.44E-04
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.56E+01	1.64E+01	0.00E+00	1.10E+02	2.75E+01	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	8.73E-06	NA	NA	0.00E+00	3.43E-06	0.00E+00	0.00E+00	1.22E-05	4	4.60E+00	1.15E+00	1.06E-05	9.20E+00	2.30E+00	5.29E-06
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	6.52E+00	8.96E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	9.24E-06	NA	NA	0.00E+00	3.49E-05	0.00E+00	0.00E+00	4.41E-05	8	1.00E-01	1.25E-02	3.53E-03	1.00E+00	1.25E-01	3.53E-04
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.15E-01	1.54E-01	0.00E+00	3.07E+00	7.68E-01	0.00E+00
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	5.81E-01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	9.64E+01	2.41E+01	0.00E+00	4.82E+02	1.21E+02	0.00E+00
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	6.56E+01	1.64E+01	0.00E+00	1.10E+02	2.75E+01	0.00E+00
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-05	NA	0.00E+00	0.00E+00	5.92E-04	0.00E+00	0.00E+00	6.11E-04	4	6.15E-01	1.54E-01	3.97E-03	3.07E+00	7.68E-01	7.96E-04
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	1.43E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	0.00E+00	6.16E-02	NA	0.00E+00	0.00E+00	9.73E-02	0.00E+00	0.00E+00	1.59E-01	4	1.26E-01	3.15E-02	5.05E+00	1.26E+00	3.15E-01	5.05E-01
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	6.00E-01	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	0.00E+00	1.49E-02	NA	0.00E+00	0.00E+00	2.40E-01	0.00E+00	0.00E+00	2.55E-01	4	1.00E+00	2.50E-01	1.02E+00	1.00E+01	2.50E+00	1.02E-01
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	1.35E-04	0.00E+00	1.28E-01	0.00E+00	0.00E+00	0.00E+00	2.22E-01	0.00E+00	0.00E+00	3.50E-01	4	2.74E+03	6.84E+02	5.12E-04	1.37E+04	3.42E+03	1.02E-04
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	1.56E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	0.00E+00	3.54E-01	NA	0.00E+00	0.00E+00	2.24E+00	0.00E+00	0.00E+00	2.59E+00	8	1.17E+01	1.46E+00	1.77E+00	1.51E+01	1.89E+00	1.37E+00
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	4.50E-01	7.10E-02	3.09E-01	3.00E-02	6.77E-02	6.77E-02	4.14E-05	0.00E+00	7.34E-01	0.00E+00	0.00E+00	0.00E+00	9.27E-01	0.00E+00	0.00E+00	1.66E+00	4	8.00E+00	2.00E+00	8.31E-01	8.00E+01	2.00E+01	8.31E-02
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	1.14E+00	5.59E+00	1.14E+00	1.92E-01	1.92E-01	0.00E+00	0.00E+00	4.42E-04	NA	0.00E+00	0.00E+00	2.11E-02	0.00E+00	0.00E+00	2.16E-02	8	1.00E+00	1.25E-01	1.73E-01	5.00E+00	6.25E-01	3.45E-02
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	4.86E-01	2.88E-01	4.76E-02	1.37E-01	1.37E-01	0.00E+00	0.00E+00	1.34E-01	NA	0.00E+00	0.00E+00	2.68E-01	0.00E+00	0.00E+00	4.01E-01	4	4.00E+01	1.00E+01	4.01E-02	8.00E+01	2.00E+01	2.01E-02
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	4.20E-01	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	0.00E+00	4.11E-03	NA	0.00E+00	0.00E+00	8.59E-02	0.00E+00	0.00E+00	9.00E-02	4	2.00E-01	5.00E-02	1.80E+00	3.30E-01	8.25E-02	1.09E+00
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	3.95E-03	NA	0.00E+00	0.00E+00	2.33E-03	0.00E+00	0.00E+00	6.28E-03	4	2.22E+01	5.55E+00	1.13E-03	2.22E+02	5.55E+01	1.13E-04
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.00E+03	1.94E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	9.24E-04	0.00E+00	7.65E+00	0.00E+00	0.00E+00	0.00E+00	5.98E+01	0.00E+00	0.00E+00	6.75E+01	4	1.60E+02	4.00E+01	1.69E+00	3.20E+02	8.00E+01	8.43E-01

Hazard Index (Total EEQ): 1.2E+01 4.1E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	1	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.00019	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.008	kg/d
Body weight =	0.037	kg
Home range =	0.089	acres
Water intake rate =	0.0051	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-4
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Short-Tailed Shrews at SWMU 41 Area A

Hazard Estimate - Tier 1
Short-tailed Shrew

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	2.12E+04	4.21E+01	NA	NA	NA	NA	4.99E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	4.99E-09	8	1.00E-06	1.25E-07	3.99E-02	1.00E-05	1.25E-06	3.99E-03
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.79E+01	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	8.43E-05	NA	0.00E+00	1.46E-02	0.00E+00	0.00E+00	0.00E+00	1.47E-02	8	1.48E+00	1.85E-01	7.92E-02	7.40E+00	9.25E-01	1.58E-02
2,4,6-Trinitrotoluene	1.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	3.43E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	3.43E-04	8	3.47E+01	4.34E+00	7.91E-05	1.74E+02	2.17E+01	1.58E-05
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	2.90E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	2.90E-04	8	2.81E+00	3.51E-01	8.27E-04	1.41E+01	1.76E+00	1.65E-04
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	0.00E+00	2.98E-05	NA	0.00E+00	5.82E-03	0.00E+00	0.00E+00	0.00E+00	5.85E-03	8	8.00E-01	1.00E-01	5.85E-02	4.00E+00	5.00E-01	1.17E-02
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	6.60E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	6.60E-04	8	1.93E+00	2.41E-01	2.74E-03	9.65E+00	1.21E+00	5.47E-04
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	3.72E-05	NA	NA	5.66E-03	0.00E+00	0.00E+00	0.00E+00	5.70E-03	8	4.60E+00	5.75E-01	9.92E-03	9.20E+00	1.15E+00	4.96E-03
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	3.72E-03	NA	NA	2.35E+00	0.00E+00	0.00E+00	0.00E+00	2.35E+00	8	1.40E-01	1.75E-02	1.34E+02	6.80E-01	8.50E-02	2.77E+01
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.00E+00	1.25E-01	0.00E+00	1.00E+01	1.25E+00	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	3.47E-05	NA	NA	4.94E-03	0.00E+00	0.00E+00	0.00E+00	4.97E-03	8	1.50E-02	1.88E-03	2.65E+00	3.00E-02	3.75E-03	1.33E+00
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.48E-05	NA	NA	5.91E-05	0.00E+00	0.00E+00	0.00E+00	8.39E-05	8	1.50E-01	1.88E-02	4.47E-03	7.50E-01	9.38E-02	8.95E-04
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	2.54E+01	2.74E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.59E-04	NA	NA	3.90E-02	0.00E+00	0.00E+00	0.00E+00	3.92E-02	8	9.20E-02	1.15E-02	3.41E+00	9.20E-01	1.15E-01	3.41E-01
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	6.78E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	9.20E-02	1.15E-02	0.00E+00	9.20E-01	1.15E-01	0.00E+00
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	4.22E-05	NA	NA	4.55E-03	0.00E+00	0.00E+00	0.00E+00	4.59E-03	8	9.20E-02	1.15E-02	3.99E-01	9.20E-01	1.15E-01	3.99E-02
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-04	NA	0.00E+00	4.67E-03	0.00E+00	0.00E+00	0.00E+00	4.83E-03	8	6.15E-01	7.69E-02	6.28E-02	3.07E+00	3.84E-01	1.26E-02
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	4.22E-05	NA	NA	6.42E-03	0.00E+00	0.00E+00	0.00E+00	6.46E-03	8	4.60E+00	5.75E-01	1.12E-02	9.20E+00	1.15E+00	5.62E-03
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	8.61E+00	8.96E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	4.46E-05	NA	NA	3.72E-03	0.00E+00	0.00E+00	0.00E+00	3.76E-03	8	1.00E-01	1.25E-02	3.01E-01	1.00E+00	1.25E-01	3.01E-02
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	7.68E-01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	9.64E+01	1.21E+01	0.00E+00	4.82E+02	6.03E+01	0.00E+00
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.42E-05	NA	0.00E+00	1.60E-03	0.00E+00	0.00E+00	0.00E+00	1.69E-03	8	6.15E-01	7.69E-02	2.20E-02	3.07E+00	3.84E-01	4.40E-03
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	6.90E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	0.00E+00	2.98E-01	NA	0.00E+00	3.35E-01	0.00E+00	0.00E+00	0.00E+00	6.33E-01	8	1.26E-01	1.58E-02	4.02E+01	1.26E+00	1.58E-01	4.02E+00
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	7.99E+00	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	0.00E+00	7.19E-02	NA	0.00E+00	4.63E+00	0.00E+00	0.00E+00	0.00E+00	4.71E+00	8	1.00E+00	1.25E-01	3.76E+01	1.00E+01	1.25E+00	3.76E+00
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	2.59E-04	0.00E+00	6.20E-01	0.00E+00	0.00E+00	1.84E+00	0.00E+00	0.00E+00	0.00E+00	2.46E+00	8	2.74E+03	3.42E+02	7.18E-03	1.37E+04	1.71E+03	1.44E-03
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	5.25E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	0.00E+00	1.71E+00	NA	0.00E+00	8.53E+00	0.00E+00	0.00E+00	0.00E+00	1.02E+01	8	1.17E+01	1.46E+00	7.00E+00	1.51E+01	1.89E+00	5.42E+00
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	8.95E+02	6.07E-01	3.09E-01	3.00E-02	6.77E-02	6.77E-02	7.92E-05	0.00E+00	3.55E+00	0.00E+00	0.00E+00	1.06E+01	0.00E+00	0.00E+00	0.00E+00	1.41E+01	8	8.00E+00	1.00E+00	1.41E+01	8.00E+01	1.00E+01	1.41E+00
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	2.87E+00	3.30E+01	1.14E+00	1.05E+00	1.05E+00	0.00E+00	0.00E+00	2.13E-03	NA	0.00E+00	6.81E-01	0.00E+00	0.00E+00	0.00E+00	6.83E-01	8	1.00E+00	1.25E-01	5.47E+00	5.00E+00	6.25E-01	1.09E+00
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	0.00E+00	0.00E+00	6.45E-01	NA	0.00E+00	4.87E+01	0.00E+00	0.00E+00	0.00E+00	4.93E+01	8	4.00E+01	5.00E+00	9.86E+00	8.00E+01	1.00E+01	4.93E+00
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	2.10E+00	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	0.00E+00	1.98E-02	NA	0.00E+00	1.89E-01	0.00E+00	0.00E+00	0.00E+00	2.09E-01	8	2.00E-01	2.50E-02	8.36E+00	3.30E-01	4.13E-02	5.06E+00
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	1.91E-02	NA	0.00E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	3.97E-01	8	2.22E+01	2.78E+00	1.43E-01	2.22E+02	2.78E+01	1.43E-02
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.03E+04	7.53E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	1.77E-03	0.00E+00	3.70E+01	0.00E+00	0.00E+00	2.26E+02	0.00E+00	0.00E+00	0.00E+00	2.62E+02	8	1.60E+02	2.00E+01	1.31E+01	3.20E+02	4.00E+01	6.56E+00

Hazard Index (Total EEQ): 2.8E+02 6.2E+01

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	1	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.00031	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.003	kg/d
Body weight =	0.0125	kg
Home range =	0.96	acres
Water intake rate =	0.0033	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-5
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Short-Tailed Shrews at SWMU 41 Area A

Hazard Estimate - Tier 2
Short-tailed Shrew

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	7.68E+03	3.95E+00	NA	NA	NA	NA	5.74E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	5.74E-10	8	1.00E-06	1.25E-07	4.59E-03	1.00E-05	1.25E-06	4.59E-04
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.35E+01	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.03E-05	NA	0.00E+00	1.33E-03	0.00E+00	0.00E+00	0.00E+00	1.34E-03	8	1.48E+00	1.85E-01	7.27E-03	7.40E+00	9.25E-01	1.45E-03
2,4,6-Trinitrotoluene	6.22E-04	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	1.89E-05	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	1.89E-05	8	3.47E+01	4.34E+00	4.35E-06	1.74E+02	2.17E+01	8.71E-07
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	3.34E-05	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	3.34E-05	8	2.81E+00	3.51E-01	9.50E-05	1.41E+01	1.76E+00	1.90E-05
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	0.00E+00	3.64E-06	NA	0.00E+00	7.04E-04	0.00E+00	0.00E+00	0.00E+00	7.08E-04	8	8.00E-01	1.00E-01	7.08E-03	4.00E+00	5.00E-01	1.42E-03
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	7.59E-05	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	7.59E-05	8	1.93E+00	2.41E-01	3.14E-04	9.65E+00	1.21E+00	6.29E-05
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	4.55E-06	NA	NA	5.19E-04	0.00E+00	0.00E+00	0.00E+00	5.23E-04	8	4.60E+00	5.75E-01	9.10E-04	9.20E+00	1.15E+00	4.55E-04
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	3.46E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	4.55E-04	NA	NA	1.50E-02	0.00E+00	0.00E+00	0.00E+00	1.55E-02	8	1.40E-01	1.75E-02	8.86E-01	6.80E-01	8.50E-02	1.82E-01
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.00E+00	1.25E-01	0.00E+00	1.00E+01	1.25E+00	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	4.25E-06	NA	NA	5.97E-04	0.00E+00	0.00E+00	0.00E+00	6.02E-04	8	1.50E-02	1.88E-03	3.21E-01	3.00E-02	3.75E-03	1.60E-01
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.03E-06	NA	NA	5.41E-06	0.00E+00	0.00E+00	0.00E+00	8.45E-06	8	1.50E-01	1.88E-02	4.51E-04	7.50E-01	9.38E-02	9.01E-05
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	1.92E+01	2.74E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.94E-05	NA	NA	3.57E-03	0.00E+00	0.00E+00	0.00E+00	3.59E-03	8	9.20E-02	1.15E-02	3.12E-01	9.20E-01	1.15E-01	3.12E-02
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	5.14E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	9.20E-02	1.15E-02	0.00E+00	9.20E-01	1.15E-01	0.00E+00
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.16E-06	NA	NA	4.16E-04	0.00E+00	0.00E+00	0.00E+00	4.22E-04	8	9.20E-02	1.15E-02	3.67E-02	9.20E-01	1.15E-01	3.67E-03
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.94E-05	NA	0.00E+00	5.65E-04	0.00E+00	0.00E+00	0.00E+00	5.84E-04	8	6.15E-01	7.69E-02	7.60E-03	3.07E+00	3.84E-01	1.52E-03
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.16E-06	NA	NA	5.88E-04	0.00E+00	0.00E+00	0.00E+00	5.93E-04	8	4.60E+00	5.75E-01	1.03E-03	9.20E+00	1.15E+00	5.16E-04
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	6.52E+00	8.96E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.46E-06	NA	NA	3.41E-04	0.00E+00	0.00E+00	0.00E+00	3.46E-04	8	1.00E-01	1.25E-02	2.77E-02	1.00E+00	1.25E-01	2.77E-03
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	5.81E-01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	9.64E+01	1.21E+01	0.00E+00	4.82E+02	6.03E+01	0.00E+00
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-05	NA	0.00E+00	1.93E-04	0.00E+00	0.00E+00	0.00E+00	2.05E-04	8	6.15E-01	7.69E-02	2.66E-03	3.07E+00	3.84E-01	5.33E-04
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	1.43E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	0.00E+00	3.64E-02	NA	0.00E+00	4.05E-02	0.00E+00	0.00E+00	0.00E+00	7.69E-02	8	1.26E-01	1.58E-02	4.88E+00	1.26E+00	1.58E-01	4.88E-01
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	6.00E-01	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	0.00E+00	8.80E-03	NA	0.00E+00	5.60E-01	0.00E+00	0.00E+00	0.00E+00	5.69E-01	8	1.00E+00	1.25E-01	4.55E+00	1.00E+01	1.25E+00	4.55E-01
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	2.97E-05	0.00E+00	7.59E-02	0.00E+00	0.00E+00	2.22E-01	0.00E+00	0.00E+00	0.00E+00	2.98E-01	8	2.74E+03	3.42E+02	8.71E-04	1.37E+04	1.71E+03	1.74E-04
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	1.56E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	0.00E+00	2.09E-01	NA	0.00E+00	1.03E+00	0.00E+00	0.00E+00	0.00E+00	1.24E+00	8	1.17E+01	1.46E+00	8.48E-01	1.51E+01	1.89E+00	6.57E-01
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	4.50E-01	7.10E-02	3.09E-01	3.00E-02	6.77E-02	6.77E-02	9.10E-06	0.00E+00	4.34E-01	0.00E+00	0.00E+00	1.28E+00	0.00E+00	0.00E+00	0.00E+00	1.71E+00	8	8.00E+00	1.00E+00	1.71E+00	8.00E+01	1.00E+01	1.71E-01
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	1.14E+00	5.59E+00	1.14E+00	1.92E-01	1.92E-01	0.00E+00	0.00E+00	2.61E-04	NA	0.00E+00	1.40E-02	0.00E+00	0.00E+00	0.00E+00	1.42E-02	8	1.00E+00	1.25E-01	1.14E-01	5.00E+00	6.25E-01	2.28E-02
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	4.86E-01	2.88E-01	4.76E-02	1.37E-01	1.37E-01	0.00E+00	0.00E+00	7.89E-02	NA	0.00E+00	2.17E-01	0.00E+00	0.00E+00	0.00E+00	2.96E-01	8	4.00E+01	5.00E+00	5.92E-02	8.00E+01	1.00E+01	2.96E-02
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	4.20E-01	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	0.00E+00	2.43E-03	NA	0.00E+00	2.29E-02	0.00E+00	0.00E+00	0.00E+00	2.53E-02	8	2.00E-01	2.50E-02	1.01E+00	3.30E-01	4.13E-02	6.13E-01
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	2.34E-03	NA	0.00E+00	4.57E-02	0.00E+00	0.00E+00	0.00E+00	4.80E-02	8	2.22E+01	2.78E+00	1.73E-02	2.22E+02	2.78E+01	1.73E-03
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.00E+03	1.94E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	2.03E-04	0.00E+00	4.52E+00	0.00E+00	0.00E+00	2.73E+01	0.00E+00	0.00E+00	0.00E+00	3.18E+01	8	1.60E+02	2.00E+01	1.59E+00	3.20E+02	4.00E+01	7.95E-01
																					Hazard Index (Total EEQ):				1.6E+01			3.6E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	1	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.00023	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.0022	kg/d
Body weight =	0.015	kg
Home range =	0.96	acres
Water intake rate =	0.0023	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	1.98E-01	unitless

Table F-6
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for American Robins at SWMU 41 Area A

Hazard Estimate - Tier 1
American Robin

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	2.12E+04	4.21E+01	NA	NA	NA	NA	3.87E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	3.87E-09	8	1.40E-05	1.75E-06	2.21E-03	1.40E-04	1.75E-05	2.21E-04
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.79E+01	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	4.28E-05	NA	0.00E+00	7.26E-03	1.38E-04	0.00E+00	0.00E+00	7.44E-03	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	1.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	2.66E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	2.66E-04	8	9.75E+00	1.22E+00	2.18E-04	4.88E+01	6.09E+00	4.37E-05
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	2.25E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	2.25E-04	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	0.00E+00	1.51E-05	NA	0.00E+00	2.90E-03	1.08E-06	0.00E+00	0.00E+00	2.92E-03	8	2.80E-03	3.50E-04	8.34E+00	2.80E-02	3.50E-03	8.34E-01
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	5.12E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	5.12E-04	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.89E-05	NA	NA	2.82E-03	2.73E-06	0.00E+00	0.00E+00	2.85E-03	8	2.14E+00	2.68E-01	1.06E-02	1.07E+01	1.34E+00	2.13E-03
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.89E-03	NA	NA	1.17E+00	1.05E-04	0.00E+00	0.00E+00	1.17E+00	8	1.80E-01	2.25E-02	5.21E+01	1.80E+00	2.25E-01	5.21E+00
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	1.76E-05	NA	NA	2.46E-03	1.12E-04	0.00E+00	0.00E+00	2.59E-03	8	7.09E-02	8.86E-03	2.93E-01	1.22E-01	1.53E-02	1.70E-01
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.26E-05	NA	NA	2.95E-05	7.17E-05	0.00E+00	0.00E+00	1.14E-04	8	1.00E+01	1.25E+00	9.10E-05	5.00E+01	6.25E+00	1.82E-05
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	2.54E+01	2.74E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	8.06E-05	NA	NA	1.95E-02	3.43E-05	0.00E+00	0.00E+00	1.96E-02	8	3.00E-01	3.75E-02	5.22E-01	1.50E+00	1.88E-01	1.04E-01
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	6.78E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	3.00E-01	3.75E-02	0.00E+00	1.50E+00	1.88E-01	0.00E+00
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.14E-05	NA	NA	2.27E-03	1.68E-05	0.00E+00	0.00E+00	2.31E-03	8	3.00E-01	3.75E-02	6.15E-02	1.50E+00	1.88E-01	1.23E-02
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.06E-05	NA	0.00E+00	2.33E-03	6.25E-04	0.00E+00	0.00E+00	3.03E-03	8	5.53E+02	6.91E+01	4.39E-05	2.77E+03	3.46E+02	8.78E-06
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.14E-05	NA	NA	3.20E-03	3.10E-06	0.00E+00	0.00E+00	3.23E-03	8	2.14E+00	2.68E-01	1.21E-02	1.07E+01	1.34E+00	2.41E-03
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	8.61E+00	8.96E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.27E-05	NA	NA	1.85E-03	3.15E-05	0.00E+00	0.00E+00	1.91E-03	8	9.20E-01	1.15E-01	1.66E-02	4.60E+00	5.75E-01	3.32E-03
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	7.68E-01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.79E-05	NA	0.00E+00	7.96E-04	5.34E-04	0.00E+00	0.00E+00	1.38E-03	8	5.53E+02	6.91E+01	1.99E-05	2.77E+03	3.46E+02	3.99E-06
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	6.90E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	0.00E+00	1.51E-01	NA	0.00E+00	1.67E-01	8.79E-02	0.00E+00	0.00E+00	4.06E-01	8	5.14E+00	6.43E-01	6.32E-01	1.28E+01	1.61E+00	2.53E-01
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	7.99E+00	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	0.00E+00	3.65E-02	NA	0.00E+00	2.31E+00	2.17E-01	0.00E+00	0.00E+00	2.56E+00	8	1.45E+00	1.81E-01	1.41E+01	2.00E+01	2.50E+00	1.03E+00
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	2.01E-04	0.00E+00	3.15E-01	0.00E+00	0.00E+00	9.16E-01	2.00E-01	0.00E+00	0.00E+00	1.43E+00	8	2.66E+00	3.33E-01	4.30E+00	2.78E+00	3.48E-01	4.12E+00
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	5.25E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	0.00E+00	8.69E-01	NA	0.00E+00	4.25E+00	2.02E+00	0.00E+00	0.00E+00	7.14E+00	8	4.70E+01	5.88E+00	1.22E+00	6.20E+01	7.75E+00	9.22E-01
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	8.95E+02	6.07E-01	3.09E-01	3.00E-02	6.77E-02	6.77E-02	6.14E-05	0.00E+00	1.80E+00	0.00E+00	0.00E+00	5.28E+00	8.38E-01	0.00E+00	0.00E+00	7.92E+00	8	3.85E+00	4.81E-01	1.65E+01	1.93E+01	2.41E+00	3.29E+00
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	2.87E+00	3.30E+01	1.14E+00	1.05E+00	1.05E+00	0.00E+00	0.00E+00	1.08E-03	NA	0.00E+00	3.40E-01	1.91E-02	0.00E+00	0.00E+00	3.60E-01	8	4.50E-01	5.63E-02	6.40E+00	9.00E-01	1.13E-01	3.20E+00
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	0.00E+00	0.00E+00	3.28E-01	NA	0.00E+00	2.43E+01	2.42E-01	0.00E+00	0.00E+00	2.48E+01	8	7.74E+01	9.68E+00	2.57E+00	1.07E+02	1.34E+01	1.86E+00
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	2.10E+00	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	0.00E+00	1.01E-02	NA	0.00E+00	9.43E-02	7.76E-02	0.00E+00	0.00E+00	1.82E-01	8	5.00E-01	6.25E-02	2.91E+00	1.00E+00	1.25E-01	1.46E+00
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	9.70E-03	NA	0.00E+00	1.88E-01	2.11E-03	0.00E+00	0.00E+00	2.00E-01	8	1.78E+02	2.23E+01	9.00E-03	8.90E+02	1.11E+02	1.80E-03
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.03E+04	7.53E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	1.37E-03	0.00E+00	1.88E+01	0.00E+00	0.00E+00	1.12E+02	5.40E+01	0.00E+00	0.00E+00	1.85E+02	8	1.45E+01	1.81E+00	1.02E+02	1.31E+02	1.64E+01	1.13E+01

Hazard Index (Total EEQ): 2.1E+02 3.4E+01

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.62	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0.38	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.0008	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.02	kg/d
Body weight =	0.0635	kg
Home range =	1.2	acres
Water intake rate =	0.013	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-7
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for American Robins at SWMU 41 Area A

Hazard Estimate - Tier 2
American Robin

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	7.68E+03	3.95E+00	NA	NA	NA	NA	4.26E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	4.26E-10	8	1.40E-05	1.75E-06	2.43E-04	1.40E-04	1.75E-05	2.43E-05
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.35E+01	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	4.46E-06	NA	0.00E+00	5.72E-04	1.43E-05	0.00E+00	0.00E+00	5.91E-04	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	6.22E-04	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	1.40E-05	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	1.40E-05	8	9.75E+00	1.22E+00	1.15E-05	4.88E+01	6.09E+00	2.30E-06
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	2.48E-05	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	2.48E-05	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	0.00E+00	1.57E-06	NA	0.00E+00	3.02E-04	1.12E-07	0.00E+00	0.00E+00	3.04E-04	8	2.80E-03	3.50E-04	8.68E-01	2.80E-02	3.50E-03	8.68E-02
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	5.63E-05	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	5.63E-05	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.97E-06	NA	NA	2.23E-04	2.84E-07	0.00E+00	0.00E+00	2.25E-04	8	2.14E+00	2.68E-01	8.41E-04	1.07E+01	1.34E+00	1.68E-04
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	3.46E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.97E-04	NA	NA	6.45E-03	1.09E-05	0.00E+00	0.00E+00	6.66E-03	8	1.80E-01	2.25E-02	2.96E-01	1.80E+00	2.25E-01	2.96E-02
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	1.84E-06	NA	NA	2.56E-04	1.17E-05	0.00E+00	0.00E+00	2.70E-04	8	7.09E-02	8.86E-03	3.04E-02	1.22E-01	1.53E-02	1.77E-02
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.31E-06	NA	NA	2.32E-06	7.46E-06	0.00E+00	0.00E+00	1.11E-05	8	1.00E+01	1.25E+00	8.88E-06	5.00E+01	6.25E+00	1.78E-06
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	1.92E+01	2.74E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	8.39E-06	NA	NA	1.53E-03	3.56E-06	0.00E+00	0.00E+00	1.55E-03	8	3.00E-01	3.75E-02	4.12E-02	1.50E+00	1.88E-01	8.24E-03
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	5.14E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	3.00E-01	3.75E-02	0.00E+00	1.50E+00	1.88E-01	0.00E+00
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.23E-06	NA	NA	1.79E-04	1.75E-06	0.00E+00	0.00E+00	1.83E-04	8	3.00E-01	3.75E-02	4.87E-03	1.50E+00	1.88E-01	9.74E-04
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.39E-06	NA	0.00E+00	2.42E-04	6.50E-05	0.00E+00	0.00E+00	3.16E-04	8	5.53E+02	6.91E+01	4.57E-06	2.77E+03	3.46E+02	9.13E-07
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.23E-06	NA	NA	2.52E-04	3.22E-07	0.00E+00	0.00E+00	2.55E-04	8	2.14E+00	2.68E-01	9.53E-04	1.07E+01	1.34E+00	1.91E-04
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	6.52E+00	8.96E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.36E-06	NA	NA	1.46E-04	3.28E-06	0.00E+00	0.00E+00	1.52E-04	8	9.20E-01	1.15E-01	1.32E-03	4.60E+00	5.75E-01	2.64E-04
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	5.81E-01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.98E-06	NA	0.00E+00	8.28E-05	5.56E-05	0.00E+00	0.00E+00	1.43E-04	8	5.53E+02	6.91E+01	2.07E-06	2.77E+03	3.46E+02	4.15E-07
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	1.43E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	0.00E+00	1.57E-02	NA	0.00E+00	1.74E-02	9.15E-03	0.00E+00	0.00E+00	4.23E-02	8	5.14E+00	6.43E-01	6.58E-02	1.28E+01	1.61E+00	2.63E-02
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	6.00E-01	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	0.00E+00	3.80E-03	NA	0.00E+00	2.40E-01	2.26E-02	0.00E+00	0.00E+00	2.67E-01	8	1.45E+00	1.81E-01	1.47E+00	2.00E+01	2.50E+00	1.07E-01
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	2.21E-05	0.00E+00	3.28E-02	0.00E+00	0.00E+00	9.53E-02	2.08E-02	0.00E+00	0.00E+00	1.49E-01	8	2.66E+00	3.33E-01	4.48E-01	2.78E+00	3.48E-01	4.28E-01
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	1.56E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	0.00E+00	9.05E-02	NA	0.00E+00	4.43E-01	2.10E-01	0.00E+00	0.00E+00	7.43E-01	8	4.70E+01	5.88E+00	1.26E-01	6.20E+01	7.75E+00	9.59E-02
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	4.50E-01	7.10E-02	3.09E-01	3.00E-02	6.77E-02	6.77E-02	6.76E-06	0.00E+00	1.87E-01	0.00E+00	0.00E+00	5.50E-01	8.72E-02	0.00E+00	0.00E+00	8.24E-01	8	3.85E+00	4.81E-01	1.71E+00	1.93E+01	2.41E+00	3.42E-01
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	1.14E+00	5.59E+00	1.14E+00	1.92E-01	1.92E-01	0.00E+00	0.00E+00	1.13E-04	NA	0.00E+00	5.99E-03	1.99E-03	0.00E+00	0.00E+00	8.09E-03	8	4.50E-01	5.63E-02	1.44E-01	9.00E-01	1.13E-01	7.19E-02
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	4.86E-01	2.88E-01	4.76E-02	1.37E-01	1.37E-01	0.00E+00	0.00E+00	3.41E-02	NA	0.00E+00	9.32E-02	2.52E-02	0.00E+00	0.00E+00	1.52E-01	8	7.74E+01	9.68E+00	1.58E-02	1.07E+02	1.34E+01	1.14E-02
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	4.20E-01	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	0.00E+00	1.05E-03	NA	0.00E+00	9.81E-03	8.07E-03	0.00E+00	0.00E+00	1.89E-02	8	5.00E-01	6.25E-02	3.03E-01	1.00E+00	1.25E-01	1.51E-01
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	1.01E-03	NA	0.00E+00	1.96E-02	2.19E-04	0.00E+00	0.00E+00	2.08E-02	8	1.78E+02	2.23E+01	9.37E-04	8.90E+02	1.11E+02	1.87E-04
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.00E+03	1.94E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	1.51E-04	0.00E+00	1.95E+00	0.00E+00	0.00E+00	1.17E+01	5.62E+00	0.00E+00	0.00E+00	1.93E+01	8	1.45E+01	1.81E+00	1.06E+01	1.31E+02	1.64E+01	1.18E+00

Hazard Index (Total EEQ): 1.6E+01 2.6E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.62	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0.38	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.00064	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.016	kg/d
Body weight =	0.0773	kg
Home range =	1.2	acres
Water intake rate =	0.011	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	1.58E-01	unitless

Table F-8
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Red-Tailed Hawks at SWMU 41 Area A

Hazard Estimate - Tier 1
Red-tailed Hawk

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	2.12E+04	4.21E+01	NA	NA	NA	NA	1.34E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	1.34E-09	8	1.40E-05	1.75E-06	7.67E-04	1.40E-04	1.75E-05	7.67E-05
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.79E+01	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	1.70E-04	5.37E-05	2.24E-04	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	1.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	9.24E-05	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	9.24E-05	8	9.75E+00	1.22E+00	7.58E-05	4.88E+01	6.09E+00	1.52E-05
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	7.82E-05	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	7.82E-05	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	1.24E-03	3.91E-04	1.63E-03	8	2.80E-03	3.50E-04	4.65E+00	2.80E-02	3.50E-03	4.65E-01
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	1.78E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	1.78E-04	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	7.50E-05	2.37E-05	9.87E-05	8	2.14E+00	2.68E-01	3.69E-04	1.07E+01	1.34E+00	7.38E-05
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	7.50E-03	2.37E-03	9.87E-03	8	1.80E-01	2.25E-02	4.39E-01	1.80E+00	2.25E-01	4.39E-02
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	8.41E-05	2.65E-05	1.11E-04	8	7.09E-02	8.86E-03	1.25E-02	1.22E-01	1.53E-02	7.25E-03
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	5.00E-05	1.58E-05	6.58E-05	8	1.00E+01	1.25E+00	5.27E-05	5.00E+01	6.25E+00	1.05E-05
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	2.54E+01	2.74E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.20E-04	1.01E-04	4.21E-04	8	3.00E-01	3.75E-02	1.12E-02	1.50E+00	1.88E-01	2.25E-03
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	6.78E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	3.00E-01	3.75E-02	0.00E+00	1.50E+00	1.88E-01	0.00E+00
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	8.51E-05	2.69E-05	1.12E-04	8	3.00E-01	3.75E-02	2.98E-03	1.50E+00	1.88E-01	5.97E-04
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	8.51E-05	2.69E-05	1.12E-04	8	2.14E+00	2.68E-01	4.18E-04	1.07E+01	1.34E+00	8.37E-05
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	8.61E+00	8.96E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	9.01E-05	2.84E-05	1.18E-04	8	9.20E-01	1.15E-01	1.03E-03	4.60E+00	5.75E-01	2.06E-04
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	7.68E-01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	6.90E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	3.00E-03	9.49E-04	3.95E-03	8	5.14E+00	6.43E-01	6.15E-03	1.28E+01	1.61E+00	2.46E-03
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	7.99E+00	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	2.35E-02	7.43E-03	3.10E-02	8	1.45E+00	1.81E-01	1.71E-01	2.00E+01	2.50E+00	1.24E-02
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	6.96E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-01	3.89E-02	1.62E-01	8	2.66E+00	3.33E-01	4.88E-01	2.78E+00	3.48E-01	4.67E-01
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	5.25E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	7.09E-01	2.24E-01	9.33E-01	8	4.70E+01	5.88E+00	1.59E-01	6.20E+01	7.75E+00	1.20E-01
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	8.95E+02	6.07E-01	3.09E-01	3.00E-02	6.77E-02	6.77E-02	2.13E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.85E-01	1.53E-01	6.38E-01	8	3.85E+00	4.81E-01	1.32E+00	1.93E+01	2.41E+00	2.65E-01
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	2.87E+00	3.30E+01	1.14E+00	1.05E+00	1.05E+00	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	4.50E-03	1.42E-03	5.92E-03	8	4.50E-01	5.63E-02	1.05E-01	9.00E-01	1.13E-01	5.26E-02
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	1.78E-01	5.63E-02	2.35E-01	8	7.74E+01	9.68E+00	2.43E-02	1.07E+02	1.34E+01	1.76E-02
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	2.10E+00	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	3.04E-02	9.58E-03	3.99E-02	8	5.00E-01	6.25E-02	6.39E-01	1.00E+00	1.25E-01	3.19E-01
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	1.54E-04	4.87E-05	2.03E-04	8	1.78E+02	2.23E+01	9.11E-06	8.90E+02	1.11E+02	1.82E-06
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.03E+04	7.53E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	4.76E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.58E+00	2.08E+00	8.66E+00	8	1.45E+01	1.81E+00	4.78E+00	1.31E+02	1.64E+01	5.29E-01

Hazard Index (Total EEQ): 1.3E+01 2.3E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \times Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0.76	unitless
Bird diet fraction =	0.24	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.063	kg/d
Body weight =	0.957	kg
Home range =	2081	acres
Water intake rate =	0.068	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-9
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Red -Tailed Hawks at SWMU 41 Area A

Hazard Estimate - Tier 2
Red-tailed Hawk

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	7.68E+03	3.95E+00	NA	NA	NA	NA	9.74E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	9.74E-14	8	1.40E-05	1.75E-06	5.57E-08	1.40E-04	1.75E-05	5.57E-09
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.35E+01	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	6.14E-09	1.94E-09	8.08E-09	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	6.22E-04	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	3.21E-09	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	3.21E-09	8	9.75E+00	1.22E+00	2.63E-09	4.88E+01	6.09E+00	5.26E-10
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	5.67E-09	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	5.67E-09	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	8.93E-08	2.82E-08	1.17E-07	8	2.80E-03	3.50E-04	3.36E-04	2.80E-02	3.50E-03	3.36E-05
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	1.29E-08	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	1.29E-08	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.71E-09	8.55E-10	3.56E-09	8	2.14E+00	2.68E-01	1.33E-08	1.07E+01	1.34E+00	2.66E-09
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	3.46E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.71E-07	8.55E-08	3.56E-07	8	1.80E-01	2.25E-02	1.58E-05	1.80E+00	2.25E-01	1.58E-06
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	6.07E-09	1.92E-09	7.98E-09	8	7.09E-02	8.86E-03	9.00E-07	1.22E-01	1.53E-02	5.23E-07
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.81E-09	5.70E-10	2.38E-09	8	1.00E+01	1.25E+00	1.90E-09	5.00E+01	6.25E+00	3.80E-10
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	1.92E+01	2.74E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.16E-08	3.65E-09	1.52E-08	8	3.00E-01	3.75E-02	4.05E-07	1.50E+00	1.88E-01	8.11E-08
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	5.14E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	3.00E-01	3.75E-02	0.00E+00	1.50E+00	1.88E-01	0.00E+00
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.07E-09	9.69E-10	4.04E-09	8	3.00E-01	3.75E-02	1.08E-07	1.50E+00	1.88E-01	2.15E-08
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.07E-09	9.69E-10	4.04E-09	8	2.14E+00	2.68E-01	1.51E-08	1.07E+01	1.34E+00	3.02E-09
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	6.52E+00	8.96E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.25E-09	1.03E-09	4.28E-09	8	9.20E-01	1.15E-01	3.72E-08	4.60E+00	5.75E-01	7.44E-09
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	5.81E-01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	1.43E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	2.17E-07	6.85E-08	2.85E-07	8	5.14E+00	6.43E-01	4.44E-07	1.28E+01	1.61E+00	1.78E-07
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	6.00E-01	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	1.70E-06	5.36E-07	2.23E-06	8	1.45E+00	1.81E-01	1.23E-05	2.00E+01	2.50E+00	8.94E-07
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	5.05E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.90E-06	2.81E-06	1.17E-05	8	2.66E+00	3.33E-01	3.52E-05	2.78E+00	3.48E-01	3.37E-05
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	1.56E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	5.12E-05	1.62E-05	6.74E-05	8	4.70E+01	5.88E+00	1.15E-05	6.20E+01	7.75E+00	8.69E-06
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	4.50E-01	7.10E-02	3.09E-01	3.00E-02	6.77E-02	6.77E-02	1.55E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-05	1.10E-05	4.60E-05	8	3.85E+00	4.81E-01	9.56E-05	1.93E+01	2.41E+00	1.91E-05
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	1.14E+00	5.59E+00	1.14E+00	1.92E-01	1.92E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	5.96E-08	1.88E-08	7.84E-08	8	4.50E-01	5.63E-02	1.39E-06	9.00E-01	1.13E-01	6.97E-07
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	4.86E-01	2.88E-01	4.76E-02	1.37E-01	1.37E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	1.29E-05	4.07E-06	1.69E-05	8	7.74E+01	9.68E+00	1.75E-06	1.07E+02	1.34E+01	1.27E-06
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	4.20E-01	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	2.19E-06	6.92E-07	2.88E-06	8	5.00E-01	6.25E-02	4.61E-05	1.00E+00	1.25E-01	2.31E-05
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	1.11E-08	3.51E-09	1.46E-08	8	1.78E+02	2.23E+01	6.58E-10	8.90E+02	1.11E+02	1.32E-10
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.00E+03	1.94E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	3.45E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.75E-04	1.50E-04	6.25E-04	8	1.45E+01	1.81E+00	3.45E-04	1.31E+02	1.64E+01	3.82E-05

Hazard Index (Total EEQ): 9.0E-04 1.6E-04

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0.76	unitless
Bird diet fraction =	0.24	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.059	kg/d
Body weight =	1.134	kg
Home range =	2081	acres
Water intake rate =	0.064	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	9.13E-05	unitless

Table F-10
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at SWMU 41 Area A

Hazard Estimate - Tier 1
Red Fox

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	2.12E+04	4.21E+01	NA	NA	NA	NA	3.65E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	3.65E-09	8	1.00E-06	1.25E-07	2.92E-02	1.00E-05	1.25E-06	2.92E-03
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.79E+01	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.09E-05	NA	0.00E+00	2.80E-04	1.38E-05	2.55E-04	5.49E-05	6.14E-04	8	1.48E+00	1.85E-01	3.32E-03	7.40E+00	9.25E-01	6.64E-04
2,4,6-Trinitrotoluene	1.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	2.51E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	2.51E-04	8	3.47E+01	4.34E+00	5.79E-05	1.74E+02	2.17E+01	1.16E-05
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	2.13E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	2.13E-04	8	2.81E+00	3.51E-01	6.05E-04	1.41E+01	1.76E+00	1.21E-04
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	0.00E+00	3.86E-06	NA	0.00E+00	1.12E-04	1.08E-07	1.85E-03	3.99E-04	2.37E-03	8	8.00E-01	1.00E-01	2.37E-02	4.00E+00	5.00E-01	4.73E-03
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	4.83E-04	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	4.83E-04	8	1.93E+00	2.41E-01	2.00E-03	9.65E+00	1.21E+00	4.00E-04
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	4.83E-06	NA	NA	1.09E-04	2.74E-07	1.12E-04	2.42E-05	2.50E-04	8	4.60E+00	5.75E-01	4.36E-04	9.20E+00	1.15E+00	2.18E-04
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	4.83E-04	NA	NA	4.51E-02	1.05E-05	1.12E-02	2.42E-03	5.93E-02	8	1.40E-01	1.75E-02	3.39E+00	6.80E-01	8.50E-02	6.97E-01
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.00E+00	1.25E-01	0.00E+00	1.00E+01	1.25E+00	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	4.51E-06	NA	NA	9.49E-05	1.12E-05	1.26E-04	2.71E-05	2.64E-04	8	1.50E-02	1.88E-03	1.41E-01	3.00E-02	3.75E-03	7.03E-02
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	3.22E-06	NA	NA	1.13E-06	7.20E-06	7.49E-05	1.61E-05	1.03E-04	8	1.50E-01	1.88E-02	5.47E-03	7.50E-01	9.38E-02	1.09E-03
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	2.54E+01	2.74E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.06E-05	NA	NA	7.49E-04	3.44E-06	4.79E-04	1.03E-04	1.36E-03	8	9.20E-02	1.15E-02	1.18E-01	9.20E-01	1.15E-01	1.18E-02
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	6.78E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	9.20E-02	1.15E-02	0.00E+00	9.20E-01	1.15E-01	0.00E+00
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	5.47E-06	NA	NA	8.74E-05	1.68E-06	1.27E-04	2.74E-05	2.49E-04	8	9.20E-02	1.15E-02	2.17E-02	9.20E-01	1.15E-01	2.17E-03
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06E-05	NA	0.00E+00	8.97E-05	6.27E-05	0.00E+00	0.00E+00	1.73E-04	8	6.15E-01	7.69E-02	2.25E-03	3.07E+00	3.84E-01	4.51E-04
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	5.47E-06	NA	NA	1.23E-04	3.11E-07	1.27E-04	2.74E-05	2.84E-04	8	4.60E+00	5.75E-01	4.94E-04	9.20E+00	1.15E+00	2.47E-04
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	8.61E+00	8.96E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	5.80E-06	NA	NA	7.14E-05	3.16E-06	1.35E-04	2.90E-05	2.44E-04	8	1.00E-01	1.25E-02	1.95E-02	1.00E+00	1.25E-01	1.95E-03
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	7.68E-01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	9.64E+01	1.21E+01	0.00E+00	4.82E+02	6.03E+01	0.00E+00
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-05	NA	0.00E+00	3.07E-05	5.36E-05	0.00E+00	0.00E+00	9.65E-05	8	6.15E-01	7.69E-02	1.26E-03	3.07E+00	3.84E-01	2.51E-04
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	6.90E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	0.00E+00	3.86E-02	NA	0.00E+00	6.43E-03	8.82E-03	4.50E-03	9.69E-04	5.94E-02	8	1.26E-01	1.58E-02	3.77E+00	1.26E+00	1.58E-01	3.77E-01
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	7.99E+00	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	0.00E+00	9.34E-03	NA	0.00E+00	8.90E-02	2.18E-02	3.52E-02	7.59E-03	1.63E-01	8	1.00E+00	1.25E-01	1.30E+00	1.00E+01	1.25E+00	1.30E-01
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	1.89E-04	0.00E+00	8.05E-02	0.00E+00	0.00E+00	3.53E-02	2.01E-02	1.85E-01	3.98E-02	3.60E-01	8	2.74E+03	3.42E+02	1.05E-03	1.37E+04	1.71E+03	2.11E-04
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	5.25E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	0.00E+00	2.22E-01	NA	0.00E+00	1.64E-01	2.03E-01	1.06E+00	2.29E-01	1.88E+00	8	1.17E+01	1.46E+00	1.29E+00	1.51E+01	1.89E+00	9.96E-01
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	8.95E+02	6.07E-01	3.09E-01	3.00E-02	6.77E-02	6.77E-02	5.80E-05	0.00E+00	4.61E-01	0.00E+00	0.00E+00	2.03E-01	8.40E-02	7.26E-01	1.56E-01	1.63E+00	8	8.00E+00	1.00E+00	1.63E+00	8.00E+01	1.00E+01	1.63E-01
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	2.87E+00	3.30E+01	1.14E+00	1.05E+00	1.05E+00	0.00E+00	0.00E+00	2.77E-04	NA	0.00E+00	1.31E-02	1.92E-03	6.74E-03	1.45E-03	2.35E-02	8	1.00E+00	1.25E-01	1.88E-01	5.00E+00	6.25E-01	3.75E-02
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	0.00E+00	0.00E+00	8.37E-02	NA	0.00E+00	9.35E-01	2.43E-02	2.67E-01	5.75E-02	1.37E+00	8	4.00E+01	5.00E+00	2.74E-01	8.00E+01	1.00E+01	1.37E-01
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	2.10E+00	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	0.00E+00	2.58E-03	NA	0.00E+00	3.63E-03	7.78E-03	4.54E-02	9.79E-03	6.92E-02	8	2.00E-01	2.50E-02	2.77E+00	3.30E-01	4.13E-02	1.68E+00
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	2.48E-03	NA	0.00E+00	7.26E-03	2.11E-04	2.31E-04	4.97E-05	1.02E-02	8	2.22E+01	2.78E+00	3.69E-03	2.22E+02	2.78E+01	3.69E-04
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.03E+04	7.53E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	1.29E-03	0.00E+00	4.80E+00	0.00E+00	0.00E+00	4.33E+00	5.42E+00	9.85E+00	2.12E+00	2.65E+01	8	1.60E+02	2.00E+01	1.33E+00	3.20E+02	4.00E+01	6.63E-01

Hazard Index (Total EEQ): 1.6E+01 5.0E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.17	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0.04	unitless
Mammal diet fraction =	0.65	unitless
Bird diet fraction =	0.14	unitless
Soil ingestion rate =	0.0095	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.34	kg/d
Body weight =	2.95	kg
Home range =	2204	acres
Water intake rate =	0.57	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-11
Tier 2 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at SWMU 41 Area A

Hazard Estimate - Tier 2
Red Fox

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	7.68E+03	3.95E+00	NA	NA	NA	NA	1.40E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	1.40E-13	8	1.00E-06	1.25E-07	1.12E-06	1.00E-05	1.25E-06	1.12E-07
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.35E+01	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	4.34E-10	NA	0.00E+00	8.40E-09	5.47E-10	5.05E-09	1.09E-09	1.55E-08	8	1.48E+00	1.85E-01	8.38E-08	7.40E+00	9.25E-01	1.68E-08
2,4,6-Trinitrotoluene	6.22E-04	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	4.62E-09	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	4.62E-09	8	3.47E+01	4.34E+00	1.06E-09	1.74E+02	2.17E+01	2.13E-10
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	8.16E-09	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	8.16E-09	8	2.81E+00	3.51E-01	2.32E-08	1.41E+01	1.76E+00	4.65E-09
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	0.00E+00	1.53E-10	NA	0.00E+00	4.43E-09	4.29E-12	7.34E-08	1.58E-08	9.38E-08	8	8.00E-01	1.00E-01	9.38E-07	4.00E+00	5.00E-01	1.88E-07
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	1.86E-08	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	1.86E-08	8	1.93E+00	2.41E-01	7.69E-08	9.65E+00	1.21E+00	1.54E-08
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.91E-10	NA	NA	3.27E-09	1.09E-11	2.23E-09	4.80E-10	6.17E-09	8	4.60E+00	5.75E-01	1.07E-08	9.20E+00	1.15E+00	5.37E-09
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	3.46E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.91E-08	NA	NA	9.47E-08	4.17E-10	2.23E-07	4.80E-08	3.85E-07	8	1.40E-01	1.75E-02	2.20E-05	6.80E-01	8.50E-02	4.53E-06
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.00E+00	1.25E-01	0.00E+00	1.00E+01	1.25E+00	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	1.79E-10	NA	NA	3.76E-09	4.46E-10	4.99E-09	1.07E-09	1.04E-08	8	1.50E-02	1.88E-03	5.57E-06	3.00E-02	3.75E-03	2.79E-06
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.28E-10	NA	NA	3.41E-11	2.85E-10	1.48E-09	3.20E-10	2.25E-09	8	1.50E-01	1.88E-02	1.20E-07	7.50E-01	9.38E-02	2.40E-08
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	1.92E+01	2.74E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	8.16E-10	NA	NA	2.25E-08	1.36E-10	9.50E-09	2.05E-09	3.50E-08	8	9.20E-02	1.15E-02	3.04E-06	9.20E-01	1.15E-01	3.04E-07
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	5.14E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	9.20E-02	1.15E-02	0.00E+00	9.20E-01	1.15E-01	0.00E+00
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.17E-10	NA	NA	2.62E-09	6.67E-11	2.52E-09	5.44E-10	5.97E-09	8	9.20E-02	1.15E-02	5.19E-07	9.20E-01	1.15E-01	5.19E-08
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-10	NA	0.00E+00	3.55E-09	2.48E-09	0.00E+00	0.00E+00	6.86E-09	8	6.15E-01	7.69E-02	8.92E-08	3.07E+00	3.84E-01	1.79E-08
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.17E-10	NA	NA	3.70E-09	1.23E-11	2.52E-09	5.44E-10	7.00E-09	8	4.60E+00	5.75E-01	1.22E-08	9.20E+00	1.15E+00	6.09E-09
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	6.52E+00	8.96E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.30E-10	NA	NA	2.14E-09	1.25E-10	2.67E-09	5.75E-10	5.75E-09	8	1.00E-01	1.25E-02	4.60E-07	1.00E+00	1.25E-01	4.60E-08
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.15E-01	7.69E-02	0.00E+00	3.07E+00	3.84E-01	0.00E+00
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	5.81E-01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	9.64E+01	1.21E+01	0.00E+00	4.82E+02	6.03E+01	0.00E+00
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	6.56E+01	8.20E+00	0.00E+00	1.10E+02	1.38E+01	0.00E+00
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.85E-10	NA	0.00E+00	1.21E-09	2.12E-09	0.00E+00	0.00E+00	3.82E-09	8	6.15E-01	7.69E-02	4.97E-08	3.07E+00	3.84E-01	9.96E-09
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	1.43E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	0.00E+00	1.53E-06	NA	0.00E+00	2.55E-07	3.50E-07	1.78E-07	3.84E-08	2.35E-06	8	1.26E-01	1.58E-02	1.49E-04	1.26E+00	1.58E-01	1.49E-05
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	6.00E-01	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	0.00E+00	3.70E-07	NA	0.00E+00	3.53E-06	8.64E-07	1.40E-06	3.01E-07	6.46E-06	8	1.00E+00	1.25E-01	5.17E-05	1.00E+01	1.25E+00	5.17E-06
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	7.27E-09	0.00E+00	3.19E-06	0.00E+00	0.00E+00	1.40E-06	7.96E-07	7.32E-06	1.58E-06	1.43E-05	8	2.74E+03	3.42E+02	4.17E-08	1.37E+04	1.71E+03	8.35E-09
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	1.56E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	0.00E+00	8.80E-06	NA	0.00E+00	6.49E-06	8.03E-06	4.21E-05	9.07E-06	7.45E-05	8	1.17E+01	1.46E+00	5.09E-05	1.51E+01	1.89E+00	3.95E-05
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	4.50E-01	7.10E-02	3.09E-01	3.00E-02	6.77E-02	6.77E-02	2.23E-09	0.00E+00	1.82E-05	0.00E+00	0.00E+00	8.06E-06	3.33E-06	2.88E-05	6.19E-06	6.46E-05	8	8.00E+00	1.00E+00	6.46E-05	8.00E+01	1.00E+01	6.46E-06
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	1.14E+00	5.59E+00	1.14E+00	1.92E-01	1.92E-01	0.00E+00	0.00E+00	1.10E-08	NA	0.00E+00	8.79E-08	7.59E-08	4.90E-08	1.06E-08	2.34E-07	8	1.00E+00	1.25E-01	1.87E-06	5.00E+00	6.25E-01	3.75E-07
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	4.86E-01	2.88E-01	4.76E-02	1.37E-01	1.37E-01	0.00E+00	0.00E+00	3.32E-06	NA	0.00E+00	1.37E-06	9.62E-07	1.06E-05	2.28E-06	1.85E-05	8	4.00E+01	5.00E+00	3.70E-06	8.00E+01	1.00E+01	1.85E-06
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	4.20E-01	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	0.00E+00	1.02E-07	NA	0.00E+00	1.44E-07	3.08E-07	1.80E-06	3.88E-07	2.74E-06	8	2.00E-01	2.50E-02	1.10E-04	3.30E-01	4.13E-02	6.65E-05
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	9.82E-08	NA	0.00E+00	2.88E-07	8.37E-09	9.14E-09	1.97E-09	4.05E-07	8	2.22E-01	2.78E+00	1.46E-07	2.22E+02	2.78E+01	1.46E-08
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.00E+03	1.94E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	4.97E-08	0.00E+00	1.90E-04	0.00E+00	0.00E+00	1.72E-04	2.15E-04	3.90E-04	8.41E-05	1.05E-03	8	1.60E+02	2.00E+01	5.25E-05	3.20E+02	4.00E+01	2.63E-05

Hazard Index (Total EEQ): 5.2E-04 1.7E-04

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.17	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0.04	unitless
Mammal diet fraction =	0.65	unitless
Bird diet fraction =	0.14	unitless
Soil ingestion rate =	0.0067	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.24	kg/d
Body weight =	4.53	kg
Home range =	2204	acres
Water intake rate =	0.39	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	8.62E-05	unitless

Table F-12
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Minks at SWMU 41 Area A

Hazard Estimate - Tier 1
Mink

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	2.12E+04	4.21E+01	NA	NA	NA	NA	5.50E-09	2.51E-08	0.00E+00	5.20E-05	6.34E-06	NA	NA	NA	NA	5.84E-05	8	1.00E-06	1.25E-07	4.67E+02	1.00E-05	1.25E-06	4.67E+01
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.79E+01	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	1.76E-05	0.00E+00	NA	1.88E-03	0.00E+00	2.54E-05	1.70E-05	1.70E-05	1.96E-03	8	1.48E+00	1.85E-01	1.06E-02	7.40E+00	9.25E-01	2.12E-03
2,4,6-Trinitrotoluene	1.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	3.78E-04	0.00E+00	0.00E+00	1.79E-03	NA	NA	NA	NA	NA	2.17E-03	8	3.47E+01	4.34E+00	5.00E-04	1.74E+02	2.17E+01	1.00E-04
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	3.20E-04	0.00E+00	0.00E+00	1.11E-03	NA	NA	NA	NA	NA	1.43E-03	8	2.81E+00	3.51E-01	4.06E-03	1.41E+01	1.76E+00	8.12E-04
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	7.92E-06	0.00E+00	NA	9.00E-04	0.00E+00	1.99E-07	1.24E-04	1.24E-04	1.15E-03	8	8.00E-01	1.00E-01	1.15E-02	4.00E+00	5.00E-01	2.31E-03
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	7.27E-04	0.00E+00	0.00E+00	2.51E-03	NA	NA	NA	NA	NA	3.24E-03	8	1.93E+00	2.41E-01	1.34E-02	9.65E+00	1.21E+00	2.69E-03
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	6.80E-05	0.00E+00	NA	6.00E-04	NA	NA	NA	NA	6.68E-04	8	6.56E+01	8.20E+00	8.14E-05	1.10E+02	1.38E+01	4.86E-05
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	5.04E-07	7.50E-06	7.50E-06	1.55E-05	8	4.60E+00	5.75E-01	2.70E-05	9.20E+00	1.15E+00	1.35E-05
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	7.60E-05	0.00E+00	NA	1.10E-03	NA	NA	NA	NA	1.18E-03	8	6.56E+01	8.20E+00	1.44E-04	1.10E+02	1.38E+01	8.58E-05
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.93E-05	7.50E-04	7.50E-04	1.52E-03	1	1.40E-01	1.40E-01	1.09E-02	6.80E-01	6.80E-01	2.23E-03
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	2.68E-04	0.00E+00	NA	2.56E-03	NA	NA	NA	NA	2.82E-03	8	6.15E-01	7.69E-02	3.67E-02	3.07E+00	3.84E-01	7.36E-03
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	3.16E-04	0.00E+00	NA	2.52E-03	NA	NA	NA	NA	2.84E-03	8	1.00E+00	1.25E-01	2.27E-02	1.00E+01	1.25E+00	2.27E-03
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	4.80E-04	0.00E+00	NA	7.49E-03	NA	NA	NA	NA	7.97E-03	8	6.15E-01	7.69E-02	1.04E-01	3.07E+00	3.84E-01	2.08E-02
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	4.00E-04	0.00E+00	NA	7.06E-03	NA	NA	NA	NA	7.46E-03	8	6.15E-01	7.69E-02	9.70E-02	3.07E+00	3.84E-01	1.94E-02
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	2.68E-03	0.00E+00	NA	4.17E-02	NA	NA	NA	NA	4.44E-02	8	6.15E-01	7.69E-02	5.78E-01	3.07E+00	3.84E-01	1.16E-01
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	3.93E-04	0.00E+00	NA	5.40E-03	NA	NA	NA	NA	5.79E-03	8	6.15E-01	7.69E-02	7.53E-02	3.07E+00	3.84E-01	1.51E-02
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	2.07E-05	8.40E-06	8.40E-06	3.75E-05	8	1.50E-02	1.88E-03	2.00E-02	3.00E-02	3.75E-03	9.99E-03
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.32E-05	5.00E-06	5.00E-06	2.32E-05	8	1.50E-01	1.88E-02	1.24E-03	7.50E-01	9.38E-02	2.48E-04
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	2.54E+01	2.74E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	6.32E-06	3.20E-05	3.20E-05	7.03E-05	8	9.20E-02	1.15E-02	6.11E-03	9.20E-01	1.15E-01	6.11E-04
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	6.78E+00	NA	NA	NA	NA	0.00E+00	9.80E-06	0.00E+00	NA	3.99E-04	NA	NA	NA	NA	4.08E-04	8	9.20E-02	1.15E-02	3.55E-02	9.20E-01	1.15E-01	3.55E-03
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	3.09E-06	8.50E-06	8.50E-06	2.01E-05	8	9.20E-02	1.15E-02	1.75E-03	9.20E-01	1.15E-01	1.75E-04
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	8.00E-04	0.00E+00	NA	1.46E-02	0.00E+00	1.15E-04	0.00E+00	0.00E+00	1.55E-02	8	6.15E-01	7.69E-02	2.02E-01	3.07E+00	3.84E-01	4.04E-02
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	4.00E-05	0.00E+00	NA	2.30E-03	NA	NA	NA	NA	2.34E-03	8	6.56E+01	8.20E+00	2.85E-04	1.10E+02	1.38E+01	1.70E-04
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	5.71E-07	8.50E-06	8.50E-06	1.76E-05	8	4.60E+00	5.75E-01	3.06E-05	9.20E+00	1.15E+00	1.53E-05
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	8.61E+00	8.96E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	5.81E-06	9.00E-06	9.00E-06	2.38E-05	1	1.00E-01	1.00E-01	2.38E-04	1.00E+00	1.00E+00	2.38E-05
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	2.68E-04	0.00E+00	NA	4.61E-03	NA	NA	NA	NA	4.87E-03	8	6.15E-01	7.69E-02	6.34E-02	3.07E+00	3.84E-01	1.27E-02
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	7.68E-01	NA	NA	NA	NA	0.00E+00	2.32E-02	0.00E+00	NA	1.07E-01	NA	NA	NA	NA	1.30E-01	8	9.64E+01	1.21E+01	1.08E-02	4.82E+02	6.03E+01	2.16E-03
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	4.40E-04	0.00E+00	NA	4.54E-03	NA	NA	NA	NA	4.98E-03	8	6.56E+01	8.20E+00	6.07E-04	1.10E+02	1.38E+01	3.62E-04
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	6.00E-04	0.00E+00	NA	6.30E-03	0.00E+00	9.85E-05	0.00E+00	0.00E+00	7.00E-03	8	6.15E-01	7.69E-02	9.10E-02	3.07E+00	3.84E-01	1.82E-02
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	6.90E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	7.20E-02	0.00E+00	NA	2.98E-01	0.00E+00	1.62E-02	3.00E-04	3.00E-04	3.87E-01	8	1.26E-01	1.58E-02	2.46E+01	1.26E+00	1.58E-01	2.46E+00
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	7.99E+00	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	8.80E-03	0.00E+00	NA	4.22E-01	0.00E+00	4.00E-02	2.35E-03	2.35E-03	4.75E-01	8	1.00E+00	1.25E-01	3.80E+00	1.00E+01	1.25E+00	3.80E-01
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	2.85E-04	1.32E-01	0.00E+00	9.87E-02	3.71E-01	0.00E+00	3.69E-02	1.23E-02	1.23E-02	6.63E-01	8	2.74E+03	3.42E+02	1.94E-03	1.37E+04	1.71E+03	3.88E-04
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	5.25E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	1.04E-01	0.00E+00	NA	3.28E+00	0.00E+00	3.72E-01	7.09E-02	7.09E-02	3.89E+00	1	1.17E+01	1.17E+01	3.33E-01	1.51E+01	1.51E+01	2.58E-01
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	8.95E+02	6.07E-01	3.09E-01	3.00E-02	6.77E-02	6.77E-02	8.73E-05	1.40E-01	0.00E+00	3.49E-02	5.10E-01	0.00E+00	1.54E-01	4.84E-02	4.84E-02	9.36E-01	8	8.00E+00	1.00E+00	9.36E-01	8.00E+01	1.00E+01	9.36E-02
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	2.87E+00	3.30E+01	1.14E+00	1.05E+00	1.05E+00	0.00E+00	1.32E-04	0.00E+00	NA	2.27E-03	0.00E+00	3.52E-03	4.50E-04	4.50E-04	6.82E-03	1	1.00E+00	1.00E+00	6.82E-03	5.00E+00	5.00E+00	1.36E-03
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	0.00E+00	1.00E-01	0.00E+00	NA	1.39E+00	0.00E+00	4.46E-02	1.78E-02	1.78E-02	1.57E+00	8	4.00E+01	5.00E+00	3.14E-01	8.00E+01	1.00E+01	1.57E-01
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	2.10E+00	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	3.08E-02	0.00E+00	NA	3.88E-01	0.00E+00	1.43E-02	3.03E-03	3.03E-03	4.39E-01	8	2.00E-01	2.50E-02	1.76E+01	3.30E-01	4.13E-02	1.06E+01
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	6.40E-04	0.00E+00	NA	8.06E-03	0.00E+00	3.88E-04	1.54E-05	1.54E-05	9.12E-03	8	2.22E+01	2.78E+00	3.29E-03	2.22E+02	2.78E+01	3.29E-04
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.03E+04	7.53E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	1.95E-03	4.84E-01	0.00E+00	8.97E+00	2.19E+01	0.00E+00	9.96E+00	6.58E-01	6.58E-01	4.26E+01	8	1.60E+02	2.00E+01	2.13E+00	3.20E+02	4.00E+01	1.06E+00

Hazard Index (Total EEQ): 5.2E+02 6.2E+01

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.18	unitless
Fish diet fraction =	0.65	unitless
Aq. Invert diet fraction =	0.12	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0.025	unitless
Bird diet fraction =	0.025	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0.0022	kg/d
Food ingestion rate =	0.11	kg/d
Body weight =	0.55	kg
Home range =	35	acres
Water intake rate =	0.16	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-13
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Minks at SWMU 41 Area A

Hazard Estimate - Tier 2
Mink

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	7.68E+03	3.95E+00	NA	NA	NA	NA	1.01E-11	4.68E-11	0.00E+00	3.51E-08	1.11E-09	NA	NA	NA	NA	3.63E-08	8	1.00E-06	1.25E-07	2.91E-01	1.00E-05	1.25E-06	2.91E-02
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.35E+01	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	3.28E-08	0.00E+00	NA	2.66E-06	0.00E+00	4.72E-08	1.58E-08	1.58E-08	2.77E-06	8	1.48E+00	1.85E-01	1.50E-05	7.40E+00	9.25E-01	3.00E-06
2,4,6-Trinitrotoluene	6.22E-04	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	3.31E-07	0.00E+00	0.00E+00	1.60E-06	NA	NA	NA	NA	NA	1.93E-06	8	3.47E+01	4.34E+00	4.45E-07	1.74E+02	2.17E+01	8.89E-08
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	5.85E-07	0.00E+00	0.00E+00	2.06E-06	NA	NA	NA	NA	NA	2.65E-06	8	2.81E+00	3.51E-01	7.53E-06	1.41E+01	1.76E+00	1.51E-06
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	1.48E-08	0.00E+00	NA	1.68E-06	0.00E+00	3.71E-10	2.30E-07	2.30E-07	2.15E-06	8	8.00E-01	1.00E-01	2.15E-05	4.00E+00	5.00E-01	4.30E-06
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	1.33E-06	0.00E+00	0.00E+00	4.68E-06	NA	NA	NA	NA	NA	6.01E-06	8	1.93E+00	2.41E-01	2.49E-05	9.65E+00	1.21E+00	4.98E-06
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	1.27E-07	0.00E+00	NA	1.12E-06	NA	NA	NA	NA	1.24E-06	8	6.56E+01	8.20E+00	1.52E-07	1.10E+02	1.38E+01	9.05E-08
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	9.38E-10	6.99E-09	6.99E-09	1.49E-08	8	4.60E+00	5.75E-01	2.59E-08	9.20E+00	1.15E+00	1.30E-08
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	1.42E-07	0.00E+00	NA	2.06E-06	NA	NA	NA	NA	2.20E-06	8	6.56E+01	8.20E+00	2.68E-07	1.10E+02	1.38E+01	1.60E-07
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	3.46E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	3.60E-08	6.99E-07	6.99E-07	1.43E-06	1	1.40E-01	1.40E-01	1.02E-05	6.80E-01	6.80E-01	2.11E-06
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	4.99E-07	0.00E+00	NA	4.76E-06	NA	NA	NA	NA	5.26E-06	8	6.15E-01	7.69E-02	6.84E-05	3.07E+00	3.84E-01	1.37E-05
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	5.89E-07	0.00E+00	NA	4.70E-06	NA	NA	NA	NA	5.29E-06	8	1.00E+00	1.25E-01	4.23E-05	1.00E+01	1.25E+00	4.23E-06
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	8.94E-07	0.00E+00	NA	1.39E-05	NA	NA	NA	NA	1.48E-05	8	6.15E-01	7.69E-02	1.93E-04	3.07E+00	3.84E-01	3.87E-05
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	7.45E-07	0.00E+00	NA	1.31E-05	NA	NA	NA	NA	1.39E-05	8	6.15E-01	7.69E-02	1.81E-04	3.07E+00	3.84E-01	3.62E-05
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	4.98E-06	0.00E+00	NA	7.78E-05	NA	NA	NA	NA	8.27E-05	8	6.15E-01	7.69E-02	1.08E-03	3.07E+00	3.84E-01	2.16E-04
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	7.32E-07	0.00E+00	NA	1.01E-05	NA	NA	NA	NA	1.08E-05	8	6.15E-01	7.69E-02	1.40E-04	3.07E+00	3.84E-01	2.81E-05
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	3.85E-08	1.56E-08	1.56E-08	6.98E-08	8	1.50E-02	1.88E-03	3.72E-05	3.00E-02	3.75E-03	1.86E-05
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	2.46E-08	4.66E-09	4.66E-09	3.39E-08	8	1.50E-01	1.88E-02	1.81E-06	7.50E-01	9.38E-02	3.62E-07
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	1.92E+01	2.74E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.18E-08	2.98E-08	2.98E-08	7.14E-08	8	9.20E-02	1.15E-02	6.21E-06	9.20E-01	1.15E-01	6.21E-07
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	5.14E+00	NA	NA	NA	NA	0.00E+00	1.83E-08	0.00E+00	NA	5.62E-07	NA	NA	NA	NA	5.81E-07	8	9.20E-02	1.15E-02	5.05E-05	9.20E-01	1.15E-01	5.05E-06
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	5.76E-09	7.92E-09	7.92E-09	2.16E-08	8	9.20E-02	1.15E-02	1.88E-06	9.20E-01	1.15E-01	1.88E-07
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	1.49E-06	0.00E+00	NA	2.72E-05	0.00E+00	2.15E-07	0.00E+00	0.00E+00	2.89E-05	8	6.15E-01	7.69E-02	3.76E-04	3.07E+00	3.84E-01	7.53E-05
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	7.45E-08	0.00E+00	NA	4.28E-06	NA	NA	NA	NA	4.35E-06	8	6.56E+01	8.20E+00	5.31E-07	1.10E+02	1.38E+01	3.17E-07
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.06E-09	7.92E-09	7.92E-09	1.69E-08	8	4.60E+00	5.75E-01	2.94E-08	9.20E+00	1.15E+00	1.47E-08
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	6.52E+00	8.96E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.08E-08	8.38E-09	8.38E-09	2.76E-08	1	1.00E-01	1.00E-01	2.76E-07	1.00E+00	1.00E+00	2.76E-08
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	5.00E-07	0.00E+00	NA	8.58E-06	NA	NA	NA	NA	9.08E-06	8	6.15E-01	7.69E-02	1.18E-04	3.07E+00	3.84E-01	2.37E-05
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	5.81E-01	NA	NA	NA	NA	0.00E+00	4.32E-05	0.00E+00	NA	1.51E-04	NA	NA	NA	NA	1.94E-04	8	9.64E+01	1.21E+01	1.61E-05	4.82E+02	6.03E+01	3.22E-06
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	8.20E-07	0.00E+00	NA	8.46E-06	NA	NA	NA	NA	9.28E-06	8	6.56E+01	8.20E+00	1.13E-06	1.10E+02	1.38E+01	6.75E-07
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	1.12E-06	0.00E+00	NA	1.17E-05	0.00E+00	1.83E-07	0.00E+00	0.00E+00	1.30E-05	8	6.15E-01	7.69E-02	1.70E-04	3.07E+00	3.84E-01	3.40E-05
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	1.43E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	1.34E-04	0.00E+00	NA	1.15E-04	0.00E+00	3.02E-05	5.59E-07	5.59E-07	2.81E-04	8	1.26E-01	1.58E-02	1.78E-02	1.26E+00	1.58E-01	1.78E-03
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	6.00E-01	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	1.64E-05	0.00E+00	NA	5.90E-05	0.00E+00	7.46E-05	4.38E-06	4.38E-06	1.59E-04	8	1.00E+00	1.25E-01	1.27E-03	1.00E+01	1.25E+00	1.27E-04
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	5.22E-07	2.46E-04	0.00E+00	2.25E-05	1.48E-04	0.00E+00	6.87E-05	2.30E-05	2.30E-05	5.31E-04	8	2.74E+03	3.42E+02	1.55E-06	1.37E+04	1.71E+03	3.10E-07
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	1.56E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	1.94E-04	0.00E+00	NA	1.81E-03	0.00E+00	6.94E-04	1.32E-04	1.32E-04	2.96E-03	1	1.17E+01	1.17E+01	2.53E-04	1.51E+01	1.51E+01	1.96E-04
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	4.50E-01	7.10E-02	3.09E-01	3.00E-02	6.77E-02	6.77E-02	1.60E-07	2.61E-04	0.00E+00	3.27E-08	1.11E-04	0.00E+00	2.88E-04	9.02E-05	9.02E-05	8.40E-04	8	8.00E+00	1.00E+00	8.40E-04	8.00E+01	1.00E+01	8.40E-05
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	1.14E+00	5.59E+00	1.14E+00	1.92E-01	1.92E-01	0.00E+00	2.46E-07	0.00E+00	NA	1.68E-06	0.00E+00	6.56E-06	1.54E-07	1.54E-07	8.79E-06	1	1.00E+00	1.00E+00	8.79E-06	5.00E+00	5.00E+00	1.76E-06
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	4.86E-01	2.88E-01	4.76E-02	1.37E-01	1.37E-01	0.00E+00	1.86E-04	0.00E+00	NA	5.43E-04	0.00E+00	8.31E-05	3.32E-05	3.32E-05	8.79E-04	8	4.00E+01	5.00E+00	1.76E-04	8.00E+01	1.00E+01	8.79E-05
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	4.20E-01	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	5.74E-05	0.00E+00	NA	1.45E-04	0.00E+00	2.66E-05	5.65E-06	5.65E-06	2.40E-04	8	2.00E-01	2.50E-02	9.60E-03	3.30E-01	4.13E-02	5.82E-03
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	1.19E-06	0.00E+00	NA	3.00E-06	0.00E+00	7.23E-07	2.87E-08	2.87E-08	4.98E-06	8	2.22E+01	2.78E+00	1.79E-06	2.22E+02	2.78E+01	1.79E-07
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.00E+03	1.94E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	3.57E-06	9.02E-04	0.00E+00	1.62E-03	1.05E-02	0.00E+00	1.86E-02	1.22E-03	1.22E-03	3.40E-02	8	1.60E+02	2.00E+01	1.70E-03	3.20E+02	4.00E+01	8.50E-04
																					Hazard Index (Total EEQ):				3.2E-01			3.9E-02

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.18	unitless
Fish diet fraction =	0.65	unitless
Aq. Invert diet fraction =	0.12	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0.025	unitless
Bird diet fraction =	0.025	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0.0014	kg/d
Food ingestion rate =	0.07	kg/d
Body weight =	1.02	kg
Home range =	35	acres
Water intake rate =	0.1	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	5.43E-03	unitless

Table F-14
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Great Blue Herons at SWMU 41 Area A

Hazard Estimate - Tier 1
Great Blue Heron

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	2.12E+04	4.21E+01	NA	NA	NA	NA	9.45E-10	6.28E-09	0.00E+00	1.92E-05	5.28E-07	NA	NA	NA	NA	1.97E-05	8	1.40E-05	1.75E-06	1.13E+01	1.40E-04	1.75E-05	1.13E+00
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.79E+01	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	4.40E-06	0.00E+00	NA	1.57E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-04	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	1.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	6.50E-05	0.00E+00	0.00E+00	6.61E-04	NA	NA	NA	NA	NA	7.26E-04	8	9.75E+00	1.22E+00	5.96E-04	4.88E+01	6.09E+00	1.19E-04
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	5.50E-05	0.00E+00	0.00E+00	4.08E-04	NA	NA	NA	NA	NA	4.63E-04	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	1.98E-06	0.00E+00	NA	7.50E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.69E-05	8	2.80E-03	3.50E-04	2.20E-01	2.80E-02	3.50E-03	2.20E-02
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	1.25E-04	0.00E+00	0.00E+00	9.28E-04	NA	NA	NA	NA	NA	1.05E-03	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	1.70E-05	0.00E+00	NA	5.00E-05	NA	NA	NA	NA	6.70E-05	8	5.53E+02	6.91E+01	9.69E-07	2.77E+03	3.46E+02	1.94E-07
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	2.14E+00	2.68E-01	0.00E+00	1.07E+01	1.34E+00	0.00E+00
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	1.90E-05	0.00E+00	NA	9.20E-05	NA	NA	NA	NA	1.11E-04	8	5.53E+02	6.91E+01	1.61E-06	2.77E+03	3.46E+02	3.21E-07
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.80E-01	2.25E-02	0.00E+00	1.80E+00	2.25E-01	0.00E+00
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	6.70E-05	0.00E+00	NA	2.13E-04	NA	NA	NA	NA	2.80E-04	8	5.53E+02	6.91E+01	4.05E-06	2.77E+03	3.46E+02	8.10E-07
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	7.90E-05	0.00E+00	NA	2.10E-04	NA	NA	NA	NA	2.89E-04	8	5.53E+02	6.91E+01	4.18E-06	2.77E+03	3.46E+02	8.37E-07
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	1.20E-04	0.00E+00	NA	6.24E-04	NA	NA	NA	NA	7.44E-04	8	5.53E+02	6.91E+01	1.08E-05	2.77E+03	3.46E+02	2.15E-06
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	1.00E-04	0.00E+00	NA	5.88E-04	NA	NA	NA	NA	6.88E-04	8	5.53E+02	6.91E+01	9.95E-06	2.77E+03	3.46E+02	1.99E-06
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	6.69E-04	0.00E+00	NA	3.48E-03	NA	NA	NA	NA	4.15E-03	8	5.53E+02	6.91E+01	6.00E-05	2.77E+03	3.46E+02	1.20E-05
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	9.82E-05	0.00E+00	NA	4.50E-04	NA	NA	NA	NA	5.48E-04	8	5.53E+02	6.91E+01	7.93E-06	2.77E+03	3.46E+02	1.59E-06
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	7.09E-02	8.86E-03	0.00E+00	1.22E-01	1.53E-02	0.00E+00
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.00E+01	1.25E+00	0.00E+00	5.00E+01	6.25E+00	0.00E+00
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	2.54E+01	2.74E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	3.00E-01	3.75E-02	0.00E+00	1.50E+00	1.88E-01	0.00E+00
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	6.78E+00	NA	NA	NA	NA	0.00E+00	2.45E-06	0.00E+00	NA	3.32E-05	NA	NA	NA	NA	3.57E-05	8	3.00E-01	3.75E-02	9.51E-04	1.50E+00	1.88E-01	1.90E-04
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	3.00E-01	3.75E-02	0.00E+00	1.50E+00	1.88E-01	0.00E+00
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	2.00E-04	0.00E+00	NA	1.22E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-03	8	5.53E+02	6.91E+01	2.05E-05	2.77E+03	3.46E+02	4.10E-06
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	1.00E-05	0.00E+00	NA	1.91E-04	NA	NA	NA	NA	2.01E-04	8	5.53E+02	6.91E+01	2.91E-06	2.77E+03	3.46E+02	5.83E-07
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	2.14E+00	2.68E-01	0.00E+00	1.07E+01	1.34E+00	0.00E+00
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	8.61E+00	8.96E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	9.20E-01	1.15E-01	0.00E+00	4.60E+00	5.75E-01	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	6.71E-05	0.00E+00	NA	3.84E-04	NA	NA	NA	NA	4.51E-04	8	5.53E+02	6.91E+01	6.52E-06	2.77E+03	3.46E+02	1.30E-06
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	7.68E-01	NA	NA	NA	NA	0.00E+00	5.80E-03	0.00E+00	NA	8.90E-03	NA	NA	NA	NA	1.47E-02	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	1.10E-04	0.00E+00	NA	3.78E-04	NA	NA	NA	NA	4.88E-04	8	5.53E+02	6.91E+01	7.07E-06	2.77E+03	3.46E+02	1.41E-06
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	1.50E-04	0.00E+00	NA	5.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.75E-04	8	5.53E+02	6.91E+01	9.76E-06	2.77E+03	3.46E+02	1.95E-06
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	6.90E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	1.80E-02	0.00E+00	NA	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.28E-02	8	5.14E+00	6.43E-01	6.67E-02	1.28E+01	1.61E+00	2.67E-02
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	7.99E+00	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	2.20E-03	0.00E+00	NA	3.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E-02	8	1.45E+00	1.81E-01	2.06E-01	2.00E+01	2.50E+00	1.49E-02
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	4.90E-05	3.30E-02	0.00E+00	3.65E-02	3.09E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-01	8	2.66E+00	3.33E-01	3.02E-01	2.78E+00	3.48E-01	2.89E-01
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	5.25E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	2.60E-02	0.00E+00	NA	2.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.99E-01	8	4.70E+01	5.88E+00	5.09E-02	6.20E+01	7.75E+00	3.86E-02
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	8.95E+02	6.07E-01	3.09E-01	3.00E-02	6.77E-02	6.77E-02	1.50E-05	3.50E-02	0.00E+00	1.29E-02	4.25E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.04E-02	8	3.85E+00	4.81E-01	1.88E-01	1.93E+01	2.41E+00	3.76E-02
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	2.87E+00	3.30E+01	1.14E+00	1.05E+00	1.05E+00	0.00E+00	3.30E-05	0.00E+00	NA	1.89E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-04	8	4.50E-01	5.63E-02	3.95E-03	9.00E-01	1.13E-01	1.98E-03
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	0.00E+00	2.50E-02	0.00E+00	NA	1.16E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-01	8	7.74E+01	9.68E+00	1.46E-02	1.07E+02	1.34E+01	1.05E-02
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	2.10E+00	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	7.70E-03	0.00E+00	NA	3.23E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02	8	5.00E-01	6.25E-02	6.41E-01	1.00E+00	1.25E-01	3.20E-01
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	1.60E-04	0.00E+00	NA	6.72E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.32E-04	8	1.78E+02	2.23E+01	3.74E-05	8.90E+02	1.11E+02	7.48E-06
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.03E+04	7.53E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	3.35E-04	1.21E-01	0.00E+00	3.31E+00	1.82E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.25E+00	8	1.45E+01	1.81E+00	2.90E+00	1.31E+02	1.64E+01	3.21E-01

Hazard Index (Total EEQ): 1.6E+01 2.2E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0.96	unitless
Aq. Invert diet fraction =	0.04	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0.0022	kg/d
Food ingestion rate =	0.11	kg/d
Body weight =	2.2	kg
Home range =	21	acres
Water intake rate =	0.11	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-15
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Great Blue Herons at SWMU 41 Area A

Hazard Estimate - Tier 2
Great Blue Heron

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	1.89E-08	mg/L	6.28E-06	mg/kg	0.00E+00	mg/kg	7.68E+03	3.95E+00	NA	NA	NA	NA	7.31E-12	4.86E-11	0.00E+00	5.39E-08	3.84E-10	NA	NA	NA	NA	5.43E-08	8	1.40E-05	1.75E-06	3.10E-02	1.40E-04	1.75E-05	3.10E-03
1,2,4-Trichlorobenzene	0.00E+00	mg/L	4.40E-03	mg/kg	3.40E-03	mg/kg	NA	1.35E+01	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	3.40E-08	0.00E+00	NA	9.20E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.54E-07	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	6.22E-04	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.06E+01	NA	NA	NA	NA	NA	2.41E-07	0.00E+00	0.00E+00	2.45E-06	NA	NA	NA	NA	NA	2.69E-06	8	9.75E+00	1.22E+00	2.21E-06	4.88E+01	6.09E+00	4.41E-07
2-amino-4,6-Dinitrotoluene	1.10E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	4.25E-07	0.00E+00	0.00E+00	3.16E-06	NA	NA	NA	NA	NA	3.58E-06	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	0.00E+00	mg/L	1.98E-03	mg/kg	1.20E-03	mg/kg	NA	1.89E+01	2.02E+01	4.61E-03	2.06E+01	2.06E+01	0.00E+00	1.53E-08	0.00E+00	NA	5.80E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.95E-07	8	2.80E-03	3.50E-04	1.70E-03	2.80E-02	3.50E-03	1.70E-04
4-amino-2,6-Dinitrotoluene	2.50E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	7.73E+00	NA	NA	NA	NA	NA	9.67E-07	0.00E+00	0.00E+00	7.18E-06	NA	NA	NA	NA	NA	8.14E-06	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	0.00E+00	mg/L	1.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.47E+00	NA	NA	NA	NA	0.00E+00	1.31E-07	0.00E+00	NA	3.86E-07	NA	NA	NA	NA	5.18E-07	8	5.53E+02	6.91E+01	7.49E-09	2.77E+03	3.46E+02	1.50E-09
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	2.14E+00	2.68E-01	0.00E+00	1.07E+01	1.34E+00	0.00E+00
Anthracene	0.00E+00	mg/L	1.90E-02	mg/kg	0.00E+00	mg/kg	NA	2.42E+00	NA	NA	NA	NA	0.00E+00	1.47E-07	0.00E+00	NA	7.11E-07	NA	NA	NA	NA	8.58E-07	8	5.53E+02	6.91E+01	1.24E-08	2.77E+03	3.46E+02	2.48E-09
Aroclor 1254	0.00E+00	mg/L	0.00E+00	mg/kg	1.50E-01	mg/kg	NA	NA	3.46E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.80E-01	2.25E-02	0.00E+00	1.80E+00	2.25E-01	0.00E+00
Benzo(a)anthracene	0.00E+00	mg/L	6.70E-02	mg/kg	0.00E+00	mg/kg	NA	1.59E+00	NA	NA	NA	NA	0.00E+00	5.18E-07	0.00E+00	NA	1.65E-06	NA	NA	NA	NA	2.17E-06	8	5.53E+02	6.91E+01	3.13E-08	2.77E+03	3.46E+02	6.27E-09
Benzo(a)pyrene	0.00E+00	mg/L	7.90E-02	mg/kg	0.00E+00	mg/kg	NA	1.33E+00	NA	NA	NA	NA	0.00E+00	6.11E-07	0.00E+00	NA	1.63E-06	NA	NA	NA	NA	2.24E-06	8	5.53E+02	6.91E+01	3.23E-08	2.77E+03	3.46E+02	6.47E-09
Benzo(b)fluoranthene	0.00E+00	mg/L	1.20E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	9.28E-07	0.00E+00	NA	4.83E-06	NA	NA	NA	NA	5.75E-06	8	5.53E+02	6.91E+01	8.32E-08	2.77E+03	3.46E+02	1.66E-08
Benzo(g,h,i)perylene	0.00E+00	mg/L	1.00E-01	mg/kg	0.00E+00	mg/kg	NA	2.94E+00	NA	NA	NA	NA	0.00E+00	7.73E-07	0.00E+00	NA	4.55E-06	NA	NA	NA	NA	5.32E-06	8	5.53E+02	6.91E+01	7.70E-08	2.77E+03	3.46E+02	1.54E-08
Benzo(k)fluoranthene	0.00E+00	mg/L	6.69E-01	mg/kg	0.00E+00	mg/kg	NA	2.60E+00	NA	NA	NA	NA	0.00E+00	5.17E-06	0.00E+00	NA	2.69E-05	NA	NA	NA	NA	3.21E-05	8	5.53E+02	6.91E+01	4.64E-07	2.77E+03	3.46E+02	9.28E-08
Chrysene	0.00E+00	mg/L	9.82E-02	mg/kg	0.00E+00	mg/kg	NA	2.29E+00	NA	NA	NA	NA	0.00E+00	7.59E-07	0.00E+00	NA	3.48E-06	NA	NA	NA	NA	4.24E-06	8	5.53E+02	6.91E+01	6.13E-08	2.77E+03	3.46E+02	1.23E-08
Dieldrin	0.00E+00	mg/L	0.00E+00	mg/kg	1.40E-03	mg/kg	NA	NA	1.47E+01	4.10E-01	1.20E+00	1.20E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	7.09E-02	8.86E-03	0.00E+00	1.22E-01	1.53E-02	0.00E+00
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	1.00E-03	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.00E+01	1.25E+00	0.00E+00	5.00E+01	6.25E+00	0.00E+00
Endrin	0.00E+00	mg/L	0.00E+00	mg/kg	6.40E-03	mg/kg	NA	NA	1.92E+01	2.74E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	3.00E-01	3.75E-02	0.00E+00	1.50E+00	1.88E-01	0.00E+00
Endrin aldehyde	0.00E+00	mg/L	2.45E-03	mg/kg	0.00E+00	mg/kg	NA	5.14E+00	NA	NA	NA	NA	0.00E+00	1.89E-08	0.00E+00	NA	1.95E-07	NA	NA	NA	NA	2.14E-07	8	3.00E-01	3.75E-02	5.69E-06	1.50E+00	1.88E-01	1.14E-06
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	3.00E-01	3.75E-02	0.00E+00	1.50E+00	1.88E-01	0.00E+00
Fluoranthene	0.00E+00	mg/L	2.00E-01	mg/kg	6.40E-03	mg/kg	NA	3.04E+00	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	1.55E-06	0.00E+00	NA	9.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-05	8	5.53E+02	6.91E+01	1.58E-07	2.77E+03	3.46E+02	3.17E-08
Fluorene	0.00E+00	mg/L	1.00E-02	mg/kg	0.00E+00	mg/kg	NA	9.57E+00	NA	NA	NA	NA	0.00E+00	7.73E-08	0.00E+00	NA	1.48E-06	NA	NA	NA	NA	1.56E-06	8	5.53E+02	6.91E+01	2.25E-08	2.77E+03	3.46E+02	4.51E-09
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	1.70E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	2.14E+00	2.68E-01	0.00E+00	1.07E+01	1.34E+00	0.00E+00
Heptachlor epoxide	0.00E+00	mg/L	0.00E+00	mg/kg	1.80E-03	mg/kg	NA	NA	6.52E+00	8.96E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	9.20E-01	1.15E-01	0.00E+00	4.60E+00	5.75E-01	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	6.71E-02	mg/kg	0.00E+00	mg/kg	NA	2.86E+00	NA	NA	NA	NA	0.00E+00	5.19E-07	0.00E+00	NA	2.97E-06	NA	NA	NA	NA	3.49E-06	8	5.53E+02	6.91E+01	5.04E-08	2.77E+03	3.46E+02	1.01E-08
Nitroglycerin	0.00E+00	mg/L	5.80E+00	mg/kg	0.00E+00	mg/kg	NA	5.81E-01	NA	NA	NA	NA	0.00E+00	4.49E-05	0.00E+00	NA	5.21E-05	NA	NA	NA	NA	9.70E-05	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	0.00E+00	mg/L	1.10E-01	mg/kg	0.00E+00	mg/kg	NA	1.72E+00	NA	NA	NA	NA	0.00E+00	8.51E-07	0.00E+00	NA	2.93E-06	NA	NA	NA	NA	3.78E-06	8	5.53E+02	6.91E+01	5.46E-08	2.77E+03	3.46E+02	1.09E-08
Pyrene	0.00E+00	mg/L	1.50E-01	mg/kg	3.80E-03	mg/kg	NA	1.75E+00	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	1.16E-06	0.00E+00	NA	4.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.22E-06	8	5.53E+02	6.91E+01	7.55E-08	2.77E+03	3.46E+02	1.51E-08
Arsenic	0.00E+00	mg/L	1.80E+01	mg/kg	1.20E+01	mg/kg	NA	1.43E-01	1.16E-01	3.75E-02	5.00E-03	5.00E-03	0.00E+00	1.39E-04	0.00E+00	NA	3.98E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E-04	8	5.14E+00	6.43E-01	2.79E-04	1.28E+01	1.61E+00	1.12E-04
Cadmium	0.00E+00	mg/L	2.20E+00	mg/kg	2.90E+00	mg/kg	NA	6.00E-01	6.66E+00	3.84E-01	1.62E-01	1.62E-01	0.00E+00	1.70E-05	0.00E+00	NA	2.04E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E-05	8	1.45E+00	1.81E-01	2.06E-04	2.00E+01	2.50E+00	1.50E-05
Chromium	9.80E-04	mg/L	3.30E+01	mg/kg	2.50E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	9.86E-02	9.86E-02	3.79E-07	2.55E-04	0.00E+00	3.46E-05	5.10E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.41E-04	8	2.66E+00	3.33E-01	1.03E-03	2.78E+00	3.48E-01	9.82E-04
Copper	0.00E+00	mg/L	2.60E+01	mg/kg	6.90E+01	mg/kg	NA	1.56E+00	5.15E-01	1.50E-01	2.05E-01	2.05E-01	0.00E+00	2.01E-04	0.00E+00	NA	6.26E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.27E-04	8	4.70E+01	5.88E+00	1.41E-04	6.20E+01	7.75E+00	1.07E-04
Lead	3.00E-04	mg/L	3.50E+01	mg/kg	1.43E+02	mg/kg	4.50E-01	7.10E-02	3.09E-01	3.00E-02	6.77E-02	6.77E-02	1.16E-07	2.71E-04	0.00E+00	5.01E-08	3.84E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.09E-04	8	3.85E+00	4.81E-01	6.43E-04	1.93E+01	2.41E+00	1.29E-04
Mercury	0.00E+00	mg/L	3.30E-02	mg/kg	8.60E-02	mg/kg	NA	1.14E+00	5.59E+00	1.14E+00	1.92E-01	1.92E-01	0.00E+00	2.55E-07	0.00E+00	NA	5.80E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.35E-07	8	4.50E-01	5.63E-02	1.48E-05	9.00E-01	1.13E-01	7.42E-06
Nickel	0.00E+00	mg/L	2.50E+01	mg/kg	2.60E+01	mg/kg	NA	4.86E-01	2.88E-01	4.76E-02	1.37E-01	1.37E-01	0.00E+00	1.93E-04	0.00E+00	NA	1.88E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E-04	8	7.74E+01	9.68E+00	3.94E-05	1.07E+02	1.34E+01	2.85E-05
Selenium	0.00E+00	mg/L	7.70E+00	mg/kg	8.00E-01	mg/kg	NA	4.20E-01	9.85E-01	4.96E-01	7.58E-01	7.58E-01	0.00E+00	5.95E-05	0.00E+00	NA	5.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-04	8	5.00E-01	6.25E-02	1.75E-03	1.00E+00	1.25E-01	8.76E-04
Silver	0.00E+00	mg/L	1.60E-01	mg/kg	7.70E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	1.24E-06	0.00E+00	NA	1.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-06	8	1.78E+02	2.23E+01	1.02E-07	8.90E+02	1.11E+02	2.05E-08
Zinc	6.70E-03	mg/L	1.21E+02	mg/kg	1.49E+03	mg/kg	1.00E+03	1.94E+00	6.31E-01	1.86E-01	8.83E-02	8.83E-02	2.59E-06	9.36E-04	0.00E+00	2.49E-03	3.62E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.05E-03	8	1.45E+01	1.81E+00	3.89E-03	1.31E+02	1.64E+01	4.30E-04

Hazard Index (Total EEQ): 4.1E-02 6.0E-03

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0.96	unitless
Aq. Invert diet fraction =	0.04	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0.002	kg/d
Food ingestion rate =	0.1	kg/d
Body weight =	2.34	kg
Home range =	21	acres
Water intake rate =	0.1	L/d
Site Area =	0.19	acres
Frac. home range (FHR) =	9.05E-03	unitless

Table
Wildlife EEQ Hazard Summary for SWMU 41 Area A

Receptor	Tier 1[a]		Tier 2[b]	
	NOAEL-Based EEQ	LOAEL-Based EEQ	NOAEL-Based EEQ	LOAEL-Based EEQ
Meadow vole	34	11	12	4.1
Hazard Driver(s)[c]:				
Short-tailed shrew	277	62	16	3.6
Hazard Driver(s)[c]:				
American robin	212	34	16	2.6
Hazard Driver(s)[c]:				
Red-tailed hawk	13	2.3	0.0009	0.0002
Hazard Driver(s)[c]:				
Red fox	16	5.0	0.001	0.0002
Hazard Driver(s)[c]:				
Mink	518	62	0.32	0.04
Hazard Driver(s)[c]:				
Great blue heron	16	2.2	0.04	0.01
Hazard Driver(s)[c]:				

[a] Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.

[b] Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR less than or equal to 1.

[c] Hazard drivers are those chemicals contributing the most to the total estimated EEQ, and the primary route of exposure associated with this driver.

Notes:

EEQ = Ecological Effects Quotient

LOAEL = Lowest Observed Adverse Effect Level

NOAEL = No Observed Adverse Effect Level

FHR = Fraction Home Range

BW = Body Weight

BAF/BCF = Bioaccumulation Factor/Bioconcentration Factor

EPC = Exposure Point Concentration

Table F-16
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Meadow Voles at SWMU 41 Area B

Hazard Estimate - Tier 1
Meadow Vole

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	4.21E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	1.00E-06	2.50E-07	0.00E+00	1.00E-05	2.50E-06	0.00E+00
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	5.80E-03	mg/kg	NA	NA	3.67E+00	2.10E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	8.19E-05	NA	NA	0.00E+00	7.16E-03	0.00E+00	0.00E+00	7.25E-03	4	4.43E+01	1.11E+01	6.54E-04	2.22E+02	5.54E+01	1.31E-04
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	5.36E-05	NA	NA	0.00E+00	4.63E-04	0.00E+00	0.00E+00	5.17E-04	4	1.48E+00	3.70E-01	1.40E-03	7.40E+00	1.85E+00	2.79E-04
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	6.21E-05	NA	NA	0.00E+00	5.36E-04	0.00E+00	0.00E+00	5.98E-04	4	1.48E+00	3.70E-01	1.62E-03	7.40E+00	1.85E+00	3.24E-04
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	7.87E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	9.88E-06	NA	NA	0.00E+00	2.03E-04	0.00E+00	0.00E+00	2.13E-04	4	8.57E+01	2.14E+01	9.92E-06	4.29E+02	1.07E+02	1.98E-06
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	5.20E-03	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	7.34E-05	NA	NA	0.00E+00	1.51E-03	0.00E+00	0.00E+00	1.58E-03	4	8.57E+01	2.14E+01	7.37E-05	4.29E+02	1.07E+02	1.47E-05
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.04E-05	NA	NA	0.00E+00	2.14E-04	0.00E+00	0.00E+00	2.25E-04	4	2.50E+00	6.25E-01	3.60E-04	1.25E+01	3.13E+00	7.19E-05
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	8.00E-01	2.00E-01	0.00E+00	4.00E+00	1.00E+00	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	5.36E-05	NA	NA	0.00E+00	2.08E-05	0.00E+00	0.00E+00	7.45E-05	4	4.60E+00	1.15E+00	6.48E-05	9.20E+00	2.30E+00	3.24E-05
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	2.19E+01	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	5.79E-04	NA	0.00E+00	0.00E+00	8.63E-05	0.00E+00	0.00E+00	6.65E-04	8	1.40E-01	1.75E-02	3.80E-02	6.80E-01	8.50E-02	7.82E-03
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	6.21E-06	NA	NA	0.00E+00	9.51E-05	0.00E+00	0.00E+00	1.01E-04	4	1.50E-01	3.75E-02	2.70E-03	7.50E-01	1.88E-01	5.40E-04
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	6.78E+00	6.78E+00	6.50E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	9.74E-06	NA	0.00E+00	0.00E+00	2.64E-05	0.00E+00	0.00E+00	3.61E-05	4	9.20E-02	2.30E-02	1.57E-03	9.20E-01	2.30E-01	1.57E-04
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.21E-05	NA	NA	0.00E+00	2.56E-05	0.00E+00	0.00E+00	3.77E-05	4	9.20E-02	2.30E-02	1.64E-03	9.20E-01	2.30E-01	1.64E-04
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.06E-05	NA	NA	0.00E+00	1.47E-03	0.00E+00	0.00E+00	1.54E-03	4	6.15E-01	1.54E-01	1.00E-02	3.07E+00	7.68E-01	2.01E-03
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.96E-05	NA	NA	0.00E+00	1.15E-05	0.00E+00	0.00E+00	4.12E-05	4	4.60E+00	1.15E+00	3.58E-05	9.20E+00	2.30E+00	1.79E-05
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	1.17E+01	1.59E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	7.43E-05	NA	NA	0.00E+00	4.91E-05	0.00E+00	0.00E+00	1.23E-04	8	1.00E-01	1.25E-02	9.87E-03	1.00E+00	1.25E-01	9.87E-04
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	9.84E+00	2.05E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.55E-05	NA	NA	0.00E+00	1.32E-05	0.00E+00	0.00E+00	2.88E-05	4	4.00E+00	1.00E+00	2.88E-05	8.00E+00	2.00E+00	1.44E-05
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-05	NA	0.00E+00	0.00E+00	9.53E-03	0.00E+00	0.00E+00	9.56E-03	4	6.56E+01	1.64E+01	5.83E-04	1.10E+02	2.75E+01	3.48E-04
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.36E-05	NA	NA	0.00E+00	1.61E-03	0.00E+00	0.00E+00	1.66E-03	4	6.15E-01	1.54E-01	1.08E-02	3.07E+00	7.68E-01	2.17E-03
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.30E+01	mg/kg	1.75E+03	6.90E-01	9.61E-02	3.75E-02	4.45E-03	4.45E-03	2.92E-03	0.00E+00	3.25E-01	0.00E+00	0.00E+00	0.00E+00	5.08E-01	0.00E+00	0.00E+00	8.35E-01	4	1.26E-01	3.15E-02	2.65E+01	1.26E+00	3.15E-01	2.65E+00
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.50E+00	mg/kg	4.54E+03	7.99E+00	6.41E+00	3.52E-01	1.47E-01	1.47E-01	1.24E-04	0.00E+00	4.94E-02	0.00E+00	0.00E+00	0.00E+00	7.25E-01	0.00E+00	0.00E+00	7.75E-01	4	1.00E+00	2.50E-01	3.10E+00	1.00E+01	2.50E+00	3.10E-01
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.30E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	1.01E-01	1.01E-01	3.87E-03	0.00E+00	3.25E-01	0.00E+00	0.00E+00	0.00E+00	5.55E-01	0.00E+00	0.00E+00	8.83E-01	4	2.74E+03	6.84E+02	1.29E-03	1.37E+04	3.42E+03	2.58E-04
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	5.70E+01	mg/kg	5.92E+03	5.25E+00	5.15E-01	1.68E-01	2.42E-01	2.42E-01	7.82E-03	0.00E+00	8.05E-01	0.00E+00	0.00E+00	0.00E+00	5.64E+00	0.00E+00	0.00E+00	6.46E+00	8	1.17E+01	1.46E+00	4.41E+00	1.51E+01	1.89E+00	3.42E+00
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	7.50E+01	mg/kg	8.95E+02	6.07E-01	3.49E-01	3.98E-02	9.71E-02	9.71E-02	1.19E-02	0.00E+00	1.06E+00	0.00E+00	0.00E+00	0.00E+00	1.76E+00	0.00E+00	0.00E+00	2.83E+00	4	8.00E+00	2.00E+00	1.41E+00	8.00E+01	2.00E+01	1.41E-01
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	2.40E-01	mg/kg	NA	2.87E+00	3.30E+01	7.09E-01	1.05E+00	1.05E+00	0.00E+00	0.00E+00	3.39E-03	NA	0.00E+00	0.00E+00	1.00E-01	0.00E+00	0.00E+00	1.04E-01	8	1.00E+00	1.25E-01	8.28E-01	5.00E+00	6.25E-01	1.66E-01
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.60E+01	mg/kg	3.90E+02	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	4.12E-03	0.00E+00	3.67E-01	0.00E+00	0.00E+00	0.00E+00	7.29E-01	0.00E+00	0.00E+00	1.10E+00	4	4.00E+01	1.00E+01	1.10E-01	8.00E+01	2.00E+01	5.50E-02
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	9.20E-01	mg/kg	6.45E+02	2.10E+00	9.49E-01	5.04E-01	6.95E-01	6.95E-01	1.65E-04	0.00E+00	1.30E-02	0.00E+00	0.00E+00	0.00E+00	2.73E-01	0.00E+00	0.00E+00	2.86E-01	4	2.00E-01	5.00E-02	5.72E+00	3.30E-01	8.25E-02	3.46E+00
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	2.20E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	3.11E-03	NA	0.00E+00	0.00E+00	1.81E-03	0.00E+00	0.00E+00	4.92E-03	4	2.22E+01	5.55E+00	8.86E-04	2.22E+02	5.55E+01	8.86E-05
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	2.34E+02	mg/kg	1.03E+04	7.53E+00	2.19E+00	4.24E-01	4.93E-01	4.93E-01	3.09E-02	0.00E+00	3.30E+00	0.00E+00	0.00E+00	0.00E+00	5.84E+01	0.00E+00	0.00E+00	6.17E+01	4	1.60E+02	4.00E+01	1.54E+00	3.20E+02	8.00E+01	7.71E-01

Hazard Index (Total EEQ): 4.4E+01 1.1E+01

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \times Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	1	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.00024	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.01	kg/d
Body weight =	0.017	kg
Home range =	0.089	acres
Water intake rate =	0.007	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-17
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Meadow Voles at SWMU 41 Area B

Hazard Estimate - Tier 2
Meadow Vole

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	3.03E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	1.00E-06	2.50E-07	0.00E+00	1.00E-05	2.50E-06	0.00E+00
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	3.70E-03	mg/kg	NA	NA	2.78E+00	2.10E+00	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.90E-05	NA	NA	0.00E+00	1.68E-03	0.00E+00	0.00E+00	1.70E-03	4	4.43E+01	1.11E+01	1.53E-04	2.22E+02	5.54E+01	3.07E-05
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.32E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.95E-05	NA	NA	0.00E+00	1.70E-04	0.00E+00	0.00E+00	1.90E-04	4	1.48E+00	3.70E-01	5.13E-04	7.40E+00	1.85E+00	1.03E-04
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.26E-05	NA	NA	0.00E+00	1.97E-04	0.00E+00	0.00E+00	2.20E-04	4	1.48E+00	3.70E-01	5.94E-04	7.40E+00	1.85E+00	1.19E-04
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	5.96E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.59E-06	NA	NA	0.00E+00	7.45E-05	0.00E+00	0.00E+00	7.81E-05	4	8.57E+01	2.14E+01	3.64E-06	4.29E+02	1.07E+02	7.29E-07
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.57E-03	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.83E-05	NA	NA	0.00E+00	3.80E-04	0.00E+00	0.00E+00	3.99E-04	4	8.57E+01	2.14E+01	1.86E-05	4.29E+02	1.07E+02	3.72E-06
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.80E-06	NA	NA	0.00E+00	7.88E-05	0.00E+00	0.00E+00	8.26E-05	4	2.50E+00	6.25E-01	1.32E-04	1.25E+01	3.13E+00	2.64E-05
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	4	8.00E-01	2.00E-01	0.00E+00	4.00E+00	1.00E+00	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.95E-05	NA	NA	0.00E+00	7.66E-06	0.00E+00	0.00E+00	2.72E-05	4	4.60E+00	1.15E+00	2.36E-05	9.20E+00	2.30E+00	1.18E-05
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	4.67E+00	2.37E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.11E-04	NA	0.00E+00	0.00E+00	3.17E-05	0.00E+00	0.00E+00	2.42E-04	8	1.40E-01	1.75E-02	1.38E-02	6.80E-01	8.50E-02	2.85E-03
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.26E-06	NA	NA	0.00E+00	3.49E-05	0.00E+00	0.00E+00	3.72E-05	4	1.50E-01	3.75E-02	9.92E-04	7.50E-01	1.88E-01	1.98E-04
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	5.14E+00	5.14E+00	6.50E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.54E-06	NA	0.00E+00	0.00E+00	9.70E-06	0.00E+00	0.00E+00	1.32E-05	4	9.20E-02	2.30E-02	5.76E-04	9.20E-01	2.30E-01	5.76E-05
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	4.42E-06	NA	NA	0.00E+00	9.40E-06	0.00E+00	0.00E+00	1.38E-05	4	9.20E-02	2.30E-02	6.01E-04	9.20E-01	2.30E-01	6.01E-05
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E-05	NA	NA	0.00E+00	5.41E-04	0.00E+00	0.00E+00	5.66E-04	4	6.15E-01	1.54E-01	3.68E-03	3.07E+00	7.68E-01	7.38E-04
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.08E-05	NA	NA	0.00E+00	4.23E-06	0.00E+00	0.00E+00	1.50E-05	4	4.60E+00	1.15E+00	1.31E-05	9.20E+00	2.30E+00	6.53E-06
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	8.85E+00	1.59E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.70E-05	NA	NA	0.00E+00	1.81E-05	0.00E+00	0.00E+00	4.51E-05	8	1.00E-01	1.25E-02	3.61E-03	1.00E+00	1.25E-01	3.61E-04
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	7.46E+00	2.05E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.65E-06	NA	NA	0.00E+00	4.86E-06	0.00E+00	0.00E+00	1.05E-05	4	4.00E+00	1.00E+00	1.05E-05	8.00E+00	2.00E+00	5.26E-06
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.73E-06	NA	0.00E+00	0.00E+00	3.50E-03	0.00E+00	0.00E+00	3.51E-03	4	6.56E+01	1.64E+01	2.14E-04	1.10E+02	2.75E+01	1.28E-04
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-05	NA	NA	0.00E+00	5.92E-04	0.00E+00	0.00E+00	6.11E-04	4	6.15E-01	1.54E-01	3.97E-03	3.07E+00	7.68E-01	7.96E-04
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.18E+01	mg/kg	5.70E+02	1.43E-01	9.76E-02	3.75E-02	4.49E-03	4.49E-03	9.79E-04	0.00E+00	1.12E-01	0.00E+00	0.00E+00	0.00E+00	1.76E-01	0.00E+00	0.00E+00	2.89E-01	4	1.26E-01	3.15E-02	9.18E+00	1.26E+00	3.15E-01	9.18E-01
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.13E+00	mg/kg	1.63E+03	6.00E-01	6.56E+00	3.71E-01	1.56E-01	1.56E-01	4.14E-05	0.00E+00	1.61E-02	0.00E+00	0.00E+00	0.00E+00	2.51E-01	0.00E+00	0.00E+00	2.67E-01	4	1.00E+00	2.50E-01	1.07E+00	1.00E+01	2.50E+00	1.07E-01
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.10E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	1.03E-01	1.03E-01	1.30E-03	0.00E+00	1.08E-01	0.00E+00	0.00E+00	0.00E+00	1.86E-01	0.00E+00	0.00E+00	2.95E-01	4	2.74E+03	6.84E+02	4.32E-04	1.37E+04	3.42E+03	8.63E-05
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	4.98E+01	mg/kg	2.00E+02	1.56E+00	5.15E-01	1.83E-01	2.72E-01	2.72E-01	2.62E-03	0.00E+00	2.56E-01	0.00E+00	0.00E+00	0.00E+00	1.97E+00	0.00E+00	0.00E+00	2.22E+00	8	1.17E+01	1.46E+00	1.52E+00	1.51E+01	1.89E+00	1.18E+00
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	5.31E+01	mg/kg	4.50E-01	7.10E-02	3.74E-01	4.63E-02	1.18E-01	1.18E-01	4.00E-03	0.00E+00	2.73E-01	0.00E+00	0.00E+00	0.00E+00	5.32E-01	0.00E+00	0.00E+00	8.09E-01	4	8.00E+00	2.00E+00	4.04E-01	8.00E+01	2.00E+01	4.04E-02
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	1.39E-01	mg/kg	NA	1.14E+00	4.06E+00	9.12E-01	1.92E-01	1.92E-01	0.00E+00	0.00E+00	7.14E-04	NA	0.00E+00	0.00E+00	2.74E-02	0.00E+00	0.00E+00	2.81E-02	8	1.00E+00	1.25E-01	2.25E-01	5.00E+00	6.25E-01	4.50E-02
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.15E+01	mg/kg	1.00E+02	4.86E-01	4.69E-01	5.00E-02	1.52E-01	1.52E-01	1.38E-03	0.00E+00	1.10E-01	0.00E+00	0.00E+00	0.00E+00	2.32E-01	0.00E+00	0.00E+00	3.44E-01	4	4.00E+01	1.00E+01	3.44E-02	8.00E+01	2.00E+01	1.72E-02
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	7.32E-01	mg/kg	6.45E+02	4.20E-01	1.01E+00	4.92E-01	8.02E-01	8.02E-01	5.51E-05	0.00E+00	3.76E-03	0.00E+00	0.00E+00	0.00E+00	7.79E-02	0.00E+00	0.00E+00	8.17E-02	4	2.00E-01	5.00E-02	1.63E+00	3.30E-01	8.25E-02	9.90E-01
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	1.44E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	7.39E-04	NA	0.00E+00	0.00E+00	4.36E-04	0.00E+00	0.00E+00	1.18E-03	4	2.22E+01	5.55E+00	2.12E-04	2.22E+02	5.55E+01	2.12E-05
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	1.98E+02	mg/kg	1.00E+03	1.94E+00	2.45E+00	4.57E-01	5.77E-01	5.77E-01	1.03E-02	0.00E+00	1.02E+00	0.00E+00	0.00E+00	0.00E+00	1.95E+01	0.00E+00	0.00E+00	2.06E+01	4	1.60E+02	4.00E+01	5.14E-01	3.20E+02	8.00E+01	2.57E-01

Hazard Index (Total EEQ): 1.5E+01 3.6E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	1	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.00019	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.008	kg/d
Body weight =	0.037	kg
Home range =	0.089	acres
Water intake rate =	0.0051	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-18
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Short-Tailed Shrews at SWMU 41 Area B

Hazard Estimate - Tier 1
Short-tailed Shrew

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	4.21E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.00E-06	1.25E-07	0.00E+00	1.00E-05	1.25E-06	0.00E+00
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	5.80E-03	mg/kg	NA	NA	3.67E+00	2.10E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.44E-04	NA	NA	5.11E-03	0.00E+00	0.00E+00	0.00E+00	5.25E-03	8	4.43E+01	5.54E+00	9.48E-04	2.22E+02	2.77E+01	1.90E-04
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	9.42E-05	NA	NA	1.59E-02	0.00E+00	0.00E+00	0.00E+00	1.60E-02	8	1.48E+00	1.85E-01	8.67E-02	7.40E+00	9.25E-01	1.73E-02
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.09E-04	NA	NA	1.88E-02	0.00E+00	0.00E+00	0.00E+00	1.90E-02	8	1.48E+00	1.85E-01	1.02E-01	7.40E+00	9.25E-01	2.05E-02
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	7.87E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.74E-05	NA	NA	1.32E-03	0.00E+00	0.00E+00	0.00E+00	1.34E-03	8	8.57E+01	1.07E+01	1.25E-04	4.29E+02	5.36E+01	2.50E-05
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	5.20E-03	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.29E-04	NA	NA	1.00E-02	0.00E+00	0.00E+00	0.00E+00	1.02E-02	8	8.57E+01	1.07E+01	9.48E-04	4.29E+02	5.36E+01	1.90E-04
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.84E-05	NA	NA	1.43E-03	0.00E+00	0.00E+00	0.00E+00	1.44E-03	8	2.50E+00	3.13E-01	4.62E-03	1.25E+01	1.56E+00	9.25E-04
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	8.00E-01	1.00E-01	0.00E+00	4.00E+00	5.00E-01	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	9.42E-05	NA	NA	1.43E-02	0.00E+00	0.00E+00	0.00E+00	1.44E-02	8	4.60E+00	5.75E-01	2.51E-02	9.20E+00	1.15E+00	1.26E-02
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	2.19E+01	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.02E-03	NA	0.00E+00	6.42E-01	0.00E+00	0.00E+00	0.00E+00	6.43E-01	8	1.40E-01	1.75E-02	3.67E+01	6.80E-01	8.50E-02	7.56E+00
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.09E-05	NA	NA	2.60E-05	0.00E+00	0.00E+00	0.00E+00	3.69E-05	8	1.50E-01	1.88E-02	1.97E-03	7.50E-01	9.38E-02	3.94E-04
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	6.78E+00	6.78E+00	6.50E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.71E-05	NA	0.00E+00	1.12E-03	0.00E+00	0.00E+00	0.00E+00	1.14E-03	8	9.20E-02	1.15E-02	9.91E-02	9.20E-01	1.15E-01	9.91E-03
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.13E-05	NA	NA	2.30E-03	0.00E+00	0.00E+00	0.00E+00	2.32E-03	8	9.20E-02	1.15E-02	2.02E-01	9.20E-01	1.15E-01	2.02E-02
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-04	NA	NA	3.65E-03	0.00E+00	0.00E+00	0.00E+00	3.77E-03	8	6.15E-01	7.69E-02	4.91E-02	3.07E+00	3.84E-01	9.83E-03
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	5.21E-05	NA	NA	7.93E-03	0.00E+00	0.00E+00	0.00E+00	7.98E-03	8	4.60E+00	5.75E-01	1.39E-02	9.20E+00	1.15E+00	6.94E-03
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	1.17E+01	1.59E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.30E-04	NA	NA	1.47E-02	0.00E+00	0.00E+00	0.00E+00	1.49E-02	8	1.00E-01	1.25E-02	1.19E+00	1.00E+00	1.25E-01	1.19E-01
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	9.84E+00	2.05E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.73E-05	NA	NA	2.60E-03	0.00E+00	0.00E+00	0.00E+00	2.63E-03	8	4.00E+00	5.00E-01	5.25E-03	8.00E+00	1.00E+00	2.63E-03
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.22E-05	NA	0.00E+00	7.02E-04	0.00E+00	0.00E+00	0.00E+00	7.44E-04	8	6.56E+01	8.20E+00	9.07E-05	1.10E+02	1.38E+01	5.41E-05
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.42E-05	NA	NA	1.60E-03	0.00E+00	0.00E+00	0.00E+00	1.69E-03	8	6.15E-01	7.69E-02	2.20E-02	3.07E+00	3.84E-01	4.40E-03
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.30E+01	mg/kg	1.75E+03	6.90E-01	9.61E-02	3.75E-02	4.45E-03	4.45E-03	1.87E-03	0.00E+00	5.70E-01	0.00E+00	0.00E+00	5.30E-01	0.00E+00	0.00E+00	0.00E+00	1.10E+00	8	1.26E-01	1.58E-02	7.00E+01	1.26E+00	1.58E-01	7.00E+00
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.50E+00	mg/kg	4.54E+03	7.99E+00	6.41E+00	3.52E-01	1.47E-01	1.47E-01	7.92E-05	0.00E+00	8.68E-02	0.00E+00	0.00E+00	5.38E+00	0.00E+00	0.00E+00	0.00E+00	5.47E+00	8	1.00E+00	1.25E-01	4.37E+01	1.00E+01	1.25E+00	4.37E+00
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.30E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	1.01E-01	1.01E-01	2.48E-03	0.00E+00	5.70E-01	0.00E+00	0.00E+00	1.69E+00	0.00E+00	0.00E+00	0.00E+00	2.26E+00	8	2.74E+03	3.42E+02	6.61E-03	1.37E+04	1.71E+03	1.32E-03
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	5.70E+01	mg/kg	5.92E+03	5.25E+00	5.15E-01	1.68E-01	2.42E-01	2.42E-01	5.02E-03	0.00E+00	1.41E+00	0.00E+00	0.00E+00	7.05E+00	0.00E+00	0.00E+00	0.00E+00	8.46E+00	8	1.17E+01	1.46E+00	5.79E+00	1.51E+01	1.89E+00	4.48E+00
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	7.50E+01	mg/kg	8.95E+02	6.07E-01	3.49E-01	3.98E-02	9.71E-02	9.71E-02	7.66E-03	0.00E+00	1.86E+00	0.00E+00	0.00E+00	6.29E+00	0.00E+00	0.00E+00	0.00E+00	8.16E+00	8	8.00E+00	1.00E+00	8.16E+00	8.00E+01	1.00E+01	8.16E-01
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	2.40E-01	mg/kg	NA	2.87E+00	3.30E+01	7.09E-01	1.05E+00	1.05E+00	0.00E+00	0.00E+00	5.95E-03	NA	0.00E+00	1.90E+00	0.00E+00	0.00E+00	0.00E+00	1.91E+00	8	1.00E+00	1.25E-01	1.53E+01	5.00E+00	6.25E-01	3.05E+00
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.60E+01	mg/kg	3.90E+02	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	2.64E-03	0.00E+00	6.45E-01	0.00E+00	0.00E+00	4.87E+01	0.00E+00	0.00E+00	0.00E+00	4.93E+01	8	4.00E+01	5.00E+00	9.86E+00	8.00E+01	1.00E+01	4.93E+00
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	9.20E-01	mg/kg	6.45E+02	2.10E+00	9.49E-01	5.04E-01	6.95E-01	6.95E-01	1.06E-04	0.00E+00	2.28E-02	0.00E+00	0.00E+00	2.09E-01	0.00E+00	0.00E+00	0.00E+00	2.32E-01	8	2.00E-01	2.50E-02	9.30E+00	3.30E-01	4.13E-02	5.63E+00
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	2.20E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	5.46E-03	NA	0.00E+00	1.08E-01	0.00E+00	0.00E+00	0.00E+00	1.13E-01	8	2.22E+01	2.78E+00	4.09E-02	2.22E+02	2.78E+01	4.09E-03
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	2.34E+02	mg/kg	1.03E+04	7.53E+00	2.19E+00	4.24E-01	4.93E-01	4.93E-01	1.98E-02	0.00E+00	5.80E+00	0.00E+00	0.00E+00	1.23E+02	0.00E+00	0.00E+00	0.00E+00	1.29E+02	8	1.60E+02	2.00E+01	6.44E+00	3.20E+02	4.00E+01	3.22E+00

Hazard Index (Total EEQ): 2.1E+02 4.1E+01

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi x Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	1	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.00031	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.003	kg/d
Body weight =	0.0125	kg
Home range =	0.96	acres
Water intake rate =	0.0033	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-19
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Short-Tailed Shrews at SWMU 41 Area B

Hazard Estimate - Tier 2
Short-tailed Shrew

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	3.03E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.00E-06	1.25E-07	0.00E+00	1.00E-05	1.25E-06	0.00E+00
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	3.70E-03	mg/kg	NA	NA	2.78E+00	2.10E+00	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.67E-05	NA	NA	1.51E-03	0.00E+00	0.00E+00	0.00E+00	1.56E-03	8	4.43E+01	5.54E+00	2.82E-04	2.22E+02	2.77E+01	5.65E-05
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.32E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.83E-05	NA	NA	7.38E-03	0.00E+00	0.00E+00	0.00E+00	7.44E-03	8	1.48E+00	1.85E-01	4.02E-02	7.40E+00	9.25E-01	8.04E-03
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	6.75E-05	NA	NA	8.72E-03	0.00E+00	0.00E+00	0.00E+00	8.79E-03	8	1.48E+00	1.85E-01	4.75E-02	7.40E+00	9.25E-01	9.51E-03
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	5.96E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.07E-05	NA	NA	6.12E-04	0.00E+00	0.00E+00	0.00E+00	6.23E-04	8	8.57E+01	1.07E+01	5.81E-05	4.29E+02	5.36E+01	1.16E-05
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.57E-03	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.48E-05	NA	NA	3.19E-03	0.00E+00	0.00E+00	0.00E+00	3.24E-03	8	8.57E+01	1.07E+01	3.03E-04	4.29E+02	5.36E+01	6.05E-05
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.13E-05	NA	NA	6.60E-04	0.00E+00	0.00E+00	0.00E+00	6.72E-04	8	2.50E+00	3.13E-01	2.15E-03	1.25E+01	1.56E+00	4.30E-04
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	8.00E-01	1.00E-01	0.00E+00	4.00E+00	5.00E-01	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.83E-05	NA	NA	6.64E-03	0.00E+00	0.00E+00	0.00E+00	6.70E-03	8	4.60E+00	5.75E-01	1.17E-02	9.20E+00	1.15E+00	5.83E-03
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	4.67E+00	2.37E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	6.29E-04	NA	0.00E+00	1.43E-02	0.00E+00	0.00E+00	0.00E+00	1.49E-02	8	1.40E-01	1.75E-02	8.51E-01	6.80E-01	8.50E-02	1.75E-01
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	6.75E-06	NA	NA	1.20E-05	0.00E+00	0.00E+00	0.00E+00	1.88E-05	8	1.50E-01	1.88E-02	1.00E-03	7.50E-01	9.38E-02	2.00E-04
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	5.14E+00	5.14E+00	6.50E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.06E-05	NA	0.00E+00	5.20E-04	0.00E+00	0.00E+00	0.00E+00	5.31E-04	8	9.20E-02	1.15E-02	4.62E-02	9.20E-01	1.15E-01	4.62E-03
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.32E-05	NA	NA	1.06E-03	0.00E+00	0.00E+00	0.00E+00	1.08E-03	8	9.20E-02	1.15E-02	9.37E-02	9.20E-01	1.15E-01	9.37E-03
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.67E-05	NA	NA	2.23E-03	0.00E+00	0.00E+00	0.00E+00	2.31E-03	8	6.15E-01	7.69E-02	3.00E-02	3.07E+00	3.84E-01	6.01E-03
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.22E-05	NA	NA	3.67E-03	0.00E+00	0.00E+00	0.00E+00	3.70E-03	8	4.60E+00	5.75E-01	6.44E-03	9.20E+00	1.15E+00	3.22E-03
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	8.85E+00	1.59E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	8.07E-05	NA	NA	6.83E-03	0.00E+00	0.00E+00	0.00E+00	6.91E-03	8	1.00E-01	1.25E-02	5.53E-01	1.00E+00	1.25E-01	5.53E-02
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	7.46E+00	2.05E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.69E-05	NA	NA	1.20E-03	0.00E+00	0.00E+00	0.00E+00	1.22E-03	8	4.00E+00	5.00E-01	2.44E-03	8.00E+00	1.00E+00	1.22E-03
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-05	NA	0.00E+00	4.29E-04	0.00E+00	0.00E+00	0.00E+00	4.55E-04	8	6.56E+01	8.20E+00	5.55E-05	1.10E+02	1.38E+01	3.31E-05
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.83E-05	NA	NA	9.75E-04	0.00E+00	0.00E+00	0.00E+00	1.03E-03	8	6.15E-01	7.69E-02	1.34E-02	3.07E+00	3.84E-01	2.69E-03
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.18E+01	mg/kg	5.70E+02	1.43E-01	9.76E-02	3.75E-02	4.49E-03	4.49E-03	1.09E-03	0.00E+00	3.34E-01	0.00E+00	0.00E+00	3.11E-01	0.00E+00	0.00E+00	0.00E+00	6.46E-01	8	1.26E-01	1.58E-02	4.10E+01	1.26E+00	1.58E-01	4.10E+00
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.13E+00	mg/kg	1.63E+03	6.00E-01	6.56E+00	3.71E-01	1.56E-01	1.56E-01	4.60E-05	0.00E+00	4.79E-02	0.00E+00	0.00E+00	3.01E+00	0.00E+00	0.00E+00	0.00E+00	3.05E+00	8	1.00E+00	1.25E-01	2.44E+01	1.00E+01	1.25E+00	2.44E+00
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.10E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	1.03E-01	1.03E-01	1.44E-03	0.00E+00	3.22E-01	0.00E+00	0.00E+00	9.42E-01	0.00E+00	0.00E+00	0.00E+00	1.27E+00	8	2.74E+03	3.42E+02	3.70E-03	1.37E+04	1.71E+03	7.40E-04
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	4.98E+01	mg/kg	2.00E+02	1.56E+00	5.15E-01	1.83E-01	2.72E-01	2.72E-01	2.91E-03	0.00E+00	7.63E-01	0.00E+00	0.00E+00	3.76E+00	0.00E+00	0.00E+00	0.00E+00	4.53E+00	8	1.17E+01	1.46E+00	3.10E+00	1.51E+01	1.89E+00	2.40E+00
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	5.31E+01	mg/kg	4.50E-01	7.10E-02	3.74E-01	4.63E-02	1.18E-01	1.18E-01	4.45E-03	0.00E+00	8.15E-01	0.00E+00	0.00E+00	2.91E+00	0.00E+00	0.00E+00	0.00E+00	3.73E+00	8	8.00E+00	1.00E+00	3.73E+00	8.00E+01	1.00E+01	3.73E-01
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	1.39E-01	mg/kg	NA	1.14E+00	4.06E+00	9.12E-01	1.92E-01	1.92E-01	0.00E+00	0.00E+00	2.13E-03	NA	0.00E+00	8.27E-02	0.00E+00	0.00E+00	0.00E+00	8.48E-02	8	1.00E+00	1.25E-01	6.78E-01	5.00E+00	6.25E-01	1.36E-01
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.15E+01	mg/kg	1.00E+02	4.86E-01	4.69E-01	5.00E-02	1.52E-01	1.52E-01	1.53E-03	0.00E+00	3.29E-01	0.00E+00	0.00E+00	1.47E+00	0.00E+00	0.00E+00	0.00E+00	1.81E+00	8	4.00E+01	5.00E+00	3.61E-01	8.00E+01	1.00E+01	1.81E-01
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	7.32E-01	mg/kg	6.45E+02	4.20E-01	1.01E+00	4.92E-01	8.02E-01	8.02E-01	6.13E-05	0.00E+00	1.12E-02	0.00E+00	0.00E+00	1.08E-01	0.00E+00	0.00E+00	0.00E+00	1.20E-01	8	2.00E-01	2.50E-02	4.78E+00	3.30E-01	4.13E-02	2.90E+00
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	1.44E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	2.21E-03	NA	0.00E+00	4.32E-02	0.00E+00	0.00E+00	0.00E+00	4.54E-02	8	2.22E+01	2.78E+00	1.64E-02	2.22E+02	2.78E+01	1.64E-03
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	1.98E+02	mg/kg	1.00E+03	1.94E+00	2.45E+00	4.57E-01	5.77E-01	5.77E-01	1.15E-02	0.00E+00	3.03E+00	0.00E+00	0.00E+00	7.11E+01	0.00E+00	0.00E+00	0.00E+00	7.41E+01	8	1.60E+02	2.00E+01	3.71E+00	3.20E+02	4.00E+01	1.85E+00

Hazard Index (Total EEQ): 8.4E+01 1.5E+01

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	1	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.00023	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.0022	kg/d
Body weight =	0.015	kg
Home range =	0.96	acres
Water intake rate =	0.0023	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-20
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for American Robins at SWMU 41 Area B

Hazard Estimate - Tier 1
American Robin

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	4.21E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.40E-05	1.75E-06	0.00E+00	1.40E-04	1.75E-05	0.00E+00
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	5.80E-03	mg/kg	NA	NA	3.67E+00	2.10E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	7.31E-05	NA	NA	2.55E-03	2.38E-03	0.00E+00	0.00E+00	5.00E-03	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	4.79E-05	NA	NA	7.95E-03	1.54E-04	0.00E+00	0.00E+00	8.15E-03	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	5.54E-05	NA	NA	9.40E-03	1.78E-04	0.00E+00	0.00E+00	9.63E-03	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	7.87E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	8.82E-06	NA	NA	6.59E-04	6.73E-05	0.00E+00	0.00E+00	7.35E-04	8	1.61E+01	2.01E+00	3.65E-04	8.04E+01	1.01E+01	7.32E-05
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	5.20E-03	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	6.55E-05	NA	NA	5.00E-03	5.00E-04	0.00E+00	0.00E+00	5.56E-03	8	1.61E+01	2.01E+00	2.76E-03	8.04E+01	1.01E+01	5.54E-04
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	9.32E-06	NA	NA	7.11E-04	7.11E-05	0.00E+00	0.00E+00	7.92E-04	8	1.61E+01	2.01E+00	3.93E-04	8.04E+01	1.01E+01	7.88E-05
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	2.80E-03	3.50E-04	0.00E+00	2.80E-02	3.50E-03	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	4.79E-05	NA	NA	7.16E-03	6.92E-06	0.00E+00	0.00E+00	7.21E-03	8	2.14E+00	2.68E-01	2.70E-02	1.07E+01	1.34E+00	5.39E-03
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	2.19E+01	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	5.17E-04	NA	0.00E+00	3.20E-01	2.86E-05	0.00E+00	0.00E+00	3.21E-01	8	1.80E-01	2.25E-02	1.42E+01	1.80E+00	2.25E-01	1.42E+00
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	5.54E-06	NA	NA	1.30E-05	3.16E-05	0.00E+00	0.00E+00	5.01E-05	8	1.00E+01	1.25E+00	4.01E-05	5.00E+01	6.25E+00	8.01E-06
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	6.78E+00	6.78E+00	6.50E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	8.69E-06	NA	0.00E+00	5.60E-04	8.76E-06	0.00E+00	0.00E+00	5.77E-04	8	3.00E-01	3.75E-02	1.54E-02	1.50E+00	1.88E-01	3.08E-03
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.08E-05	NA	NA	1.15E-03	8.49E-06	0.00E+00	0.00E+00	1.17E-03	8	3.00E-01	3.75E-02	3.11E-02	1.50E+00	1.88E-01	6.22E-03
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.30E-05	NA	NA	1.82E-03	4.88E-04	0.00E+00	0.00E+00	2.37E-03	8	5.53E+02	6.91E+01	3.43E-05	2.77E+03	3.46E+02	6.86E-06
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.65E-05	NA	NA	3.95E-03	3.82E-06	0.00E+00	0.00E+00	3.98E-03	8	2.14E+00	2.68E-01	1.49E-02	1.07E+01	1.34E+00	2.98E-03
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	1.17E+01	1.59E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	6.63E-05	NA	NA	7.35E-03	1.63E-05	0.00E+00	0.00E+00	7.44E-03	8	9.20E-01	1.15E-01	6.47E-02	4.60E+00	5.75E-01	1.29E-02
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	9.84E+00	2.05E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.39E-05	NA	NA	1.30E-03	4.39E-06	0.00E+00	0.00E+00	1.31E-03	8	2.58E+01	3.22E+00	4.08E-04	1.29E+02	1.61E+01	8.16E-05
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.14E-05	NA	0.00E+00	3.50E-04	3.17E-03	0.00E+00	0.00E+00	3.54E-03	8	5.53E+02	6.91E+01	5.12E-05	2.77E+03	3.46E+02	1.02E-05
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.79E-05	NA	NA	7.96E-04	5.34E-04	0.00E+00	0.00E+00	1.38E-03	8	5.53E+02	6.91E+01	1.99E-05	2.77E+03	3.46E+02	3.99E-06
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.30E+01	mg/kg	1.75E+03	6.90E-01	9.61E-02	3.75E-02	4.45E-03	4.45E-03	1.45E-03	0.00E+00	2.90E-01	0.00E+00	0.00E+00	2.64E-01	1.69E-01	0.00E+00	0.00E+00	7.24E-01	8	5.14E+00	6.43E-01	1.13E+00	1.28E+01	1.61E+00	4.51E-01
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.50E+00	mg/kg	4.54E+03	7.99E+00	6.41E+00	3.52E-01	1.47E-01	1.47E-01	6.14E-05	0.00E+00	4.41E-02	0.00E+00	0.00E+00	2.68E+00	2.41E-01	0.00E+00	0.00E+00	2.97E+00	8	1.45E+00	1.81E-01	1.64E+01	2.00E+01	2.50E+00	1.19E+00
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.30E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	1.01E-01	1.01E-01	1.92E-03	0.00E+00	2.90E-01	0.00E+00	0.00E+00	8.42E-01	1.84E-01	0.00E+00	0.00E+00	1.32E+00	8	2.66E+00	3.33E-01	3.96E+00	2.78E+00	3.48E-01	3.79E+00
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	5.70E+01	mg/kg	5.92E+03	5.25E+00	5.15E-01	1.68E-01	2.42E-01	2.42E-01	3.89E-03	0.00E+00	7.18E-01	0.00E+00	0.00E+00	3.51E+00	1.87E+00	0.00E+00	0.00E+00	6.11E+00	8	4.70E+01	5.88E+00	1.04E+00	6.20E+01	7.75E+00	7.88E-01
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	7.50E+01	mg/kg	8.95E+02	6.07E-01	3.49E-01	3.98E-02	9.71E-02	9.71E-02	5.94E-03	0.00E+00	9.45E-01	0.00E+00	0.00E+00	3.14E+00	5.83E-01	0.00E+00	0.00E+00	4.67E+00	8	3.85E+00	4.81E-01	9.71E+00	1.93E+01	2.41E+00	1.94E+00
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	2.40E-01	mg/kg	NA	2.87E+00	3.30E+01	7.09E-01	1.05E+00	1.05E+00	0.00E+00	0.00E+00	3.02E-03	NA	0.00E+00	9.48E-01	3.32E-02	0.00E+00	0.00E+00	9.84E-01	8	4.50E-01	5.63E-02	1.75E+01	9.00E-01	1.13E-01	8.75E+00
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.60E+01	mg/kg	3.90E+02	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	2.05E-03	0.00E+00	3.28E-01	0.00E+00	0.00E+00	2.43E+01	2.42E-01	0.00E+00	0.00E+00	2.48E+01	8	7.74E+01	9.68E+00	2.57E+00	1.07E+02	1.34E+01	1.86E+00
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	9.20E-01	mg/kg	6.45E+02	2.10E+00	9.49E-01	5.04E-01	6.95E-01	6.95E-01	8.19E-05	0.00E+00	1.16E-02	0.00E+00	0.00E+00	1.04E-01	9.05E-02	0.00E+00	0.00E+00	2.07E-01	8	5.00E-01	6.25E-02	3.31E+00	1.00E+00	1.25E-01	1.65E+00
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	2.20E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	2.77E-03	NA	0.00E+00	5.38E-02	6.01E-04	0.00E+00	0.00E+00	5.72E-02	8	1.78E+02	2.23E+01	2.57E-03	8.90E+02	1.11E+02	5.14E-04
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	2.34E+02	mg/kg	1.03E+04	7.53E+00	2.19E+00	4.24E-01	4.93E-01	4.93E-01	1.54E-02	0.00E+00	2.95E+00	0.00E+00	0.00E+00	6.13E+01	1.94E+01	0.00E+00	0.00E+00	8.36E+01	8	1.45E+01	1.81E+00	4.61E+01	1.31E+02	1.64E+01	5.11E+00

Hazard Index (Total EEQ): 1.2E+02 2.7E+01

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi x Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.62	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0.38	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.0008	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.02	kg/d
Body weight =	0.0635	kg
Home range =	1.2	acres
Water intake rate =	0.013	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-21
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for American Robins at SWMU 41 Area B

Hazard Estimate - Tier 2
American Robin

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	3.03E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.40E-05	1.75E-06	0.00E+00	1.40E-04	1.75E-05	0.00E+00
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	3.70E-03	mg/kg	NA	NA	2.78E+00	2.10E+00	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.76E-05	NA	NA	7.28E-04	8.97E-04	0.00E+00	0.00E+00	1.65E-03	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.32E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.83E-05	NA	NA	3.56E-03	9.10E-05	0.00E+00	0.00E+00	3.68E-03	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.28E-05	NA	NA	4.21E-03	1.05E-04	0.00E+00	0.00E+00	4.35E-03	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	5.96E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.22E-06	NA	NA	2.95E-04	3.98E-05	0.00E+00	0.00E+00	3.40E-04	8	1.61E+01	2.01E+00	1.69E-04	8.04E+01	1.01E+01	3.39E-05
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.57E-03	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.66E-05	NA	NA	1.54E-03	2.03E-04	0.00E+00	0.00E+00	1.77E-03	8	1.61E+01	2.01E+00	8.79E-04	8.04E+01	1.01E+01	1.76E-04
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.51E-06	NA	NA	3.19E-04	4.21E-05	0.00E+00	0.00E+00	3.66E-04	8	1.61E+01	2.01E+00	1.82E-04	8.04E+01	1.01E+01	3.64E-05
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	2.80E-03	3.50E-04	0.00E+00	2.80E-02	3.50E-03	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.83E-05	NA	NA	3.21E-03	4.09E-06	0.00E+00	0.00E+00	3.24E-03	8	2.14E+00	2.68E-01	1.21E-02	1.07E+01	1.34E+00	2.42E-03
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	4.67E+00	2.37E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.06E-04	NA	0.00E+00	6.88E-03	1.69E-05	0.00E+00	0.00E+00	7.21E-03	8	1.80E-01	2.25E-02	3.20E-01	1.80E+00	2.25E-01	3.20E-02
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.28E-06	NA	NA	5.81E-06	1.87E-05	0.00E+00	0.00E+00	2.78E-05	8	1.00E+01	1.25E+00	2.22E-05	5.00E+01	6.25E+00	4.44E-06
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	5.14E+00	5.14E+00	6.50E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.14E-06	NA	0.00E+00	2.51E-04	5.18E-06	0.00E+00	0.00E+00	2.61E-04	8	3.00E-01	3.75E-02	6.97E-03	1.50E+00	1.88E-01	1.39E-03
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	6.41E-06	NA	NA	5.14E-04	5.02E-06	0.00E+00	0.00E+00	5.25E-04	8	3.00E-01	3.75E-02	1.40E-02	1.50E+00	1.88E-01	2.80E-03
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.73E-05	NA	NA	1.08E-03	2.89E-04	0.00E+00	0.00E+00	1.40E-03	8	5.53E+02	6.91E+01	2.03E-05	2.77E+03	3.46E+02	4.06E-06
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.56E-05	NA	NA	1.77E-03	2.26E-06	0.00E+00	0.00E+00	1.79E-03	8	2.14E+00	2.68E-01	6.69E-03	1.07E+01	1.34E+00	1.34E-03
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	8.85E+00	1.59E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.92E-05	NA	NA	3.29E-03	9.65E-06	0.00E+00	0.00E+00	3.34E-03	8	9.20E-01	1.15E-01	2.91E-02	4.60E+00	5.75E-01	5.81E-03
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	7.46E+00	2.05E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	8.20E-06	NA	NA	5.81E-04	2.60E-06	0.00E+00	0.00E+00	5.91E-04	8	2.58E+01	3.22E+00	1.84E-04	1.29E+02	1.61E+01	3.67E-05
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-05	NA	0.00E+00	2.07E-04	1.87E-03	0.00E+00	0.00E+00	2.09E-03	8	5.53E+02	6.91E+01	3.03E-05	2.77E+03	3.46E+02	6.05E-06
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.83E-05	NA	NA	4.71E-04	3.16E-04	0.00E+00	0.00E+00	8.15E-04	8	5.53E+02	6.91E+01	1.18E-05	2.77E+03	3.46E+02	2.36E-06
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.18E+01	mg/kg	5.70E+02	1.43E-01	9.76E-02	3.75E-02	4.49E-03	4.49E-03	9.09E-04	0.00E+00	1.62E-01	0.00E+00	0.00E+00	1.50E-01	9.43E-02	0.00E+00	0.00E+00	4.08E-01	8	5.14E+00	6.43E-01	6.34E-01	1.28E+01	1.61E+00	2.54E-01
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.13E+00	mg/kg	1.63E+03	6.00E-01	6.56E+00	3.71E-01	1.56E-01	1.56E-01	3.84E-05	0.00E+00	2.33E-02	0.00E+00	0.00E+00	1.45E+00	1.34E-01	0.00E+00	0.00E+00	1.61E+00	8	1.45E+00	1.81E-01	8.87E+00	2.00E+01	2.50E+00	6.43E-01
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.10E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	1.03E-01	1.03E-01	1.20E-03	0.00E+00	1.56E-01	0.00E+00	0.00E+00	4.55E-01	9.94E-02	0.00E+00	0.00E+00	7.12E-01	8	2.66E+00	3.33E-01	2.14E+00	2.78E+00	3.48E-01	2.05E+00
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	4.98E+01	mg/kg	2.00E+02	1.56E+00	5.15E-01	1.83E-01	2.72E-01	2.72E-01	2.43E-03	0.00E+00	3.71E-01	0.00E+00	0.00E+00	1.82E+00	1.05E+00	0.00E+00	0.00E+00	3.24E+00	8	4.70E+01	5.88E+00	5.51E-01	6.20E+01	7.75E+00	4.18E-01
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	5.31E+01	mg/kg	4.50E-01	7.10E-02	3.74E-01	4.63E-02	1.18E-01	1.18E-01	3.71E-03	0.00E+00	3.96E-01	0.00E+00	0.00E+00	1.40E+00	2.84E-01	0.00E+00	0.00E+00	2.09E+00	8	3.85E+00	4.81E-01	4.34E+00	1.93E+01	2.41E+00	8.68E-01
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	1.39E-01	mg/kg	NA	1.14E+00	4.06E+00	9.12E-01	1.92E-01	1.92E-01	0.00E+00	0.00E+00	1.04E-03	NA	0.00E+00	3.99E-02	1.46E-02	0.00E+00	0.00E+00	5.56E-02	8	4.50E-01	5.63E-02	9.88E-01	9.00E-01	1.13E-01	4.94E-01
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.15E+01	mg/kg	1.00E+02	4.86E-01	4.69E-01	5.00E-02	1.52E-01	1.52E-01	1.28E-03	0.00E+00	1.60E-01	0.00E+00	0.00E+00	7.12E-01	1.24E-01	0.00E+00	0.00E+00	9.97E-01	8	7.74E+01	9.68E+00	1.03E-01	1.07E+02	1.34E+01	7.45E-02
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	7.32E-01	mg/kg	6.45E+02	4.20E-01	1.01E+00	4.92E-01	8.02E-01	8.02E-01	5.12E-05	0.00E+00	5.45E-03	0.00E+00	0.00E+00	5.22E-02	4.16E-02	0.00E+00	0.00E+00	9.93E-02	8	5.00E-01	6.25E-02	1.59E+00	1.00E+00	1.25E-01	7.95E-01
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	1.44E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	1.07E-03	NA	0.00E+00	2.08E-02	2.33E-04	0.00E+00	0.00E+00	2.22E-02	8	1.78E+02	2.23E+01	9.96E-04	8.90E+02	1.11E+02	1.99E-04
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	1.98E+02	mg/kg	1.00E+03	1.94E+00	2.45E+00	4.57E-01	5.77E-01	5.77E-01	9.61E-03	0.00E+00	1.47E+00	0.00E+00	0.00E+00	3.43E+01	1.04E+01	0.00E+00	0.00E+00	4.62E+01	8	1.45E+01	1.81E+00	2.55E+01	1.31E+02	1.64E+01	2.82E+00

Hazard Index (Total EEQ): 4.5E+01 8.5E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi x Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.62	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0.38	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.00064	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.016	kg/d
Body weight =	0.0773	kg
Home range =	1.2	acres
Water intake rate =	0.011	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	9.00E-01	unitless

Table F-22
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Red-Tailed Hawks at SWMU 41 Area B

Hazard Estimate - Tier 1
Red-tailed Hawk

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	4.21E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.40E-05	1.75E-06	0.00E+00	1.40E-04	1.75E-05	0.00E+00
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	5.80E-03	mg/kg	NA	NA	3.67E+00	2.10E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.90E-04	9.16E-05	3.82E-04	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.90E-04	6.00E-05	2.50E-04	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.20E-04	6.95E-05	2.90E-04	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	7.87E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.50E-05	1.11E-05	4.61E-05	8	1.61E+01	2.01E+00	2.29E-05	8.04E+01	1.01E+01	4.59E-06
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	5.20E-03	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.60E-04	8.22E-05	3.42E-04	8	1.61E+01	2.01E+00	1.70E-04	8.04E+01	1.01E+01	3.41E-05
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.70E-05	1.17E-05	4.87E-05	8	1.61E+01	2.01E+00	2.42E-05	8.04E+01	1.01E+01	4.85E-06
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	2.80E-03	3.50E-04	0.00E+00	2.80E-02	3.50E-03	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.90E-04	6.00E-05	2.50E-04	8	2.14E+00	2.68E-01	9.35E-04	1.07E+01	1.34E+00	1.87E-04
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	2.19E+01	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	2.05E-03	6.48E-04	2.70E-03	8	1.80E-01	2.25E-02	1.20E-01	1.80E+00	2.25E-01	1.20E-02
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.20E-05	6.95E-06	2.90E-05	8	1.00E+01	1.25E+00	2.32E-05	5.00E+01	6.25E+00	4.63E-06
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	6.78E+00	6.78E+00	6.50E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	3.45E-05	1.09E-05	4.54E-05	8	3.00E-01	3.75E-02	1.21E-03	1.50E+00	1.88E-01	2.42E-04
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.30E-05	1.36E-05	5.66E-05	8	3.00E-01	3.75E-02	1.51E-03	1.50E+00	1.88E-01	3.02E-04
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.05E-04	3.32E-05	1.38E-04	8	2.14E+00	2.68E-01	5.17E-04	1.07E+01	1.34E+00	1.03E-04
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	1.17E+01	1.59E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.63E-04	8.31E-05	3.46E-04	8	9.20E-01	1.15E-01	3.01E-03	4.60E+00	5.75E-01	6.02E-04
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	9.84E+00	2.05E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	5.50E-05	1.74E-05	7.24E-05	8	2.58E+01	3.22E+00	2.25E-05	1.29E+02	1.61E+01	4.49E-06
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.30E+01	mg/kg	1.75E+03	6.90E-01	9.61E-02	3.75E-02	4.45E-03	4.45E-03	5.04E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.12E-03	1.62E-03	7.24E-03	8	5.14E+00	6.43E-01	1.13E-02	1.28E+01	1.61E+00	4.51E-03
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.50E+00	mg/kg	4.54E+03	7.99E+00	6.41E+00	3.52E-01	1.47E-01	1.47E-01	2.13E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E-02	8.12E-03	3.39E-02	8	1.45E+00	1.81E-01	1.87E-01	2.00E+01	2.50E+00	1.35E-02
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.30E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	1.01E-01	1.01E-01	6.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-01	3.66E-02	1.53E-01	8	2.66E+00	3.33E-01	4.61E-01	2.78E+00	3.48E-01	4.41E-01
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	5.70E+01	mg/kg	5.92E+03	5.25E+00	5.15E-01	1.68E-01	2.42E-01	2.42E-01	1.35E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.90E-01	2.18E-01	9.09E-01	8	4.70E+01	5.88E+00	1.55E-01	6.20E+01	7.75E+00	1.17E-01
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	7.50E+01	mg/kg	8.95E+02	6.07E-01	3.49E-01	3.98E-02	9.71E-02	9.71E-02	2.06E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.64E-01	1.15E-01	4.81E-01	8	3.85E+00	4.81E-01	1.00E+00	1.93E+01	2.41E+00	2.00E-01
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	2.40E-01	mg/kg	NA	2.87E+00	3.30E+01	7.09E-01	1.05E+00	1.05E+00	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	1.26E-02	3.97E-03	1.65E-02	8	4.50E-01	5.63E-02	2.94E-01	9.00E-01	1.13E-01	1.47E-01
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.60E+01	mg/kg	3.90E+02	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	7.11E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-01	5.63E-02	2.35E-01	8	7.74E+01	9.68E+00	2.43E-02	1.07E+02	1.34E+01	1.76E-02
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	9.20E-01	mg/kg	6.45E+02	2.10E+00	9.49E-01	5.04E-01	6.95E-01	6.95E-01	2.84E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-02	1.01E-02	4.21E-02	8	5.00E-01	6.25E-02	6.74E-01	1.00E+00	1.25E-01	3.37E-01
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	2.20E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	4.40E-05	1.39E-05	5.79E-05	8	1.78E+02	2.23E+01	2.60E-06	8.90E+02	1.11E+02	5.21E-07
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	2.34E+02	mg/kg	1.03E+04	7.53E+00	2.19E+00	4.24E-01	4.93E-01	4.93E-01	5.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.77E+00	1.82E+00	7.60E+00	8	1.45E+01	1.81E+00	4.19E+00	1.31E+02	1.64E+01	4.64E-01

Hazard Index (Total EEQ): 7.1E+00 1.8E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi x Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0.76	unitless
Bird diet fraction =	0.24	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.063	kg/d
Body weight =	0.957	kg
Home range =	2081	acres
Water intake rate =	0.068	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-23
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Red -Tailed Hawks at SWMU 41 Area B

Hazard Estimate - Tier 2
Red-tailed Hawk

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	3.03E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.40E-05	1.75E-06	0.00E+00	1.40E-04	1.75E-05	0.00E+00
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	3.70E-03	mg/kg	NA	NA	2.78E+00	2.10E+00	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.79E-08	1.20E-08	4.99E-08	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.32E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.90E-08	1.23E-08	5.13E-08	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.51E-08	1.43E-08	5.94E-08	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	5.96E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	7.18E-09	2.27E-09	9.45E-09	8	1.61E+01	2.01E+00	4.70E-09	8.04E+01	1.01E+01	9.40E-10
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.57E-03	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.67E-08	1.16E-08	4.82E-08	8	1.61E+01	2.01E+00	2.40E-08	8.04E+01	1.01E+01	4.80E-09
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	7.59E-09	2.40E-09	9.99E-09	8	1.61E+01	2.01E+00	4.96E-09	8.04E+01	1.01E+01	9.94E-10
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	2.80E-03	3.50E-04	0.00E+00	2.80E-02	3.50E-03	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.90E-08	1.23E-08	5.13E-08	8	2.14E+00	2.68E-01	1.92E-07	1.07E+01	1.34E+00	3.84E-08
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	4.67E+00	2.37E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	4.21E-07	1.33E-07	5.54E-07	8	1.80E-01	2.25E-02	2.46E-05	1.80E+00	2.25E-01	2.46E-06
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.51E-09	1.43E-09	5.94E-09	8	1.00E+01	1.25E+00	4.75E-09	5.00E+01	6.25E+00	9.50E-10
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	5.14E+00	5.14E+00	6.50E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	7.08E-09	2.24E-09	9.32E-09	8	3.00E-01	3.75E-02	2.48E-07	1.50E+00	1.88E-01	4.97E-08
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	8.82E-09	2.79E-09	1.16E-08	8	3.00E-01	3.75E-02	3.10E-07	1.50E+00	1.88E-01	6.19E-08
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.15E-08	6.80E-09	2.84E-08	8	2.14E+00	2.68E-01	1.06E-07	1.07E+01	1.34E+00	2.12E-08
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	8.85E+00	1.59E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	5.40E-08	1.70E-08	7.10E-08	8	9.20E-01	1.15E-01	6.18E-07	4.60E+00	5.75E-01	1.24E-07
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	7.46E+00	2.05E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.13E-08	3.56E-09	1.49E-08	8	2.58E+01	3.22E+00	4.61E-09	1.29E+02	1.61E+01	9.22E-10
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.18E+01	mg/kg	5.70E+02	1.43E-01	9.76E-02	3.75E-02	4.49E-03	4.49E-03	2.08E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-06	6.33E-07	2.85E-06	8	5.14E+00	6.43E-01	4.43E-06	1.28E+01	1.61E+00	1.77E-06
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.13E+00	mg/kg	1.63E+03	6.00E-01	6.56E+00	3.71E-01	1.56E-01	1.56E-01	8.79E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-05	3.16E-06	1.32E-05	8	1.45E+00	1.81E-01	7.26E-05	2.00E+01	2.50E+00	5.27E-06
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.10E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	1.03E-01	1.03E-01	2.75E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.45E-05	1.41E-05	5.88E-05	8	2.66E+00	3.33E-01	1.77E-04	2.78E+00	3.48E-01	1.69E-04
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	4.98E+01	mg/kg	2.00E+02	1.56E+00	5.15E-01	1.83E-01	2.72E-01	2.72E-01	5.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.78E-04	8.77E-05	3.66E-04	8	4.70E+01	5.88E+00	6.23E-05	6.20E+01	7.75E+00	4.72E-05
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	5.31E+01	mg/kg	4.50E-01	7.10E-02	3.74E-01	4.63E-02	1.18E-01	1.18E-01	8.49E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-04	4.05E-05	1.70E-04	8	3.85E+00	4.81E-01	3.52E-04	1.93E+01	2.41E+00	7.05E-05
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	1.39E-01	mg/kg	NA	1.14E+00	4.06E+00	9.12E-01	1.92E-01	1.92E-01	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	5.48E-07	1.73E-07	7.21E-07	8	4.50E-01	5.63E-02	1.28E-05	9.00E-01	1.13E-01	6.41E-06
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.15E+01	mg/kg	1.00E+02	4.86E-01	4.69E-01	5.00E-02	1.52E-01	1.52E-01	2.93E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.69E-05	2.11E-05	8.83E-05	8	7.74E+01	9.68E+00	9.13E-06	1.07E+02	1.34E+01	6.61E-06
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	7.32E-01	mg/kg	6.45E+02	4.20E-01	1.01E+00	4.92E-01	8.02E-01	8.02E-01	1.17E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-05	3.80E-06	1.59E-05	8	5.00E-01	6.25E-02	2.54E-04	1.00E+00	1.25E-01	1.27E-04
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	1.44E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	0.00E+00	0.00E+00	1.18E-08	3.73E-09	1.56E-08	8	1.78E+02	2.23E+01	6.99E-10	8.90E+02	1.11E+02	1.40E-10
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	1.98E+02	mg/kg	1.00E+03	1.94E+00	2.45E+00	4.57E-01	5.77E-01	5.77E-01	2.20E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-03	7.39E-04	3.08E-03	8	1.45E+01	1.81E+00	1.70E-03	1.31E+02	1.64E+01	1.88E-04

Hazard Index (Total EEQ): 2.7E-03 6.2E-04

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0.76	unitless
Bird diet fraction =	0.24	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.059	kg/d
Body weight =	1.134	kg
Home range =	2081	acres
Water intake rate =	0.064	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	5.19E-04	unitless

Table F-24
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at SWMU 41 Area B

Hazard Estimate - Tier 1
Red Fox

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	4.21E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.00E-06	1.25E-07	0.00E+00	1.00E-05	1.25E-06	0.00E+00
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	5.80E-03	mg/kg	NA	NA	3.67E+00	2.10E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.87E-05	NA	NA	9.81E-05	2.39E-04	4.35E-04	9.36E-05	8.84E-04	8	4.43E+01	5.54E+00	1.60E-04	2.22E+02	2.77E+01	3.19E-05
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.22E-05	NA	NA	3.06E-04	1.54E-05	2.85E-04	6.13E-05	6.80E-04	8	1.48E+00	1.85E-01	3.68E-03	7.40E+00	9.25E-01	7.35E-04
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.42E-05	NA	NA	3.62E-04	1.79E-05	3.30E-04	7.10E-05	7.95E-04	8	1.48E+00	1.85E-01	4.30E-03	7.40E+00	9.25E-01	8.59E-04
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	7.87E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.25E-06	NA	NA	2.54E-05	6.75E-06	5.24E-05	1.13E-05	9.81E-05	8	8.57E+01	1.07E+01	9.16E-06	4.29E+02	5.36E+01	1.83E-06
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	5.20E-03	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.67E-05	NA	NA	1.93E-04	5.01E-05	3.90E-04	8.39E-05	7.33E-04	8	8.57E+01	1.07E+01	6.84E-05	4.29E+02	5.36E+01	1.37E-05
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.38E-06	NA	NA	2.74E-05	7.14E-06	5.54E-05	1.19E-05	1.04E-04	8	2.50E+00	3.13E-01	3.34E-04	1.25E+01	1.56E+00	6.67E-05
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	8.00E-01	1.00E-01	0.00E+00	4.00E+00	5.00E-01	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.22E-05	NA	NA	2.76E-04	6.94E-07	2.85E-04	6.13E-05	6.35E-04	8	4.60E+00	5.75E-01	1.10E-03	9.20E+00	1.15E+00	5.52E-04
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	2.19E+01	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.32E-04	NA	0.00E+00	1.23E-02	2.87E-06	3.07E-03	6.62E-04	1.62E-02	8	1.40E-01	1.75E-02	9.26E-01	6.80E-01	8.50E-02	1.91E-01
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.42E-06	NA	NA	4.99E-07	3.17E-06	3.30E-05	7.10E-06	4.51E-05	8	1.50E-01	1.88E-02	2.41E-03	7.50E-01	9.38E-02	4.82E-04
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	6.78E+00	6.78E+00	6.50E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.22E-06	NA	0.00E+00	2.16E-05	8.79E-07	5.17E-05	1.11E-05	8.75E-05	8	9.20E-02	1.15E-02	7.61E-03	9.20E-01	1.15E-01	7.61E-04
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	2.77E-06	NA	NA	4.42E-05	8.52E-07	6.44E-05	1.39E-05	1.26E-04	8	9.20E-02	1.15E-02	1.10E-02	9.20E-01	1.15E-01	1.10E-03
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-05	NA	NA	7.01E-05	4.90E-05	0.00E+00	0.00E+00	1.35E-04	8	6.15E-01	7.69E-02	1.76E-03	3.07E+00	3.84E-01	3.52E-04
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	6.76E-06	NA	NA	1.52E-04	3.84E-07	1.57E-04	3.39E-05	3.51E-04	8	4.60E+00	5.75E-01	6.10E-04	9.20E+00	1.15E+00	3.05E-04
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	1.17E+01	1.59E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	1.69E-05	NA	NA	2.83E-04	1.64E-06	3.94E-04	8.49E-05	7.81E-04	8	1.00E-01	1.25E-02	6.25E-02	1.00E+00	1.25E-01	6.25E-03
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	9.84E+00	2.05E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	3.54E-06	NA	NA	4.99E-05	4.41E-07	8.24E-05	1.77E-05	1.54E-04	8	4.00E+00	5.00E-01	3.08E-04	8.00E+00	1.00E+00	1.54E-04
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-06	NA	0.00E+00	1.35E-05	3.18E-04	0.00E+00	0.00E+00	3.37E-04	8	6.56E+01	8.20E+00	4.10E-05	1.10E+02	1.38E+01	2.45E-05
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-05	NA	NA	3.07E-05	5.36E-05	0.00E+00	0.00E+00	9.65E-05	8	6.15E-01	7.69E-02	1.26E-03	3.07E+00	3.84E-01	2.51E-04
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.30E+01	mg/kg	1.75E+03	6.90E-01	9.61E-02	3.75E-02	4.45E-03	4.45E-03	1.37E-03	0.00E+00	7.41E-02	0.00E+00	0.00E+00	1.02E-02	1.69E-02	7.66E-03	1.65E-03	1.12E-01	8	1.26E-01	1.58E-02	7.10E+00	1.26E+00	1.58E-01	7.10E-01
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.50E+00	mg/kg	4.54E+03	7.99E+00	6.41E+00	3.52E-01	1.47E-01	1.47E-01	5.80E-05	0.00E+00	1.13E-02	0.00E+00	0.00E+00	1.03E-01	2.41E-02	3.85E-02	8.29E-03	1.86E-01	8	1.00E+00	1.25E-01	1.49E+00	1.00E+01	1.25E+00	1.49E-01
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.30E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	1.01E-01	1.01E-01	1.82E-03	0.00E+00	7.41E-02	0.00E+00	0.00E+00	3.24E-02	1.85E-02	1.74E-01	3.74E-02	3.38E-01	8	2.74E+03	3.42E+02	9.88E-04	1.37E+04	1.71E+03	1.97E-04
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	5.70E+01	mg/kg	5.92E+03	5.25E+00	5.15E-01	1.68E-01	2.42E-01	2.42E-01	3.67E-03	0.00E+00	1.84E-01	0.00E+00	0.00E+00	1.35E-01	1.88E-01	1.03E+00	2.23E-01	1.77E+00	8	1.17E+01	1.46E+00	1.21E+00	1.51E+01	1.89E+00	9.36E-01
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	7.50E+01	mg/kg	8.95E+02	6.07E-01	3.49E-01	3.98E-02	9.71E-02	9.71E-02	5.60E-03	0.00E+00	2.42E-01	0.00E+00	0.00E+00	1.21E-01	5.85E-02	5.45E-01	1.17E-01	1.09E+00	8	8.00E+00	1.00E+00	1.09E+00	8.00E+01	1.00E+01	1.09E-01
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	2.40E-01	mg/kg	NA	2.87E+00	3.30E+01	7.09E-01	1.05E+00	1.05E+00	0.00E+00	0.00E+00	7.73E-04	NA	0.00E+00	3.65E-02	3.34E-03	1.88E-02	4.05E-03	6.35E-02	8	1.00E+00	1.25E-01	5.08E-01	5.00E+00	6.25E-01	1.02E-01
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.60E+01	mg/kg	3.90E+02	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	1.93E-03	0.00E+00	8.37E-02	0.00E+00	0.00E+00	9.35E-01	2.43E-02	2.67E-01	5.75E-02	1.37E+00	8	4.00E+01	5.00E+00	2.74E-01	8.00E+01	1.00E+01	1.37E-01
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	9.20E-01	mg/kg	6.45E+02	2.10E+00	9.49E-01	5.04E-01	6.95E-01	6.95E-01	7.73E-05	0.00E+00	2.96E-03	0.00E+00	0.00E+00	4.02E-03	9.08E-03	4.79E-02	1.03E-02	7.44E-02	8	2.00E-01	2.50E-02	2.97E+00	3.30E-01	4.13E-02	1.80E+00
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	2.20E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	7.08E-04	NA	0.00E+00	2.07E-03	6.03E-05	6.59E-05	1.42E-05	2.92E-03	8	2.22E+01	2.78E+00	1.05E-03	2.22E+02	2.78E+01	1.05E-04
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	2.34E+02	mg/kg	1.03E+04	7.53E+00	2.19E+00	4.24E-01	4.93E-01	4.93E-01	1.45E-02	0.00E+00	7.54E-01	0.00E+00	0.00E+00	2.36E+00	1.94E+00	8.64E+00	1.86E+00	1.56E+01	8	1.60E+02	2.00E+01	7.79E-01	3.20E+02	4.00E+01	3.89E-01

Hazard Index (Total EEQ): 1.6E+01 4.5E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.17	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0.04	unitless
Mammal diet fraction =	0.65	unitless
Bird diet fraction =	0.14	unitless
Soil ingestion rate =	0.0095	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.34	kg/d
Body weight =	2.95	kg
Home range =	2204	acres
Water intake rate =	0.57	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-25
Tier 2 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at SWMU 41 Area B

Hazard Estimate - Tier 2
Red Fox

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	3.03E+00	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	1.00E-06	1.25E-07	0.00E+00	1.00E-05	1.25E-06	0.00E+00
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	3.70E-03	mg/kg	NA	NA	2.78E+00	2.10E+00	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.68E-09	NA	NA	1.07E-08	3.43E-08	3.12E-08	6.72E-09	8.55E-08	8	4.43E+01	5.54E+00	1.54E-08	2.22E+02	2.77E+01	3.09E-09
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.32E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.75E-09	NA	NA	5.23E-08	3.48E-09	3.21E-08	6.91E-09	9.75E-08	8	1.48E+00	1.85E-01	5.27E-07	7.40E+00	9.25E-01	1.05E-07
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.19E-09	NA	NA	6.18E-08	4.02E-09	3.71E-08	8.00E-09	1.14E-07	8	1.48E+00	1.85E-01	6.17E-07	7.40E+00	9.25E-01	1.23E-07
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	5.96E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.07E-10	NA	NA	4.33E-09	1.52E-09	5.91E-09	1.27E-09	1.35E-08	8	8.57E+01	1.07E+01	1.26E-09	4.29E+02	5.36E+01	2.53E-10
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.57E-03	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.59E-09	NA	NA	2.26E-08	7.76E-09	3.01E-08	6.49E-09	6.96E-08	8	8.57E+01	1.07E+01	6.49E-09	4.29E+02	5.36E+01	1.30E-09
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.36E-10	NA	NA	4.67E-09	1.61E-09	6.24E-09	1.34E-09	1.44E-08	8	2.50E+00	3.13E-01	4.61E-08	1.25E+01	1.56E+00	9.22E-09
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	0.00E+00	0.00E+00	NA	0.00E+00	NA	NA	NA	NA	0.00E+00	8	8.00E-01	1.00E-01	0.00E+00	4.00E+00	5.00E-01	0.00E+00
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.75E-09	NA	NA	4.70E-08	1.56E-10	3.21E-08	6.91E-09	8.89E-08	8	4.60E+00	5.75E-01	1.55E-07	9.20E+00	1.15E+00	7.73E-08
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	4.67E+00	2.37E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	2.97E-08	NA	0.00E+00	1.01E-07	6.47E-10	3.46E-07	7.45E-08	5.52E-07	8	1.40E-01	1.75E-02	3.15E-05	6.80E-01	8.50E-02	6.49E-06
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.19E-10	NA	NA	8.52E-11	7.13E-10	3.71E-09	8.00E-10	5.63E-09	8	1.50E-01	1.88E-02	3.00E-07	7.50E-01	9.38E-02	6.00E-08
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	5.14E+00	5.14E+00	6.50E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	5.00E-10	NA	0.00E+00	3.68E-09	1.98E-10	5.82E-09	1.25E-09	1.15E-08	8	9.20E-02	1.15E-02	9.96E-07	9.20E-01	1.15E-01	9.96E-08
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	6.23E-10	NA	NA	7.54E-09	1.92E-10	7.26E-09	1.56E-09	1.72E-08	8	9.20E-02	1.15E-02	1.49E-06	9.20E-01	1.15E-01	1.49E-07
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-09	NA	NA	1.58E-08	1.10E-08	0.00E+00	0.00E+00	3.04E-08	8	6.15E-01	7.69E-02	3.96E-07	3.07E+00	3.84E-01	7.93E-08
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	1.52E-09	NA	NA	2.60E-08	8.64E-11	1.77E-08	3.82E-09	4.91E-08	8	4.60E+00	5.75E-01	8.55E-08	9.20E+00	1.15E+00	4.27E-08
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	8.85E+00	1.59E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	3.81E-09	NA	NA	4.83E-08	3.69E-10	4.44E-08	9.56E-09	1.06E-07	8	1.00E-01	1.25E-02	8.52E-06	1.00E+00	1.25E-01	8.52E-07
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	7.46E+00	2.05E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	7.97E-10	NA	NA	8.52E-09	9.93E-11	9.28E-09	2.00E-09	2.07E-08	8	4.00E+00	5.00E-01	4.14E-08	8.00E+00	1.00E+00	2.07E-08
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-09	NA	0.00E+00	3.04E-09	7.15E-08	0.00E+00	0.00E+00	7.58E-08	8	6.56E+01	8.20E+00	9.24E-09	1.10E+02	1.38E+01	5.51E-09
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.75E-09	NA	NA	6.91E-09	1.21E-08	0.00E+00	0.00E+00	2.17E-08	8	6.15E-01	7.69E-02	2.83E-07	3.07E+00	3.84E-01	5.66E-08
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.18E+01	mg/kg	5.70E+02	1.43E-01	9.76E-02	3.75E-02	4.49E-03	4.49E-03	3.00E-07	0.00E+00	1.58E-05	0.00E+00	0.00E+00	2.21E-06	3.60E-06	1.65E-06	3.55E-07	2.39E-05	8	1.26E-01	1.58E-02	1.52E-03	1.26E+00	1.58E-01	1.52E-04
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.13E+00	mg/kg	1.63E+03	6.00E-01	6.56E+00	3.71E-01	1.56E-01	1.56E-01	1.27E-08	0.00E+00	2.27E-06	0.00E+00	0.00E+00	2.13E-05	5.11E-06	8.22E-06	1.77E-06	3.87E-05	8	1.00E+00	1.25E-01	3.09E-04	1.00E+01	1.25E+00	3.09E-05
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.10E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	1.03E-01	1.03E-01	3.97E-07	0.00E+00	1.52E-05	0.00E+00	0.00E+00	6.67E-06	3.80E-06	3.66E-05	7.88E-06	7.06E-05	8	2.74E+03	3.42E+02	2.06E-07	1.37E+04	1.71E+03	4.12E-08
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	4.98E+01	mg/kg	2.00E+02	1.56E+00	5.15E-01	1.83E-01	2.72E-01	2.72E-01	8.02E-07	0.00E+00	3.61E-05	0.00E+00	0.00E+00	2.66E-05	4.01E-05	2.28E-04	4.92E-05	3.81E-04	8	1.17E+01	1.46E+00	2.61E-04	1.51E+01	1.89E+00	2.02E-04
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	5.31E+01	mg/kg	4.50E-01	7.10E-02	3.74E-01	4.63E-02	1.18E-01	1.18E-01	1.22E-06	0.00E+00	3.85E-05	0.00E+00	0.00E+00	2.06E-05	1.09E-05	1.05E-04	2.27E-05	1.99E-04	8	8.00E+00	1.00E+00	1.99E-04	8.00E+01	1.00E+01	1.99E-05
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	1.39E-01	mg/kg	NA	1.14E+00	4.06E+00	9.12E-01	1.92E-01	1.92E-01	0.00E+00	0.00E+00	1.01E-07	NA	0.00E+00	5.85E-07	5.59E-07	4.50E-07	9.70E-08	1.79E-06	8	1.00E+00	1.25E-01	1.43E-05	5.00E+00	6.25E-01	2.87E-06
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.15E+01	mg/kg	1.00E+02	4.86E-01	4.69E-01	5.00E-02	1.52E-01	1.52E-01	4.22E-07	0.00E+00	1.56E-05	0.00E+00	0.00E+00	1.04E-05	4.74E-06	5.50E-05	1.19E-05	9.80E-05	8	4.00E+01	5.00E+00	1.96E-05	8.00E+01	1.00E+01	9.80E-06
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	7.32E-01	mg/kg	6.45E+02	4.20E-01	1.01E+00	4.92E-01	8.02E-01	8.02E-01	1.69E-08	0.00E+00	5.31E-07	0.00E+00	0.00E+00	7.66E-07	1.59E-06	9.90E-06	2.13E-06	1.49E-05	8	2.00E-01	2.50E-02	5.97E-04	3.30E-01	4.13E-02	3.62E-04
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	1.44E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	0.00E+00	1.04E-07	NA	0.00E+00	3.06E-07	8.90E-09	9.72E-09	2.09E-09	4.31E-07	8	2.22E+01	2.78E+00	1.55E-07	2.22E+02	2.78E+01	1.55E-08
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	1.98E+02	mg/kg	1.00E+03	1.94E+00	2.45E+00	4.57E-01	5.77E-01	5.77E-01	3.16E-06	0.00E+00	1.43E-04	0.00E+00	0.00E+00	5.03E-04	3.99E-04	1.92E-03	4.14E-04	3.39E-03	8	1.60E+02	2.00E+01	1.69E-04	3.20E+02	4.00E+01	8.47E-05

Hazard Index (Total EEQ): 3.1E-03 8.7E-04

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.17	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0.04	unitless
Mammal diet fraction =	0.65	unitless
Bird diet fraction =	0.14	unitless
Soil ingestion rate =	0.0067	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.24	kg/d
Body weight =	4.53	kg
Home range =	2204	acres
Water intake rate =	0.39	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	4.90E-04	unitless

Table F-26
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Minks at SWMU 41 Area B

Hazard Estimate - Tier 1
Mink

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	4.21E+01	NA	NA	NA	NA	0.00E+00	5.76E-09	0.00E+00	NA	1.45E-06	NA	NA	NA	NA	1.46E-06	8	1.00E-06	1.25E-07	1.17E+01	1.00E-05	1.25E-06	1.17E+00
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	5.80E-03	mg/kg	NA	NA	3.67E+00	2.10E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	4.38E-04	2.90E-05	2.90E-05	4.96E-04	8.00E+00	4.43E+01	5.54E+00	8.97E-05	2.22E+02	2.77E+01	1.79E-05
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	2.83E-05	1.90E-05	1.90E-05	6.63E-05	8.00E+00	1.48E+00	1.85E-01	3.59E-04	7.40E+00	9.25E-01	7.17E-05
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	3.28E-05	2.20E-05	2.20E-05	7.68E-05	8.00E+00	1.48E+00	1.85E-01	4.15E-04	7.40E+00	9.25E-01	8.31E-05
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	7.87E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.24E-05	3.50E-06	3.50E-06	1.94E-05	8.00E+00	8.57E+01	1.07E+01	1.81E-06	4.29E+02	5.36E+01	3.62E-07
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	5.20E-03	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	9.21E-05	2.60E-05	2.60E-05	1.44E-04	8.00E+00	8.57E+01	1.07E+01	1.35E-05	4.29E+02	5.36E+01	2.69E-06
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.31E-05	3.70E-06	3.70E-06	2.05E-05	8.00E+00	2.50E+00	3.13E-01	6.56E-05	1.25E+01	1.56E+00	1.31E-05
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	2.65E-05	0.00E+00	NA	2.57E-03	NA	NA	NA	NA	2.59E-03	8.00E+00	8.00E-01	1.00E-01	2.59E-02	4.00E+00	5.00E-01	5.18E-03
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.28E-06	1.90E-05	1.90E-05	3.93E-05	8.00E+00	4.60E+00	5.75E-01	6.83E-05	9.20E+00	1.15E+00	3.42E-05
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	2.19E+01	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	3.61E-04	0.00E+00	NA	4.74E-02	0.00E+00	5.28E-06	2.05E-04	2.05E-04	4.82E-02	1.00E+00	1.40E-01	1.40E-01	3.44E-01	6.80E-01	6.80E-01	7.08E-02
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	5.82E-06	2.20E-06	2.20E-06	1.02E-05	8.00E+00	1.50E-01	1.88E-02	5.45E-04	7.50E-01	9.38E-02	1.09E-04
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	6.78E+00	6.78E+00	6.50E-02	1.00E+00	1.00E+00	0.00E+00	2.44E-05	0.00E+00	NA	9.92E-04	0.00E+00	1.61E-06	3.45E-06	3.45E-06	1.02E-03	8.00E+00	9.20E-02	1.15E-02	8.91E-02	9.20E-01	1.15E-01	8.91E-03
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.57E-06	4.30E-06	4.30E-06	1.02E-05	8.00E+00	9.20E-02	1.15E-02	8.84E-04	9.20E-01	1.15E-01	8.84E-05
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	9.00E-05	0.00E+00	0.00E+00	9.00E-05	8.00E+00	6.15E-01	7.69E-02	1.17E-03	3.07E+00	3.84E-01	2.35E-04
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	7.05E-07	1.05E-05	1.05E-05	2.17E-05	8.00E+00	4.60E+00	5.75E-01	3.77E-05	9.20E+00	1.15E+00	1.89E-05
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	1.17E+01	1.59E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	3.01E-06	2.63E-05	2.63E-05	5.56E-05	1.00E+00	1.00E-01	1.00E-01	5.56E-04	1.00E+00	1.00E+00	5.56E-05
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	9.84E+00	2.05E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	8.10E-07	5.50E-06	5.50E-06	1.18E-05	8.00E+00	4.00E+00	5.00E-01	2.36E-05	8.00E+00	1.00E+00	1.18E-05
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	6.40E-06	0.00E+00	NA	6.60E-05	0.00E+00	5.83E-04	0.00E+00	0.00E+00	6.56E-04	8.00E+00	6.56E+01	8.20E+00	8.00E-05	1.10E+02	1.38E+01	4.77E-05
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	9.85E-05	0.00E+00	0.00E+00	9.85E-05	8	6.15E-01	7.69E-02	1.28E-03	3.07E+00	3.84E-01	2.57E-04
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.30E+01	mg/kg	1.75E+03	6.90E-01	9.61E-02	3.75E-02	4.45E-03	4.45E-03	2.07E-03	6.64E-02	0.00E+00	1.62E+00	2.75E-01	0.00E+00	3.11E-02	5.12E-04	5.12E-04	1.99E+00	8	1.26E-01	1.58E-02	1.26E+02	1.26E+00	1.58E-01	1.26E+01
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.50E+00	mg/kg	4.54E+03	7.99E+00	6.41E+00	3.52E-01	1.47E-01	1.47E-01	8.73E-05	1.00E-02	0.00E+00	1.77E-01	4.79E-01	0.00E+00	4.44E-02	2.57E-03	2.57E-03	7.16E-01	8	1.00E+00	1.25E-01	5.73E+00	1.00E+01	1.25E+00	5.73E-01
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.30E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	1.01E-01	1.01E-01	2.73E-03	1.40E-01	0.00E+00	9.47E-01	3.93E-01	0.00E+00	3.39E-02	1.16E-02	1.16E-02	1.54E+00	8	2.74E+03	3.42E+02	4.50E-03	1.37E+04	1.71E+03	9.00E-04
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	5.70E+01	mg/kg	5.92E+03	5.25E+00	5.15E-01	1.68E-01	2.42E-01	2.42E-01	5.53E-03	1.54E-01	0.00E+00	1.46E+01	4.84E+00	0.00E+00	3.45E-01	6.90E-02	6.90E-02	2.01E+01	1	1.17E+01	1.17E+01	1.72E+00	1.51E+01	1.51E+01	1.33E+00
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	7.50E+01	mg/kg	8.95E+02	6.07E-01	3.49E-01	3.98E-02	9.71E-02	9.71E-02	8.44E-03	2.37E-01	0.00E+00	3.37E+00	8.64E-01	0.00E+00	1.08E-01	3.64E-02	3.64E-02	4.66E+00	8	8.00E+00	1.00E+00	4.66E+00	8.00E+01	1.00E+01	4.66E-01
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	2.40E-01	mg/kg	NA	2.87E+00	3.30E+01	7.09E-01	1.05E+00	1.05E+00	0.00E+00	1.48E-04	0.00E+00	NA	2.55E-03	0.00E+00	6.13E-03	1.26E-03	1.26E-03	1.13E-02	1	1.00E+00	1.00E+00	1.13E-02	5.00E+00	5.00E+00	2.27E-03
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.60E+01	mg/kg	3.90E+02	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	2.91E-03	8.80E-02	0.00E+00	5.07E-01	1.22E+00	0.00E+00	4.46E-02	1.78E-02	1.78E-02	1.90E+00	8	4.00E+01	5.00E+00	3.81E-01	8.00E+01	1.00E+01	1.90E-01
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	9.20E-01	mg/kg	6.45E+02	2.10E+00	9.49E-01	5.04E-01	6.95E-01	6.95E-01	1.16E-04	2.16E-02	0.00E+00	3.35E-02	2.72E-01	0.00E+00	1.67E-02	3.20E-03	3.20E-03	3.50E-01	8	2.00E-01	2.50E-02	1.40E+01	3.30E-01	4.13E-02	8.50E+00
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	2.20E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	4.40E-04	0.00E+00	NA	5.54E-03	0.00E+00	1.11E-04	4.40E-06	4.40E-06	6.10E-03	8	2.22E+01	2.78E+00	2.20E-03	2.22E+02	2.78E+01	2.20E-04
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	2.34E+02	mg/kg	1.03E+04	7.53E+00	2.19E+00	4.24E-01	4.93E-01	4.93E-01	2.18E-02	6.20E-01	0.00E+00	1.00E+02	2.80E+01	0.00E+00	3.57E+00	5.77E-01	5.77E-01	1.34E+02	8	1.60E+02	2.00E+01	6.69E+00	3.20E+02	4.00E+01	3.34E+00

Hazard Index (Total EEQ): 1.7E+02 2.8E+01

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi x Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.18	unitless
Fish diet fraction =	0.65	unitless
Aq. Invert diet fraction =	0.12	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0.025	unitless
Bird diet fraction =	0.025	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0.0022	kg/d
Food ingestion rate =	0.11	kg/d
Body weight =	0.55	kg
Home range =	35	acres
Water intake rate =	0.16	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-27
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Minks at SWMU 41 Area B

Hazard Estimate - Tier 2
Mink

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	3.03E+00	NA	NA	NA	NA	0.00E+00	6.10E-11	0.00E+00	NA	1.11E-09	NA	NA	NA	NA	1.17E-09	8	1.00E-06	1.25E-07	9.36E-03	1.00E-05	1.25E-06	9.36E-04
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	3.70E-03	mg/kg	NA	NA	2.78E+00	2.10E+00	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	2.96E-06	9.79E-08	9.79E-08	3.16E-06	8	4.43E+01	5.54E+00	5.70E-07	2.22E+02	2.77E+01	1.14E-07
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.32E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	3.00E-07	1.01E-07	1.01E-07	5.01E-07	8	1.48E+00	1.85E-01	2.71E-06	7.40E+00	9.25E-01	5.42E-07
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	3.48E-07	1.16E-07	1.16E-07	5.81E-07	8	1.48E+00	1.85E-01	3.14E-06	7.40E+00	9.25E-01	6.28E-07
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	5.96E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.31E-07	1.85E-08	1.85E-08	1.68E-07	8	8.57E+01	1.07E+01	1.57E-08	4.29E+02	5.36E+01	3.14E-09
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.57E-03	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	6.70E-07	9.46E-08	9.46E-08	8.59E-07	8	8.57E+01	1.07E+01	8.02E-08	4.29E+02	5.36E+01	1.60E-08
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.39E-07	1.96E-08	1.96E-08	1.78E-07	8	2.50E+00	3.13E-01	5.70E-07	1.25E+01	1.56E+00	1.14E-07
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	2.80E-07	0.00E+00	NA	2.72E-05	NA	NA	NA	NA	2.74E-05	8	8.00E-01	1.00E-01	2.74E-04	4.00E+00	5.00E-01	5.49E-05
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.35E-08	1.01E-07	1.01E-07	2.15E-07	8	4.60E+00	5.75E-01	3.73E-07	9.20E+00	1.15E+00	1.87E-07
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	4.67E+00	2.37E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	3.82E-06	0.00E+00	NA	1.07E-04	0.00E+00	5.59E-08	1.09E-06	1.09E-06	1.13E-04	1	1.40E-01	1.40E-01	8.08E-04	6.80E-01	6.80E-01	1.66E-04
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	6.16E-08	1.16E-08	1.16E-08	8.49E-08	8	1.50E-01	1.88E-02	4.53E-06	7.50E-01	9.38E-02	9.06E-07
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	5.14E+00	5.14E+00	6.50E-02	5.00E-01	5.00E-01	0.00E+00	2.58E-07	0.00E+00	NA	7.95E-06	0.00E+00	1.71E-08	1.83E-08	1.83E-08	8.27E-06	8	9.20E-02	1.15E-02	7.19E-04	9.20E-01	1.15E-01	7.19E-05
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.66E-08	2.28E-08	2.28E-08	6.21E-08	8	9.20E-02	1.15E-02	5.40E-06	9.20E-01	1.15E-01	5.40E-07
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	9.53E-07	0.00E+00	0.00E+00	9.53E-07	8	6.15E-01	7.69E-02	1.24E-05	3.07E+00	3.84E-01	2.48E-06
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	7.47E-09	5.56E-08	5.56E-08	1.19E-07	8	4.60E+00	5.75E-01	2.06E-07	9.20E+00	1.15E+00	1.03E-07
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	8.85E+00	1.59E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	3.18E-08	1.39E-07	1.39E-07	3.10E-07	1	1.00E-01	1.00E-01	3.10E-06	1.00E+00	1.00E+00	3.10E-07
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	7.46E+00	2.05E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	8.58E-09	2.91E-08	2.91E-08	6.68E-08	8	4.00E+00	5.00E-01	1.34E-07	8.00E+00	1.00E+00	6.68E-08
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	6.78E-08	0.00E+00	NA	6.99E-07	0.00E+00	6.18E-06	0.00E+00	0.00E+00	6.95E-06	8	6.56E+01	8.20E+00	8.47E-07	1.10E+02	1.38E+01	5.05E-07
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	1.04E-06	0.00E+00	0.00E+00	1.04E-06	8	6.15E-01	7.69E-02	1.36E-05	3.07E+00	3.84E-01	2.72E-06
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.18E+01	mg/kg	5.70E+02	1.43E-01	9.76E-02	3.75E-02	4.49E-03	4.49E-03	2.15E-05	7.03E-04	0.00E+00	5.57E-03	6.03E-04	0.00E+00	3.11E-04	5.17E-06	5.17E-06	7.22E-03	8	1.26E-01	1.58E-02	4.58E-01	1.26E+00	1.58E-01	4.58E-02
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.13E+00	mg/kg	1.63E+03	6.00E-01	6.56E+00	3.71E-01	1.56E-01	1.56E-01	9.08E-07	1.06E-04	0.00E+00	6.73E-04	3.81E-04	0.00E+00	4.42E-04	2.58E-05	2.58E-05	1.65E-03	8	1.00E+00	1.25E-01	1.32E-02	1.00E+01	1.25E+00	1.32E-03
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.10E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	1.03E-01	1.03E-01	2.84E-05	1.48E-03	0.00E+00	1.23E-03	8.89E-04	0.00E+00	3.28E-04	1.15E-04	1.15E-04	4.19E-03	8	2.74E+03	3.42E+02	1.22E-05	1.37E+04	1.71E+03	2.45E-06
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	4.98E+01	mg/kg	2.00E+02	1.56E+00	5.15E-01	1.83E-01	2.72E-01	2.72E-01	5.75E-05	1.63E-03	0.00E+00	5.23E-03	1.52E-02	0.00E+00	3.47E-03	7.16E-04	7.16E-04	2.70E-02	1	1.17E+01	1.17E+01	2.31E-03	1.51E+01	1.51E+01	1.79E-03
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	5.31E+01	mg/kg	4.50E-01	7.10E-02	3.74E-01	4.63E-02	1.18E-01	1.18E-01	8.77E-05	2.51E-03	0.00E+00	1.80E-05	1.07E-03	0.00E+00	9.38E-04	3.31E-04	3.31E-04	5.29E-03	8	8.00E+00	1.00E+00	5.29E-03	8.00E+01	1.00E+01	5.29E-04
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	1.39E-01	mg/kg	NA	1.14E+00	4.06E+00	9.12E-01	1.92E-01	1.92E-01	0.00E+00	1.57E-06	0.00E+00	NA	1.07E-05	0.00E+00	4.83E-05	1.41E-06	1.41E-06	6.34E-05	1	1.00E+00	1.00E+00	6.34E-05	5.00E+00	5.00E+00	1.27E-05
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.15E+01	mg/kg	1.00E+02	4.86E-01	4.69E-01	5.00E-02	1.52E-01	1.52E-01	3.03E-05	9.32E-04	0.00E+00	1.38E-03	2.72E-03	0.00E+00	4.09E-04	1.73E-04	1.73E-04	5.81E-03	8	4.00E+01	5.00E+00	1.16E-03	8.00E+01	1.00E+01	5.81E-04
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	7.32E-01	mg/kg	6.45E+02	4.20E-01	1.01E+00	4.92E-01	8.02E-01	8.02E-01	1.21E-06	2.29E-04	0.00E+00	3.55E-04	5.76E-04	0.00E+00	1.37E-04	3.11E-05	3.11E-05	1.36E-03	8	2.00E-01	2.50E-02	5.44E-02	3.30E-01	4.13E-02	3.30E-02
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	1.44E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	4.66E-06	0.00E+00	NA	1.17E-05	0.00E+00	7.68E-07	3.05E-08	3.05E-08	1.72E-05	8	2.22E+01	2.78E+00	6.21E-06	2.22E+02	2.78E+01	6.21E-07
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	1.98E+02	mg/kg	1.00E+03	1.94E+00	2.45E+00	4.57E-01	5.77E-01	5.77E-01	2.27E-04	6.56E-03	0.00E+00	1.03E-01	7.63E-02	0.00E+00	3.45E-02	6.04E-03	6.04E-03	2.33E-01	8	1.60E+02	2.00E+01	1.16E-02	3.20E+02	4.00E+01	5.82E-03

Hazard Index (Total EEQ): 5.6E-01 9.0E-02

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0.18	unitless
Fish diet fraction =	0.65	unitless
Aq. Invert diet fraction =	0.12	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0.025	unitless
Bird diet fraction =	0.025	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0.0014	kg/d
Food ingestion rate =	0.07	kg/d
Body weight =	1.02	kg
Home range =	35	acres
Water intake rate =	0.1	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	3.09E-02	unitless

Table F-28
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Great Blue Herons at SWMU 41 Area B

Hazard Estimate - Tier 1
Great Blue Heron

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	4.21E+01	NA	NA	NA	NA	0.00E+00	1.44E-09	0.00E+00	NA	1.21E-07	NA	NA	NA	NA	1.23E-07	8	1.40E-05	1.75E-06	7.01E-02	1.40E-04	1.75E-05	7.01E-03
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	5.80E-03	mg/kg	NA	NA	3.67E+00	2.10E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.79E+01	2.07E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	7.87E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.61E+01	2.01E+00	0.00E+00	8.04E+01	1.01E+01	0.00E+00
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	5.20E-03	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.61E+01	2.01E+00	0.00E+00	8.04E+01	1.01E+01	0.00E+00
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	8.03E+00	4.92E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.61E+01	2.01E+00	0.00E+00	8.04E+01	1.01E+01	0.00E+00
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	6.62E-06	0.00E+00	NA	2.14E-04	NA	NA	NA	NA	2.20E-04	8	2.80E-03	3.50E-04	6.30E-01	2.80E-02	3.50E-03	6.30E-02
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	2.14E+00	2.68E-01	0.00E+00	1.07E+01	1.34E+00	0.00E+00
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	2.19E+01	6.52E+01	3.58E-03	1.00E+00	1.00E+00	0.00E+00	9.02E-05	0.00E+00	NA	3.95E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.04E-03	8	1.80E-01	2.25E-02	1.80E-01	1.80E+00	2.25E-01	1.80E-02
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	2.46E-01	3.67E-01	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.00E+01	1.25E+00	0.00E+00	5.00E+01	6.25E+00	0.00E+00
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	6.78E+00	6.78E+00	6.50E-02	1.00E+00	1.00E+00	0.00E+00	6.10E-06	0.00E+00	NA	8.27E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.87E-05	8	3.00E-01	3.75E-02	2.37E-03	1.50E+00	1.88E-01	4.73E-04
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	1.12E+01	5.06E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	3.00E-01	3.75E-02	0.00E+00	1.50E+00	1.88E-01	0.00E+00
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.57E+01	9.33E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	2.14E+00	2.68E-01	0.00E+00	1.07E+01	1.34E+00	0.00E+00
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	1.17E+01	1.59E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	9.20E-01	1.15E-01	0.00E+00	4.60E+00	5.75E-01	0.00E+00
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	9.84E+00	2.05E-02	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	2.58E+01	3.22E+00	0.00E+00	1.29E+02	1.61E+01	0.00E+00
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-06	0.00E+00	NA	5.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E-06	8	5.53E+02	6.91E+01	1.03E-07	2.77E+03	3.46E+02	2.06E-08
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.30E+01	mg/kg	1.75E+03	6.90E-01	9.61E-02	3.75E-02	4.45E-03	4.45E-03	3.55E-04	1.66E-02	0.00E+00	5.96E-01	2.29E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.36E-01	8	5.14E+00	6.43E-01	9.90E-01	1.28E+01	1.61E+00	3.96E-01
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.50E+00	mg/kg	4.54E+03	7.99E+00	6.41E+00	3.52E-01	1.47E-01	1.47E-01	1.50E-05	2.50E-03	0.00E+00	6.53E-02	4.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-01	8	1.45E+00	1.81E-01	5.95E-01	2.00E+01	2.50E+00	4.31E-02
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.30E+01	mg/kg	7.75E+02	4.68E-01	3.06E-01	4.10E-02	1.01E-01	1.01E-01	4.70E-04	3.50E-02	0.00E+00	3.50E-01	3.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.18E-01	8	2.66E+00	3.33E-01	1.26E+00	2.78E+00	3.48E-01	1.20E+00
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	5.70E+01	mg/kg	5.92E+03	5.25E+00	5.15E-01	1.68E-01	2.42E-01	2.42E-01	9.50E-04	3.84E-02	0.00E+00	5.39E+00	4.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.84E+00	8	4.70E+01	5.88E+00	9.94E-01	6.20E+01	7.75E+00	7.53E-01
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	7.50E+01	mg/kg	8.95E+02	6.07E-01	3.49E-01	3.98E-02	9.71E-02	9.71E-02	1.45E-03	5.93E-02	0.00E+00	1.25E+00	7.20E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E+00	8	3.85E+00	4.81E-01	2.86E+00	1.93E+01	2.41E+00	5.73E-01
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	2.40E-01	mg/kg	NA	2.87E+00	3.30E+01	7.09E-01	1.05E+00	1.05E+00	0.00E+00	3.70E-05	0.00E+00	NA	2.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.49E-04	8	4.50E-01	5.63E-02	4.43E-03	9.00E-01	1.13E-01	2.22E-03
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.60E+01	mg/kg	3.90E+02	2.32E+00	7.80E+00	4.76E-02	1.37E-01	1.37E-01	5.00E-04	2.20E-02	0.00E+00	1.87E-01	1.02E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-01	8	7.74E+01	9.68E+00	3.22E-02	1.07E+02	1.34E+01	2.33E-02
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	9.20E-01	mg/kg	6.45E+02	2.10E+00	9.49E-01	5.04E-01	6.95E-01	6.95E-01	2.00E-05	5.40E-03	0.00E+00	1.24E-02	2.27E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E-02	8	5.00E-01	6.25E-02	6.48E-01	1.00E+00	1.25E-01	3.24E-01
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	2.20E-01	mg/kg	NA	2.10E+00	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	1.10E-04	0.00E+00	NA	4.62E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.72E-04	8	1.78E+02	2.23E+01	2.57E-05	8.90E+02	1.11E+02	5.14E-06
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	2.34E+02	mg/kg	1.03E+04	7.53E+00	2.19E+00	4.24E-01	4.93E-01	4.93E-01	3.75E-03	1.55E-01	0.00E+00	3.71E+01	2.33E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.96E+01	8	1.45E+01	1.81E+00	2.18E+01	1.31E+02	1.64E+01	2.42E+00

Hazard Index (Total EEQ): 3.0E+01 5.8E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used a default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0.96	unitless
Aq. Invert diet fraction =	0.04	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0.0022	kg/d
Food ingestion rate =	0.11	kg/d
Body weight =	2.2	kg
Home range =	21	acres
Water intake rate =	0.11	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-29
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Great Blue Herons at SWMU 41 Area B

Hazard Estimate - Tier 2
Great Blue Heron

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Soil Exposure Point Concentration	Units	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF	Bird BAF	PDE Surface Water	PDE Sediment	PDE Soil	PDE Fish	PDE Aq. Invert.	PDE Terr. Invert.	PDE Plants	PDE Mammals	PDE Birds	Total PDE	Chemical-Specific Toxicity Value UF	NOAEL	Adjusted NOAEL	EEQ N	LOAEL	Adjusted LOAEL	EEQ L
							---------- unitless ----------						mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d		mg/kg-d	mg/kg-d	
2,3,7,8-TCDD-TE	0.00E+00	mg/L	1.44E-06	mg/kg	0.00E+00	mg/kg	NA	3.03E+00	NA	NA	NA	NA	0.00E+00	6.33E-11	0.00E+00	NA	3.84E-10	NA	NA	NA	NA	4.47E-10	8	1.40E-05	1.75E-06	2.55E-04	1.40E-04	1.75E-05	2.55E-05
1,1,2,2-Tetrachloroethane	0.00E+00	mg/L	0.00E+00	mg/kg	3.70E-03	mg/kg	NA	NA	2.78E+00	2.10E+00	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.32E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-03	mg/kg	NA	NA	1.35E+01	2.07E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.00E-04	mg/kg	NA	NA	5.96E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.61E+01	2.01E+00	0.00E+00	8.04E+01	1.01E+01	0.00E+00
1,3-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	3.57E-03	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.61E+01	2.01E+00	0.00E+00	8.04E+01	1.01E+01	0.00E+00
1,4-Dichlorobenzene	0.00E+00	mg/L	0.00E+00	mg/kg	7.40E-04	mg/kg	NA	NA	6.08E+00	4.92E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.61E+01	2.01E+00	0.00E+00	8.04E+01	1.01E+01	0.00E+00
4,4'-DDT	0.00E+00	mg/L	6.62E-03	mg/kg	0.00E+00	mg/kg	NA	1.62E+01	NA	NA	NA	NA	0.00E+00	2.91E-07	0.00E+00	NA	9.40E-06	NA	NA	NA	NA	9.69E-06	8	2.80E-03	3.50E-04	2.77E-02	2.80E-02	3.50E-03	2.77E-03
alpha-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	2.14E+00	2.68E-01	0.00E+00	1.07E+01	1.34E+00	0.00E+00
Aroclor 1254	0.00E+00	mg/L	9.02E-02	mg/kg	4.10E-02	mg/kg	NA	4.67E+00	2.37E+00	3.58E-03	5.00E-01	5.00E-01	0.00E+00	3.96E-06	0.00E+00	NA	3.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-05	8	1.80E-01	2.25E-02	1.82E-03	1.80E+00	2.25E-01	1.82E-04
Endosulfan II	0.00E+00	mg/L	0.00E+00	mg/kg	4.40E-04	mg/kg	NA	NA	1.86E-01	3.67E-01	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	1.00E+01	1.25E+00	0.00E+00	5.00E+01	6.25E+00	0.00E+00
Endrin aldehyde	0.00E+00	mg/L	6.10E-03	mg/kg	6.90E-04	mg/kg	NA	5.14E+00	5.14E+00	6.50E-02	5.00E-01	5.00E-01	0.00E+00	2.68E-07	0.00E+00	NA	2.75E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.02E-06	8	3.00E-01	3.75E-02	8.05E-05	1.50E+00	1.88E-01	1.61E-05
Endrin ketone	0.00E+00	mg/L	0.00E+00	mg/kg	8.60E-04	mg/kg	NA	NA	8.44E+00	5.06E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	3.00E-01	3.75E-02	0.00E+00	1.50E+00	1.88E-01	0.00E+00
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	5.00E-03	mg/kg	NA	NA	3.04E+00	5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
gamma-Chlordane	0.00E+00	mg/L	0.00E+00	mg/kg	2.10E-03	mg/kg	NA	NA	1.19E+01	9.33E-03	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	2.14E+00	2.68E-01	0.00E+00	1.07E+01	1.34E+00	0.00E+00
Heptachlor	0.00E+00	mg/L	0.00E+00	mg/kg	5.26E-03	mg/kg	NA	NA	8.85E+00	1.59E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	9.20E-01	1.15E-01	0.00E+00	4.60E+00	5.75E-01	0.00E+00
Methoxychlor	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E-03	mg/kg	NA	NA	7.46E+00	2.05E-02	5.00E-01	5.00E-01	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	2.58E+01	3.22E+00	0.00E+00	1.29E+02	1.61E+01	0.00E+00
Phenanthrene	0.00E+00	mg/L	1.60E-03	mg/kg	1.70E-03	mg/kg	NA	1.72E+00	1.72E+00	9.53E+00	0.00E+00	0.00E+00	0.00E+00	7.03E-08	0.00E+00	NA	2.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-07	8	5.53E+02	6.91E+01	4.52E-09	2.77E+03	3.46E+02	9.03E-10
Pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	3.80E-03	mg/kg	NA	NA	1.75E+00	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00
Arsenic	7.10E-03	mg/L	1.66E+01	mg/kg	2.18E+01	mg/kg	5.70E+02	1.43E-01	9.76E-02	3.75E-02	4.49E-03	4.49E-03	1.56E-05	7.30E-04	0.00E+00	8.54E-03	2.09E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.49E-03	8	5.14E+00	6.43E-01	1.48E-02	1.28E+01	1.61E+00	5.91E-03
Cadmium	3.00E-04	mg/L	2.50E+00	mg/kg	3.13E+00	mg/kg	1.63E+03	6.00E-01	6.56E+00	3.71E-01	1.56E-01	1.56E-01	6.59E-07	1.10E-04	0.00E+00	1.03E-03	1.32E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-03	8	1.45E+00	1.81E-01	7.03E-03	2.00E+01	2.50E+00	5.10E-04
Chromium	9.40E-03	mg/L	3.50E+01	mg/kg	2.10E+01	mg/kg	9.50E+01	1.00E-01	3.06E-01	4.10E-02	1.03E-01	1.03E-01	2.07E-05	1.54E-03	0.00E+00	1.88E-03	3.08E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.75E-03	8	2.66E+00	3.33E-01	1.13E-02	2.78E+00	3.48E-01	1.08E-02
Copper	1.90E-02	mg/L	3.84E+01	mg/kg	4.98E+01	mg/kg	2.00E+02	1.56E+00	5.15E-01	1.83E-01	2.72E-01	2.72E-01	4.18E-05	1.69E-03	0.00E+00	8.02E-03	5.25E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-02	8	4.70E+01	5.88E+00	2.55E-03	6.20E+01	7.75E+00	1.94E-03
Lead	2.90E-02	mg/L	5.93E+01	mg/kg	5.31E+01	mg/kg	4.50E-01	7.10E-02	3.74E-01	4.63E-02	1.18E-01	1.18E-01	6.37E-05	2.61E-03	0.00E+00	2.75E-05	3.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.07E-03	8	3.85E+00	4.81E-01	6.38E-03	1.93E+01	2.41E+00	1.28E-03
Mercury	0.00E+00	mg/L	3.70E-02	mg/kg	1.39E-01	mg/kg	NA	1.14E+00	4.06E+00	9.12E-01	1.92E-01	1.92E-01	0.00E+00	1.63E-06	0.00E+00	NA	3.70E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-06	8	4.50E-01	5.63E-02	9.46E-05	9.00E-01	1.13E-01	4.73E-05
Nickel	1.00E-02	mg/L	2.20E+01	mg/kg	2.15E+01	mg/kg	1.00E+02	4.86E-01	4.69E-01	5.00E-02	1.52E-01	1.52E-01	2.20E-05	9.67E-04	0.00E+00	2.11E-03	9.40E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.04E-03	8	7.74E+01	9.68E+00	4.17E-04	1.07E+02	1.34E+01	3.02E-04
Selenium	4.00E-04	mg/L	5.40E+00	mg/kg	7.32E-01	mg/kg	6.45E+02	4.20E-01	1.01E+00	4.92E-01	8.02E-01	8.02E-01	8.79E-07	2.37E-04	0.00E+00	5.44E-04	1.99E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.82E-04	8	5.00E-01	6.25E-02	1.57E-02	1.00E+00	1.25E-01	7.86E-03
Silver	0.00E+00	mg/L	1.10E-01	mg/kg	1.44E-01	mg/kg	NA	4.20E-01	2.05E+00	1.40E-02	4.00E-03	4.00E-03	0.00E+00	4.84E-06	0.00E+00	NA	4.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.90E-06	8	1.78E+02	2.23E+01	4.00E-07	8.90E+02	1.11E+02	8.00E-08
Zinc	7.50E-02	mg/L	1.55E+02	mg/kg	1.98E+02	mg/kg	1.00E+03	1.94E+00	2.45E+00	4.57E-01	5.77E-01	5.77E-01	1.65E-04	6.81E-03	0.00E+00	1.58E-01	2.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-01	8	1.45E+01	1.81E+00	1.06E-01	1.31E+02	1.64E+01	1.17E-02

Hazard Index (Total EEQ): 1.9E-01 4.3E-02

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Plant diet fraction =	0	unitless
Fish diet fraction =	0.96	unitless
Aq. Invert diet fraction =	0.04	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0.002	kg/d
Food ingestion rate =	0.1	kg/d
Body weight =	2.34	kg
Home range =	21	acres
Water intake rate =	0.1	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	5.14E-02	unitless

Table F-30
Tier 2 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at the New River Unit Rail Yard

Hazard Estimate - Tier 2
Red Fox

	Surface Water Exposure		Sediment Exposure		Soil Exposure		Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Plant BAF	Mammal BAF
Chemical	Point Concentration	Units	Point Concentration	Units	Point Concentration	Units	---------- unitless ----------				
2,3,7,8-TCDD-TE	0	mg/L	0.00000144	mg/kg	0	mg/kg	NA	=EXP(1.18*LN(D8)+3.53)/D8	NA	NA	NA
1,1,2,2-Tetrachloroethane	0	mg/L	0	mg/kg	0.00369798733779053	mg/kg	NA	NA	2.779134304735 85	2.09981000171164	0.5
1,2,3-Trichlorobenzene	0	mg/L	0	mg/kg	0.0038	mg/kg	NA	NA	13.2430902306641	0.207233518166858	0.5
1,2,4-Trichlorobenzene	0	mg/L	0	mg/kg	0.0044	mg/kg	NA	NA	13.5197564611097	0.207233518166858	0.5
1,2-Dichlorobenzene	0	mg/L	0	mg/kg	0.0007	mg/kg	NA	NA	5.95922230089411	0.492220843141473	0.5
1,3-Dichlorobenzene	0	mg/L	0	mg/kg	0.00357249488090962	mg/kg	NA	NA	6.08280064353938	0.492220843141473	0.5
1,4-Dichlorobenzene	0	mg/L	0	mg/kg	0.00074	mg/kg	NA	NA	6.08280064353938	0.492220843141473	0.5
4,4'-DDT	0	mg/L	0.006615	mg/kg	0	mg/kg	NA	=EXP(0.8689*LN(D15)+2.1247)/D15	NA	NA	NA
alpha-Chlordane	0	mg/L	0	mg/kg	0.0038	mg/kg	NA	NA	11.9171996519426	0.00932652803434191	0.5
Aroclor 1254	0	mg/L	0.0902	mg/kg	0.041	mg/kg	NA	4.67	=EXP(1.29*LN(F17)+1.79)/F17	0.00357733819916289	0.5
Endosulfan II	0	mg/L	0	mg/kg	0.00044	mg/kg	NA	NA	0.186453539413395	0.367282300498085	0.5
Endrin aldehyde	0	mg/L	0.006095	mg/kg	0.00069	mg/kg	NA	5.13534419345269	5.14	0.065	0.5
Endrin ketone	0	mg/L	0	mg/kg	0.00086	mg/kg	NA	NA	8.44	0.0505568491940655	0.5
Fluoranthene	0	mg/L	0	mg/kg	0.005	mg/kg	NA	NA	3.04	0.5	0
gamma-Chlordane	0	mg/L	0	mg/kg	0.0021	mg/kg	NA	NA	11.92	0.00932652803434191	0.5
Heptachlor	0	mg/L	0	mg/kg	0.00526	mg/kg	NA	NA	8.84834455514111	0.0158825415442 25	0.5
Methoxychlor	0	mg/L	0	mg/kg	0.0011	mg/kg	NA	NA	7.4559739618135	0.0204521985402521	0.5
Phenanthrene	0	mg/L	0.0016	mg/kg	0.0017	mg/kg	NA	1.72	1.72	=EXP(0.6203*LN(F25)-0.1665)/F25	0
Pyrene	0	mg/L	0	mg/kg	0.0038	mg/kg	NA	NA	1.75	0.72	0
Arsenic	0.0071	mg/L	16.6	mg/kg	21.75	mg/kg	570	0.143	=EXP(0.706*LN(F27)-1.421)/F27	0.03752	=EXP(0.8188*LN(F27)-4.8471)/F27
Cadmium	0.0003	mg/L	2.5	mg/kg	3.126	mg/kg	1630	0.6	=EXP(0.795*LN(F28)+2.114)/F28	=EXP(0.546*LN(F28)-0.475)/F28	=EXP(0.4723*LN(F28)-1.2571)/F28
Chromium	0.0094	mg/L	35	mg/kg	21	mg/kg	95	0.1	0.306	0.041	=EXP(0.7338*LN(F29)-1.4599)/F29
Copper	0.019	mg/L	38.4	mg/kg	49.79	mg/kg	200	1.556	0.515	=EXP(0.394*LN(F30)+0.668)/F30	=EXP(0.144*LN(F30)+2.042)/F30
Lead	0.029	mg/L	59.3	mg/kg	53.12	mg/kg	0.45	0.071	=EXP(0.807*LN(F31)-0.218)/F31	=EXP(0.561*LN(F31)-1.328)/F31	=EXP(0.4422*LN(F31)+0.0761)/F31
Mercury	0	mg/L	0.037	mg/kg	0.139	mg/kg	NA	1.136	=EXP(0.33*LN(F32)+0.078)/F32	=EXP(0.54*LN(F32)-1)/F32	0.192
Nickel	0.01	mg/L	22	mg/kg	21.46	mg/kg	100	0.486	=EXP(-1.54*LN(F33)+7.03)/F33	=EXP(0.748*LN(F33)-2.223)/F33	=EXP(0.4658*LN(F33)-0.2462)/F33
Selenium	0.0004	mg/L	5.4	mg/kg	0.732	mg/kg	645	0.42	=EXP(0.733*LN(F34)-0.075)/F34	=EXP(1.104*LN(F34)-0.677)/F34	=EXP(0.3764*LN(F34)-0.4158)/F34
Silver	0	mg/L	0.11	mg/kg	0.144	mg/kg	NA	0.42	2.045	0.014	0.004
Zinc	0.075	mg/L	155	mg/kg	197.8	mg/kg	1000	1.936	=EXP(0.328*LN(F36)+4.449)/F36	=EXP(0.554*LN(F36)+1.575)/F36	=EXP(0.0706*LN(F36)+4.3632)/F36

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.
Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR.
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EEQ = Ecological Effects Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
PDE = Predicted Daily Exposure
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box): n See appropriate text tables for equations.
If BAF/BCF regression equation produced Tier 2 value exceeding maximum Tier 1 BAF/BCF value, Tier 1 value used as default.
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or NOAEL = LOAEL/UF or NOAEL/UF
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Table F-30
Tier 2 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at the New River Unit Rail Yard

Hazard Estimate - Tier 2
Red Fox

Chemical	Bird BAF	PDE Surface Water mg/kg-d	PDE Sediment mg/kg-d	PDE Soil mg/kg-d	PDE Fish mg/kg-d	PDE Aq. Invert. mg/kg-d
2,3,7,8-TCDD-TE	NA	=$AA$54*B8*$AA$56/$AA$52	=$AA$50*D8*$AA$56/$AA$52	=$AA$49*F8*$AA$56/$AA$52	=IF(H8="NA","NA",$AA$44*B8*H8*$AA$51*$AA$56/$AA$52)	=IF(I8="NA","NA",$AA$45*D8*I8*$AA$51*$AA$56/$AA$52)
1,1,2,2-Tetrachloroethane	0.5	=$AA$54*B9*$AA$56/$AA$52	=$AA$50*D9*$AA$56/$AA$52	=$AA$49*F9*$AA$56/$AA$52	=IF(H9="NA","NA",$AA$44*B9*H9*$AA$51*$AA$56/$AA$52)	=IF(I9="NA","NA",$AA$45*D9*I9*$AA$51*$AA$56/$AA$52)
1,2,3-Trichlorobenzene	0.5	=$AA$54*B10*$AA$56/$AA$52	=$AA$50*D10*$AA$56/$AA$52	=$AA$49*F10*$AA$56/$AA$52	=IF(H10="NA","NA",$AA$44*B10*H10*$AA$51*$AA$56/$AA$52)	=IF(I10="NA","NA",$AA$45*D10*I10*$AA$51*$AA$56/$AA$52)
1,2,4-Trichlorobenzene	0.5	=$AA$54*B11*$AA$56/$AA$52	=$AA$50*D11*$AA$56/$AA$52	=$AA$49*F11*$AA$56/$AA$52	=IF(H11="NA","NA",$AA$44*B11*H11*$AA$51*$AA$56/$AA$52)	=IF(I11="NA","NA",$AA$45*D11*I11*$AA$51*$AA$56/$AA$52)
1,2-Dichlorobenzene	0.5	=$AA$54*B12*$AA$56/$AA$52	=$AA$50*D12*$AA$56/$AA$52	=$AA$49*F12*$AA$56/$AA$52	=IF(H12="NA","NA",$AA$44*B12*H12*$AA$51*$AA$56/$AA$52)	=IF(I12="NA","NA",$AA$45*D12*I12*$AA$51*$AA$56/$AA$52)
1,3-Dichlorobenzene	0.5	=$AA$54*B13*$AA$56/$AA$52	=$AA$50*D13*$AA$56/$AA$52	=$AA$49*F13*$AA$56/$AA$52	=IF(H13="NA","NA",$AA$44*B13*H13*$AA$51*$AA$56/$AA$52)	=IF(I13="NA","NA",$AA$45*D13*I13*$AA$51*$AA$56/$AA$52)
1,4-Dichlorobenzene	0.5	=$AA$54*B14*$AA$56/$AA$52	=$AA$50*D14*$AA$56/$AA$52	=$AA$49*F14*$AA$56/$AA$52	=IF(H14="NA","NA",$AA$44*B14*H14*$AA$51*$AA$56/$AA$52)	=IF(I14="NA","NA",$AA$45*D14*I14*$AA$51*$AA$56/$AA$52)
4,4'-DDT	NA	=$AA$54*B15*$AA$56/$AA$52	=$AA$50*D15*$AA$56/$AA$52	=$AA$49*F15*$AA$56/$AA$52	=IF(H15="NA","NA",$AA$44*B15*H15*$AA$51*$AA$56/$AA$52)	=IF(I15="NA","NA",$AA$45*D15*I15*$AA$51*$AA$56/$AA$52)
alpha-Chlordane	0.5	=$AA$54*B16*$AA$56/$AA$52	=$AA$50*D16*$AA$56/$AA$52	=$AA$49*F16*$AA$56/$AA$52	=IF(H16="NA","NA",$AA$44*B16*H16*$AA$51*$AA$56/$AA$52)	=IF(I16="NA","NA",$AA$45*D16*I16*$AA$51*$AA$56/$AA$52)
Aroclor 1254	0.5	=$AA$54*B17*$AA$56/$AA$52	=$AA$50*D17*$AA$56/$AA$52	=$AA$49*F17*$AA$56/$AA$52	=IF(H17="NA","NA",$AA$44*B17*H17*$AA$51*$AA$56/$AA$52)	=IF(I17="NA","NA",$AA$45*D17*I17*$AA$51*$AA$56/$AA$52)
Endosulfan II	0.5	=$AA$54*B18*$AA$56/$AA$52	=$AA$50*D18*$AA$56/$AA$52	=$AA$49*F18*$AA$56/$AA$52	=IF(H18="NA","NA",$AA$44*B18*H18*$AA$51*$AA$56/$AA$52)	=IF(I18="NA","NA",$AA$45*D18*I18*$AA$51*$AA$56/$AA$52)
Endrin aldehyde	0.5	=$AA$54*B19*$AA$56/$AA$52	=$AA$50*D19*$AA$56/$AA$52	=$AA$49*F19*$AA$56/$AA$52	=IF(H19="NA","NA",$AA$44*B19*H19*$AA$51*$AA$56/$AA$52)	=IF(I19="NA","NA",$AA$45*D19*I19*$AA$51*$AA$56/$AA$52)
Endrin ketone	0.5	=$AA$54*B20*$AA$56/$AA$52	=$AA$50*D20*$AA$56/$AA$52	=$AA$49*F20*$AA$56/$AA$52	=IF(H20="NA","NA",$AA$44*B20*H20*$AA$51*$AA$56/$AA$52)	=IF(I20="NA","NA",$AA$45*D20*I20*$AA$51*$AA$56/$AA$52)
Fluoranthene	0	=$AA$54*B21*$AA$56/$AA$52	=$AA$50*D21*$AA$56/$AA$52	=$AA$49*F21*$AA$56/$AA$52	=IF(H21="NA","NA",$AA$44*B21*H21*$AA$51*$AA$56/$AA$52)	=IF(I21="NA","NA",$AA$45*D21*I21*$AA$51*$AA$56/$AA$52)
gamma-Chlordane	0.5	=$AA$54*B22*$AA$56/$AA$52	=$AA$50*D22*$AA$56/$AA$52	=$AA$49*F22*$AA$56/$AA$52	=IF(H22="NA","NA",$AA$44*B22*H22*$AA$51*$AA$56/$AA$52)	=IF(I22="NA","NA",$AA$45*D22*I22*$AA$51*$AA$56/$AA$52)
Heptachlor	0.5	=$AA$54*B23*$AA$56/$AA$52	=$AA$50*D23*$AA$56/$AA$52	=$AA$49*F23*$AA$56/$AA$52	=IF(H23="NA","NA",$AA$44*B23*H23*$AA$51*$AA$56/$AA$52)	=IF(I23="NA","NA",$AA$45*D23*I23*$AA$51*$AA$56/$AA$52)
Methoxychlor	0.5	=$AA$54*B24*$AA$56/$AA$52	=$AA$50*D24*$AA$56/$AA$52	=$AA$49*F24*$AA$56/$AA$52	=IF(H24="NA","NA",$AA$44*B24*H24*$AA$51*$AA$56/$AA$52)	=IF(I24="NA","NA",$AA$45*D24*I24*$AA$51*$AA$56/$AA$52)
Phenanthrene	0	=$AA$54*B25*$AA$56/$AA$52	=$AA$50*D25*$AA$56/$AA$52	=$AA$49*F25*$AA$56/$AA$52	=IF(H25="NA","NA",$AA$44*B25*H25*$AA$51*$AA$56/$AA$52)	=IF(I25="NA","NA",$AA$45*D25*I25*$AA$51*$AA$56/$AA$52)
Pyrene	0	=$AA$54*B26*$AA$56/$AA$52	=$AA$50*D26*$AA$56/$AA$52	=$AA$49*F26*$AA$56/$AA$52	=IF(H26="NA","NA",$AA$44*B26*H26*$AA$51*$AA$56/$AA$52)	=IF(I26="NA","NA",$AA$45*D26*I26*$AA$51*$AA$56/$AA$52)
Arsenic	=EXP(0.8188*LN(F27)-4.8471)/F27	=$AA$54*B27*$AA$56/$AA$52	=$AA$50*D27*$AA$56/$AA$52	=$AA$49*F27*$AA$56/$AA$52	=IF(H27="NA","NA",$AA$44*B27*H27*$AA$51*$AA$56/$AA$52)	=IF(I27="NA","NA",$AA$45*D27*I27*$AA$51*$AA$56/$AA$52)
Cadmium	=EXP(0.4723*LN(F28)-1.2571)/F28	=$AA$54*B28*$AA$56/$AA$52	=$AA$50*D28*$AA$56/$AA$52	=$AA$49*F28*$AA$56/$AA$52	=IF(H28="NA","NA",$AA$44*B28*H28*$AA$51*$AA$56/$AA$52)	=IF(I28="NA","NA",$AA$45*D28*I28*$AA$51*$AA$56/$AA$52)
Chromium	=EXP(0.7338*LN(F29)-1.4599)/F29	=$AA$54*B29*$AA$56/$AA$52	=$AA$50*D29*$AA$56/$AA$52	=$AA$49*F29*$AA$56/$AA$52	=IF(H29="NA","NA",$AA$44*B29*H29*$AA$51*$AA$56/$AA$52)	=IF(I29="NA","NA",$AA$45*D29*I29*$AA$51*$AA$56/$AA$52)
Copper	=EXP(0.144*LN(F30)+2.042)/F30	=$AA$54*B30*$AA$56/$AA$52	=$AA$50*D30*$AA$56/$AA$52	=$AA$49*F30*$AA$56/$AA$52	=IF(H30="NA","NA",$AA$44*B30*H30*$AA$51*$AA$56/$AA$52)	=IF(I30="NA","NA",$AA$45*D30*I30*$AA$51*$AA$56/$AA$52)
Lead	=EXP(0.4422*LN(F31)+0.0761)/F31	=$AA$54*B31*$AA$56/$AA$52	=$AA$50*D31*$AA$56/$AA$52	=$AA$49*F31*$AA$56/$AA$52	=IF(H31="NA","NA",$AA$44*B31*H31*$AA$51*$AA$56/$AA$52)	=IF(I31="NA","NA",$AA$45*D31*I31*$AA$51*$AA$56/$AA$52)
Mercury	0.192	=$AA$54*B32*$AA$56/$AA$52	=$AA$50*D32*$AA$56/$AA$52	=$AA$49*F32*$AA$56/$AA$52	=IF(H32="NA","NA",$AA$44*B32*H32*$AA$51*$AA$56/$AA$52)	=IF(I32="NA","NA",$AA$45*D32*I32*$AA$51*$AA$56/$AA$52)
Nickel	=EXP(0.4658*LN(F33)-0.2462)/F33	=$AA$54*B33*$AA$56/$AA$52	=$AA$50*D33*$AA$56/$AA$52	=$AA$49*F33*$AA$56/$AA$52	=IF(H33="NA","NA",$AA$44*B33*H33*$AA$51*$AA$56/$AA$52)	=IF(I33="NA","NA",$AA$45*D33*I33*$AA$51*$AA$56/$AA$52)
Selenium	=EXP(0.3764*LN(F34)-0.4158)/F34	=$AA$54*B34*$AA$56/$AA$52	=$AA$50*D34*$AA$56/$AA$52	=$AA$49*F34*$AA$56/$AA$52	=IF(H34="NA","NA",$AA$44*B34*H34*$AA$51*$AA$56/$AA$52)	=IF(I34="NA","NA",$AA$45*D34*I34*$AA$51*$AA$56/$AA$52)
Silver	0.004	=$AA$54*B35*$AA$56/$AA$52	=$AA$50*D35*$AA$56/$AA$52	=$AA$49*F35*$AA$56/$AA$52	=IF(H35="NA","NA",$AA$44*B35*H35*$AA$51*$AA$56/$AA$52)	=IF(I35="NA","NA",$AA$45*D35*I35*$AA$51*$AA$56/$AA$52)
Zinc	=EXP(0.0706*LN(F36)+4.3632)/F36	=$AA$54*B36*$AA$56/$AA$52	=$AA$50*D36*$AA$56/$AA$52	=$AA$49*F36*$AA$56/$AA$52	=IF(H36="NA","NA",$AA$44*B36*H36*$AA$51*$AA$56/$AA$52)	=IF(I36="NA","NA",$AA$45*D36*I36*$AA$51*$AA$56/$AA$52)

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x Cij}{BW} \right) \right] \right)$$

Table F-30
Tier 2 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at the New River Unit Rail Yard

Hazard Estimate - Tier 2
Red Fox

Chemical	PDE Terr. Invert. mg/kg-d	PDE Plants mg/kg-d	PDE Mammals mg/kg-d	PDE Birds mg/kg-d	Total PDE mg/kg-d	Chemical-Specific Toxicity Value UF
2,3,7,8-TCDD-TE	=IF(J8="NA","NA",$AA$46*F8*J8*$AA$51*$AA$56/$AA$52)	=IF(K8="NA","NA",$AA$43*F8*K8*$AA$51*$AA$56/$AA$52)	=IF(L8="NA","NA",$AA$47*F8*L8*$AA$51*$AA$56/$AA$52)	=IF(M8="NA","NA",$AA$48*F8*M8*$AA$51*$AA$56/$AA$52)	=SUM(N8:V8)	8
1,1,2,2-Tetrachloroethane	=IF(J9="NA","NA",$AA$46*F9*J9*$AA$51*$AA$56/$AA$52)	=IF(K9="NA","NA",$AA$43*F9*K9*$AA$51*$AA$56/$AA$52)	=IF(L9="NA","NA",$AA$47*F9*L9*$AA$51*$AA$56/$AA$52)	=IF(M9="NA","NA",$AA$48*F9*M9*$AA$51*$AA$56/$AA$52)	=SUM(N9:V9)	8
1,2,3-Trichlorobenzene	=IF(J10="NA","NA",$AA$46*F10*J10*$AA$51*$AA$56/$AA$52)	=IF(K10="NA","NA",$AA$43*F10*K10*$AA$51*$AA$56/$AA$52)	=IF(L10="NA","NA",$AA$47*F10*L10*$AA$51*$AA$56/$AA$52)	=IF(M10="NA","NA",$AA$48*F10*M10*$AA$51*$AA$56/$AA$52)	=SUM(N10:V10)	8
1,2,4-Trichlorobenzene	=IF(J11="NA","NA",$AA$46*F11*J11*$AA$51*$AA$56/$AA$52)	=IF(K11="NA","NA",$AA$43*F11*K11*$AA$51*$AA$56/$AA$52)	=IF(L11="NA","NA",$AA$47*F11*L11*$AA$51*$AA$56/$AA$52)	=IF(M11="NA","NA",$AA$48*F11*M11*$AA$51*$AA$56/$AA$52)	=SUM(N11:V11)	8
1,2-Dichlorobenzene	=IF(J12="NA","NA",$AA$46*F12*J12*$AA$51*$AA$56/$AA$52)	=IF(K12="NA","NA",$AA$43*F12*K12*$AA$51*$AA$56/$AA$52)	=IF(L12="NA","NA",$AA$47*F12*L12*$AA$51*$AA$56/$AA$52)	=IF(M12="NA","NA",$AA$48*F12*M12*$AA$51*$AA$56/$AA$52)	=SUM(N12:V12)	8
1,3-Dichlorobenzene	=IF(J13="NA","NA",$AA$46*F13*J13*$AA$51*$AA$56/$AA$52)	=IF(K13="NA","NA",$AA$43*F13*K13*$AA$51*$AA$56/$AA$52)	=IF(L13="NA","NA",$AA$47*F13*L13*$AA$51*$AA$56/$AA$52)	=IF(M13="NA","NA",$AA$48*F13*M13*$AA$51*$AA$56/$AA$52)	=SUM(N13:V13)	8
1,4-Dichlorobenzene	=IF(J14="NA","NA",$AA$46*F14*J14*$AA$51*$AA$56/$AA$52)	=IF(K14="NA","NA",$AA$43*F14*K14*$AA$51*$AA$56/$AA$52)	=IF(L14="NA","NA",$AA$47*F14*L14*$AA$51*$AA$56/$AA$52)	=IF(M14="NA","NA",$AA$48*F14*M14*$AA$51*$AA$56/$AA$52)	=SUM(N14:V14)	8
4,4'-DDT	=IF(J15="NA","NA",$AA$46*F15*J15*$AA$51*$AA$56/$AA$52)	=IF(K15="NA","NA",$AA$43*F15*K15*$AA$51*$AA$56/$AA$52)	=IF(L15="NA","NA",$AA$47*F15*L15*$AA$51*$AA$56/$AA$52)	=IF(M15="NA","NA",$AA$48*F15*M15*$AA$51*$AA$56/$AA$52)	=SUM(N15:V15)	8
alpha-Chlordane	=IF(J16="NA","NA",$AA$46*F16*J16*$AA$51*$AA$56/$AA$52)	=IF(K16="NA","NA",$AA$43*F16*K16*$AA$51*$AA$56/$AA$52)	=IF(L16="NA","NA",$AA$47*F16*L16*$AA$51*$AA$56/$AA$52)	=IF(M16="NA","NA",$AA$48*F16*M16*$AA$51*$AA$56/$AA$52)	=SUM(N16:V16)	8
Aroclor 1254	=IF(J17="NA","NA",$AA$46*F17*J17*$AA$51*$AA$56/$AA$52)	=IF(K17="NA","NA",$AA$43*F17*K17*$AA$51*$AA$56/$AA$52)	=IF(L17="NA","NA",$AA$47*F17*L17*$AA$51*$AA$56/$AA$52)	=IF(M17="NA","NA",$AA$48*F17*M17*$AA$51*$AA$56/$AA$52)	=SUM(N17:V17)	8
Endosulfan II	=IF(J18="NA","NA",$AA$46*F18*J18*$AA$51*$AA$56/$AA$52)	=IF(K18="NA","NA",$AA$43*F18*K18*$AA$51*$AA$56/$AA$52)	=IF(L18="NA","NA",$AA$47*F18*L18*$AA$51*$AA$56/$AA$52)	=IF(M18="NA","NA",$AA$48*F18*M18*$AA$51*$AA$56/$AA$52)	=SUM(N18:V18)	8
Endrin aldehyde	=IF(J19="NA","NA",$AA$46*F19*J19*$AA$51*$AA$56/$AA$52)	=IF(K19="NA","NA",$AA$43*F19*K19*$AA$51*$AA$56/$AA$52)	=IF(L19="NA","NA",$AA$47*F19*L19*$AA$51*$AA$56/$AA$52)	=IF(M19="NA","NA",$AA$48*F19*M19*$AA$51*$AA$56/$AA$52)	=SUM(N19:V19)	8
Endrin ketone	=IF(J20="NA","NA",$AA$46*F20*J20*$AA$51*$AA$56/$AA$52)	=IF(K20="NA","NA",$AA$43*F20*K20*$AA$51*$AA$56/$AA$52)	=IF(L20="NA","NA",$AA$47*F20*L20*$AA$51*$AA$56/$AA$52)	=IF(M20="NA","NA",$AA$48*F20*M20*$AA$51*$AA$56/$AA$52)	=SUM(N20:V20)	8
Fluoranthene	=IF(J21="NA","NA",$AA$46*F21*J21*$AA$51*$AA$56/$AA$52)	=IF(K21="NA","NA",$AA$43*F21*K21*$AA$51*$AA$56/$AA$52)	=IF(L21="NA","NA",$AA$47*F21*L21*$AA$51*$AA$56/$AA$52)	=IF(M21="NA","NA",$AA$48*F21*M21*$AA$51*$AA$56/$AA$52)	=SUM(N21:V21)	8
gamma-Chlordane	=IF(J22="NA","NA",$AA$46*F22*J22*$AA$51*$AA$56/$AA$52)	=IF(K22="NA","NA",$AA$43*F22*K22*$AA$51*$AA$56/$AA$52)	=IF(L22="NA","NA",$AA$47*F22*L22*$AA$51*$AA$56/$AA$52)	=IF(M22="NA","NA",$AA$48*F22*M22*$AA$51*$AA$56/$AA$52)	=SUM(N22:V22)	8
Heptachlor	=IF(J23="NA","NA",$AA$46*F23*J23*$AA$51*$AA$56/$AA$52)	=IF(K23="NA","NA",$AA$43*F23*K23*$AA$51*$AA$56/$AA$52)	=IF(L23="NA","NA",$AA$47*F23*L23*$AA$51*$AA$56/$AA$52)	=IF(M23="NA","NA",$AA$48*F23*M23*$AA$51*$AA$56/$AA$52)	=SUM(N23:V23)	8
Methoxychlor	=IF(J24="NA","NA",$AA$46*F24*J24*$AA$51*$AA$56/$AA$52)	=IF(K24="NA","NA",$AA$43*F24*K24*$AA$51*$AA$56/$AA$52)	=IF(L24="NA","NA",$AA$47*F24*L24*$AA$51*$AA$56/$AA$52)	=IF(M24="NA","NA",$AA$48*F24*M24*$AA$51*$AA$56/$AA$52)	=SUM(N24:V24)	8
Phenanthrene	=IF(J25="NA","NA",$AA$46*F25*J25*$AA$51*$AA$56/$AA$52)	=IF(K25="NA","NA",$AA$43*F25*K25*$AA$51*$AA$56/$AA$52)	=IF(L25="NA","NA",$AA$47*F25*L25*$AA$51*$AA$56/$AA$52)	=IF(M25="NA","NA",$AA$48*F25*M25*$AA$51*$AA$56/$AA$52)	=SUM(N25:V25)	8
Pyrene	=IF(J26="NA","NA",$AA$46*F26*J26*$AA$51*$AA$56/$AA$52)	=IF(K26="NA","NA",$AA$43*F26*K26*$AA$51*$AA$56/$AA$52)	=IF(L26="NA","NA",$AA$47*F26*L26*$AA$51*$AA$56/$AA$52)	=IF(M26="NA","NA",$AA$48*F26*M26*$AA$51*$AA$56/$AA$52)	=SUM(N26:V26)	8
Arsenic	=IF(J27="NA","NA",$AA$46*F27*J27*$AA$51*$AA$56/$AA$52)	=IF(K27="NA","NA",$AA$43*F27*K27*$AA$51*$AA$56/$AA$52)	=IF(L27="NA","NA",$AA$47*F27*L27*$AA$51*$AA$56/$AA$52)	=IF(M27="NA","NA",$AA$48*F27*M27*$AA$51*$AA$56/$AA$52)	=SUM(N27:V27)	8
Cadmium	=IF(J28="NA","NA",$AA$46*F28*J28*$AA$51*$AA$56/$AA$52)	=IF(K28="NA","NA",$AA$43*F28*K28*$AA$51*$AA$56/$AA$52)	=IF(L28="NA","NA",$AA$47*F28*L28*$AA$51*$AA$56/$AA$52)	=IF(M28="NA","NA",$AA$48*F28*M28*$AA$51*$AA$56/$AA$52)	=SUM(N28:V28)	8
Chromium	=IF(J29="NA","NA",$AA$46*F29*J29*$AA$51*$AA$56/$AA$52)	=IF(K29="NA","NA",$AA$43*F29*K29*$AA$51*$AA$56/$AA$52)	=IF(L29="NA","NA",$AA$47*F29*L29*$AA$51*$AA$56/$AA$52)	=IF(M29="NA","NA",$AA$48*F29*M29*$AA$51*$AA$56/$AA$52)	=SUM(N29:V29)	8
Copper	=IF(J30="NA","NA",$AA$46*F30*J30*$AA$51*$AA$56/$AA$52)	=IF(K30="NA","NA",$AA$43*F30*K30*$AA$51*$AA$56/$AA$52)	=IF(L30="NA","NA",$AA$47*F30*L30*$AA$51*$AA$56/$AA$52)	=IF(M30="NA","NA",$AA$48*F30*M30*$AA$51*$AA$56/$AA$52)	=SUM(N30:V30)	8
Lead	=IF(J31="NA","NA",$AA$46*F31*J31*$AA$51*$AA$56/$AA$52)	=IF(K31="NA","NA",$AA$43*F31*K31*$AA$51*$AA$56/$AA$52)	=IF(L31="NA","NA",$AA$47*F31*L31*$AA$51*$AA$56/$AA$52)	=IF(M31="NA","NA",$AA$48*F31*M31*$AA$51*$AA$56/$AA$52)	=SUM(N31:V31)	8
Mercury	=IF(J32="NA","NA",$AA$46*F32*J32*$AA$51*$AA$56/$AA$52)	=IF(K32="NA","NA",$AA$43*F32*K32*$AA$51*$AA$56/$AA$52)	=IF(L32="NA","NA",$AA$47*F32*L32*$AA$51*$AA$56/$AA$52)	=IF(M32="NA","NA",$AA$48*F32*M32*$AA$51*$AA$56/$AA$52)	=SUM(N32:V32)	8
Nickel	=IF(J33="NA","NA",$AA$46*F33*J33*$AA$51*$AA$56/$AA$52)	=IF(K33="NA","NA",$AA$43*F33*K33*$AA$51*$AA$56/$AA$52)	=IF(L33="NA","NA",$AA$47*F33*L33*$AA$51*$AA$56/$AA$52)	=IF(M33="NA","NA",$AA$48*F33*M33*$AA$51*$AA$56/$AA$52)	=SUM(N33:V33)	8
Selenium	=IF(J34="NA","NA",$AA$46*F34*J34*$AA$51*$AA$56/$AA$52)	=IF(K34="NA","NA",$AA$43*F34*K34*$AA$51*$AA$56/$AA$52)	=IF(L34="NA","NA",$AA$47*F34*L34*$AA$51*$AA$56/$AA$52)	=IF(M34="NA","NA",$AA$48*F34*M34*$AA$51*$AA$56/$AA$52)	=SUM(N34:V34)	8
Silver	=IF(J35="NA","NA",$AA$46*F35*J35*$AA$51*$AA$56/$AA$52)	=IF(K35="NA","NA",$AA$43*F35*K35*$AA$51*$AA$56/$AA$52)	=IF(L35="NA","NA",$AA$47*F35*L35*$AA$51*$AA$56/$AA$52)	=IF(M35="NA","NA",$AA$48*F35*M35*$AA$51*$AA$56/$AA$52)	=SUM(N35:V35)	8
Zinc	=IF(J36="NA","NA",$AA$46*F36*J36*$AA$51*$AA$56/$AA$52)	=IF(K36="NA","NA",$AA$43*F36*K36*$AA$51*$AA$56/$AA$52)	=IF(L36="NA","NA",$AA$47*F36*L36*$AA$51*$AA$56/$AA$52)	=IF(M36="NA","NA",$AA$48*F36*M36*$AA$51*$AA$56/$AA$52)	=SUM(N36:V36)	8

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x Cij}{BW} \right) \right] \right)$$

Table F-30
Tier 2 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at the New River Unit Rail Yard

Hazard Estimate - Tier 2
Red Fox

Chemical	NOAEL mg/kg-d	Adjusted NOAEL mg/kg-d	EEQ N	LOAEL mg/kg-d	Adjusted LOAEL mg/kg-d	EEQ L
2,3,7,8-TCDD-TE	0.000001	=IF(Y8="NA","NA",Y8/X8)	=IF(Y8="NA","NA",W8/Z8)	0.00001	=IF(AB8="NA","NA",AB8	=IF(AB8="NA","NA",W
1,1,2,2-Tetrachloroethane	44.3	=IF(Y9="NA","NA",Y9/X9)	=IF(Y9="NA","NA",W9/Z9)	221.5	=IF(AB9="NA","NA",AB9	=IF(AB9="NA","NA",W
1,2,3-Trichlorobenzene	1.48	=IF(Y10="NA","NA",Y10/X10)	=IF(Y10="NA","NA",W10/Z10)	7.4	=IF(AB10="NA","NA",AB	=IF(AB10="NA","NA",'
1,2,4-Trichlorobenzene	1.48	=IF(Y11="NA","NA",Y11/X11)	=IF(Y11="NA","NA",W11/Z11)	7.4	=IF(AB11="NA","NA",AB	=IF(AB11="NA","NA",'
1,2-Dichlorobenzene	85.7	=IF(Y12="NA","NA",Y12/X12)	=IF(Y12="NA","NA",W12/Z12)	428.5	=IF(AB12="NA","NA",AB	=IF(AB12="NA","NA",'
1,3-Dichlorobenzene	85.7	=IF(Y13="NA","NA",Y13/X13)	=IF(Y13="NA","NA",W13/Z13)	428.5	=IF(AB13="NA","NA",AB	=IF(AB13="NA","NA",'
1,4-Dichlorobenzene	2.5	=IF(Y14="NA","NA",Y14/X14)	=IF(Y14="NA","NA",W14/Z14)	12.5	=IF(AB14="NA","NA",AB	=IF(AB14="NA","NA",'
4,4'-DDT	0.8	=IF(Y15="NA","NA",Y15/X15)	=IF(Y15="NA","NA",W15/Z15)	4	=IF(AB15="NA","NA",AB	=IF(AB15="NA","NA",'
alpha-Chlordane	4.6	=IF(Y16="NA","NA",Y16/X16)	=IF(Y16="NA","NA",W16/Z16)	9.2	=IF(AB16="NA","NA",AB	=IF(AB16="NA","NA",'
Aroclor 1254	0.14	=IF(Y17="NA","NA",Y17/X17)	=IF(Y17="NA","NA",W17/Z17)	0.68	=IF(AB17="NA","NA",AB	=IF(AB17="NA","NA",'
Endosulfan II	0.15	=IF(Y18="NA","NA",Y18/X18)	=IF(Y18="NA","NA",W18/Z18)	0.75	=IF(AB18="NA","NA",AB	=IF(AB18="NA","NA",'
Endrin aldehyde	0.092	=IF(Y19="NA","NA",Y19/X19)	=IF(Y19="NA","NA",W19/Z19)	0.92	=IF(AB19="NA","NA",AB	=IF(AB19="NA","NA",'
Endrin ketone	0.092	=IF(Y20="NA","NA",Y20/X20)	=IF(Y20="NA","NA",W20/Z20)	0.92	=IF(AB20="NA","NA",AB	=IF(AB20="NA","NA",'
Fluoranthene	0.615	=IF(Y21="NA","NA",Y21/X21)	=IF(Y21="NA","NA",W21/Z21)	3.07	=IF(AB21="NA","NA",AB	=IF(AB21="NA","NA",'
gamma-Chlordane	4.6	=IF(Y22="NA","NA",Y22/X22)	=IF(Y22="NA","NA",W22/Z22)	9.2	=IF(AB22="NA","NA",AB	=IF(AB22="NA","NA",'
Heptachlor	0.1	=IF(Y23="NA","NA",Y23/X23)	=IF(Y23="NA","NA",W23/Z23)	1	=IF(AB23="NA","NA",AB	=IF(AB23="NA","NA",'
Methoxychlor	4	=IF(Y24="NA","NA",Y24/X24)	=IF(Y24="NA","NA",W24/Z24)	8	=IF(AB24="NA","NA",AB	=IF(AB24="NA","NA",'
Phenanthrene	65.6	=IF(Y25="NA","NA",Y25/X25)	=IF(Y25="NA","NA",W25/Z25)	110	=IF(AB25="NA","NA",AB	=IF(AB25="NA","NA",'
Pyrene	0.615	=IF(Y26="NA","NA",Y26/X26)	=IF(Y26="NA","NA",W26/Z26)	3.07	=IF(AB26="NA","NA",AB	=IF(AB26="NA","NA",'
Arsenic	0.126	=IF(Y27="NA","NA",Y27/X27)	=IF(Y27="NA","NA",W27/Z27)	1.26	=IF(AB27="NA","NA",AB	=IF(AB27="NA","NA",'
Cadmium	1	=IF(Y28="NA","NA",Y28/X28)	=IF(Y28="NA","NA",W28/Z28)	10	=IF(AB28="NA","NA",AB	=IF(AB28="NA","NA",'
Chromium	2737	=IF(Y29="NA","NA",Y29/X29)	=IF(Y29="NA","NA",W29/Z29)	13690	=IF(AB29="NA","NA",AB	=IF(AB29="NA","NA",'
Copper	11.7	=IF(Y30="NA","NA",Y30/X30)	=IF(Y30="NA","NA",W30/Z30)	15.1	=IF(AB30="NA","NA",AB	=IF(AB30="NA","NA",'
Lead	8	=IF(Y31="NA","NA",Y31/X31)	=IF(Y31="NA","NA",W31/Z31)	80	=IF(AB31="NA","NA",AB	=IF(AB31="NA","NA",'
Mercury	1	=IF(Y32="NA","NA",Y32/X32)	=IF(Y32="NA","NA",W32/Z32)	5	=IF(AB32="NA","NA",AB	=IF(AB32="NA","NA",'
Nickel	40	=IF(Y33="NA","NA",Y33/X33)	=IF(Y33="NA","NA",W33/Z33)	80	=IF(AB33="NA","NA",AB	=IF(AB33="NA","NA",'
Selenium	0.2	=IF(Y34="NA","NA",Y34/X34)	=IF(Y34="NA","NA",W34/Z34)	0.33	=IF(AB34="NA","NA",AB	=IF(AB34="NA","NA",'
Silver	22.2	=IF(Y35="NA","NA",Y35/X35)	=IF(Y35="NA","NA",W35/Z35)	222	=IF(AB35="NA","NA",AB	=IF(AB35="NA","NA",'
Zinc	160	=IF(Y36="NA","NA",Y36/X36)	=IF(Y36="NA","NA",W36/Z36)	320	=IF(AB36="NA","NA",AB	=IF(AB36="NA","NA",'
Hazard Index (Total EEQ):			=SUM(AA8:AA36)			=SUM(AD8:AD36)

Species-Specific Factors

$$Ej = \left[\frac{A}{IR}\sum\left(\frac{IRi \times Cij}{BW}\right)\right]$$

Plant diet fraction =	0.17	unitless
Fish diet fraction =	0	unitless
Aq. Invert. diet fraction =	0	unitless
Terr. Invert. diet fraction =	0.04	unitless
Mammal diet fraction =	0.65	unitless
Bird diet fraction =	0.14	unitless
Soil ingestion rate =	0.0067	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.24	kg/d
Body weight =	4.53	kg
Home range =	2204	acres
Water intake rate =	0.39	L/d
Site Area =	1.08	acres
Frac. home range (FHR) =	=IF(((AA55/AA53)>1),1,(AA55/AA53))	unitless

Table
Wildlife EEQ Hazard Summary for SWMU 41 Area B

Receptor	Tier 1[a]		Tier 2[b]	
	NOAEL-Based EEQ	LOAEL-Based EEQ	NOAEL-Based EEQ	LOAEL-Based EEQ
Meadow vole	44	11	15	3.6
Hazard Driver(s)[c]:				
Short-tailed shrew	207	41	84	15
Hazard Driver(s)[c]:				
American robin	116	27	45	8.5
Hazard Driver(s)[c]:				
Red-tailed hawk	7.1	1.8	0.003	0.0006
Hazard Driver(s)[c]:				
Red fox	16	4.5	0.003	0.0009
Hazard Driver(s)[c]:				
Mink	172	28	0.56	0.09
Hazard Driver(s)[c]:				
Great blue heron	30	5.8	0.19	0.04
Hazard Driver(s)[c]:				

[a] Tier 1 = Max EEQ using max EPC, max BAF/BCF, max Intake Rates, min BW, and FHR =1.

[b] Tier 2 = EEQ using 95% EPC, non-max BAF/BCF, avg Intake Rates, avg BW and calculated FHR less than or equal to 1.

[c] Hazard drivers are those chemicals contributing the most to the total estimated EEQ, and the primary route of exposure associated with this driver.

Notes:

EEQ = Ecological Effects Quotient

LOAEL = Lowest Observed Adverse Effect Level

NOAEL = No Observed Adverse Effect Level

FHR = Fraction home range

BW = Body weight

BAF/BCF = Bioaccumulation Factor/Bioconcentration Factor

EPC = Exposure point concentration

Table F-31
Recommended Bioaccumulation/Bioconcentration Factors or Regression Equations Utilized for the Soil-to-Plant Pathway at SWMU 41

Constituent	USEPA (2007) Eco-SSL Uptake Equation [a]	Alternate Regression Equation [b, c]	Alternate BAF/BCF	Recommended Tier 1 BAF/BCF	Rationale for Recommended Tier 1 BAF/BCF	Recommended Tier 2 BAF/BCF	Rationale for Recommended Tier 2 BAF/BCF
2,3,7,8-TCDD-TE	--[d]	Log (PC)= -0.578(Log[Kow])+1.588	--	0.004	Travis & Arms K_{ow} Regression Eq.	0.004	Travis & Arms K_{ow} Regression Eq.
1,1,2,2-Tetrachloroethane	--	Log (PC)= -0.578(Log[Kow])+1.588	--	2.1	Travis & Arms K_{ow} Regression Eq.	2.1	Travis & Arms K_{ow} Regression Eq.
1,2,3-Trichlorobenzene	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.21	Travis & Arms K_{ow} Regression Eq.	0.21	Travis & Arms K_{ow} Regression Eq.
1,2,4-Trichlorobenzene	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.21	Travis & Arms K_{ow} Regression Eq.	0.21	Travis & Arms K_{ow} Regression Eq.
1,2-Dichlorobenzene	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.49	Travis & Arms K_{ow} Regression Eq.	0.49	Travis & Arms K_{ow} Regression Eq.
1,3-Dichlorobenzene	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.49	Travis & Arms K_{ow} Regression Eq.	0.49	Travis & Arms K_{ow} Regression Eq.
1,4-Dichlorobenzene	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.49	Travis & Arms K_{ow} Regression Eq.	0.49	Travis & Arms K_{ow} Regression Eq.
2,4,6-Trinitrotoluene	Pc= 4.23(soil)	--	--	4.23	Recommended BAF from USEPA (2007)	4.23	Recommended BAF from USEPA (2007)
2-amino-4,6-Dinitrotoluene	--	Log (PC)= -0.578(Log[Kow])+1.588	--	3.35	Travis & Arms K_{ow} Regression Eq.	3.35	Travis & Arms K_{ow} Regression Eq.
4,4'-DDT	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.0046	Travis & Arms K_{ow} Regression Eq.	0.0046	Travis & Arms K_{ow} Regression Eq.
4-amino-2,6-Dinitrotoluene	--	Log (PC)= -0.578(Log[Kow])+1.588	--	3.35	Travis & Arms K_{ow} Regression Eq.	3.35	Travis & Arms K_{ow} Regression Eq.
Acenaphthene	ln (Pc)= -0.8556(ln[soil])-5.562	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
alpha-Chlordane	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.009	Travis & Arms K_{ow} Regression Eq.	0.009	Travis & Arms K_{ow} Regression Eq.
Anthracene	ln (Pc)= 0.7784(ln[soil])-0.9887	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Aroclor 1254	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.004	Travis & Arms K_{ow} Regression Eq.	0.004	Travis & Arms K_{ow} Regression Eq.
Benzo(a)anthracene	ln (Pc)= 0.5944(ln[soil])-2.7078	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Benzo(a)pyrene	ln (Pc)= 0.9750(ln[soil])-2.0615	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Benzo(b)fluoranthene	Pc= 0.31(soil)	--	--	0.31	Recommended BAF from USEPA (2007)	0.31	Recommended BAF from USEPA (2007)
Benzo(g,h,i)perylene	ln (Pc)= 1.1829(ln[soil])-0.9313	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Benzo(k)fluoranthene	ln (Pc)= 0.8595(ln[soil])-2.1579	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Chrysene	ln (Pc)= 0.5944(ln[soil])-2.7078	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Dieldrin	Pc= 0.41(soil)	--	--	0.41	Recommended BAF from USEPA (2007)	0.41	Recommended BAF from USEPA (2007)
Endosulfan II	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.37	Travis & Arms K_{ow} Regression Eq.	0.37	Travis & Arms K_{ow} Regression Eq.
Endrin	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.027	Travis & Arms K_{ow} Regression Eq.	0.027	Travis & Arms K_{ow} Regression Eq.
Endrin aldehyde	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.065	Travis & Arms K_{ow} Regression Eq.	0.065	Travis & Arms K_{ow} Regression Eq.
Endrin ketone	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.051	Travis & Arms K_{ow} Regression Eq.	0.051	Travis & Arms K_{ow} Regression Eq.
Fluoranthene	Pc= 0.50(soil)	--	--	0.50	Recommended BAF from USEPA (2007)	0.50	Recommended BAF from USEPA (2007)
Fluorene	ln (Pc)= -0.8556(ln[soil])-5.562	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
gamma-Chlordane	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.009	Travis & Arms K_{ow} Regression Eq.	0.009	Travis & Arms K_{ow} Regression Eq.
Heptachlor	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.016	Travis & Arms K_{ow} Regression Eq.	0.016	Travis & Arms K_{ow} Regression Eq.
Heptachlor epoxide	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.09	Travis & Arms K_{ow} Regression Eq.	0.09	Travis & Arms K_{ow} Regression Eq.
Indeno(1,2,3-cd)pyrene	Pc= 0.11(soil)	--	--	0.11	Recommended BAF from USEPA (2007)	0.11	Recommended BAF from USEPA (2007)
Methoxychlor	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.02	Travis & Arms K_{ow} Regression Eq.	0.02	Travis & Arms K_{ow} Regression Eq.
Nitroglycerin	--	Log (PC)= -0.578(Log[Kow])+1.588	--	5.2	Travis & Arms K_{ow} Regression Eq.	5.2	Travis & Arms K_{ow} Regression Eq.
Phenanthrene	ln (Pc)= 0.6203(ln[soil])-0.1665	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Pyrene	Pc= 0.72(soil)	--	--	0.72	Recommended BAF from USEPA (2007)	0.72	Recommended BAF from USEPA (2007)
Arsenic	Pc= 0.03752(soil)	--	--	0.038	Recommended BAF from USEPA (2007)	0.038	Recommended BAF from USEPA (2007)
Cadmium	ln (Pc)= 0.546(ln[soil])-0.475	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Chromium	Pc= 0.041(soil)	--	--	0.041	Recommended BAF from USEPA (2007)	0.041	Recommended BAF from USEPA (2007)
Copper	ln (Pc)= 0.394(ln[soil])+0.668	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Lead	ln (Pc)= 0.561(ln[soil])-1.328	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)

Table F-31
Recommended Bioaccumulation/Bioconcentration Factors or Regression Equations Utilized for the Soil-to-Plant Pathway at SWMU 41

Constituent	USEPA (2007) Eco-SSL Uptake Equation [a]	Alternate Regression Equation [b, c]	Alternate BAF/BCF	Recommended Tier 1 BAF/BCF	Rationale for Recommended Tier 1 BAF/BCF	Recommended Tier 2 BAF/BCF	Rationale for Recommended Tier 2 BAF/BCF
Mercury	--	ln (Pc)=0.54(ln[soil])-1.00	--	Regression Eq.	Efroymson, et al. Regression Equation	Regression Eq.	Efroymson, et al. Regression Equation
Nickel	ln (Pc)= 0.748(ln[soil])-2.223	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Selenium	ln (Pc)= 1.104(ln[soil])-0.677	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Silver	Pc= 0.014(soil)	--	--	0.014	Recommended BAF from USEPA (2007)	0.014	Recommended BAF from USEPA (2007)
Zinc	ln (Pc)= 0.554(ln[soil])+1.575	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)

Notes: Pc (plant tissue concentration [mg/kg d.w.]); soil (concentration in soil [mg/kg d.w.]); BAF/BCF (bioaccumulation/bioconcentration factor); log K_{ow} (octanol/water partition coefficient).

If a soil to plant BAF/BCF was not available from USEPA, 2007, Ecological Soil Screening Level Guidance, an alternate value was used (see below).

[a] USEPA, 2007, Ecological Soil Screening Level Guidance, Soil to Plant Uptake Equations, OSWER Directive 9285.7-55.

[b] for organic chemicals: BAF estimated using Travis and Arms (1988) K_{ow} regression equation, with the log K_{ow} from USEPA, 2007, Estimation Programs Interface (EPI) Suite, v3.20 (Tier 2).

Constituent	Tier 1 and Tier 2 Log K_{ow}	Reference
2,3,7,8-TCDD TE	6.92	USEPA EPI Suite, 2007
1,1,2,2-Tetrachloroethane	2.19	USEPA EPI Suite, 2007
1,2,3-Trichlorobenzene	3.93	USEPA EPI Suite, 2007
1,2,4-Trichlorobenzene	3.93	USEPA EPI Suite, 2007
1,2-Dichlorobenzene	3.28	USEPA EPI Suite, 2007
1,3-Dichlorobenzene	3.28	USEPA EPI Suite, 2007
1,4-Dichlorobenzene	3.28	USEPA EPI Suite, 2007
2-amino-4,6-Dinitrotoluene	1.84	USEPA EPI Suite, 2007
4,4'-DDT	6.79	USEPA EPI Suite, 2007
4-amino-2,6-Dinitrotoluene	1.84	USEPA EPI Suite, 2007
alpha-Chlordane	6.26	USEPA EPI Suite, 2007
Aroclor 1254	6.98	USEPA EPI Suite, 2007
Endosulfan II	3.50	USEPA EPI Suite, 2007
Endrin	5.45	USEPA EPI Suite, 2007
Endrin aldehyde	4.80	USEPA EPI Suite, 2007
Endrin ketone	4.99	USEPA EPI Suite, 2007
gamma-Chlordane	6.26	USEPA EPI Suite, 2007
Heptachlor	5.86	USEPA EPI Suite, 2007
Heptachlor epoxide	4.56	USEPA EPI Suite, 2007
Methoxychlor	5.67	USEPA EPI Suite, 2007
Nitroglycerin	1.51	USEPA EPI Suite, 2007

[c] for inorganic chemicals: Efroymson, R.A. et al., 2001, Uptake of Inorganic Chemicals from Soil by Plant Leaves: Regressions of Field Data, Environ. Tox. Chem., 20:2561-2571.

[d] -- indicates that a BAF/BCF or regression equation is not available or not applicable.

Table F-32
Recommended Bioaccumulation/Bioconcentration Factors or Regression Equations Utilized for the Soil-to-Earthworm Pathway at SWMU 41

Constituent	USEPA (2007) Eco-SSL Uptake Equation [a]	Sample et al. 1998 [b]			Sample et al. 1999 [c]	Recommended Tier 1 BAF/BCF	Rationale for Recommended Tier 1 BAF/BCF	Recommended Tier 2 BAF/BCF	Rationale for Recommended Tier 2 BAF/BCF
		Median BAF/BCF	90th Percentile BAF/BCF	Maximum BAF/BCF	Regression Equation				
2,3,7,8-TCDD-TE	-- [d]	11.011	22.229	42.068	ln (EW)=1.18(ln[soil])+3.53	42.068	Maximum value	Regression Eq.	Chemical-specific Regression Eq.
1,1,2,2-Tetrachloroethane	--	--	--	--	--	3.67	Kow Regression Eq., using geo-mean TOC	2.78	Kow Regression Eq., using arith-mean TOC
1,2,3-Trichlorobenzene	--	--	--	--	--	17.49	Kow Regression Eq., using geo-mean TOC	13.24	Kow Regression Eq., using arith-mean TOC
1,2,4-Trichlorobenzene	--	--	--	--	--	17.85	Kow Regression Eq., using geo-mean TOC	13.52	Kow Regression Eq., using arith-mean TOC
1,2-Dichlorobenzene	--	--	--	--	--	7.87	Kow Regression Eq., using geo-mean TOC	5.96	Kow Regression Eq., using arith-mean TOC
1,3-Dichlorobenzene	--	--	--	--	--	8.03	Kow Regression Eq., using geo-mean TOC	6.08	Kow Regression Eq., using arith-mean TOC
1,4-Dichlorobenzene	--	--	--	--	--	8.03	Kow Regression Eq., using geo-mean TOC	6.08	Kow Regression Eq., using arith-mean TOC
2,4,6-Trinitrotoluene	--	--	--	--	--	0.14	Kow Regression Eq., using geo-mean TOC	0.11	Kow Regression Eq., using arith-mean TOC
2-amino-4,6-Dinitrotoluene	--	--	--	--	--	1.93	Kow Regression Eq., using geo-mean TOC	1.46	Kow Regression Eq., using arith-mean TOC
4,4'-DDT	ln (EW)= 0.8689(ln[soil])+2.1247	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
4-amino-2,6-Dinitrotoluene	--	--	--	--	--	1.93	Kow Regression Eq., using geo-mean TOC	1.46	Kow Regression Eq., using arith-mean TOC
Acenaphthene	(EW)= 1.47(soil)	--	--	--	--	1.47	Recommended BAF (USEPA 2007)	1.47	Recommended BAF (USEPA 2007)
alpha-Chlordane	--	--	--	--	--	15.73	Kow Regression Eq., using geo-mean TOC	11.92	Kow Regression Eq., using arith-mean TOC
Anthracene	(EW)= 2.42(soil)	--	--	--	--	2.42	Recommended BAF (USEPA 2007)	2.42	Recommended BAF (USEPA 2007)
Aroclor 1254	--	6.67	15.909	65.227	ln (EW)=1.29(ln[soil])+1.79	65.227	Maximum value	Regression Eq.	Chemical-specific Regression Eq.
Benzo(a)anthracene	(EW)= 1.59(soil)	--	--	--	--	1.59	Recommended BAF (USEPA 2007)	1.59	Recommended BAF (USEPA 2007)
Benzo(a)pyrene	(EW)= 1.33(soil)	--	--	--	--	1.33	Recommended BAF (USEPA 2007)	1.33	Recommended BAF (USEPA 2007)
Benzo(b)fluoranthene	(EW)= 2.6(soil)	--	--	--	--	2.6	Recommended BAF (USEPA 2007)	2.6	Recommended BAF (USEPA 2007)
Benzo(g,h,i)perylene	(EW)= 2.94(soil)	--	--	--	--	2.94	Recommended BAF (USEPA 2007)	2.94	Recommended BAF (USEPA 2007)
Benzo(k)fluoranthene	(EW)= 2.6(soil)	--	--	--	--	2.6	Recommended BAF (USEPA 2007)	2.6	Recommended BAF (USEPA 2007)
Chrysene	(EW)= 2.29(soil)	--	--	--	--	2.29	Recommended BAF (USEPA 2007)	2.29	Recommended BAF (USEPA 2007)
Dieldrin	(EW)= 14.7(soil)	--	--	--	--	14.7	Recommended BAF (USEPA 2007)	14.7	Recommended BAF (USEPA 2007)
Endosulfan II	--	--	--	--	--	0.25	Kow Regression Eq., using geo-mean TOC	0.19	Kow Regression Eq., using arith-mean TOC
Endrin	--	--	--	--	--	25.40	Kow Regression Eq., using geo-mean TOC	19.24	Kow Regression Eq., using arith-mean TOC
Endrin aldehyde	--	--	--	--	--	6.78	Kow Regression Eq., using geo-mean TOC	5.14	Kow Regression Eq., using arith-mean TOC
Endrin ketone	--	--	--	--	--	11.15	Kow Regression Eq., using geo-mean TOC	8.44	Kow Regression Eq., using arith-mean TOC
Fluoranthene	(EW)= 3.04(soil)	--	--	--	--	3.04	Recommended BAF (USEPA 2007)	3.04	Recommended BAF (USEPA 2007)
Fluorene	(EW)= 9.57(soil)	--	--	--	--	9.57	Recommended BAF (USEPA 2007)	9.57	Recommended BAF (USEPA 2007)
gamma-Chlordane	--	--	--	--	--	15.73	Kow Regression Eq., using geo-mean TOC	11.92	Kow Regression Eq., using arith-mean TOC
Heptachlor	--	--	--	--	--	11.68	Kow Regression Eq., using geo-mean TOC	8.85	Kow Regression Eq., using arith-mean TOC
Heptachlor epoxide	--	--	--	--	--	8.61	Kow Regression Eq., using geo-mean TOC	6.52	Kow Regression Eq., using arith-mean TOC
Indeno(1,2,3-cd)pyrene	(EW)= 2.86(soil)	--	--	--	--	2.86	Recommended BAF (USEPA 2007)	2.86	Recommended BAF (USEPA 2007)
Methoxychlor	--	--	--	--	--	9.84	Kow Regression Eq., using geo-mean TOC	7.46	Kow Regression Eq., using arith-mean TOC
Nitroglycerin	--	--	--	--	--	0.77	Kow Regression Eq., using geo-mean TOC	0.58	Kow Regression Eq., using arith-mean TOC
Phenanthrene	(EW)= 1.72(soil)	--	--	--	--	1.72	Recommended BAF (USEPA 2007)	1.72	Recommended BAF (USEPA 2007)
Pyrene	(EW)= 1.75(soil)	--	--	--	--	1.75	Recommended BAF (USEPA 2007)	1.75	Recommended BAF (USEPA 2007)
Arsenic	ln (EW)= 0.706(ln[soil])-1.421	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Cadmium	ln (EW)= 0.795(ln[soil])+2.114	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Chromium	(EW)= 0.306(soil)	--	--	--	--	0.306	Recommended BAF (USEPA 2007)	0.306	Recommended BAF (USEPA 2007)
Copper	(EW)= 0.515(soil)	--	--	--	--	0.515	Recommended BAF (USEPA 2007)	0.515	Recommended BAF (USEPA 2007)
Lead	ln (EW)= 0.807(ln[soil])-0.218	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Mercury	--	1.693	20.625	33	ln (EW)=0.33(ln[soil])+0.078	33	Maximum value	Regression Eq.	Chemical-specific Regression Eq.
Nickel	--	1.059	4.73	7.8	ln (EW)= -1.54(ln[soil])+7.03	7.8	Maximum value	Regression Eq.	Chemical-specific Regression Eq.
Selenium	ln (EW)= 0.733(ln[soil])-0.075	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)
Silver	(EW)= 2.045(soil)	--	--	--	--	2.045	Recommended BAF (USEPA 2007)	2.045	Recommended BAF (USEPA 2007)
Zinc	ln (EW)= 0.328(ln[soil])+4.449	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2007)	Regression Eq.	Recommended Equation (USEPA 2007)

Notes: EW (earthworm tissue concentration [mg/kg d.w.]); soil (concentration in soil [mg/kg d.w.]); BAF/BCF (bioaccumulation/bioconcentration factor); log Kow (octanol/water partition coefficient); -- indicates that a BAF/BCF or regression equation is not available or not applicable.
Hierarchy for Selection of BAFs:

Table F-32

Recommended Bioaccumulation/Bioconcentration Factors or Regression Equations Utilized for the Soil-to-Earthworm Pathway at SWMU 41

[a] USEPA, 2007, Ecological Soil Screening Level Guidance (Eco-SSL), Soil to Earthworm Uptake Equations, OSWER Directive 9285.7-55.

[b] Sample, B.E. et al., 1998, Development and Validation of Bioaccumulation Models for Earthworms, ES/ER/TM-220.

[c] Sample, B.E. et al., 1999, Literature-Derived Bioaccumulation Models for Earthworms: Development and Validation, Environ. Toxicol. Chem., 18(9): 2110-2120 (models from Table 3 of publication).

[e] USEPA, 2007, EcoSSL regression equation using site specific TOC values and chemical specific log Kow and Koc values. Equation details provided below.

Log Kow values and Koc values are from: USEPA, 2007, Estimation Programs Interface (EPI) Suite, v3.20.

There were no relevant TOC values collected at SWMU 41, so TOC concentrations were utilized as follows: Tier I: Lower-bound (geometric mean of nine RFAAP MMA samples) surface soil TOC = **1.28%**; Tier II arithmetic mean (mean of nine RFAAP MMA samples) surface soil TOC = **1.69%**.

TOC values:	Sample ID	Area / Matrix	Sample Date	Analyte	Result	Units
	31SB05A	MMA / SS	07/08/02	Total Organic Carbon	53300	UG/G
	39SB05A	MMA / SS	07/09/02	Total Organic Carbon	4560	UG/G
	48SB08A	MMA / SS	06/24/02	Total Organic Carbon	16700	UG/G
	49SS01	MMA / SS	06/24/02	Total Organic Carbon	17600	UG/G
	50SS01	MMA / SS	06/25/02	Total Organic Carbon	18900	UG/G
	58SB04A	MMA / SS	07/10/02	Total Organic Carbon	8760	UG/G
	59SS03	MMA / SS	06/27/02	Total Organic Carbon	14000	UG/G
	B43SB34A	MMA / SS	07/08/02	Total Organic Carbon	3950	UG/G
	LFSB12A	MMA / SS	06/26/02	Total Organic Carbon	14500	UG/G
				TOC Arithmetic Mean =	**16919**	**UG/G**
				TOC Geo. Mean =	**12840**	**UG/G**

Equation:

$$BAF = \frac{((10^{(0.87*\log Kow-2)})/0.16)}{foc^{*}\ Koc}$$

Log Kow, Koc, BAF Results:	Constituent	Koc	Log Kow	Tier 1 BAF/BCF	Tier 2 BAF/BCF
	1,1,2,2-Tetrachloroethane	107	2.19	3.67	2.78
	1,2,3-Trichlorobenzene	733	3.93	17.49	13.24
	1,2,4-Trichlorobenzene	718	3.93	17.85	13.52
	1,2-Dichlorobenzene	443	3.28	7.87	5.96
	1,3-Dichlorobenzene	434	3.28	8.03	6.08
	1,4-Dichlorobenzene	434	3.28	8.03	6.08
	2,4,6-Trinitrotoluene	1830	1.99	0.14	0.11
	2-amino-4,6-DNT	101	1.84	1.93	1.46
	4-amino-2,6-DNT	101	1.84	1.93	1.46
	alpha-Chlordane	86700	6.26	15.73	11.92
	Aroclor 1254	75600	6.98	76.34	57.82
	Endosulfan II	22000	3.5	0.25	0.19
	Endrin	10600	5.45	25.40	19.24
	Endrin aldehyde	10800	4.8	6.78	5.14
	Endrin ketone	9610	4.99	11.15	8.44
	gamma-Chlordane	86700	6.26	15.73	11.92
	Heptachlor	52400	5.86	11.68	8.85
	Heptachlor epoxide	5260	4.56	8.61	6.52
	Indeno(1,2,3-cd)pyrene	2680000	6.7	1.23	0.93
	Methoxychlor	42500	5.67	9.84	7.46
	Nitroglycerin	131	1.51	0.77	0.58

Table F-33
Recommended Bioaccumulation/Bioconcentration Factors Utilized for the Soil-to-Small Mammal and Bird Pathways at SWMU 41

Constituent	USEPA (2007) Eco-SSL Uptake Equation [a]	Sample et al., 1998 [b]						Recommended Tier 1 BAF/BCF	Rationale for Recommended Tier 1 BAF/BCF	Recommended Tier 2 BAF/BCF	Rationale for Recommended Tier 2 BAF/BCF
		Insectivore Median BAF/BCF	Herbivore Median BAF/BCF	Omnivore Median BAF/BCF	General [c] Median BAF/BCF	General [c] Maximum BAF/BCF	General [c] 90th percentile BAF/BCF				
2,3,7,8-TCDD-TE	--[d]	--	1.2857	0.7783	1.07	2.2	2.2	2.2	General maximum value	2.2	General 90th percentile value
1,1,2,2-Tetrachloroethane	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
1,2,3-Trichlorobenzene	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
1,2,4-Trichlorobenzene	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
1,2-Dichlorobenzene	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
1,3-Dichlorobenzene	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
1,4-Dichlorobenzene	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
2,4,6-Trinitrotoluene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
2-amino-4,6-Dinitrotoluene	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
4,4'-DDT	ln(mam)= 0.7254(ln[soil])+1.1788	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2007)	Regression Eq.	Recommended Regression Eq. (USEPA 2007)
4-amino-2,6-Dinitrotoluene	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Acenaphthene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
alpha-Chlordane	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Anthracene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
Aroclor 1254	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Benzo(a)anthracene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
Benzo(a)pyrene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
Benzo(b)fluoranthene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
Benzo(g,h,i)perylene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
Benzo(k)fluoranthene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
Chrysene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
Dieldrin	(mam)= 1.2(soil)	--	--	--	--	--	--	1.2	Recommended BAF (USEPA 2007)	1.2	Recommended BAF (USEPA 2007)
Endosulfan II	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Endrin	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Endrin aldehyde	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Endrin ketone	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Fluoranthene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
Fluorene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
gamma-Chlordane	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Heptachlor	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Heptachlor epoxide	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Indeno(1,2,3-cd)pyrene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
Methoxychlor	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Nitroglycerin	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Phenanthrene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
Pyrene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2007)	0	Uptake assumed to be negligible (USEPA 2007)
Arsenic	ln(mam)= 0.8188(ln[soil])-4.8471	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2007)	Regression Eq.	Recommended Regression Eq. (USEPA 2007)
Cadmium	ln(mam)= 0.4723(ln[soil])-1.2571	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2007)	Regression Eq.	Recommended Regression Eq. (USEPA 2007)
Chromium	ln(mam)= 0.7338(ln[soil])-1.4599	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2007)	Regression Eq.	Recommended Regression Eq. (USEPA 2007)
Copper	ln(mam)= 0.144(ln[soil])+2.042	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2007)	Regression Eq.	Recommended Regression Eq. (USEPA 2007)
Lead	ln(mam)= 0.4422(ln[soil])+0.0761	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2007)	Regression Eq.	Recommended Regression Eq. (USEPA 2007)
Mercury	--	1.046 [g]	0.0239 [g]	0.0543	0.0543	1.046	0.192	1.046	General maximum value	0.192	General 90th percentile value
Nickel	ln(mam)= 0.4658(ln[soil])-0.2462	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2007)	Regression Eq.	Recommended Regression Eq. (USEPA 2007)
Selenium	ln(mam)= 0.3764(ln[soil])-0.4158	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2007)	Regression Eq.	Recommended Regression Eq. (USEPA 2007)
Silver	(mam)= 0.004(soil)	--	--	--	--	--	--	0.004	Recommended BAF (USEPA 2007)	0.004	Recommended BAF (USEPA 2007)
Zinc	ln(mam)= 0.0706(ln[soil])+4.3632	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2007)	Regression Eq.	Recommended Regression Eq. (USEPA 2007)

Notes: mam (mammal or bird tissue concentration [mg/kg d.w.]); diet (concentration in diet [mg/kg d.w.] assuming 100% earthworm consumption); soil (concentration in soil [mg/kg d.w.]); BAF/BCF (bioaccumulation/bioconcentration factor).
Bird BAF/BCF values were based on the recommended small mammal BAF/BCF values, as bird uptake values are not readily available.

[a] USEPA, 2007, Ecological Soil Screening Level Guidance, Soil to Small Mammal Uptake Equations, OSWER Directive 9285.7-55.

[b] Sample et al., 1998, Development and Validation of Bioaccumulation Models for Small Mammals, ES/ER/TM-219.

[c] General = combination dataset used for insectivore, herbivore, and omnivore receptors to estimate a "general" receptor BAF/BCF value.

[d] "--" indicates that a BAF/BCF is not available or not applicable.

[e] Uptake assumed to be negligible (USEPA 2005).

[f] Known bioaccumulative organics (TCDD and TCDF) have BAFs/BCFs of 1.1 and 0.13 (median) and 2.2 and 0.16 (maximum) from Sample et al. (1998).
Conservative BAF/BCF default values of 1 and 0.5 were selected for other organics at the site, as they are not expected to be as bioaccumulative as TCDD/TCDF.

[g] Only one BAF/BCF value available for exposure to mercury in soil (median is also 90th percentile value and maximum value).

Table F-34
Recommended Bioaccumulation/Bioconcentration Factors Utilized for the Sediment-to-Aquatic Invertebrate Pathway at SWMU 41

Constituent	Bechtel Jacobs [a]			Recommended Tier 1 BAF/BCF [b, c]	Recommended Tier 2 BAF/BCF [b, c]	Rationale for Recommended Tier 2 BAF/BCF
	Median BAF/BCF	90th Percentile BAF/BCF	Maximum BAF/BCF			
2,3,7,8-TCDD-TE	--[d]	--	--	42.07	ln (EW)=1.18(ln[sed])+3.53	Soil Tier 2 BAF/BCF
1,2,4-Trichlorobenzene	--	--	--	17.85	13.52	Soil Tier 2 BAF/BCF
4,4'-DDT	--	--	--	ln (EW)= 0.8689(ln[sed])+2.1247	ln (EW)= 0.8689(ln[sed])+2.1247	Soil Tier 2 BAF/BCF
Acenaphthene	--	--	--	1.47	1.47	Soil Tier 2 BAF/BCF
Anthracene	--	--	--	2.42	2.42	Soil Tier 2 BAF/BCF
Aroclor 1254	4.67	21.89	51.31	21.89	4.67	Median sediment BAF/BCF
Benzo(a)anthracene	--	--	--	1.59	1.59	Soil Tier 2 BAF/BCF
Benzo(a)pyrene	--	--	--	1.33	1.33	Soil Tier 2 BAF/BCF
Benzo(b)fluoranthene	--	--	--	2.60	2.60	Soil Tier 2 BAF/BCF
Benzo(g,h,i)perylene	--	--	--	2.94	2.94	Soil Tier 2 BAF/BCF
Benzo(k)fluoranthene	--	--	--	2.60	2.60	Soil Tier 2 BAF/BCF
Chrysene	--	--	--	2.29	2.29	Soil Tier 2 BAF/BCF
Endrin aldehyde	--	--	--	6.78	5.14	Soil Tier 2 BAF/BCF
Fluoranthene	--	--	--	3.04	3.04	Soil Tier 2 BAF/BCF
Fluorene	--	--	--	9.57	9.57	Soil Tier 2 BAF/BCF
Indeno(1,2,3-cd)pyrene	--	--	--	2.86	2.86	Soil Tier 2 BAF/BCF
Nitroglycerin	--	--	--	0.77	0.58	Soil Tier 2 BAF/BCF
Phenanthrene	--	--	--	1.72	1.72	Soil Tier 2 BAF/BCF
Pyrene	--	--	--	1.75	1.75	Soil Tier 2 BAF/BCF
Arsenic	0.143	0.69	4.33	0.69	0.14	Median sediment BAF/BCF
Cadmium	0.6	7.99	41.55	7.99	0.6	Median sediment BAF/BCF
Chromium	0.1	0.468	1.101	0.47	0.1	Median sediment BAF/BCF
Copper	1.556	5.25	23.87	5.25	1.56	Median sediment BAF/BCF
Lead	0.071	0.607	7.08	0.61	0.071	Median sediment BAF/BCF
Mercury	1.136	2.868	3.981	2.87	1.14	Median sediment BAF/BCF
Nickel	0.486	2.32	5.746	2.32	0.49	Median sediment BAF/BCF
Selenium	--	--	--	2.1	0.42	Geo. mean of medians (Bechtel, 1998)
Silver	--	--	--	2.1	0.42	Geo. mean of medians (Bechtel, 1998)
Zinc	1.936	7.527	14.512	7.53	1.94	Median sediment BAF/BCF

Notes:

[a] Bechtel Jacobs Company LLC, 1998, Biota Sediment Accumulation Factors for Invertebrates: Review and Recommendations for the Oak Ridge Reservation, BJC/OR-112. (Depurated and nondepurated results used). 90th percentile value for Tier 1, median value for Tier 2.

[b] If a sediment BAF/BCF was not available for an inorganic constituent, the geometric mean of the available sediment inorganic BAFs/BCFs were used. The 90th percentile (2.1) was used for Tier 1 and the median (0.42) was used for Tier 2.

[c] If a sediment BAF/BCF was not available for an organic constituent, soil-to-invertebrate BAFs/BCFs were used. See soil-to-earthworm BAF/BCF appendix table for derivation of alternate BAF/BCF values.

[d] -- indicates that a BAF/BCF is not available.

Notes:

Geometric means for 90th percentile and median inorganic BAF/BCFs were calculated using the data provided below from Bechtel (1998):

	90th Percentile	Median
Arsenic	0.69	0.143
Cadmium	7.99	0.6
Chromium	0.468	0.1
Copper	5.25	1.556
Lead	0.607	0.071
Mercury	2.868	1.136
Nickel	2.32	0.486
Zinc	7.527	1.936
Geom. Mean	**2.1**	**0.42**

Table F-34
Recommended Bioaccumulation/Bioconcentration Factors Utilized for the Sediment-to-Aquatic Invertebrate Pathway at SWMU 41

Constituent	Bechtel Jacobs [a]			Recommended Tier 1 BAF/BCF [b, c]	Recommended Tier 2 BAF/BCF [b, c]	Rationale for Recommended Tier 2 BAF/BCF
	Median BAF/BCF	90th Percentile BAF/BCF	Maximum BAF/BCF			

Table F-35
Recommended Bioaccumulation/Bioconcentration Factors Utilized for the Water-to-Fish Pathway at SMWU 41

Constituent	IAEA [a] (Recommended Value and Range)	Bintein and Devillers [b]	USEPA, 1999 [c]	USEPA, 1989 [d]	Recommended Tier 1 (Maximum) BAF/BCF	Recommended Tier 2 (RME) BAF/BCF	Rationale for Recommended Tier 2 BAF/BCF
2,3,7,8-TCDD-TE	-- [e]	7680	21175	--	21175	7680	Lowest value
2,4,6-Trinitrotoluene	--	10.6	--	--	10.6	10.6	Only value available
2-amino-4,6-Dinitrotoluene	--	7.7	--	--	7.7	7.7	Only value available
4-amino-2,6-Dinitrotoluene	--	7.7	--	--	7.7	7.7	Only value available
Arsenic	--	--	570	1750	1750	570	Lowest value
Cadmium	--	--	4535	1630	4535	1630	Lowest value
Chromium	200 (0.4-2000)	--	95	775 (CrVI)	775	95	Lowest value
Copper	200 (0.5-200)	--	3550	5915	5915	200	Lowest value
Lead	300 (100-300)	--	0.45	895	895	0.45	Lowest value
Nickel	100	--	390	250	390	100	Lowest value
Selenium	--	--	645	--	645	645	Only value available
Zinc	1000 (100-3000)	--	10295	2890	10295	1000	Lowest value

[a] International Atomic Energy Agency (IAEA), 1994, *Handbook of Parameter Values for the Protection of Radionuclide Transfer in Temperate Environments* , Technical Reports Series No. 364.

[b] Bintein, S. and J. Devillers, 1993, *Nonlinear Dependence of Fish Bioconcentration on n-Octanol/'Water Partition Coefficient,* in SAR and QSAR in Environmental Research, Vol. 1, pp. 29-39, Gordon and Branch Science Publishers. See details below.

[c] USEPA, 1999, *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, EPA530-D-99-001A (Peer Review Draft),* Appendix C - Media-to-Receptor BCFs (water to fish). Wet weight BCFs converted to dry weight BCFs by multiplying by 5 (fish moisture content = 80%).

[d] USEPA, 1989, *Assessing Human Health Risks from Contaminated Fish and Shellfish: A Guidance Manual* , EPA-503/8-89-002. Wet weight BCFs converted to dry weight BCFs by multiplying by 5 (fish moisture content = 80%).

[e] -- indicates that a BAF/BCF is not available.

The following recommended regression equation from Bintein, S. and J. Devillers (1993) was used, along with log Kow values from USEPA, 2007, Estimation Programs Interface (EPI) Suite, v3.20. **$\log BCF = 0.910 \log Kow - 1.975 \log (6.8\ 10^{-7}\ Kow + 1) - 0.786$**

Constituent	Log Kow	Tier 1 BAF/BCF	Tier 2 BAF/BCF
2,3,7,8-TCDD-TE	6.92	7680	7680
2,4,6-Trinitrotoluene	1.99	10.6	10.6
2-amino-4,6-Dinitrotoluene	1.84	7.7	7.7
4-amino-2,6-Dinitrotoluene	1.84	7.7	7.7

Table F-36
NOAEL Toxicity Reference Values Used to Derive
Wildlife Toxicity Benchmarks for COPECs at SWMU 41

COPEC	Mammalian Data				Avian Data			
	Toxicity Value	NOAEL (mg/kg/d)	Test Species	Reference	Toxicity Value	NOAEL (mg/kg/d)	Test Species	Reference
Organics								
2,3,7,8-TCDD	--	0.000001	rat	Sample et al. (1996)	--	0.000014	ring-necked pheasant	Sample et al. (1996)
1,1,2,2-Tetrachloroethane	--	44.3	mouse	ATSDR, 1996	--	--	--	--
1,2,3-Trichlorobenzene	--	1.48	rat	Based on 1,2,4-Trichlorobenzene, LANL, 2005	--	--	--	--
1,2,4-Trichlorobenzene	--	1.48	rat	LANL, 2005	--	--	--	--
1,2-Dichlorobenzene	--	85.7	rat	USEPA, 2008	1608 (LD50)	16.1	northern bobwhite	Based on 1,4-Dichlorobenzene, Ecotox (2008)
1,3-Dichlorobenzene	--	85.7	rat	Based on 1,2-Dichlorobenzene, USEPA, 2008	1608 (LD50)	16.1	northern bobwhite	Based on 1,4-Dichlorobenzene, Ecotox (2008)
1,4-Dichlorobenzene	--	2.5	rat	LANL, 2005	1608 (LD50)	16.1	northern bobwhite	Ecotox (2008)
2,4,6-Trinitrotoluene	--	34.7	rat	LANL, 2005	--	9.75	quail, bobwhite	LANL, 2005
2-amino-4,6-Dinitrotoluene	--	2.81	rat	LANL, 2005	--	--	--	--
4,4'-DDT	--	0.8	rat	Sample et al. (1996)	--	0.0028	brown pelican	Sample et al. (1996)
4-amino-2,6-Dinitrotoluene	--	1.93	rat	LANL, 2005	--	--	--	--
Acenaphthene	--	65.6	rat	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler (1987)
alpha-Chlordane	--	4.6	mouse	Based on Chlordane, Sample et al. (1996)	--	2.14	red-winged blackbird	Based on Chlordane, Sample et al. (1996)
Anthracene	--	65.6	rat	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler (1987)
Aroclor 1254	--	0.14	mink	Sample et al. (1996)	--	0.18	ring-necked pheasant	Sample et al. (1996)
Benzo(a)anthracene	--	0.615	mouse	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(a)pyrene	--	1.0	mouse	Sample et al. (1996)	--	553	mallard duck	Eisler (1987)
Benzo(b)fluoranthene	--	0.615	mouse	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(g,h,i)perylene	--	0.615	mouse	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(k)fluoranthene	--	0.615	mouse	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler (1987)
Chrysene	--	0.615	mouse	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler (1987)
Dieldrin		0.015	rat	EcoSSL (EPA, 2007)	--	0.0709	mallard duck	EcoSSL (EPA, 2007)
Endosulfan II	--	0.15	rat	Sample et al. (1996)	--	10	gray partridge	Sample et al. (1996)
Endrin	0.92 (LOAEL)	0.092	mouse	Sample et al. (1996)	--	0.3	mallard duck	Sample et al. (1996)
Endrin aldehyde	0.92 (LOAEL)	0.092	mouse	Based on Endrin, Sample et al. (1996)	--	0.3	mallard duck	Based on Endrin, Sample et al. (1996)
Endrin ketone	0.92 (LOAEL)	0.092	mouse	Based on Endrin, Sample et al. (1996)	--	0.3	mallard duck	Based on Endrin, Sample et al. (1996)
Fluoranthene	--	0.615	mouse	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler (1987)
Fluorene	--	65.6	rat	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler, 1987
gamma-Chlordane	--	4.6	mouse	Based on Chlordane, Sample et al. (1996)	--	2.14	red-winged blackbird	Based on Chlordane, Sample et al. (1996)
Heptachlor	--	0.1	mink	Sample et al. (1996)	92 (LC50)	0.92	quail	LANL, 2005
Heptachlor epoxide	--	0.1	mink	Based on Heptachlor, Sample et al. (1996)	92 (LC50)	0.92	quail	Based on Heptachlor, LANL (2005)
Indeno(1,2,3-cd)pyrene	--	0.615	mouse	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler (1987)
Methoxychlor	--	4	rat	Sample et al. (1996)	--	25.78	Japanese quail	LANL, 2005
Nitroglycerin	--	96.4	mouse	LANL, 2005	--	--	--	--
Phenanthrene	--	65.6	rat	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler (1987)

Table F-36
NOAEL Toxicity Reference Values Used to Derive
Wildlife Toxicity Benchmarks for COPECs at SWMU 41

COPEC	Mammalian Data				Avian Data			
	Toxicity Value	NOAEL (mg/kg/d)	Test Species	Reference	Toxicity Value	NOAEL (mg/kg/d)	Test Species	Reference
Pyrene	--	0.615	mouse	EcoSSL (EPA, 2007)	--	553	mallard duck	Based on B(a)P, Eisler (1987)
Inorganics								
Arsenic	--	0.126	mouse	Sample et al. (1996)	--	5.14	mallard duck	Sample et al. (1996)
Cadmium	--	1	rat	Sample et al. (1996)	--	1.45	mallard duck	Sample et al. (1996)
Chromium	--	2,737	rat	Sample et al. (1996)	--	2.66	chicken, black duck, turkey	EcoSSL (EPA, 2007)
Copper	--	11.7	mink	Sample et al. (1996)	--	47	chicks	Sample et al. (1996)
Lead	--	8	rat	Sample et al. (1996)	--	3.85	American kestrel	Sample et al. (1996)
Mercury	--	1.0	mink	Sample et al. (1996)	--	0.45	Japanese quail	Sample et al. (1996)
Nickel	--	40	rat	Sample et al. (1996)	--	77.4	mallard duck	Sample et al. (1996)
Selenium	--	0.2	rat	Sample et al. (1996)	--	0.5	mallard duck	Sample et al. (1996)
Silver	222 (LOAEL)	22.2	rat	ATSDR (1990)	--	178.0	mallard duck	Terr. Tox. Database (USACHPPM, 2002)
Zinc	--	160.0	rat	Sample et al. (1996)	--	14.5	hens	Sample et al. (1996)

N/A indicates that the information is not available.

As recommended by Wentsel et al. (1996), Tri-Service Procedural Guidelines for Ecological Risk Assessments, the following adjustments were made to toxicity data when NOAEL or LOAEL data were not available:

- Subchronic LOAELs were converted to chronic NOAELs by dividing by a factor of 20.
- Chronic NOAELs were converted to chronic LOAELs by multiplying by a factor of 5.0.
- Subchronic NOAELs/LOAELs were converted to chronic NOAELs/LOAELs by dividing by a factor of 10.
- Chronic LOAELs were converted to chronic NOAELs by dividing by a factor of 10.
- LD_{50} concentrations were converted to chronic NOAELs by dividing by a factor of 100.
- LD_{50} concentrations were converted to chronic LOAELs by dividing by a factor of 20.

Methodology for Selection of TRVs:

(1) Sample et al., 1996, Toxicological Benchmarks for Wildlife.

(2) USEPA, 2007, Ecological Screening Levels (Eco-SSL). Low molecular weigh (LMW) PAH NOAELs based on Verschuuren et al., 1976; high molecular weight (HMW) PAH NOAELs based on Culp et al., 1998; LMW LOAELs based on Murata et al., 1997; HMW PAH LOAELs based on Culp et al., 1998.

(3) LANL (2005). Ecorisk Database, Release 2.2, September 2005, Los Alamos National Laboratory.

(4) Others as listed below:

ATSDR, 1990, Toxicological Profile for Silver, U.S. Public Health Service.
ATSDR, 1996, Toxicological Profile for 1,1,2,2-Tetrachloroethane, U.S. Public Health Service.
Eisler, 1987, PAH Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review.
TERRETOX, http://www.epa.gov/ecotox.
USACHPPM, 2002, Terrestrial Toxicity Database.
USEPA, 1999, SLERA Protocol for Hazardous Waste Combustion Facilties.
USEPA, 2000, OPP (Office of Pesticide Programs). Environmental Effects Database (EEDB).
USEPA, 2008, Integrated Risk Information System (IRIS).

Table F-37
LOAEL Toxicity Reference Values Used to Derive
Wildlife Toxicity Benchmarks for COPECs at SWMU 41

COPEC	Mammalian Data				Avian Data			
	Toxicity Value	LOAEL (mg/kg/d)	Test Species	Reference	Toxicity Value	LOAEL (mg/kg/d)	Test Species	Reference
Organics								
2,3,7,8-TCDD TE	--	0.00001	rat	Sample et al. (1996)	--	0.00014	ring-necked pheasant	Sample et al. (1996)
1,1,2,2-Tetrachloroethane	44.3 (chronic NOAEL)	222	mouse	ATSDR, 1996	--	--	--	--
1,2,3-Trichlorobenzene	1.48 (chronic NOAEL)	7.4	rat	Based on 1,2,4-Trichlorobenzene, LANL, 2005	--	--	--	--
1,2,4-Trichlorobenzene	1.48 (chronic NOAEL)	7.4	rat	LANL, 2005	--	--	--	--
1,2-Dichlorobenzene	85.7 (chronic NOAEL)	429	rat	USEPA, 2008	1608 (LD50)	80.4	northern bobwhite	Based on 1,4-Dichlorobenzene, Ecotox (2008)
1,3-Dichlorobenzene	85.7 (chronic NOAEL)	429	rat	Based on 1,2-Dichlorobenzene, USEPA, 2008	1608 (LD50)	80.4	northern bobwhite	Based on 1,4-Dichlorobenzene, Ecotox (2008)
1,4-Dichlorobenzene	2.5 (chronic NOAEL)	12.5	rat	LANL, 2005	1608 (LD50)	80.4	northern bobwhite	Ecotox (2008)
2,4,6-Trinitrotoluene	34.7 (chronic NOAEL)	174	rat	LANL, 2005	9.75 (chronic NOAEL)	48.8	quail, bobwhite	LANL, 2005
2-amino-4,6-Dinitrotoluene	2.81 (chronic NOAEL)	14.1	rat	LANL, 2005	--	--	--	--
4,4'-DDT	--	4.0	rat	Sample et al. (1996)	--	0.0280	brown pelican	Sample et al. (1996)
4-amino-2,6-Dinitrotoluene	1.93 (chronic NOAEL)	9.65	rat	LANL, 2005	--	--	--	--
Acenaphthene	--	110	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
alpha-Chlordane	--	9.2	mouse	Based on Chlordane, Sample et al. (1996)	--	10.7	red-winged blackbird	Based on Chlordane, Sample et al. (1996)
Anthracene	--	110	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Aroclor 1254	--	0.68	mouse	Sample et al. (1996)	--	1.8	ring-necked pheasant	Sample et al. (1996)
Benzo(a)anthracene	--	3.07	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(a)pyrene	--	10	mouse	Sample et al. (1996)	553 (NOAEL)	2765	mallard duck	Eisler (1987)
Benzo(b)fluoranthene	--	3.07	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(g,h,i)perylene	--	3.07	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(k)fluoranthene	--	3.07	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Chrysene	--	3.07	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Dieldrin	--	0.03	rat	EcoSSL (EPA, 2007)	--	0.122	mallard duck	EcoSSL (EPA, 2007)
Endosulfan II	0.15 (NOAEL)	0.75	rat	Sample et al. (1996)	10 (NOAEL)	50	gray partridge	Sample et al. (1996)
Endrin	--	0.92	mouse	Sample et al. (1996)	0.3 (NOAEL)	1.5	mallard duck	Sample et al. (1996)
Endrin aldehyde	--	0.92	mouse	Based on Endrine, Sample et al. (1996)	0.3 (NOAEL)	1.5	mallard duck	Based on Endrine, Sample et al. (1996)
Endrin ketone	--	0.92	mouse	Based on Endrine, Sample et al. (1996)	0.3 (NOAEL)	1.5	mallard duck	Based on Endrine, Sample et al. (1996)
Fluoranthene	--	3.07	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Fluorene	--	110	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on Benzo(a)pyrene, Eisler 1987
gamma-Chlordane	--	9.2	mouse	Based on Chlordane, Sample et al. (1996)	--	10.7	red-winged blackbird	Based on Chlordane, Sample et al. (1996)
Heptachlor	--	1.0	mink	Sample et al. (1996)	92 (LC50)	4.6	quail	LANL, 2005
Heptachlor epoxide	--	1.0	mink	Based on Heptachlor, Sample et al. (1996)	92 (LC50)	4.6	quail	Based on Heptachlor, LANL (2005)
Indeno(1,2,3-cd)pyrene	--	3.07	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Methoxychlor	--	8	rat	Sample et al. (1996)	25.78 (chronic NOAEL)	129	Japanese quail	LANL, 2005

Table F-37
LOAEL Toxicity Reference Values Used to Derive
Wildlife Toxicity Benchmarks for COPECs at SWMU 41

COPEC	Mammalian Data				Avian Data			
	Toxicity Value	LOAEL (mg/kg/d)	Test Species	Reference	Toxicity Value	LOAEL (mg/kg/d)	Test Species	Reference
Nitroglycerin	96.4 (chronic NOAEL)	482	mouse	LANL, 2005	--	--	--	--
Phenanthrene	--	110	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Pyrene	--	3.07	mouse	EcoSSL (EPA, 2007)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Inorganics								
Arsenic	--	1.26	mouse	Sample et al. (1996)	--	12.84	mallard duck	Sample et al. (1996)
Cadmium	--	10	rat	Sample et al. (1996)	--	20.0	mallard duck	Sample et al. (1996)
Chromium	2,737 (NOAEL)	13690	rat	Sample et al. (1996)	--	2.78	chicken, black duck, turkey	EcoSSL (EPA, 2007)
Copper	--	15.1	mink	Sample et al. (1996)	--	62	chicks	Sample et al. (1996)
Lead	--	80	rat	Sample et al. (1996)	3.85 (NOAEL)	19.25	American kestrel	Sample et al. (1996)
Mercury	1.0 (NOAEL)	5	mink	Sample et al. (1996)	--	0.9	Japanese quail	Sample et al. (1996)
Nickel	--	80	rat	Sample et al. (1996)	--	107	mallard duck	Sample et al. (1996)
Selenium	--	0.33	rat	Sample et al. (1996)	--	1	mallard duck	Sample et al. (1996)
Silver	--	222	rat	ATSDR (1990)	178 (NOAEL)	890	mallard duck	Terr. Tox. Database (USACHPPM, 2002)
Zinc	--	320	rat	Sample et al. (1996)	--	131	hens	Sample et al. (1996)

N/A indicates that the information is not available.

As recommended by Wentsel et al. (1996), Tri-Service Procedural Guidelines for Ecological Risk Assessments, the following adjustments were made to toxicity data when NOAEL or LOAEL data were not available:

- Subchronic LOAELs were converted to chronic NOAELs by dividing by a factor of 20.
- Chronic NOAELs were converted to chronic LOAELs by multiplying by a factor of 5.0.
- Subchronic NOAELs/LOAELs were converted to chronic NOAELs/LOAELs by dividing by a factor of 10.
- Chronic LOAELs were converted to chronic NOAELs by dividing by a factor of 10.
- LD_{50} concentrations were converted to chronic NOAELs by dividing by a factor of 100.
- LD_{50} concentrations were converted to chronic LOAELs by dividing by a factor of 20.

Methodology for Selection of TRVs:

(1) Sample et al., 1996, Toxicological Benchmarks for Wildlife.
(2) USEPA, 2007, Ecological Screening Levels (Eco-SSL). Low molecular weigh (LMW) PAH NOAELs based on Verschuuren et al., 1976; high molecular weight (HMW) PAH NOAELs based on Culp et al., 1998; LMW LOAELs based on Murata et al., 1997; HMW PAH LOAELs based on Culp et al., 1998.
(3) LANL (2005). Ecorisk Database, Release 2.2, September 2005, Los Alamos National Laboratory.
(4) Others as listed below:

ATSDR, 1990, Toxicological Profile for Silver, U.S. Public Health Service.
ATSDR, 1996, Toxicological Profile for 1,1,2,2-Tetrachloroethane, U.S. Public Health Service.
Eisler, 1987, PAH Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review.
TERRETOX, http://www.epa.gov/ecotox.
USACHPPM, 2002, Terrestrial Toxicity Database.
USEPA, 1999, SLERA Protocol for Hazardous Waste Combustion Facilties.
USEPA, 2000, OPP (Office of Pesticide Programs). Environmental Effects Database (EEDB).
USEPA, 2008, Integrated Risk Information System (IRIS).

Table F-38
Uncertainty Factors[a] for Ecological TRV[b] Extrapolations[c] at SWMU 41

Laboratory Animals (toxicity database)		Selected Site Receptor Species	
Rat	G: *Rattus* F: Muridae O: Rodentia	Meadow vole	G: *Microtus* F: Muridae O: Rodentia
Mouse	G: *Mus* F: Muridae O: Rodentia	Short-tailed shrew	G: *Blarina* F: Soricidae O: Insectivora
Mink	G: *Mustela* F: Mustelidae O: Carnivora	American robin	G: *Turdus* F: Muscicapidae O: Passeriformes
Pheasant	G: *Phasianus* F: Phasianidae O: Galliformes	Red-tailed hawk	G: *Buteo* F: Accipitridae O: Ciconiiformes
American kestrel	G: *Falco* F: Falconidae O: Ciconiiformes	Red fox	G: *Vulpes* F: Canidae O: Carnivora
Chick, Hens Poultry	G: *Gallus* F: Phasianidae O: Galliformes	Great blue heron	G: *Ardea* F: Ardeidae O: Ciconiiformes
Brown pelican	G: *Pelecanus* F: Pelicanidae O: Pelicaniformes	Mink	G: *Mustela* F: Mustelidae O: Carnivora
Red-winged blackbird	G: *Agelaius* F: Icteridae O: Passeriformes		
Northern bobwhite	G: *Colinus* F: Odontophoridae O: Galliformes		
Black duck, Mallard	G: *Anas* F: Anatidae O: Anseriformes		

Continued on next page

Table F-38
Uncertainty Factors[a] for Ecological TRV[b] Extrapolations[c] at SWMU 41

Laboratory Animals (toxicity database)	
Japanese quail	G: *Coturnix* F: Phasianidae O: Galliformes
Gray partridge	G: *Perdix* F: Phasianidae O: Galliformes
Turkey	G: *Meleagris* F: Meleagrididae O: Galliformes

[a] From ***Tri-Service Procedural Guidelines for Ecological Risk Assessment*** (Wentsel et al. 1996)
[b] TRV = Toxicity Reference Value
[c] Interclass extrapolations not performed; only within bird class or within mammal class.

The Uncertainty Factors Used for TRV Extrapolations are Summarized Below:

- Extrapolation between two different species = uncertainty factor of 2
- Extrapolation between two different genera (G) = uncertainty factor of 4
- Extrapolation between two different families (F) or orders (O) = uncertainty factor of 8
- Thus, for all extrapolations used in the SLERA food chain model, an uncertainty factor of 8 was used, except for:
    - rat or mouse toxicity values extrapolated to the meadow vole where an uncertainty factor of 4 was used

Table F-39
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Ecological Screening Value (2)	Region III BTAG Screening Levels (3)	Above Screening Value (Y/N)
	87-61-6	1,2,3-Trichlorobenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	NVA	1.00E-01	No
Surface Soil	**95-94-3**	**1,2,4,5-Tetrachlorobenzene**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**2.02E+00**	**1.00E-01**	**Yes**
	96-12-8	1,2-Dibromo-3-chloropropane			mg/kg		0/5	1.00E-02 - 1.00E-02	1.00E-02	3.52E-01	NVA	No
	106-93-4	1,2-Dibromoethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	1.23E+00	NVA	No
	99-35-4	**1,3,5-Trinitrobenzene**			**mg/kg**		**0/5**	**1.00E+00 - 1.00E+00**	**1.00E+00**	**3.76E-01**	**NVA**	**Yes**
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	6.55E-01	NVA	No
	118-96-7	2,4,6-Trinitrotoluene			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	6.40E+00	NVA	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	2.10E+00	NVA	No
	88-72-2	2-Nitrotoluene			mg/kg		0/5	1.00E+00 - 1.00E+00	1.00E+00	2.00E+00	NVA	No
	99-08-1	3-Nitrotoluene			mg/kg		0/5	1.00E+00 - 1.00E+00	1.00E+00	2.40E+00	NVA	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	7.30E-01	NVA	No
	99-99-0	4-Nitrotoluene			mg/kg		0/5	1.00E+00 - 1.00E+00	1.00E+00	4.40E+00	NVA	No
	1912-24-9	Atrazine			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	NVA	NVA	No
	92-52-4	Biphenyl			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	6.00E+01	NVA	No
	105-60-2	Caprolactam			mg/kg		0/5	3.30E-01 - 3.30E-01	3.30E-01	NVA	NVA	No
	74-97-5	Chlorobromomethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	NVA	3.00E+03	No
	110-82-7	Cyclohexane			mg/kg		0/5	1.00E-02 - 1.00E-02	1.00E-02	NVA	NVA	No
	121-82-4	Cyclonite			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	7.50E+00	NVA	No
	75-71-8	Dichlorodifluoromethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	NVA	NVA	No
	76-13-1	Freon 113			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	NVA	NVA	No
	2691-41-0	HMX			mg/kg		0/5	1.00E+00 - 1.00E+00	1.00E+00	2.70E+01	NVA	No
	98-82-8	Isopropylbenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	NVA	NVA	No
	79-20-9	Methyl Acetate			mg/kg		0/5	1.00E-02 - 1.00E-02	1.00E-02	NVA	NVA	No
	1634-04-4	Methyl tert-butyl ether			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	NVA	NVA	No
	55-63-0	Nitroglycerin			mg/kg		0/5	1.00E+01 - 1.00E+01	1.00E+01	7.10E+01	NVA	No
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/5	1.00E+01 - 1.00E+01	1.00E+01	8.60E+03	NVA	No
	479-45-8	**Tetryl**			**mg/kg**		**0/5**	**1.00E+00 - 1.00E+00**	**1.00E+00**	**9.90E-01**	**NVA**	**Yes**
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	7.84E-01	3.00E-01	No
	93-76-5	2,4,5-T			mg/kg		0/2	5.00E-02 - 5.00E-02	5.00E-02	5.96E-01	NVA	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/2	5.00E-02 - 5.00E-02	5.00E-02	1.09E-01	NVA	No
	94-75-7	**2,4-D**			**mg/kg**		**0/2**	**2.00E-01 - 2.00E-01**	**2.00E-01**	**2.73E-02**	**NVA**	**Yes**
	94-82-6	2,4-DB			mg/kg		0/2	2.00E-01 - 2.00E-01	2.00E-01	NVA	NVA	No
	72-54-8	4,4'-DDD			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	2.10E-02	1.00E-01	No
	72-55-9	4,4'-DDE			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	2.10E-02	1.00E-01	No
	309-00-2	**Aldrin**			**mg/kg**		**0/2**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**3.32E-03**	**1.00E-01**	**Yes**
	319-84-6	alpha-BHC			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	9.94E-02	NVA	No
	319-85-7	**beta-BHC**			**mg/kg**		**0/2**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**3.98E-03**	**NVA**	**Yes**
	75-99-0	Dalapon			mg/kg		0/2	2.60E-01 - 2.70E-01	2.70E-01	NVA	NVA	No
	319-86-8	delta-BHC			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	9.94E+00	NVA	No
	1918-00-9	Dicamba			mg/kg		0/2	2.00E-01 - 2.00E-01	2.00E-01	NVA	NVA	No

Table F-39
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Ecological Screening Value (2)	Region III BTAG Screening Levels (3)	Above Screening Value (Y/N)
	120-36-5	Dichloroprop			mg/kg		0/2	2.00E-01 - 2.00E-01	2.00E-01	NVA	NVA	No
Surface Soil	959-98-8	Endosulfan I			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	1.19E-01	NVA	No
	1031-07-8	Endosulfan sulfate			mg/kg		0/2	2.00E-02 - 2.00E-02	2.00E-02	3.58E-02	NVA	No
	7421-93-4	**Endrin aldehyde**			**mg/kg**		**0/2**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**1.05E-02**	**NVA**	**Yes**
	58-89-9	**gamma-BHC (Lindane)**			**mg/kg**		**0/2**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**5.00E-03**	**1.00E-01**	**Yes**
	76-44-8	**Heptachlor**			**mg/kg**		**0/2**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**5.98E-03**	**NVA**	**Yes**
	94-74-6	MCPA			mg/kg		0/4	2.00E+01 - 2.00E+01	2.00E+01	NVA	NVA	No
	93-65-2	MCPP			mg/kg		0/2	2.00E+01 - 2.00E+01	2.00E+01	NVA	NVA	No
	72-43-5	**Methoxychlor**			**mg/kg**		**0/2**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**1.99E-02**	**1.00E-01**	**Yes**
	8001-35-2	**Toxaphene**			**mg/kg**		**0/2**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**1.19E-01**	**NVA**	**Yes**
	12674-11-2	Aroclor 1016			mg/kg		0/2	6.60E-02 - 6.60E-02	6.60E-02	3.71E-01	1.00E-01	No
	11104-28-2	Aroclor 1221			mg/kg		0/2	6.60E-02 - 6.60E-02	6.60E-02	3.71E-01	1.00E-01	No
	11141-16-5	Aroclor 1232			mg/kg		0/2	6.60E-02 - 6.60E-02	6.60E-02	3.71E-01	1.00E-01	No
	53469-21-9	Aroclor 1242			mg/kg		0/2	3.30E-02 - 3.30E-02	3.30E-02	3.71E-01	1.00E-01	No
	12672-29-6	Aroclor 1248			mg/kg		0/2	3.30E-02 - 3.30E-02	3.30E-02	3.71E-01	1.00E-01	No
	11096-82-5	Aroclor 1260			mg/kg		0/2	6.60E-02 - 6.60E-02	6.60E-02	3.71E-01	1.00E-01	No
	131-11-3	Dimethylphthalate			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	7.34E+02	1.00E+01	No
	95-50-1	1,2-Dichlorobenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	2.96E+00	1.00E-01	No
	541-73-1	1,3-Dichlorobenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	3.77E+01	NVA	No
	106-46-7	1,4-Dichlorobenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	2.00E+01	1.00E-01	No
	95-95-4	**2,4,5-Trichlorophenol**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**9.00E+00**	**1.00E-01**	**Yes**
	88-06-2	**2,4,6-Trichlorophenol**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**4.00E+00**	**1.00E-01**	**Yes**
	120-83-2	**2,4-Dichlorophenol**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**8.75E+01**	**1.00E-01**	**Yes**
	105-67-9	**2,4-Dimethylphenol**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**1.00E-02**	**1.00E-01**	**Yes**
	51-28-5	**2,4-Dinitrophenol**			**mg/kg**		**0/5**	**3.30E-01 - 3.30E-01**	**3.30E-01**	**2.00E+01**	**1.00E-01**	**Yes**
	121-14-2	2,4-Dinitrotoluene			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	1.28E+00	NVA	No
	606-20-2	**2,6-Dinitrotoluene**			**mg/kg**		**0/5**	**1.00E+00 - 1.00E+00**	**1.00E+00**	**3.28E-02**	**NVA**	**Yes**
	91-58-7	**2-Chloronaphthalene**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**1.22E-02**	**NVA**	**Yes**
	95-57-8	**2-Chlorophenol**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**2.43E-01**	**1.00E-01**	**Yes**
	91-57-6	2-Methylnaphthalene			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	3.24E+00	NVA	No
	88-74-4	2-Nitroaniline			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	7.41E+01	NVA	No
	88-75-5	**2-Nitrophenol**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**1.60E+00**	**1.00E-01**	**Yes**
	88-85-7	**2-sec-butyl-4,6-dinitrophenol**			**mg/kg**		**0/2**	**2.00E-01 - 2.00E-01**	**2.00E-01**	**2.18E-02**	**NVA**	**Yes**
	91-94-1	**3,3'-Dichlorobenzidine**			**mg/kg**		**0/5**	**5.50E-01 - 1.00E+00**	**1.00E+00**	**6.46E-01**	**NVA**	**Yes**
	99-09-2	3-Nitroaniline			mg/kg		0/5	1.70E-01 - 2.25E-01	2.25E-01	3.16E+00	NVA	No
	534-52-1	**4,6-Dinitro-o-cresol**			**mg/kg**		**0/5**	**2.10E-01 - 2.25E-01**	**2.25E-01**	**1.44E-01**	**NVA**	**Yes**
	100-01-6	4-Nitroaniline			mg/kg		0/5	1.70E-01 - 2.25E-01	2.25E-01	2.19E+01	NVA	No
	100-02-7	**4-Nitrophenol**			**mg/kg**		**0/5**	**3.30E-01 - 3.30E-01**	**3.30E-01**	**7.00E+00**	**1.00E-01**	**Yes**
	83-32-9	Acenaphthene			mg/kg		0/5	1.00E-01 - 1.00E-01	1.00E-01	2.00E+01	1.00E-01	No
	208-96-8	**Acenaphthylene**			**mg/kg**		**0/5**	**2.10E-01 - 2.10E-01**	**2.10E-01**	**2.90E+01**	**1.00E-01**	**Yes**

Table F-39
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Ecological Screening Value (2)	Region III BTAG Screening Levels (3)	Above Screening Value (Y/N)
	98-86-2	Acetophenone			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	3.00E+02	NVA	No
Surface Soil	120-12-7	Anthracene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	2.90E+01	1.00E-01	No
	100-52-7	Benzaldehyde			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	NVA	NVA	No
	56-55-3	Benzo(a)anthracene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	50-32-8	Benzo(a)pyrene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	205-99-2	Benzo(b)fluoranthene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	191-24-2	Benzo(g,h,i)perylene			mg/kg		0/5	6.00E-02 - 6.00E-02	6.00E-02	1.10E+00	1.00E-01	No
	207-08-9	Benzo(k)fluoranthene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	3.02E-01	NVA	No
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	2.37E+01	NVA	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	1.99E+01	NVA	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	2.39E-01	NVA	No
	86-74-8	Carbazole			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	NVA	NVA	No
	218-01-9	Chrysene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	117-84-0	Di-n-octyl phthalate			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	7.09E+02	NVA	No
	53-70-3	Dibenz(a,h)anthracene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	132-64-9	Dibenzofuran			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	6.10E+00	NVA	No
	84-66-2	Diethyl phthalate			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	1.00E+02	NVA	No
	86-73-7	Fluorene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	2.90E+01	1.00E-01	No
	118-74-1	Hexachlorobenzene			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	1.99E-01	NVA	No
	87-68-3	**Hexachlorobutadiene**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**3.98E-02**	**NVA**	**Yes**
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	1.00E+01	NVA	No
	67-72-1	Hexachloroethane			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	5.96E-01	NVA	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	78-59-1	Isophorone			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	1.39E+02	NVA	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	5.44E-01	NVA	No
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	5.45E-01	NVA	No
	91-20-3	**Naphthalene**			**mg/kg**		**0/5**	**1.00E-01 - 1.00E-01**	**1.00E-01**	**2.90E+01**	**1.00E-01**	**Yes**
	98-95-3	Nitrobenzene			mg/kg		0/5	5.00E-01 - 5.00E-01	5.00E-01	1.31E+00	NVA	No
	95-48-7	**o-Cresol**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**4.04E+01**	**1.00E-01**	**Yes**
	106-47-8	p-Chloroaniline			mg/kg		0/5	1.70E-01 - 2.25E-01	2.25E-01	1.10E+00	NVA	No
	106-44-5	**p-Cresol**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**1.63E+02**	**1.00E-01**	**Yes**
	87-86-5	**Pentachlorophenol**			**mg/kg**		**0/5**	**3.30E-01 - 3.30E-01**	**3.30E-01**	**2.10E+00**	**1.00E-01**	**Yes**
	85-01-8	Phenanthrene			mg/kg		0/5	2.10E-02 - 2.10E-02	2.10E-02	2.90E+01	1.00E-01	No
	108-95-2	**Phenol**			**mg/kg**		**0/5**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**3.00E+01**	**1.00E-01**	**Yes**
	71-55-6	1,1,1-Trichloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	2.98E+01	3.00E-01	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	1.27E-01	3.00E-01	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	2.86E+01	3.00E-01	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	2.01E+01	3.00E-01	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	8.28E+00	NVA	No

Table F-39
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Ecological Screening Value (2)	Region III BTAG Screening Levels (3)	Above Screening Value (Y/N)
Surface Soil	107-06-2	1,2-Dichloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	2.12E+01	8.70E+02	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	3.27E+01	NVA	No
	591-78-6	2-Hexanone			mg/kg		0/5	1.00E-02 - 1.00E-02	1.00E-02	1.26E+01	NVA	No
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	NVA	NVA	No
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/5	1.70E-01 - 1.70E-01	1.70E-01	NVA	NVA	No
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/5	1.00E-02 - 1.00E-02	1.00E-02	4.43E+02	1.00E+02	No
	75-27-4	Bromodichloromethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	5.40E-01	4.50E+02	No
	74-83-9	Bromomethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	2.35E-01	NVA	No
	56-23-5	Carbon tetrachloride			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	2.98E+00	3.00E-01	No
	108-90-7	Chlorobenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	4.00E+01	1.00E-01	No
	75-00-3	Chloroethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	NVA	NVA	No
	74-87-3	Chloromethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	1.04E+01	NVA	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	3.98E-01	3.00E-01	No
	124-48-1	Dibromochloromethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	2.05E+00	NVA	No
	100-41-4	Ethylbenzene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	5.16E+00	1.00E-01	No
	100-42-5	Styrene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	3.00E+02	1.00E-01	No
	10061-02-6	trans-1,3-Dichloropropene			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	3.98E-01	3.00E-01	No
	75-25-2	Tribromomethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	1.59E+01	1.47E+03	No
	67-66-3	Trichloromethane			mg/kg		0/5	5.00E-03 - 5.00E-03	5.00E-03	1.19E+00	3.00E-01	No

(1) Maximum non-detect limit value used for screening.

(2) Screening toxicity values from USEPA Eco SSLs (2009); Efroymson et al., PRGs (1997); and USEPA Region V EDQLs (1999); and other sources. See text for derivation.

(3) Screening toxicity values from USEPA Region III BTAG Screening Table (September, 1995).

Definitions: N/A = Not Applicable or Not Available
NVA = No Value Available

Table F-40
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	87-61-6	1,2,3-Trichlorobenzene			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	8.58E-01	No
Sediment	95-94-3	1,2,4,5-Tetrachlorobenzene			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	1.09E+00	No
	96-12-8	1,2-Dibromo-3-chloropropane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	106-93-4	1,2-Dibromoethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	90-12-0	**1-Methylnaphthalene**			**mg/kg**		**0/3**	**3.20E-01 - 7.20E-01**	**7.20E-01**	**2.02E-02**	**Yes**
	ICF14A-AA-I	3&4-Methylphenol			mg/kg		0/3	2.00E-01 - 4.50E-01	4.50E-01	6.70E-01	No
	1912-24-9	**Atrazine**			**mg/kg**		**0/3**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**6.62E-03**	**Yes**
	100-51-6	Benzyl alcohol			mg/kg		0/3	2.00E-01 - 4.50E-01	4.50E-01	NVA	No
	92-52-4	Biphenyl			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	1.22E+00	No
	105-60-2	Caprolactam			mg/kg		0/3	3.30E-01 - 3.30E-01	3.30E-01	NVA	No
	74-97-5	Chlorobromomethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	110-82-7	Cyclohexane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	75-71-8	Dichlorodifluoromethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	76-13-1	Freon 113			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	98-82-8	Isopropylbenzene			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	8.60E-02	No
	ICF87	**m+p-Xylenes**			**mg/kg**		**0/3**	**1.10E-02 - 3.50E-02**	**3.50E-02**	**2.52E-02**	**Yes**
	1634-04-4	Methyl tert-butyl ether			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	108-87-2	Methylcyclohexane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	95-47-6	o-Xylene			mg/kg		0/3	5.50E-03 - 1.70E-02	1.70E-02	2.52E-02	No
	75-69-4	Trichlorofluoromethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	98-86-2	Acetophenone			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	NVA	No
	100-52-7	Benzaldehyde			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	NVA	No
	65-85-0	**Benzoic Acid**			**mg/kg**		**0/3**	**1.00E+00 - 2.30E+00**	**2.30E+00**	**6.50E-01**	**Yes**
	106-44-5	p-Cresol			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	6.70E-01	No
	1330-20-7	Xylenes (total)			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	2.52E-02	No
	99-35-4	1,3,5-Trinitrobenzene			mg/kg		0/6	2.00E-01 - 1.00E+00	1.00E+00	NVA	No
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/6	2.00E-01 - 5.00E-01	5.00E-01	NVA	No
	118-96-7	**2,4,6-Trinitrotoluene**			**mg/kg**		**0/6**	**2.00E-01 - 5.00E-01**	**5.00E-01**	**9.20E-02**	**Yes**
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/6	2.00E-01 - 5.00E-01	5.00E-01	NVA	No
	88-72-2	2-Nitrotoluene			mg/kg		0/6	2.00E-01 - 1.00E+00	1.00E+00	4.06E+00	No
	99-08-1	3-Nitrotoluene			mg/kg		0/6	2.00E-01 - 1.00E+00	1.00E+00	4.06E+00	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/6	2.00E-01 - 5.00E-01	5.00E-01	NVA	No
	99-99-0	4-Nitrotoluene			mg/kg		0/6	2.00E-01 - 1.00E+00	1.00E+00	4.06E+00	No
	156-59-2	cis-1,2-Dichloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	1.05E+00	No
	121-82-4	**Cyclonite**			**mg/kg**		**0/6**	**2.00E-01 - 5.00E-01**	**5.00E-01**	**1.30E-02**	**Yes**
	2691-41-0	HMX			mg/kg		0/6	2.00E-01 - 1.00E+00	1.00E+00	NVA	No
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/6	1.60E+00 - 1.00E+01	1.00E+01	NVA	No
	479-45-8	Tetryl			mg/kg		0/6	4.10E-01 - 1.00E+00	1.00E+00	NVA	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	1.05E+00	No
	93-76-5	2,4,5-T			mg/kg		0/6	8.10E-03 - 5.00E-02	5.00E-02	1.23E+01	No

Table F-40
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/6	1.60E-02 - 5.00E-02	5.00E-02	6.75E-01	No
Sediment	94-75-7	2,4-D			mg/kg		0/6	4.00E-02 - 2.00E-01	2.00E-01	NVA	No
	94-82-6	2,4-DB			mg/kg		0/6	8.10E-02 - 2.00E-01	2.00E-01	NVA	No
	72-54-8	**4,4'-DDD**			**mg/kg**		**0/6**	**4.00E-03 - 2.00E-02**	**2.00E-02**	**4.88E-03**	**Yes**
	72-55-9	**4,4'-DDE**			**mg/kg**		**0/6**	**4.00E-03 - 2.00E-02**	**2.00E-02**	**3.16E-03**	**Yes**
	309-00-2	**Aldrin**			**mg/kg**		**0/6**	**2.00E-03 - 2.00E-02**	**2.00E-02**	**2.00E-03**	**Yes**
	319-84-6	**alpha-BHC**			**mg/kg**		**0/6**	**2.00E-03 - 2.00E-02**	**2.00E-02**	**6.00E-03**	**Yes**
	5103-71-9	**alpha-Chlordane**			**mg/kg**		**0/6**	**2.00E-03 - 2.00E-02**	**2.00E-02**	**3.24E-03**	**Yes**
	319-85-7	**beta-BHC**			**mg/kg**		**0/6**	**2.00E-03 - 2.00E-02**	**2.00E-02**	**5.00E-03**	**Yes**
	75-99-0	Dalapon			mg/kg		0/6	4.00E-02 - 3.60E-01	3.60E-01	NVA	No
	319-86-8	delta-BHC			mg/kg		0/6	2.00E-03 - 2.00E-02	2.00E-02	6.40E+00	No
	1918-00-9	Dicamba			mg/kg		0/6	8.10E-03 - 2.00E-01	2.00E-01	NVA	No
	120-36-5	Dichloroprop			mg/kg		0/6	4.00E-02 - 2.00E-01	2.00E-01	NVA	No
	60-57-1	**Dieldrin**			**mg/kg**		**0/6**	**2.00E-03 - 2.00E-02**	**2.00E-02**	**1.90E-03**	**Yes**
	959-98-8	**Endosulfan I**			**mg/kg**		**0/6**	**2.00E-03 - 2.00E-02**	**2.00E-02**	**2.90E-03**	**Yes**
	33213-65-9	**Endosulfan II**			**mg/kg**		**0/6**	**4.00E-03 - 2.00E-02**	**2.00E-02**	**1.40E-02**	**Yes**
	1031-07-8	**Endosulfan sulfate**			**mg/kg**		**0/6**	**4.00E-03 - 2.00E-02**	**2.00E-02**	**5.40E-03**	**Yes**
	72-20-8	**Endrin**			**mg/kg**		**0/6**	**4.00E-03 - 2.00E-02**	**2.00E-02**	**2.22E-03**	**Yes**
	53494-70-5	**Endrin ketone**			**mg/kg**		**0/6**	**4.00E-03 - 2.00E-02**	**2.00E-02**	**2.22E-03**	**Yes**
	58-89-9	**gamma-BHC (Lindane)**			**mg/kg**		**0/6**	**2.00E-03 - 2.00E-02**	**2.00E-02**	**2.37E-03**	**Yes**
	5103-74-2	**gamma-Chlordane**			**mg/kg**		**0/6**	**2.00E-03 - 2.00E-02**	**2.00E-02**	**3.24E-03**	**Yes**
	76-44-8	Heptachlor			mg/kg		0/6	2.00E-02 - 4.40E-02	4.40E-02	6.80E-02	No
	1024-57-3	**Heptachlor epoxide**			**mg/kg**		**0/6**	**2.00E-03 - 2.00E-02**	**2.00E-02**	**2.47E-03**	**Yes**
	94-74-6	MCPA			mg/kg		0/6	2.00E-01 - 2.00E+01	2.00E+01	NVA	No
	93-65-2	MCPP			mg/kg		0/6	2.00E-01 - 2.00E+01	2.00E+01	NVA	No
	72-43-5	**Methoxychlor**			**mg/kg**		**0/6**	**2.00E-02 - 8.80E-02**	**8.80E-02**	**1.87E-02**	**Yes**
	8001-35-2	**Toxaphene**			**mg/kg**		**0/6**	**1.00E-01 - 3.50E-01**	**3.50E-01**	**1.00E-04**	**Yes**
	12674-11-2	**Aroclor 1016**			**mg/kg**		**0/6**	**2.00E-02 - 6.60E-02**	**6.60E-02**	**5.98E-02**	**Yes**
	11104-28-2	**Aroclor 1221**			**mg/kg**		**0/6**	**2.00E-02 - 6.60E-02**	**6.60E-02**	**5.98E-02**	**Yes**
	11141-16-5	**Aroclor 1232**			**mg/kg**		**0/6**	**2.00E-02 - 6.60E-02**	**6.60E-02**	**5.98E-02**	**Yes**
	53469-21-9	Aroclor 1242			mg/kg		0/6	2.00E-02 - 4.40E-02	4.40E-02	5.98E-02	No
	12672-29-6	Aroclor 1248			mg/kg		0/6	2.00E-02 - 4.40E-02	4.40E-02	5.98E-02	No
	11097-69-1	**Aroclor 1254**			**mg/kg**		**0/6**	**2.00E-02 - 6.60E-02**	**6.60E-02**	**5.98E-02**	**Yes**
	11096-82-5	**Aroclor 1260**			**mg/kg**		**0/6**	**2.00E-02 - 6.60E-02**	**6.60E-02**	**5.98E-02**	**Yes**
	131-11-3	Dimethylphthalate			mg/kg		0/6	1.70E-01 - 9.00E-01	9.00E-01	NVA	No
	95-50-1	**1,2-Dichlorobenzene**			**mg/kg**		**0/6**	**5.00E-03 - 4.50E-01**	**4.50E-01**	**1.65E-02**	**Yes**
	541-73-1	1,3-Dichlorobenzene			mg/kg		0/6	5.00E-03 - 4.50E-01	4.50E-01	4.43E+00	No
	106-46-7	1,4-Dichlorobenzene			mg/kg		0/6	5.00E-03 - 4.50E-01	4.50E-01	5.99E-01	No
	95-95-4	**2,4,5-Trichlorophenol**			**mg/kg**		**0/6**	**1.70E-01 - 4.50E-01**	**4.50E-01**	**2.13E-01**	**Yes**
	88-06-2	**2,4,6-Trichlorophenol**			**mg/kg**		**0/6**	**1.70E-01 - 4.50E-01**	**4.50E-01**	**2.13E-01**	**Yes**

Table F-40
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	120-83-2	**2,4-Dichlorophenol**			**mg/kg**		**0/6**	**1.70E-01 - 4.50E-01**	**4.50E-01**	**1.17E-01**	**Yes**
Sediment	**105-67-9**	**2,4-Dimethylphenol**			**mg/kg**		**0/6**	**1.70E-01 - 4.50E-01**	**4.50E-01**	**2.90E-02**	**Yes**
	51-28-5	2,4-Dinitrophenol			mg/kg		0/6	3.30E-01 - 2.30E+00	2.30E+00	NVA	No
	121-14-2	**2,4-Dinitrotoluene**			**mg/kg**		**0/6**	**2.00E-01 - 5.00E-01**	**5.00E-01**	**4.16E-02**	**Yes**
	606-20-2	**2,6-Dinitrotoluene**			**mg/kg**		**0/6**	**2.00E-01 - 1.00E+00**	**1.00E+00**	**4.16E-02**	**Yes**
	91-58-7	2-Chloronaphthalene			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	NVA	No
	95-57-8	**2-Chlorophenol**			**mg/kg**		**0/6**	**1.70E-01 - 4.50E-01**	**4.50E-01**	**3.12E-02**	**Yes**
	91-57-6	**2-Methylnaphthalene**			**mg/kg**		**0/6**	**1.70E-01 - 7.20E-01**	**7.20E-01**	**2.02E-02**	**Yes**
	88-74-4	2-Nitroaniline			mg/kg		0/6	1.70E-01 - 9.00E-01	9.00E-01	NVA	No
	88-75-5	2-Nitrophenol			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	NVA	No
	88-85-7	**2-sec-butyl-4,6-dinitrophenol**			**mg/kg**		**0/6**	**8.10E-03 - 2.00E-01**	**2.00E-01**	**6.11E-04**	**Yes**
	91-94-1	**3,3'-Dichlorobenzidine**			**mg/kg**		**0/6**	**4.00E-01 - 1.00E+00**	**1.00E+00**	**1.27E-01**	**Yes**
	99-09-2	3-Nitroaniline			mg/kg		0/6	2.25E-01 - 9.00E-01	9.00E-01	NVA	No
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/6	2.25E-01 - 9.00E-01	9.00E-01	NVA	No
	100-01-6	4-Nitroaniline			mg/kg		0/6	2.25E-01 - 9.00E-01	9.00E-01	NVA	No
	100-02-7	4-Nitrophenol			mg/kg		0/6	3.30E-01 - 2.30E+00	2.30E+00	NVA	No
	208-96-8	**Acenaphthylene**			**mg/kg**		**0/6**	**2.10E-01 - 7.20E-01**	**7.20E-01**	**5.90E-03**	**Yes**
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	NVA	No
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	NVA	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	NVA	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/6	1.70E-01 - 9.00E-01	9.00E-01	1.09E+01	No
	86-74-8	Carbazole			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	NVA	No
	53-70-3	**Dibenz(a,h)anthracene**			**mg/kg**		**0/6**	**2.10E-02 - 1.40E-01**	**1.40E-01**	**3.30E-02**	**Yes**
	132-64-9	**Dibenzofuran**			**mg/kg**		**0/6**	**1.70E-01 - 4.50E-01**	**4.50E-01**	**4.15E-01**	**Yes**
	84-66-2	**Diethyl phthalate**			**mg/kg**		**0/6**	**1.70E-01 - 9.00E-01**	**9.00E-01**	**6.03E-01**	**Yes**
	117-84-0	Di-n-octyl phthalate			mg/kg		0/6	1.70E-01 - 9.00E-01	9.00E-01	NVA	No
	118-74-1	**Hexachlorobenzene**			**mg/kg**		**0/6**	**1.70E-01 - 4.50E-01**	**4.50E-01**	**2.00E-02**	**Yes**
	87-68-3	Hexachlorobutadiene			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	NVA	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	NVA	No
	67-72-1	Hexachloroethane			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	1.03E+00	No
	78-59-1	Isophorone			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	NVA	No
	91-20-3	**Naphthalene**			**mg/kg**		**0/6**	**1.00E-01 - 7.20E-01**	**7.20E-01**	**1.76E-01**	**Yes**
	98-95-3	Nitrobenzene			mg/kg		0/6	2.00E-01 - 5.00E-01	5.00E-01	NVA	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	NVA	No
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	2.68E+00	No
	95-48-7	o-Cresol			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	6.70E-01	No
	106-47-8	p-Chloroaniline			mg/kg		0/6	2.25E-01 - 9.00E-01	9.00E-01	NVA	No
	87-86-5	**Pentachlorophenol**			**mg/kg**		**0/6**	**3.30E-01 - 2.30E+00**	**2.30E+00**	**5.04E-01**	**Yes**
	108-95-2	**Phenol**			**mg/kg**		**0/6**	**1.70E-01 - 4.50E-01**	**4.50E-01**	**4.20E-01**	**Yes**
	71-55-6	1,1,1-Trichloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	1.24E+00	No

Table F-40
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
Sediment	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	1.36E+00	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	1.24E+00	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	NVA	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	3.10E-02	No
	107-06-2	1,2-Dichloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	NVA	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	NVA	No
	591-78-6	2-Hexanone			mg/kg		0/6	1.00E-02 - 8.60E-02	8.60E-02	NVA	No
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	1.23E+00	No
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/6	1.70E-01 - 4.50E-01	4.50E-01	NVA	No
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/6	1.00E-02 - 8.60E-02	8.60E-02	NVA	No
	75-27-4	Bromodichloromethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	NVA	No
	56-23-5	Carbon tetrachloride			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	6.42E-02	No
	108-90-7	**Chlorobenzene**			**mg/kg**		**0/6**	**5.00E-03 - 1.70E-02**	**1.70E-02**	**8.42E-03**	**Yes**
	75-00-3	Chloroethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	NVA	No
	74-87-3	Chloromethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	NVA	No
	10061-01-5	**cis-1,3-Dichloro-1-propene**			**mg/kg**		**0/6**	**5.00E-03 - 1.70E-02**	**1.70E-02**	**5.09E-05**	**Yes**
	124-48-1	Dibromochloromethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	NVA	No
	100-41-4	Ethylbenzene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	1.10E+00	No
	100-42-5	Styrene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	5.59E-01	No
	127-18-4	Tetrachloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	4.68E-01	No
	10061-02-6	**trans-1,3-Dichloropropene**			**mg/kg**		**0/6**	**5.00E-03 - 1.70E-02**	**1.70E-02**	**5.09E-05**	**Yes**
	75-25-2	Tribromomethane			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	6.54E-01	No
	79-01-6	Trichloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	9.69E-02	No
	75-01-4	Vinyl Chloride			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	NVA	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/6	5.00E-03 - 1.70E-02	1.70E-02	3.10E-02	No

(1) Maximum non-detect limit value used for screening.

(2) Screening toxicity values from USEPA Region III BTAG Screening Table (January 2009).

Definitions: N/A = Not Applicable or Not Available
NVA = No Value Available

Table F-41
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	87-61-6	1,2,3-Trichlorobenzene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	8.00E-03	No
Surface Water	**95-94-3**	**1,2,4,5-Tetrachlorobenzene**			**mg/l**		**0/3**	**5.00E-03 - 5.00E-03**	**5.00E-03**	**3.00E-03**	**Yes**
	96-12-8	1,2-Dibromo-3-chloropropane			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	106-93-4	1,2-Dibromoethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	99-35-4	1,3,5-Trinitrobenzene			mg/l		0/6	2.00E-04 - 6.50E-04	6.50E-04	NVA	No
	99-65-0	1,3-Dinitrobenzene			mg/l		0/6	2.00E-04 - 1.00E-03	1.00E-03	NVA	No
	90-12-0	1-Methylnaphthalene			mg/l		0/3	9.70E-04 - 1.10E-03	1.10E-03	2.10E-03	No
	88-72-2	2-Nitrotoluene			mg/l		0/6	2.00E-04 - 1.00E-03	1.00E-03	NVA	No
	ICF14A-AA-I	3&4-Methylphenol			mg/l		0/3	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	99-08-1	3-Nitrotoluene			mg/l		0/6	2.00E-04 - 2.00E-03	2.00E-03	7.50E-01	No
	99-99-0	4-Nitrotoluene			mg/l		0/6	2.00E-04 - 2.00E-03	2.00E-03	1.90E+00	No
	1912-24-9	**Atrazine**			**mg/l**		**0/3**	**5.00E-03 - 5.00E-03**	**5.00E-03**	**1.80E-03**	**Yes**
	100-51-6	Benzyl alcohol			mg/l		0/3	4.90E-03 - 5.70E-03	5.70E-03	8.60E-03	No
	92-52-4	Biphenyl			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	1.40E-02	No
	105-60-2	Caprolactam			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	74-97-5	Chlorobromomethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	156-59-2	cis-1,2-Dichloroethene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	5.90E-01	No
	110-82-7	Cyclohexane			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	121-82-4	Cyclonite			mg/l		0/6	2.00E-04 - 6.50E-04	6.50E-04	3.60E-01	No
	75-71-8	Dichlorodifluoromethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	76-13-1	Freon 113			mg/l		0/3	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	2691-41-0	HMX			mg/l		0/6	2.00E-04 - 1.00E-03	1.00E-03	1.50E-01	No
	98-82-8	Isopropylbenzene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	2.60E-03	No
	79-20-9	Methyl Acetate			mg/l		0/3	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	1634-04-4	Methyl tert-butyl ether			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	1.11E+01	No
	108-87-2	Methylcyclohexane			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	55-63-0	Nitroglycerin			mg/l		0/6	2.00E-03 - 5.00E-03	5.00E-03	1.38E-01	No
	95-47-6	o-Xylene			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	1.80E-03	No
	78-11-5	Pentaerythritol tetranitrate			mg/l		0/6	2.00E-03 - 1.00E-02	1.00E-02	8.50E+01	No
	479-45-8	Tetryl			mg/l		0/6	2.00E-04 - 2.00E-03	2.00E-03	NVA	No
	Shaw 10	Total Tetrachlorodibenzo-p-dioxin			mg/l		0/3	1.79E-09 - 5.25E-09	5.25E-09	NVA	No
	156-60-5	trans-1,2-Dichloroethene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	9.70E-01	No
	75-69-4	Trichlorofluoromethane			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	7440-36-0	Antimony			mg/l		0/6	2.00E-03 - 3.40E-03	3.40E-03	3.00E-02	No
	7440-38-2	Arsenic			mg/l		0/6	1.00E-03 - 2.80E-03	2.80E-03	5.00E-03	No
	7440-41-7	**Beryllium**			**mg/l**		**0/6**	**1.00E-03 - 4.00E-03**	**4.00E-03**	**6.60E-04**	**Yes**
	7440-43-9	**Cadmium**			**mg/l**		**0/6**	**5.00E-04 - 1.00E-03**	**1.00E-03**	**2.50E-04**	**Yes**
	7440-48-4	Cobalt			mg/l		0/6	1.00E-03 - 1.00E-02	1.00E-02	2.30E-02	No
	7440-50-8	**Copper**			**mg/l**		**0/5**	**1.00E-03 - 2.00E-02**	**2.00E-02**	**9.00E-03**	**Yes**
	7439-97-6	**Mercury (Inorganic)**			**mg/l**		**0/6**	**1.00E-04 - 4.00E-04**	**4.00E-04**	**2.60E-05**	**Yes**

Table F-41
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	7440-02-0	Nickel			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	5.20E-02	No
	7782-49-2	**Selenium**			**mg/l**		**0/6**	**2.00E-03 - 2.80E-03**	**2.80E-03**	**1.00E-03**	**Yes**
Surface Water	7440-22-4	Silver			mg/l		0/6	5.00E-04 - 9.00E-04	9.00E-04	3.20E-03	No
	7440-28-0	**Thallium**			**mg/l**		**0/6**	**1.00E-03 - 2.90E-03**	**2.90E-03**	**8.00E-04**	**Yes**
	93-76-5	2,4,5-T			mg/l		0/3	2.00E-04 - 2.00E-04	2.00E-04	6.86E-01	No
	93-72-1	2,4,5-TP (Silvex)			mg/l		0/3	2.00E-04 - 2.00E-04	2.00E-04	3.00E-02	No
	94-75-7	2,4-D			mg/l		0/3	1.50E-03 - 1.50E-03	1.50E-03	NVA	No
	94-82-6	2,4-DB			mg/l		0/3	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	72-54-8	**4,4'-DDD**			**mg/l**		**0/3**	**9.80E-05 - 1.10E-04**	**1.10E-04**	**1.10E-05**	**Yes**
	72-55-9	**4,4'-DDE**			**mg/l**		**0/3**	**9.80E-05 - 1.10E-04**	**1.10E-04**	**5.00E-07**	**Yes**
	50-29-3	**4,4-DDT**			**mg/l**		**0/3**	**9.80E-05 - 1.10E-04**	**1.10E-04**	**5.00E-07**	**Yes**
	309-00-2	Aldrin			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	3.00E-03	No
	319-84-6	alpha-BHC			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	2.20E-03	No
	5103-71-9	**alpha-Chlordane**			**mg/l**		**0/3**	**4.90E-05 - 5.30E-05**	**5.30E-05**	**2.20E-06**	**Yes**
	319-85-7	beta-BHC			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	2.20E-03	No
	75-99-0	Dalapon			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	319-86-8	delta-BHC			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	1.41E-01	No
	1918-00-9	Dicamba			mg/l		0/3	2.00E-04 - 2.00E-04	2.00E-04	NVA	No
	120-36-5	Dichloroprop			mg/l		0/3	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	60-57-1	Dieldrin			mg/l		0/3	4.90E-05 - 5.30E-05	5.30E-05	5.60E-05	No
	959-98-8	**Endosulfan I**			**mg/l**		**0/3**	**4.90E-05 - 5.30E-05**	**5.30E-05**	**5.10E-05**	**Yes**
	33213-65-9	**Endosulfan II**			**mg/l**		**0/3**	**9.80E-05 - 1.10E-04**	**1.10E-04**	**5.10E-05**	**Yes**
	1031-07-8	**Endosulfan sulfate**			**mg/l**		**0/3**	**9.80E-05 - 1.10E-04**	**1.10E-04**	**5.10E-05**	**Yes**
	72-20-8	**Endrin**			**mg/l**		**0/3**	**9.80E-05 - 1.10E-04**	**1.10E-04**	**3.60E-05**	**Yes**
	7421-93-4	**Endrin aldehyde**			**mg/l**		**0/3**	**9.80E-05 - 1.10E-04**	**1.10E-04**	**3.60E-05**	**Yes**
	53494-70-5	**Endrin ketone**			**mg/l**		**0/3**	**9.80E-05 - 1.10E-04**	**1.10E-04**	**3.60E-05**	**Yes**
	58-89-9	**gamma-BHC (Lindane)**			**mg/l**		**0/3**	**4.90E-05 - 5.30E-05**	**5.30E-05**	**1.00E-05**	**Yes**
	5103-74-2	**gamma-Chlordane**			**mg/l**		**0/3**	**4.90E-05 - 5.30E-05**	**5.30E-05**	**2.20E-06**	**Yes**
	76-44-8	**Heptachlor**			**mg/l**		**0/3**	**4.90E-05 - 5.30E-05**	**5.30E-05**	**1.90E-06**	**Yes**
	1024-57-3	**Heptachlor epoxide**			**mg/l**		**0/3**	**4.90E-05 - 5.30E-05**	**5.30E-05**	**1.90E-06**	**Yes**
	94-74-6	MCPA			mg/l		0/3	5.00E-02 - 5.00E-02	5.00E-02	NVA	No
	93-65-2	MCPP			mg/l		0/3	5.00E-02 - 5.00E-02	5.00E-02	NVA	No
	72-43-5	**Methoxychlor**			**mg/l**		**0/3**	**9.80E-05 - 1.10E-04**	**1.10E-04**	**1.90E-05**	**Yes**
	8001-35-2	**Toxaphene**			**mg/l**		**0/3**	**2.50E-03 - 2.70E-03**	**2.70E-03**	**2.00E-07**	**Yes**
	12674-11-2	**Aroclor 1016**			**mg/l**		**0/3**	**4.90E-04 - 5.30E-04**	**5.30E-04**	**7.40E-08**	**Yes**
	11104-28-2	**Aroclor 1221**			**mg/l**		**0/3**	**4.90E-04 - 5.30E-04**	**5.30E-04**	**7.40E-08**	**Yes**
	11141-16-5	**Aroclor 1232**			**mg/l**		**0/3**	**4.90E-04 - 5.30E-04**	**5.30E-04**	**7.40E-08**	**Yes**
	53469-21-9	**Aroclor 1242**			**mg/l**		**0/3**	**4.90E-04 - 5.30E-04**	**5.30E-04**	**7.40E-08**	**Yes**
	12672-29-6	**Aroclor 1248**			**mg/l**		**0/3**	**4.90E-04 - 5.30E-04**	**5.30E-04**	**7.40E-08**	**Yes**
	11097-69-1	**Aroclor 1254**			**mg/l**		**0/3**	**4.90E-04 - 5.30E-04**	**5.30E-04**	**7.40E-08**	**Yes**

Table F-41
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	11096-82-5	**Aroclor 1260**			**mg/l**		**0/3**	**4.90E-04 - 5.30E-04**	**5.30E-04**	**7.40E-08**	**Yes**
	131-11-3	Dimethylphthalate			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	120-82-1	1,2,4-Trichlorobenzene			mg/l		0/6	1.00E-03 - 5.70E-03	5.70E-03	2.40E-02	No
Surface Water	**95-50-1**	**1,2-Dichlorobenzene**			**mg/l**		**0/6**	**1.00E-03 - 5.70E-03**	**5.70E-03**	**7.00E-04**	**Yes**
	541-73-1	1,3-Dichlorobenzene			mg/l		0/6	1.00E-03 - 5.70E-03	5.70E-03	1.50E-01	No
	106-46-7	1,4-Dichlorobenzene			mg/l		0/6	1.00E-03 - 5.70E-03	5.70E-03	2.60E-02	No
	95-95-4	2,4,5-Trichlorophenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	88-06-2	**2,4,6-Trichlorophenol**			**mg/l**		**0/6**	**4.90E-03 - 5.70E-03**	**5.70E-03**	**4.90E-03**	**Yes**
	120-83-2	2,4-Dichlorophenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	1.10E-02	No
	105-67-9	2,4-Dimethylphenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	51-28-5	2,4-Dinitrophenol			mg/l		0/6	1.00E-02 - 2.80E-02	2.80E-02	NVA	No
	121-14-2	2,4-Dinitrotoluene			mg/l		0/6	2.00E-04 - 6.50E-04	6.50E-04	4.40E-02	No
	606-20-2	2,6-Dinitrotoluene			mg/l		0/6	2.00E-04 - 1.00E-03	1.00E-03	8.10E-02	No
	91-58-7	2-Chloronaphthalene			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	95-57-8	2-Chlorophenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	2.40E-02	No
	91-57-6	**2-Methylnaphthalene**			**mg/l**		**0/6**	**9.70E-04 - 5.00E-03**	**5.00E-03**	**4.70E-03**	**Yes**
	88-74-4	2-Nitroaniline			mg/l		0/6	5.00E-03 - 1.10E-02	1.10E-02	NVA	No
	88-75-5	2-Nitrophenol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	1.92E+00	No
	88-85-7	**2-sec-butyl-4,6-dinitrophenol**			**mg/l**		**0/3**	**2.00E-04 - 2.00E-04**	**2.00E-04**	**5.00E-05**	**Yes**
	91-94-1	**3,3'-Dichlorobenzidine**			**mg/l**		**0/6**	**9.70E-03 - 1.10E-02**	**1.10E-02**	**4.50E-03**	**Yes**
	99-09-2	3-Nitroaniline			mg/l		0/6	5.00E-03 - 1.10E-02	1.10E-02	NVA	No
	534-52-1	4,6-Dinitro-o-cresol			mg/l		0/6	5.00E-03 - 1.10E-02	1.10E-02	NVA	No
	100-01-6	4-Nitroaniline			mg/l		0/6	6.00E-03 - 1.10E-02	1.10E-02	NVA	No
	100-02-7	4-Nitrophenol			mg/l		0/6	1.00E-02 - 2.80E-02	2.80E-02	6.00E-02	No
	83-32-9	Acenaphthene			mg/l		0/6	9.70E-04 - 1.20E-03	1.20E-03	5.80E-03	No
	208-96-8	Acenaphthylene			mg/l		0/6	9.70E-04 - 1.20E-03	1.20E-03	NVA	No
	98-86-2	Acetophenone			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	120-12-7	**Anthracene**			**mg/l**		**0/6**	**9.70E-04 - 1.20E-03**	**1.20E-03**	**1.20E-05**	**Yes**
	100-52-7	Benzaldehyde			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	56-55-3	**Benzo(a)anthracene**			**mg/l**		**0/6**	**6.20E-05 - 2.30E-04**	**2.30E-04**	**1.80E-05**	**Yes**
	50-32-8	**Benzo(a)pyrene**			**mg/l**		**0/6**	**6.20E-05 - 2.30E-04**	**2.30E-04**	**1.50E-05**	**Yes**
	205-99-2	Benzo(b)fluoranthene			mg/l		0/6	9.00E-05 - 2.30E-04	2.30E-04	NVA	No
	191-24-2	Benzo(g,h,i)perylene			mg/l		0/6	1.90E-04 - 1.20E-03	1.20E-03	NVA	No
	207-08-9	Benzo(k)fluoranthene			mg/l		0/6	1.20E-04 - 2.30E-04	2.30E-04	NVA	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	111-44-4	bis(2-Chloroethyl)ether			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	1.60E-02	No
	85-68-7	Butyl benzyl phthalate			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	1.90E-02	No
	86-74-8	Carbazole			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No

Table F-41
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	218-01-9	Chrysene			mg/l		0/6	1.90E-04 - 1.20E-03	1.20E-03	NVA	No
	84-74-2	**Di-n-butyl phthalate**			**mg/l**		**0/6**	**4.90E-03 - 2.00E-02**	**2.00E-02**	**1.90E-02**	**Yes**
	117-84-0	Di-n-octyl phthalate			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	2.20E-02	No
	53-70-3	Dibenz(a,h)anthracene			mg/l		0/6	1.90E-04 - 2.40E-04	2.40E-04	NVA	No
Surface Water	**132-64-9**	**Dibenzofuran**			**mg/l**		**0/6**	**4.90E-03 - 5.70E-03**	**5.70E-03**	**3.70E-03**	**Yes**
	206-44-0	**Fluoranthene**			**mg/l**		**0/6**	**9.70E-04 - 1.20E-03**	**1.20E-03**	**4.00E-05**	**Yes**
	86-73-7	Fluorene			mg/l		0/6	9.70E-04 - 1.20E-03	1.20E-03	3.00E-03	No
	118-74-1	**Hexachlorobenzene**			**mg/l**		**0/6**	**4.90E-03 - 5.70E-03**	**5.70E-03**	**3.00E-07**	**Yes**
	87-68-3	**Hexachlorobutadiene**			**mg/l**		**0/6**	**4.90E-03 - 5.70E-03**	**5.70E-03**	**1.30E-03**	**Yes**
	77-47-4	Hexachlorocyclopentadiene			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	67-72-1	Hexachloroethane			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	1.20E-02	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/l		0/6	6.20E-05 - 2.30E-04	2.30E-04	NVA	No
	78-59-1	Isophorone			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	86-30-6	n-Nitrosodiphenylamine			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	2.10E-01	No
	91-20-3	Naphthalene			mg/l		0/6	6.20E-04 - 1.10E-03	1.10E-03	1.10E-03	No
	98-95-3	Nitrobenzene			mg/l		0/6	2.00E-04 - 6.50E-04	6.50E-04	NVA	No
	95-48-7	o-Cresol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	1.30E-02	No
	59-50-7	p-Chloro-m-cresol			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	106-47-8	p-Chloroaniline			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	2.32E-01	No
	106-44-5	p-Cresol			mg/l		0/3	5.00E-03 - 5.00E-03	5.00E-03	5.43E-01	No
	87-86-5	**Pentachlorophenol**			**mg/l**		**0/6**	**5.00E-05 - 2.80E-02**	**2.80E-02**	**5.00E-04**	**Yes**
	85-01-8	**Phenanthrene**			**mg/l**		**0/6**	**9.70E-04 - 1.20E-03**	**1.20E-03**	**4.00E-04**	**Yes**
	108-95-2	**Phenol**			**mg/l**		**0/6**	**4.90E-03 - 5.70E-03**	**5.70E-03**	**4.00E-03**	**Yes**
	129-00-0	**Pyrene**			**mg/l**		**0/6**	**9.70E-04 - 1.20E-03**	**1.20E-03**	**2.50E-05**	**Yes**
	71-55-6	1,1,1-Trichloroethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	1.10E-02	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	6.10E-01	No
	79-00-5	1,1,2-Trichloroethane			mg/l		0/6	1.00E-03 - 2.00E-03	2.00E-03	1.20E+00	No
	75-34-3	1,1-Dichloroethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	4.70E-02	No
	75-35-4	1,1-Dichloroethene			mg/l		0/6	1.00E-03 - 2.00E-03	2.00E-03	2.50E-02	No
	107-06-2	1,2-Dichloroethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	1.00E-01	No
	78-87-5	1,2-Dichloropropane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	78-93-3	2-Butanone			mg/l		0/6	5.00E-03 - 2.00E-02	2.00E-02	1.40E+01	No
	591-78-6	2-Hexanone			mg/l		0/6	5.00E-03 - 2.00E-02	2.00E-02	9.90E-02	No
	101-55-3	**4-Bromophenyl phenylether**			**mg/l**		**0/6**	**4.90E-03 - 5.70E-03**	**5.70E-03**	**1.50E-03**	**Yes**
	7005-72-3	4-Chlorophenyl phenylether			mg/l		0/6	4.90E-03 - 5.70E-03	5.70E-03	NVA	No
	108-10-1	4-Methyl-2-pentanone			mg/l		0/6	5.00E-03 - 2.00E-02	2.00E-02	1.70E-01	No
	67-64-1	Acetone			mg/l		0/6	2.00E-02 - 2.50E-02	2.50E-02	1.50E+00	No
	71-43-2	Benzene			mg/l		0/6	1.00E-03 - 2.00E-03	2.00E-03	3.70E-01	No
	75-27-4	Bromodichloromethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	NVA	No

Table F-41
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area A

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	74-83-9	Bromomethane			mg/l		0/6	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	75-15-0	**Carbon disulfide**			**mg/l**		**0/6**	**2.00E-03 - 2.00E-02**	**2.00E-02**	**9.20E-04**	**Yes**
	56-23-5	Carbon tetrachloride			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	1.33E-02	No
	108-90-7	Chlorobenzene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	1.30E-03	No
	75-00-3	Chloroethane			mg/l		0/6	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
Surface Water	74-87-3	Chloromethane			mg/l		0/6	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	10061-01-5	**cis-1,3-Dichloro-1-propene**			**mg/l**		**0/6**	**1.00E-03 - 1.00E-03**	**1.00E-03**	**5.50E-05**	**Yes**
	124-48-1	Dibromochloromethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	100-41-4	Ethylbenzene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	9.00E-02	No
	75-09-2	Methylene chloride			mg/l		0/6	4.00E-03 - 5.00E-03	5.00E-03	9.81E-02	No
	100-42-5	Styrene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	7.20E-02	No
	127-18-4	Tetrachloroethene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	1.11E-01	No
	108-88-3	Toluene			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	2.00E-03	No
	10061-02-6	**trans-1,3-Dichloropropene**			**mg/l**		**0/6**	**1.00E-03 - 2.00E-03**	**2.00E-03**	**5.50E-05**	**Yes**
	75-25-2	Tribromomethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	3.20E-01	No
	79-01-6	Trichloroethene			mg/l		0/6	1.00E-03 - 2.00E-03	2.00E-03	2.10E-02	No
	67-66-3	Trichloromethane			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	1.80E-03	No
	75-01-4	Vinyl Chloride			mg/l		0/6	1.00E-03 - 1.00E-03	1.00E-03	9.30E-01	No
	1330-20-7	Xylenes (total)			mg/l		0/6	2.00E-03 - 3.00E-03	3.00E-03	1.30E-02	No

(1) Maximum non-detect limit value used for screening.

(2) Screening toxicity values from USEPA Region III BTAG Screening Table (January 2009).

Definitions: N/A = Not Applicable or Not Available
NVA = No Value Available

Table F-42
Selection of Ecological Soil Screening Toxicity Values for SWMU 41

Parameter	Ecological Soil Screening Levels[a] (mg/kg)	Ecological Preliminary Remediation Goals[b] (mg/kg)	Ecological Data Quality Levels[c] (mg/kg)	Other Ecological Soil Screening Levels[d] (mg/kg)	Selected Ecological Screening Toxicity Value[e] (mg/kg)
Inorganic Compounds					
Aluminum	NVA	NVA	NVA	pH Dependant	pH Dependant
Antimony	$0.27_{(mammal)}$	$5_{(plant)}$	1.42E-01	--	2.70E-01
Arsenic	$18_{(plant)}$	$9.9_{(mammal, plant)}$	5.70E+00	--	9.90E+00
Barium	$330_{(earthworm)}$	2.83E+02	1.04E+00	--	2.83E+02
Beryllium	$21_{(mammal)}$	1.00E+01	1.06E+00	--	1.00E+01
Cadmium	$0.36_{(mammal)}$	$4_{(plant, bird)}$	2.22E-03	--	3.60E-01
Calcium	NVA	NVA	NVA	NVA	Nutrient
Chromium	$26_{(bird)}$	$0.4_{(earthworm)}$	4.00E-01	--	4.00E-01
Cobalt	$13_{(plant)}$	$20_{(plant)}$	1.40E-01	--	1.30E+01
Copper	$28_{(bird)}$	$60_{(earthworm)}$	3.13E-01	--	2.80E+01
Iron	NVA	NVA	NVA	NVA	NVA
Lead	$11_{(bird)}$	4.05E+01	5.37E-02	--	1.10E+01
Magnesium	NVA	NVA	NVA	NVA	Nutrient
Manganese	$220_{(plant)}$	NVA	NVA	50[f]	2.20E+02
Mercury	NVA	5.10E-04	1.00E-01	--	5.10E-04
Nickel	$38_{(plant)}$	3.00E+01	1.36E+01	--	3.00E+01
Potassium	NVA	NVA	NVA	NVA	Nutrient
Selenium	$0.52_{(plant)}$	2.10E-01	2.77E-02	--	2.10E-01
Silver	$4.2_{(bird)}$	$2_{(plant)}$	4.04E+00	--	2.00E+00
Sodium	NVA	NVA	NVA	NVA	Nutrient
Thallium	NVA	1.00E+00	5.69E-02	--	1.00E+00
Vanadium	$7.8_{(bird)}$	2.00E+00	1.59E+00	--	2.00E+00
Zinc	$46_{(bird)}$	$8.5_{(bird)}$	6.62E+00	--	8.50E+00
Total Organic Carbon	NVA	NVA	NVA	NVA	NVA
Organic Compounds					
1,1,1,2-Tetrachloroethane	NVA	NVA	2.25E+02	--	2.25E+02
1,1,1-Trichloroethane	NVA	NVA	2.98E+01	--	2.98E+01
1,1,2,2-Tetrachloroethane	NVA	NVA	1.27E-01	--	1.27E-01
1,1,2-Trichloroethane	NVA	NVA	2.86E+01	--	2.86E+01
1,1-Dichloroethane	NVA	NVA	2.01E+01	--	2.01E+01
1,1-Dichloroethene	NVA	NVA	8.28E+00	--	8.28E+00
1,1-Dichloropropene	NVA	NVA	NVA	NVA	NVA
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NVA	NVA	3.86E-05	--	3.86E-05
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	NVA	NVA	1.99E-07	--	1.99E-07
1,2,3,4,7,8-Hexachlorodibenzofuran	NVA	NVA	3.86E-05	--	3.86E-05
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	NVA	NVA	1.99E-07	--	1.99E-07
1,2,3,6,7,8-Hexachlorodibenzofuran	NVA	NVA	3.86E-05	--	3.86E-05
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	NVA	NVA	1.99E-07	--	1.99E-07
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	NVA	NVA	1.99E-07	--	1.99E-07
1,2,3-Trichlorobenzene	NVA	NVA	NVA	NVA	NVA
1,2,3-Trichloropropane	NVA	NVA	3.36E+00	--	3.36E+00
1,2,4,5-Tetrachlorobenzene	NVA	NVA	2.02E+00	--	2.02E+00
1,2,4-Trichlorobenzene	NVA	$20_{(earthworm)}$	1.11E+01	--	2.00E+01
1,2,4-Trimethylbenzene	NVA	NVA	NVA	NVA	NVA
1,2-Dibromo-3-chloropropane	NVA	NVA	3.52E-02	--	3.52E-01
1,2-Dibromoethane	NVA	NVA	1.23E+00	--	1.23E+00
1,2-Dichlorobenzene	NVA	NVA	2.96E+00	--	2.96E+00
1,2-Dichloroethane	NVA	NVA	2.12E+01	--	2.12E+01
1,2-Dichloroethene (total)	NVA	NVA	7.84E-01	--	7.84E-01
1,2-Dichloropropane	NVA	NVA	3.27E+01	--	3.27E+01
1,2-Diphenylhydrazine	NVA	NVA	NVA	NVA	NVA

Table F-42
Selection of Ecological Soil Screening Toxicity Values for SWMU 41

Parameter	Ecological Soil Screening Levels[a] (mg/kg)	Ecological Preliminary Remediation Goals[b] (mg/kg)	Ecological Data Quality Levels[c] (mg/kg)	Other Ecological Soil Screening Levels[d] (mg/kg)	Selected Ecological Screening Toxicity Value[e] (mg/kg)
1,3,5-Trimethylbenzene	NVA	NVA	NVA	NVA	NVA
1,3,5-Trinitrobenzene	NVA	NVA	3.76E-01	--	3.76E-01
1,3,5-Trinitrobenzene	NVA	NVA	3.76E-01	--	3.76E-01
1,3-Dichlorobenzene	NVA	NVA	3.77E+01	--	3.77E+01
1,3-Dichloropropane	NVA	NVA	NVA	NVA	NVA
1,3-Dinitrobenzene	NVA	NVA	6.55E-01	--	6.55E-01
1,3-Dinitrobenzene	NVA	NVA	6.55E-01	--	6.55E-01
1,4-Dichlorobenzene	NVA	$20_{(earthworm)}$	5.46E-01	--	2.00E+01
2,2-Dichloropropane	NVA	NVA	NVA	NVA	NVA
2,3,7,8-Tetrachlorodibenzo-p-dioxin	NVA	3.15E-06	1.99E-07	--	3.15E-06
2,4,5-T	NVA	NVA	5.96E-01	--	5.96E-01
2,4,5-TP (Silvex)	NVA	NVA	1.09E-01	--	1.09E-01
2,4,5-Trichlorophenol	NVA	$9_{(earthworm)}$	1.41E+01	--	9.00E+00
2,4,6-Trichlorophenol	NVA	$4_{(plant)}$	9.94E+00	--	4.00E+00
2,4,6-Trinitrotoluene	NVA	NVA	NVA	6.40E+00	6.40E+00
2,4-D	NVA	NVA	2.73E-02	--	2.73E-02
2,4-DB	NVA	NVA	NVA	NVA	NVA
2,4-Dichlorophenol	NVA	NVA	8.75E+01	--	8.75E+01
2,4-Dimethylphenol	NVA	NVA	1.00E-02	--	1.00E-02
2,4-Dinitrophenol	NVA	$20_{(plant)}$	6.09E-02	--	2.00E+01
2,4-Dinitrotoluene	NVA	NVA	1.28E+00	--	1.28E+00
2,6-Dinitrotoluene	NVA	NVA	3.28E-02	--	3.28E-02
2-amino-4,6-Dinitrotoluene	NVA	NVA	NVA	2.10E+00	2.10E+00
2-Butanone	NVA	NVA	8.96E+01	--	8.96E+01
2-Chloroethyl vinyl ether	NVA	NVA	NVA	NVA	NVA
2-Chloronaphthalene	NVA	NVA	1.22E-02	--	1.22E-02
2-Chlorophenol	NVA	NVA	2.43E-01	--	2.43E-01
2-Chlorotoluene	NVA	NVA	NVA	NVA	NVA
2-Hexanone	NVA	NVA	1.26E+01	--	1.26E+01
2-Methylnaphthalene	NVA	NVA	3.24E+00	--	3.24E+00
2-Nitroaniline	NVA	NVA	7.41E+01	--	7.41E+01
2-Nitrophenol	NVA	NVA	1.60E+00	--	1.60E+00
2-Nitrotoluene	NVA	NVA	NVA	2.00E+00	2.00E+00
2-sec-butyl-4,6-dinitrophenol	NVA	NVA	2.18E-02	--	2.18E-02
3&4-Methylphenol	NVA	NVA	4.04E+01	--	4.04E+01
3,3'-Dichlorobenzidine	NVA	NVA	6.46E-01	--	6.46E-01
3-Nitroaniline	NVA	NVA	3.16E+00	--	3.16E+00
3-Nitrotoluene	NVA	NVA	NVA	2.40E+00	2.40E+00
4,4'-DDD	$0.021_{(mammal)}$	NVA	7.58E-01	--	2.10E-02
4,4'-DDE	$0.021_{(mammal)}$	NVA	5.96E-01	--	2.10E-02
4,4'-DDT	$0.021_{(mammal)}$	NVA	1.75E-02	--	2.10E-02
4,6-Dinitro-o-cresol	NVA	NVA	1.44E-01	--	1.44E-01
4-amino-2,6-Dinitrotoluene	NVA	NVA	NVA	7.30E-01	7.30E-01
4-Bromophenyl phenylether	NVA	NVA	NVA	NVA	NVA
4-Chlorophenyl phenylether	NVA	NVA	NVA	NVA	NVA
4-Methyl-2-pentanone	NVA	NVA	4.43E+02	--	4.43E+02
4-Nitroaniline	NVA	NVA	2.19E+01	--	2.19E+01
4-Nitrophenol	NVA	$7_{(earthworm)}$	5.12E+00	--	7.00E+00
4-Nitrotoluene	NVA	NVA	NVA	4.40E+00	4.40E+00
Acenaphthene	$29_{(earthworm)}$	$20_{(plant)}$	6.82E+02	--	2.00E+01
Acenaphthylene	$29_{(earthworm)}$	NVA	6.82E+02	--	2.90E+01
Acetone	NVA	NVA	2.50E+00	--	2.50E+00
Acetonitrile	NVA	NVA	1.37E+00	--	1.37E+00

Table F-42
Selection of Ecological Soil Screening Toxicity Values for SWMU 41

Parameter	Ecological Soil Screening Levels[a] (mg/kg)	Ecological Preliminary Remediation Goals[b] (mg/kg)	Ecological Data Quality Levels[c] (mg/kg)	Other Ecological Soil Screening Levels[d] (mg/kg)	Selected Ecological Screening Toxicity Value[e] (mg/kg)
Acetophenone	NVA	NVA	3.00E+02	--	3.00E+02
Acraldehyde	NVA	NVA	5.27E+00	--	5.27E+00
Acrylonitrile	NVA	NVA	2.39E-02	--	2.39E-02
Aldrin	NVA	NVA	3.32E-03	--	3.32E-03
alpha-BHC	NVA	NVA	9.94E-02	--	9.94E-02
alpha-Chlordane	NVA	NVA	2.24E-01	--	2.24E-01
Anthracene	$29_{(earthworm)}$	NVA	1.48E+03	--	2.90E+01
Aroclor 1016	NVA	$0.371_{(mammal)}$	3.32E-04	--	3.71E-01
Aroclor 1221	NVA	$0.371_{(mammal)}$	3.32E-04	--	3.71E-01
Aroclor 1232	NVA	$0.371_{(mammal)}$	3.32E-04	--	3.71E-01
Aroclor 1242	NVA	$0.371_{(mammal)}$	3.32E-04	--	3.71E-01
Aroclor 1248	NVA	$0.371_{(mammal)}$	3.32E-04	--	3.71E-01
Aroclor 1254	NVA	$0.371_{(mammal)}$	3.32E-04	--	3.71E-01
Aroclor 1260	NVA	$0.371_{(mammal)}$	3.32E-04	--	3.71E-01
Atrazine	NVA	NVA	NVA	NVA	NVA
Benzaldehyde	NVA	NVA	NVA	NVA	NVA
Benzene	NVA	NVA	2.55E-01	--	2.55E-01
Benzo(a)anthracene	$1.1_{(mammal)}$	NVA	5.21E+00	--	1.10E+00
Benzo(a)pyrene	$1.1_{(mammal)}$	NVA	1.52E+00	--	1.10E+00
Benzo(b)fluoranthene	$1.1_{(mammal)}$	NVA	5.98E+01	--	1.10E+00
Benzo(g,h,i)perylene	$1.1_{(mammal)}$	NVA	1.19E+02	--	1.10E+00
Benzo(k)fluoranthene	$1.1_{(mammal)}$	NVA	1.48E+02	--	1.10E+00
Benzoic acid	NVA	NVA	NVA	1.00E+00	1.00E+00
Benzyl alcohol	NVA	NVA	6.58E+01	--	6.58E+01
beta-BHC	NVA	NVA	3.98E-03	--	3.98E-03
Biphenyl	NVA	60(plant)	NVA	--	6.00E+01
bis(2-Chloroethoxy)methane	NVA	NVA	3.02E-01	--	3.02E-01
bis(2-Chloroethyl)ether	NVA	NVA	2.37E+01	--	2.37E+01
bis(2-Chloroisopropyl)ether	NVA	NVA	1.99E+01	--	1.99E+01
bis(2-Ethylhexyl) phthalate	NVA	NVA	9.26E-01	--	9.26E-01
Bromobenzene	NVA	NVA	NVA	NVA	NVA
Bromodichloromethane	NVA	NVA	5.40E-01	--	5.40E-01
Bromomethane	NVA	NVA	2.35E-01	--	2.35E-01
Butyl benzyl phthalate	NVA	NVA	2.39E-01	--	2.39E-01
Caprolactam	NVA	NVA	NVA	NVA	NVA
Carbazole	NVA	NVA	NVA	NVA	NVA
Carbon disulfide	NVA	NVA	9.41E-02	--	9.41E-02
Carbon tetrachloride	NVA	NVA	2.98E+00	--	2.98E+00
Chlorobenzene	NVA	$40_{(earthworm)}$	1.31E+01	--	4.00E+01
Chlorobromomethane	NVA	NVA	NVA	NVA	NVA
Chloroethane	NVA	NVA	NVA	NVA	NVA
Chloroform	NVA	NVA	1.19E+00	--	1.19E+00
Chloromethane	NVA	NVA	1.04E+01	--	1.04E+01
Chrysene	$1.1_{(mammal)}$	NVA	4.73E+00	--	1.10E+00
cis-1,2-Dichloroethene	NVA	NVA	7.84E-01	--	7.84E-01
cis-1,3-Dichloro-1-propene	NVA	NVA	3.98E-01	--	3.98E-01
Cyclohexane	NVA	NVA	NVA	NVA	NVA
Cyclonite	NVA	NVA	NVA	7.50E+00	7.50E+00
Dalapon	NVA	NVA	NVA	NVA	NVA
delta-BHC	NVA	NVA	9.94E+00	--	9.94E+00
Dibenz(a,h)anthracene	$1.1_{(mammal)}$	NVA	1.84E+01	--	1.10E+00
Dibenzofuran	NVA	NVA	NVA	6.10E+00	6.10E+00
Dibromochloromethane	NVA	NVA	2.05E+00	--	2.05E+00

Table F-42
Selection of Ecological Soil Screening Toxicity Values for SWMU 41

Parameter	Ecological Soil Screening Levels[a] (mg/kg)	Ecological Preliminary Remediation Goals[b] (mg/kg)	Ecological Data Quality Levels[c] (mg/kg)	Other Ecological Soil Screening Levels[d] (mg/kg)	Selected Ecological Screening Toxicity Value[e] (mg/kg)
Dibromomethane	NVA	NVA	NVA	NVA	NVA
Dicamba	NVA	NVA	NVA	NVA	NVA
Dichlorodifluoromethane	NVA	NVA	NVA	NVA	NVA
Dichloroprop	NVA	NVA	NVA	NVA	NVA
Dieldrin	$0.0049_{(mammal)}$	NVA	2.38E-03	--	4.90E-03
Diethyl phthalate	NVA	$100_{(plant)}$	2.48E+01	--	1.00E+02
Dimethylphthalate	NVA	NVA	7.34E+02	--	7.34E+02
Di-n-butyl phthalate	NVA	$200_{(plant)}$	1.50E-01	--	2.00E+02
Di-n-octyl phthalate	NVA	NVA	7.09E+02	--	7.09E+02
Endosulfan I	NVA	NVA	1.19E-01	--	1.19E-01
Endosulfan II	NVA	NVA	1.19E-01	--	1.19E-01
Endosulfan sulfate	NVA	NVA	3.58E-02	--	3.58E-02
Endrin	NVA	NVA	1.01E-02	--	1.01E-02
Endrin Aldehyde	NVA	NVA	1.05E-02	--	1.05E-02
Endrin ketone	NVA	NVA	NVA	NVA	NVA
Ethanol	NVA	NVA	NVA	NVA	NVA
Ethylbenzene	NVA	NVA	5.16E+00	--	5.16E+00
Fluoranthene	$1.1_{(mammal)}$	NVA	1.22E+02	--	1.10E+00
Fluorene	$29_{(earthworm)}$	NVA	1.22E+02	--	2.90E+01
Freon 113	NVA	NVA	NVA	NVA	NVA
gamma-BHC (Lindane)	NVA	NVA	5.00E-03	--	5.00E-03
gamma-Chlordane	NVA	NVA	2.24E-01	--	2.24E-01
Heptachlor	NVA	NVA	5.98E-03	--	5.98E-03
Heptachlor epoxide	NVA	NVA	1.52E-01	--	1.52E-01
Hexachlorobenzene	NVA	NVA	1.99E-01	--	1.99E-01
Hexachlorobutadiene	NVA	NVA	3.98E-02	--	3.98E-02
Hexachlorocyclopentadiene	NVA	$10_{(plant)}$	7.55E-01	--	1.00E+01
Hexachloroethane	NVA	NVA	5.96E-01	--	5.96E-01
HMX	NVA	NVA	NVA	2.70E+01	2.70E+01
Indeno(1,2,3-cd)pyrene	$1.1_{(mammal)}$	NVA	1.09E+02	--	1.10E+00
Isophorone	NVA	NVA	1.39E+02	--	1.39E+02
Isopropylbenzene	NVA	NVA	NVA	NVA	NVA
m+p-Xylenes	NVA	NVA	1.00E+01	--	1.00E+01
MCPA	NVA	NVA	NVA	NVA	NVA
MCPP	NVA	NVA	NVA	NVA	NVA
Methoxychlor	NVA	NVA	1.99E-02	--	1.99E-02
Methyl Acetate	NVA	NVA	NVA	NVA	NVA
Methyl tert-butyl ether	NVA	NVA	NVA	NVA	NVA
Methylene chloride	NVA	NVA	4.05E+00	--	4.05E+00
Naphthalene	$29_{(earthworm)}$	NVA	9.94E-02	--	2.90E+01
n-Butylbenzene	NVA	NVA	NVA	NVA	NVA
Nitrobenzene	NVA	NVA	1.31E+00	--	1.31E+00
Nitroglycerin	NVA	NVA	NVA	7.10E+01	7.10E+01
n-Nitroso-di-n-propylamine	NVA	NVA	5.44E-01	--	5.44E-01
n-Nitrosodiphenylamine	NVA	NVA	5.45E-01	--	5.45E-01
n-Propylbenzene	NVA	NVA	NVA	NVA	NVA
o-Cresol	NVA	NVA	4.04E+01	--	4.04E+01
Octachlorodibenzodioxin	NVA	NVA	1.99E-07	--	1.99E-07
Octachlorodibenzofuran	NVA	NVA	3.86E-05	--	3.86E-05
o-Xylene	NVA	NVA	1.00E+01	--	1.00E+01
p-Chloroaniline	NVA	NVA	1.10E+00	--	1.10E+00
p-Chloro-m-cresol	NVA	NVA	7.95E+00	--	7.95E+00
p-Chlorotoluene	NVA	NVA	NVA	NVA	NVA

Table F-42
Selection of Ecological Soil Screening Toxicity Values for SWMU 41

Parameter	Ecological Soil Screening Levels[a] (mg/kg)	Ecological Preliminary Remediation Goals[b] (mg/kg)	Ecological Data Quality Levels[c] (mg/kg)	Other Ecological Soil Screening Levels[d] (mg/kg)	Selected Ecological Screening Toxicity Value[e] (mg/kg)
p-Cresol	NVA	NVA	1.63E+02	--	1.63E+02
p-Cymene	NVA	NVA	NVA	NVA	NVA
Pentachlorophenol	$2.1_{(bird)}$	$3_{(plant)}$	1.19E-01	--	2.10E+00
Pentaerythritol tetranitrate (PETN)	NVA	NVA	NVA	8.60E+03	8.60E+03
Phenanthrene	$29_{(earthworm)}$	NVA	4.57E+01	--	2.90E+01
Phenol	NVA	$30_{(earthworm)}$	1.20E+02	--	3.00E+01
Pyrene	$1.1_{(mammal)}$	NVA	7.85E+01	--	1.10E+00
Pyridine	NVA	NVA	1.03E+00	--	1.03E+00
sec-Butylbenzene	NVA	NVA	NVA	NVA	NVA
Styrene	NVA	$300_{(plant)}$	4.69E+00	--	3.00E+02
TCDD TE	NVA	3.15E-06	1.99E-07	--	3.15E-06
tert-Butylbenzene	NVA	NVA	NVA	NVA	NVA
Tetrachloroethene	NVA	NVA	9.92E+00	--	9.92E+00
Tetryl	NVA	NVA	NVA	9.90E-01	9.90E-01
Toluene	NVA	$200_{(plant)}$	5.45E+00	--	2.00E+02
Total HPCDD	NVA	NVA	1.99E-07		1.99E-07
Total HPCDF	NVA	NVA	3.86E-05		3.86E-05
Total HXCDD	NVA	NVA	1.99E-07		1.99E-07
Total HXCDF	NVA	NVA	3.86E-05		3.86E-05
Total PECDF	NVA	NVA	3.86E-05		3.86E-05
Total Petroleum Hydrocarbons	NVA	NVA	NVA	NVA	NVA
Toxaphene	NVA	NVA	1.19E-01	--	1.19E-01
trans-1,2-Dichloroethene	NVA	NVA	7.84E-01	--	7.84E-01
trans-1,3-Dichloropropene	NVA	NVA	3.98E-01	--	3.98E-01
Tribromomethane	NVA	NVA	1.59E+01	--	1.59E+01
Trichloroethene	NVA	NVA	1.24E+01	--	1.24E+01
Trichlorofluoromethane	NVA	NVA	1.64E+01	--	1.64E+01
Trichloromethane	NVA	NVA	1.19E+00	--	1.19E+00
Vinyl Acetate	NVA	NVA	1.27E+01	--	1.27E+01
Vinyl Chloride	NVA	NVA	6.46E-01	--	6.46E-01
Xylenes (total)	NVA	NVA	1.00E+01	--	1.00E+01

a USEPA (2009), Ecological Soil Screening Level Guidance. Available on-line: http://www.epa.gov/ecotox/ecossl/

b Preliminary Remediation Goals for Ecological Endpoints, R.A. Efroymson et al., August 1997.

c Ecological Data Quality Levels, U.S.EPA Region 5, October 1999.

d LANL (2005). Ecorisk Database Release 2.2, Los Alamos National Laboratory, September.

e The following hierarchy was utilized to select the final Ecological Screening Toxicity Values for this assessment:

1. The lower value of either the Ecological Soil Screening Level Guidance or the Preliminary Remediation Goals for Ecological Endpoints.
2. Ecological Data Quality Levels, U.S.EPA Region 5
3. If no other value is available, the selected ESL is from LANL, 2005.

NVA = No Value Available

Table F-43
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Ecological Screening Value (2)	Region III BTAG Screening Levels (3)	Above Screening Value (Y/N)
	95-94-3	**1,2,4,5-Tetrachlorobenzene**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**2.02E+00**	**1.00E-01**	**Yes**
Surface Soil	**99-35-4**	**1,3,5-Trinitrobenzene**			**mg/kg**		**0/8**	**1.00E+00 - 1.00E+00**	**1.00E+00**	**3.76E-01**	**NVA**	**Yes**
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	6.55E-01	NVA	No
	118-96-7	2,4,6-Trinitrotoluene			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	6.40E+00	NVA	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	2.10E+00	NVA	No
	88-72-2	2-Nitrotoluene			mg/kg		0/8	1.00E+00 - 1.00E+00	1.00E+00	2.00E+00	NVA	No
	99-08-1	3-Nitrotoluene			mg/kg		0/8	1.00E+00 - 1.00E+00	1.00E+00	2.40E+00	NVA	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	7.30E-01	NVA	No
	99-99-0	4-Nitrotoluene			mg/kg		0/8	1.00E+00 - 1.00E+00	1.00E+00	4.40E+00	NVA	No
	1912-24-9	Atrazine			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	NVA	NVA	No
	92-52-4	Biphenyl			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	6.00E+01	NVA	No
	105-60-2	Caprolactam			mg/kg		0/8	3.30E-01 - 3.30E-01	3.30E-01	NVA	NVA	No
	74-97-5	Chlorobromomethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	NVA	3.00E+03	No
	121-82-4	Cyclonite			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	7.50E+00	NVA	No
	75-71-8	Dichlorodifluoromethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	NVA	NVA	No
	76-13-1	Freon 113			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	NVA	NVA	No
	2691-41-0	HMX			mg/kg		0/8	1.00E+00 - 1.00E+00	1.00E+00	2.70E+01	NVA	No
	55-63-0	Nitroglycerin			mg/kg		0/8	1.00E+01 - 1.00E+01	1.00E+01	7.10E+01	NVA	No
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/8	1.00E+01 - 1.00E+01	1.00E+01	8.60E+03	NVA	No
	479-45-8	**Tetryl**			**mg/kg**		**0/8**	**1.00E+00 - 1.00E+00**	**1.00E+00**	**9.90E-01**	**NVA**	**Yes**
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	7.84E-01	3.00E-01	No
	93-76-5	2,4,5-T			mg/kg		0/3	5.00E-02 - 5.00E-02	5.00E-02	5.96E-01	NVA	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/3	5.00E-02 - 5.00E-02	5.00E-02	1.09E-01	NVA	No
	94-75-7	**2,4-D**			**mg/kg**		**0/3**	**2.00E-01 - 2.00E-01**	**2.00E-01**	**2.73E-02**	**NVA**	**Yes**
	94-82-6	2,4-DB			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	NVA	NVA	No
	72-54-8	4,4'-DDD			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	2.10E-02	1.00E-01	No
	72-55-9	4,4'-DDE			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	2.10E-02	1.00E-01	No
	50-29-3	4,4'-DDT			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	2.10E-02	1.00E-01	No
	309-00-2	**Aldrin**			**mg/kg**		**0/3**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**3.32E-03**	**1.00E-01**	**Yes**
	319-84-6	alpha-BHC			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	9.94E-02	NVA	No
	319-85-7	**beta-BHC**			**mg/kg**		**0/3**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**3.98E-03**	**NVA**	**Yes**
	75-99-0	Dalapon			mg/kg		0/3	2.00E-01 - 3.40E-01	3.40E-01	NVA	NVA	No
	319-86-8	delta-BHC			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	9.94E+00	NVA	No
	1918-00-9	Dicamba			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	NVA	NVA	No
	120-36-5	Dichloroprop			mg/kg		0/3	2.00E-01 - 2.00E-01	2.00E-01	NVA	NVA	No
	60-57-1	**Dieldrin**			**mg/kg**		**0/3**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**4.90E-03**	**1.00E-01**	**Yes**

Table F-43
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Ecological Screening Value (2)	Region III BTAG Screening Levels (3)	Above Screening Value (Y/N)
	959-98-8	Endosulfan I			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	1.19E-01	NVA	No
Surface Soil	1031-07-8	Endosulfan sulfate			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	3.58E-02	NVA	No
	72-20-8	**Endrin**			**mg/kg**		**0/3**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**1.01E-02**	**1.00E-01**	**Yes**
	58-89-9	**gamma-BHC (Lindane)**			**mg/kg**		**0/3**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**5.00E-03**	**1.00E-01**	**Yes**
	1024-57-3	Heptachlor epoxide			mg/kg		0/3	2.00E-02 - 2.00E-02	2.00E-02	1.52E-01	1.00E-01	No
	94-74-6	MCPA			mg/kg		0/12	2.00E+01 - 2.00E+01	2.00E+01	NVA	NVA	No
	93-65-2	MCPP			mg/kg		0/3	2.00E+01 - 2.00E+01	2.00E+01	NVA	NVA	No
	8001-35-2	**Toxaphene**			**mg/kg**		**0/3**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**1.19E-01**	**NVA**	**Yes**
	12674-11-2	Aroclor 1016			mg/kg		0/3	6.60E-02 - 6.60E-02	6.60E-02	3.71E-01	1.00E-01	No
	11104-28-2	Aroclor 1221			mg/kg		0/3	6.60E-02 - 6.60E-02	6.60E-02	3.71E-01	1.00E-01	No
	11141-16-5	Aroclor 1232			mg/kg		0/3	6.60E-02 - 6.60E-02	6.60E-02	3.71E-01	1.00E-01	No
	53469-21-9	Aroclor 1242			mg/kg		0/3	3.30E-02 - 3.30E-02	3.30E-02	3.71E-01	1.00E-01	No
	12672-29-6	Aroclor 1248			mg/kg		0/3	3.30E-02 - 3.30E-02	3.30E-02	3.71E-01	1.00E-01	No
	11096-82-5	Aroclor 1260			mg/kg		0/3	6.60E-02 - 6.60E-02	6.60E-02	3.71E-01	1.00E-01	No
	131-11-3	Dimethylphthalate			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	7.34E+02	1.00E+01	No
	95-95-4	**2,4,5-Trichlorophenol**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**9.00E+00**	**1.00E-01**	**Yes**
	88-06-2	**2,4,6-Trichlorophenol**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**4.00E+00**	**1.00E-01**	**Yes**
	120-83-2	**2,4-Dichlorophenol**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**8.75E+01**	**1.00E-01**	**Yes**
	105-67-9	**2,4-Dimethylphenol**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**1.00E-02**	**1.00E-01**	**Yes**
	51-28-5	**2,4-Dinitrophenol**			**mg/kg**		**0/8**	**3.30E-01 - 3.30E-01**	**3.30E-01**	**2.00E+01**	**1.00E-01**	**Yes**
	121-14-2	2,4-Dinitrotoluene			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	1.28E+00	NVA	No
	606-20-2	**2,6-Dinitrotoluene**			**mg/kg**		**0/8**	**1.00E+00 - 1.00E+00**	**1.00E+00**	**3.28E-02**	**NVA**	**Yes**
	91-58-7	**2-Chloronaphthalene**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**1.22E-02**	**NVA**	**Yes**
	95-57-8	**2-Chlorophenol**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**2.43E-01**	**1.00E-01**	**Yes**
	91-57-6	2-Methylnaphthalene			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	3.24E+00	NVA	No
	88-74-4	2-Nitroaniline			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	7.41E+01	NVA	No
	88-75-5	**2-Nitrophenol**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**1.60E+00**	**1.00E-01**	**Yes**
	88-85-7	**2-sec-butyl-4,6-dinitrophenol**			**mg/kg**		**0/3**	**2.00E-01 - 2.00E-01**	**2.00E-01**	**2.18E-02**	**NVA**	**Yes**
	91-94-1	**3,3'-Dichlorobenzidine**			**mg/kg**		**0/8**	**5.50E-01 - 1.00E+00**	**1.00E+00**	**6.46E-01**	**NVA**	**Yes**
	99-09-2	3-Nitroaniline			mg/kg		0/8	1.70E-01 - 2.25E-01	2.25E-01	3.16E+00	NVA	No
	534-52-1	**4,6-Dinitro-o-cresol**			**mg/kg**		**0/8**	**2.10E-01 - 2.25E-01**	**2.25E-01**	**1.44E-01**	**NVA**	**Yes**
	100-01-6	4-Nitroaniline			mg/kg		0/8	1.70E-01 - 2.25E-01	2.25E-01	2.19E+01	NVA	No
	100-02-7	**4-Nitrophenol**			**mg/kg**		**0/8**	**3.30E-01 - 3.30E-01**	**3.30E-01**	**7.00E+00**	**1.00E-01**	**Yes**
	83-32-9	Acenaphthene			mg/kg		0/8	1.00E-01 - 1.00E-01	1.00E-01	2.00E+01	1.00E-01	No
	208-96-8	**Acenaphthylene**			**mg/kg**		**0/8**	**2.10E-01 - 2.10E-01**	**2.10E-01**	**2.90E+01**	**1.00E-01**	**Yes**
	98-86-2	Acetophenone			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	3.00E+02	NVA	No

Table F-43
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Ecological Screening Value (2)	Region III BTAG Screening Levels (3)	Above Screening Value (Y/N)
	120-12-7	Anthracene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	2.90E+01	1.00E-01	No
Surface Soil	100-52-7	Benzaldehyde			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	NVA	NVA	No
	56-55-3	Benzo(a)anthracene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	50-32-8	Benzo(a)pyrene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	205-99-2	Benzo(b)fluoranthene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	191-24-2	Benzo(g,h,i)perylene			mg/kg		0/8	6.00E-02 - 6.00E-02	6.00E-02	1.10E+00	1.00E-01	No
	207-08-9	Benzo(k)fluoranthene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	3.02E-01	NVA	No
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	2.37E+01	NVA	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	1.99E+01	NVA	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	2.39E-01	NVA	No
	86-74-8	Carbazole			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	NVA	NVA	No
	218-01-9	Chrysene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	117-84-0	Di-n-octyl phthalate			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	7.09E+02	NVA	No
	53-70-3	Dibenz(a,h)anthracene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	132-64-9	Dibenzofuran			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	6.10E+00	NVA	No
	86-73-7	Fluorene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	2.90E+01	1.00E-01	No
	118-74-1	Hexachlorobenzene			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	1.99E-01	NVA	No
	87-68-3	**Hexachlorobutadiene**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**3.98E-02**	**NVA**	**Yes**
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	1.00E+01	NVA	No
	67-72-1	Hexachloroethane			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	5.96E-01	NVA	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/kg		0/8	2.10E-02 - 2.10E-02	2.10E-02	1.10E+00	1.00E-01	No
	78-59-1	Isophorone			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	1.39E+02	NVA	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	5.44E-01	NVA	No
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	5.45E-01	NVA	No
	91-20-3	Naphthalene			mg/kg		0/8	1.00E-01 - 1.00E-01	1.00E-01	2.90E+01	1.00E-01	No
	98-95-3	Nitrobenzene			mg/kg		0/8	5.00E-01 - 5.00E-01	5.00E-01	1.31E+00	NVA	No
	95-48-7	**o-Cresol**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**4.04E+01**	**1.00E-01**	**Yes**
	106-47-8	p-Chloroaniline			mg/kg		0/8	1.70E-01 - 2.25E-01	2.25E-01	1.10E+00	NVA	No
	106-44-5	**p-Cresol**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**1.63E+02**	**1.00E-01**	**Yes**
	87-86-5	**Pentachlorophenol**			**mg/kg**		**0/8**	**3.30E-01 - 3.30E-01**	**3.30E-01**	**2.10E+00**	**1.00E-01**	**Yes**
	108-95-2	**Phenol**			**mg/kg**		**0/8**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**3.00E+01**	**1.00E-01**	**Yes**
	71-55-6	1,1,1-Trichloroethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	2.98E+01	3.00E-01	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	2.86E+01	3.00E-01	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	2.01E+01	3.00E-01	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	8.28E+00	NVA	No

Table F-43
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Ecological Screening Value (2)	Region III BTAG Screening Levels (3)	Above Screening Value (Y/N)
Surface Soil	78-87-5	1,2-Dichloropropane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	3.27E+01	NVA	No
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	NVA	NVA	No
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	NVA	NVA	No
	75-27-4	Bromodichloromethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	5.40E-01	4.50E+02	No
	56-23-5	Carbon tetrachloride			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	2.98E+00	3.00E-01	No
	75-00-3	Chloroethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	NVA	NVA	No
	74-87-3	Chloromethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	1.04E+01	NVA	No
	127-18-4	Tetrachloroethene			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	9.92E+00	3.00E-01	No
	79-01-6	Trichloroethene			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	1.24E+01	3.00E-01	No
	67-66-3	Trichloromethane			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	1.19E+00	3.00E-01	No
	75-01-4	Vinyl Chloride			mg/kg		0/8	5.00E-03 - 5.00E-03	5.00E-03	6.46E-01	3.00E-01	No

(1) Maximum non-detect limit value used for screening.

(2) Screening toxicity values from USEPA Eco SSLs (2009); Efroymson et al., PRGs (1997); and USEPA Region V EDQLs (1999); and other sources. See text for derivation.

(3) Screening toxicity values from USEPA Region III BTAG Screening Table (September, 1995).

Definitions: N/A = Not Applicable or Not Available
NVA = No Value Available

Table F-44
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
Sediment	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran			mg/kg		0/1	5.94E-07 - 5.94E-07	5.94E-07	NVA	No
	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin			mg/kg		0/1	5.94E-07 - 5.94E-07	5.94E-07	NVA	No
	90-12-0	**1-Methylnaphthalene**			**mg/kg**		**0/1**	**3.10E-01 - 3.10E-01**	**3.10E-01**	**2.02E-02**	**Yes**
	ICF14A-AA-I	3&4-Methylphenol			mg/kg		0/1	1.90E-01 - 1.90E-01	1.90E-01	6.70E-01	No
	100-51-6	Benzyl alcohol			mg/kg		0/1	1.90E-01 - 1.90E-01	1.90E-01	NVA	No
	ICF87	m+p-Xylenes			mg/kg		0/1	1.10E-02 - 1.10E-02	1.10E-02	2.52E-02	No
	95-47-6	o-Xylene			mg/kg		0/1	5.60E-03 - 5.60E-03	5.60E-03	2.52E-02	No
	Shaw 10	Total Tetrachlorodibenzo-p-dioxin			mg/kg		0/1	1.81E-07 - 1.81E-07	1.81E-07	NVA	No
	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin			mg/kg		0/1	1.81E-07 - 1.81E-07	1.81E-07	NVA	No
	65-85-0	**Benzoic Acid**			**mg/kg**		**0/1**	**9.50E-01 - 9.50E-01**	**9.50E-01**	**6.50E-01**	**Yes**
	87-61-6	1,2,3-Trichlorobenzene			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	8.58E-01	No
	95-94-3	1,2,4,5-Tetrachlorobenzene			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	1.09E+00	No
	96-12-8	1,2-Dibromo-3-chloropropane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	106-93-4	1,2-Dibromoethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	1912-24-9	**Atrazine**			**mg/kg**		**0/3**	**1.70E-01 - 1.70E-01**	**1.70E-01**	**6.62E-03**	**Yes**
	92-52-4	Biphenyl			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	1.22E+00	No
	105-60-2	Caprolactam			mg/kg		0/3	3.30E-01 - 3.30E-01	3.30E-01	NVA	No
	74-97-5	Chlorobromomethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	110-82-7	Cyclohexane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	75-71-8	Dichlorodifluoromethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	76-13-1	Freon 113			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	98-82-8	Isopropylbenzene			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	8.60E-02	No
	79-20-9	Methyl Acetate			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	1634-04-4	Methyl tert-butyl ether			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	108-87-2	Methylcyclohexane			mg/kg		0/3	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	75-69-4	Trichlorofluoromethane			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	98-86-2	Acetophenone			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	NVA	No
	100-52-7	Benzaldehyde			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	NVA	No
	106-44-5	p-Cresol			mg/kg		0/3	1.70E-01 - 1.70E-01	1.70E-01	6.70E-01	No
	1330-20-7	Xylenes (total)			mg/kg		0/3	5.00E-03 - 5.00E-03	5.00E-03	2.52E-02	No
	99-35-4	1,3,5-Trinitrobenzene			mg/kg		0/4	2.10E-01 - 1.00E+00	1.00E+00	NVA	No
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/4	2.10E-01 - 5.00E-01	5.00E-01	NVA	No
	118-96-7	**2,4,6-Trinitrotoluene**			**mg/kg**		**0/4**	**2.10E-01 - 5.00E-01**	**5.00E-01**	**9.20E-02**	**Yes**
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/4	2.10E-01 - 5.00E-01	5.00E-01	NVA	No

Table F-44
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	88-72-2	2-Nitrotoluene			mg/kg		0/4	2.10E-01 - 1.00E+00	1.00E+00	4.06E+00	No
	99-08-1	3-Nitrotoluene			mg/kg		0/4	2.10E-01 - 1.00E+00	1.00E+00	4.06E+00	No
Sediment	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/4	2.10E-01 - 5.00E-01	5.00E-01	NVA	No
	99-99-0	4-Nitrotoluene			mg/kg		0/4	2.10E-01 - 1.00E+00	1.00E+00	4.06E+00	No
	156-59-2	cis-1,2-Dichloroethene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	1.05E+00	No
	121-82-4	**Cyclonite**			**mg/kg**		**0/4**	**2.10E-01 - 5.00E-01**	**5.00E-01**	**1.30E-02**	**Yes**
	2691-41-0	HMX			mg/kg		0/4	2.10E-01 - 1.00E+00	1.00E+00	NVA	No
	55-63-0	Nitroglycerin			mg/kg		0/4	1.60E+00 - 1.00E+01	1.00E+01	NVA	No
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/4	1.60E+00 - 1.00E+01	1.00E+01	NVA	No
	479-45-8	Tetryl			mg/kg		0/4	4.10E-01 - 1.00E+00	1.00E+00	NVA	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	1.05E+00	No
	93-76-5	2,4,5-T			mg/kg		0/4	7.70E-03 - 5.00E-02	5.00E-02	1.23E+01	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/4	1.50E-02 - 5.00E-02	5.00E-02	6.75E-01	No
	94-75-7	2,4-D			mg/kg		0/4	3.80E-02 - 2.00E-01	2.00E-01	NVA	No
	94-82-6	2,4-DB			mg/kg		0/4	7.70E-02 - 2.00E-01	2.00E-01	NVA	No
	72-54-8	**4,4'-DDD**			**mg/kg**		**0/4**	**1.90E-02 - 2.00E-02**	**2.00E-02**	**4.88E-03**	**Yes**
	72-55-9	**4,4'-DDE**			**mg/kg**		**0/4**	**1.90E-02 - 2.00E-02**	**2.00E-02**	**3.16E-03**	**Yes**
	309-00-2	**Aldrin**			**mg/kg**		**0/4**	**9.60E-03 - 2.00E-02**	**2.00E-02**	**2.00E-03**	**Yes**
	319-84-6	**alpha-BHC**			**mg/kg**		**0/4**	**9.60E-03 - 2.00E-02**	**2.00E-02**	**6.00E-03**	**Yes**
	5103-71-9	**alpha-Chlordane**			**mg/kg**		**0/4**	**9.60E-03 - 2.00E-02**	**2.00E-02**	**3.24E-03**	**Yes**
	319-85-7	**beta-BHC**			**mg/kg**		**0/4**	**9.60E-03 - 2.00E-02**	**2.00E-02**	**5.00E-03**	**Yes**
	75-99-0	Dalapon			mg/kg		0/4	3.80E-02 - 3.80E-01	3.80E-01	NVA	No
	319-86-8	delta-BHC			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	6.40E+00	No
	1918-00-9	Dicamba			mg/kg		0/4	7.70E-03 - 2.00E-01	2.00E-01	NVA	No
	120-36-5	Dichloroprop			mg/kg		0/4	3.80E-02 - 2.00E-01	2.00E-01	NVA	No
	60-57-1	**Dieldrin**			**mg/kg**		**0/4**	**9.60E-03 - 2.00E-02**	**2.00E-02**	**1.90E-03**	**Yes**
	959-98-8	**Endosulfan I**			**mg/kg**		**0/4**	**9.60E-03 - 2.00E-02**	**2.00E-02**	**2.90E-03**	**Yes**
	33213-65-9	**Endosulfan II**			**mg/kg**		**0/4**	**1.90E-02 - 2.00E-02**	**2.00E-02**	**1.40E-02**	**Yes**
	1031-07-8	**Endosulfan sulfate**			**mg/kg**		**0/4**	**1.90E-02 - 2.00E-02**	**2.00E-02**	**5.40E-03**	**Yes**
	72-20-8	**Endrin**			**mg/kg**		**0/4**	**1.90E-02 - 2.00E-02**	**2.00E-02**	**2.22E-03**	**Yes**
	53494-70-5	**Endrin ketone**			**mg/kg**		**0/4**	**1.90E-02 - 2.00E-02**	**2.00E-02**	**2.22E-03**	**Yes**
	58-89-9	**gamma-BHC (Lindane)**			**mg/kg**		**0/4**	**9.60E-03 - 2.00E-02**	**2.00E-02**	**2.37E-03**	**Yes**
	5103-74-2	**gamma-Chlordane**			**mg/kg**		**0/4**	**9.60E-03 - 2.00E-02**	**2.00E-02**	**3.24E-03**	**Yes**
	76-44-8	Heptachlor			mg/kg		0/4	9.60E-03 - 2.00E-02	2.00E-02	6.80E-02	No

Table F-44
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	1024-57-3	**Heptachlor epoxide**			**mg/kg**		**0/4**	**9.60E-03 - 2.00E-02**	**2.00E-02**	**2.47E-03**	**Yes**
	94-74-6	MCPA			mg/kg		0/4	1.90E-01 - 2.00E+01	2.00E+01	NVA	No
	93-65-2	MCPP			mg/kg		0/4	1.90E-01 - 2.00E+01	2.00E+01	NVA	No
Sediment	**72-43-5**	**Methoxychlor**			**mg/kg**		**0/4**	**2.00E-02 - 3.90E-02**	**3.90E-02**	**1.87E-02**	**Yes**
	8001-35-2	**Toxaphene**			**mg/kg**		**0/4**	**1.70E-01 - 4.80E-01**	**4.80E-01**	**1.00E-04**	**Yes**
	12674-11-2	**Aroclor 1016**			**mg/kg**		**0/4**	**1.90E-02 - 6.60E-02**	**6.60E-02**	**5.98E-02**	**Yes**
	11104-28-2	**Aroclor 1221**			**mg/kg**		**0/4**	**1.90E-02 - 6.60E-02**	**6.60E-02**	**5.98E-02**	**Yes**
	11141-16-5	**Aroclor 1232**			**mg/kg**		**0/4**	**1.90E-02 - 6.60E-02**	**6.60E-02**	**5.98E-02**	**Yes**
	53469-21-9	Aroclor 1242			mg/kg		0/4	1.90E-02 - 3.30E-02	3.30E-02	5.98E-02	No
	12672-29-6	Aroclor 1248			mg/kg		0/4	1.90E-02 - 3.30E-02	3.30E-02	5.98E-02	No
	11096-82-5	**Aroclor 1260**			**mg/kg**		**0/4**	**1.90E-02 - 6.60E-02**	**6.60E-02**	**5.98E-02**	**Yes**
	131-11-3	Dimethylphthalate			mg/kg		0/4	1.70E-01 - 3.80E-01	3.80E-01	NVA	No
	120-82-1	1,2,4-Trichlorobenzene			mg/kg		0/4	5.00E-03 - 1.90E-01	1.90E-01	2.10E+00	No
	95-50-1	**1,2-Dichlorobenzene**			**mg/kg**		**0/4**	**5.00E-03 - 1.90E-01**	**1.90E-01**	**1.65E-02**	**Yes**
	541-73-1	1,3-Dichlorobenzene			mg/kg		0/4	5.00E-03 - 1.90E-01	1.90E-01	4.43E+00	No
	106-46-7	1,4-Dichlorobenzene			mg/kg		0/4	5.00E-03 - 1.90E-01	1.90E-01	5.99E-01	No
	95-95-4	2,4,5-Trichlorophenol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	2.13E-01	No
	88-06-2	2,4,6-Trichlorophenol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	2.13E-01	No
	120-83-2	**2,4-Dichlorophenol**			**mg/kg**		**0/4**	**1.70E-01 - 1.90E-01**	**1.90E-01**	**1.17E-01**	**Yes**
	105-67-9	**2,4-Dimethylphenol**			**mg/kg**		**0/4**	**1.70E-01 - 1.90E-01**	**1.90E-01**	**2.90E-02**	**Yes**
	51-28-5	2,4-Dinitrophenol			mg/kg		0/4	3.30E-01 - 9.50E-01	9.50E-01	NVA	No
	121-14-2	**2,4-Dinitrotoluene**			**mg/kg**		**0/4**	**2.10E-01 - 5.00E-01**	**5.00E-01**	**4.16E-02**	**Yes**
	606-20-2	**2,6-Dinitrotoluene**			**mg/kg**		**0/4**	**2.10E-01 - 1.00E+00**	**1.00E+00**	**4.16E-02**	**Yes**
	91-58-7	2-Chloronaphthalene			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	95-57-8	**2-Chlorophenol**			**mg/kg**		**0/4**	**1.70E-01 - 1.90E-01**	**1.90E-01**	**3.12E-02**	**Yes**
	91-57-6	**2-Methylnaphthalene**			**mg/kg**		**0/4**	**1.70E-01 - 3.10E-01**	**3.10E-01**	**2.02E-02**	**Yes**
	88-74-4	2-Nitroaniline			mg/kg		0/4	1.70E-01 - 3.80E-01	3.80E-01	NVA	No
	88-75-5	2-Nitrophenol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	88-85-7	**2-sec-butyl-4,6-dinitrophenol**			**mg/kg**		**0/4**	**7.70E-03 - 2.00E-01**	**2.00E-01**	**6.11E-04**	**Yes**
	91-94-1	**3,3'-Dichlorobenzidine**			**mg/kg**		**0/4**	**3.80E-01 - 1.00E+00**	**1.00E+00**	**1.27E-01**	**Yes**
	99-09-2	3-Nitroaniline			mg/kg		0/4	2.25E-01 - 3.80E-01	3.80E-01	NVA	No
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/4	2.25E-01 - 3.80E-01	3.80E-01	NVA	No
	100-01-6	4-Nitroaniline			mg/kg		0/4	2.25E-01 - 3.80E-01	3.80E-01	NVA	No
	100-02-7	4-Nitrophenol			mg/kg		0/4	3.30E-01 - 9.50E-01	9.50E-01	NVA	No

Table F-44
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	83-32-9	**Acenaphthene**			**mg/kg**		**0/4**	**1.00E-01 - 3.10E-01**	**3.10E-01**	**6.70E-03**	**Yes**
	208-96-8	**Acenaphthylene**			**mg/kg**		**0/4**	**2.10E-01 - 3.10E-01**	**3.10E-01**	**5.90E-03**	**Yes**
	120-12-7	**Anthracene**			**mg/kg**		**0/4**	**2.10E-02 - 3.10E-01**	**3.10E-01**	**5.72E-02**	**Yes**
	56-55-3	Benzo(a)anthracene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	1.08E-01	No
Sediment	50-32-8	Benzo(a)pyrene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	1.50E-01	No
	205-99-2	**Benzo(b)fluoranthene**			**mg/kg**		**0/4**	**2.10E-02 - 6.10E-02**	**6.10E-02**	**2.72E-02**	**Yes**
	191-24-2	Benzo(g,h,i)perylene			mg/kg		0/4	6.00E-02 - 6.10E-02	6.10E-02	1.70E-01	No
	207-08-9	Benzo(k)fluoranthene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	2.40E-01	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	86-74-8	Carbazole			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	218-01-9	Chrysene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	1.66E-01	No
	53-70-3	**Dibenz(a,h)anthracene**			**mg/kg**		**0/4**	**2.10E-02 - 6.10E-02**	**6.10E-02**	**3.30E-02**	**Yes**
	132-64-9	Dibenzofuran			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	4.15E-01	No
	84-66-2	Diethyl phthalate			mg/kg		0/4	1.70E-01 - 3.80E-01	3.80E-01	6.03E-01	No
	117-84-0	Di-n-octyl phthalate			mg/kg		0/4	1.70E-01 - 3.80E-01	3.80E-01	NVA	No
	206-44-0	Fluoranthene			mg/kg		0/4	2.10E-02 - 3.10E-01	3.10E-01	4.23E-01	No
	86-73-7	**Fluorene**			**mg/kg**		**0/4**	**2.10E-02 - 3.10E-01**	**3.10E-01**	**7.74E-02**	**Yes**
	118-74-1	**Hexachlorobenzene**			**mg/kg**		**0/4**	**1.70E-01 - 1.90E-01**	**1.90E-01**	**2.00E-02**	**Yes**
	87-68-3	Hexachlorobutadiene			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	67-72-1	Hexachloroethane			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	1.03E+00	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/kg		0/4	2.10E-02 - 6.10E-02	6.10E-02	1.90E-01	No
	78-59-1	Isophorone			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	91-20-3	**Naphthalene**			**mg/kg**		**0/4**	**1.00E-01 - 3.10E-01**	**3.10E-01**	**1.76E-01**	**Yes**
	98-95-3	Nitrobenzene			mg/kg		0/4	2.10E-01 - 5.00E-01	5.00E-01	NVA	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	2.68E+00	No
	95-48-7	o-Cresol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	6.70E-01	No
	106-47-8	p-Chloroaniline			mg/kg		0/4	2.25E-01 - 3.80E-01	3.80E-01	NVA	No
	59-50-7	p-Chloro-m-cresol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	87-86-5	**Pentachlorophenol**			**mg/kg**		**0/4**	**3.30E-01 - 9.50E-01**	**9.50E-01**	**5.04E-01**	**Yes**
	108-95-2	Phenol			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	4.20E-01	No

Table F-44
Summary of Screening for Non-Detected Chemicals
Current/Future - Sediment at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	129-00-0	**Pyrene**			**mg/kg**		**0/4**	**2.10E-02 - 3.10E-01**	**3.10E-01**	**1.95E-01**	**Yes**
	71-55-6	1,1,1-Trichloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	1.24E+00	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	1.36E+00	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	1.24E+00	No
Sediment	75-34-3	1,1-Dichloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	NVA	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	3.10E-02	No
	107-06-2	1,2-Dichloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	NVA	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	NVA	No
	591-78-6	2-Hexanone			mg/kg		0/4	1.00E-02 - 2.80E-02	2.80E-02	NVA	No
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	1.23E+00	No
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/4	1.70E-01 - 1.90E-01	1.90E-01	NVA	No
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/4	1.00E-02 - 2.80E-02	2.80E-02	NVA	No
	67-64-1	Acetone			mg/kg		0/4	5.60E-02 - 6.00E-02	6.00E-02	NVA	No
	75-27-4	Bromodichloromethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	NVA	No
	74-83-9	Bromomethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	NVA	No
	56-23-5	Carbon tetrachloride			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	6.42E-02	No
	108-90-7	Chlorobenzene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	8.42E-03	No
	75-00-3	Chloroethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	NVA	No
	74-87-3	Chloromethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	NVA	No
	10061-01-5	**cis-1,3-Dichloro-1-propene**			**mg/kg**		**0/4**	**5.00E-03 - 5.60E-03**	**5.60E-03**	**5.09E-05**	**Yes**
	124-48-1	Dibromochloromethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	NVA	No
	100-41-4	Ethylbenzene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	1.10E+00	No
	100-42-5	Styrene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	5.59E-01	No
	127-18-4	Tetrachloroethene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	4.68E-01	No
	10061-02-6	**trans-1,3-Dichloropropene**			**mg/kg**		**0/4**	**5.00E-03 - 5.60E-03**	**5.60E-03**	**5.09E-05**	**Yes**
	75-25-2	Tribromomethane			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	6.54E-01	No
	75-01-4	Vinyl Chloride			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	NVA	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/4	5.00E-03 - 5.60E-03	5.60E-03	3.10E-02	No

(1) Maximum non-detect limit value used for screening.

(2) Screening toxicity values from USEPA Region III BTAG Screening Table (January 2009).

Definitions: N/A = Not Applicable or Not Available
NVA = No Value Available

Table F-45
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	87-61-6	1,2,3-Trichlorobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	8.00E-03	No
Surface Water	**95-94-3**	**1,2,4,5-Tetrachlorobenzene**			**mg/l**		**0/4**	**5.00E-03 - 5.00E-03**	**5.00E-03**	**3.00E-03**	**Yes**
	96-12-8	1,2-Dibromo-3-chloropropane			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	106-93-4	1,2-Dibromoethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	99-35-4	1,3,5-Trinitrobenzene			mg/l		0/4	6.50E-04 - 6.50E-04	6.50E-04	NVA	No
	99-65-0	1,3-Dinitrobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	118-96-7	2,4,6-Trinitrotoluene			mg/l		0/4	6.50E-04 - 6.50E-04	6.50E-04	1.00E-01	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	1.48E+00	No
	88-72-2	2-Nitrotoluene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	99-08-1	3-Nitrotoluene			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	7.50E-01	No
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	1.48E+00	No
	99-99-0	4-Nitrotoluene			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	1.90E+00	No
	1912-24-9	**Atrazine**			**mg/l**		**0/4**	**5.00E-03 - 5.00E-03**	**5.00E-03**	**1.80E-03**	**Yes**
	92-52-4	Biphenyl			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	1.40E-02	No
	105-60-2	Caprolactam			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	74-97-5	Chlorobromomethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	156-59-2	cis-1,2-Dichloroethene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	5.90E-01	No
	110-82-7	Cyclohexane			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	121-82-4	Cyclonite			mg/l		0/4	6.50E-04 - 6.50E-04	6.50E-04	3.60E-01	No
	75-71-8	Dichlorodifluoromethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	76-13-1	Freon 113			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	2691-41-0	HMX			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	1.50E-01	No
	98-82-8	Isopropylbenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	2.60E-03	No
	79-20-9	Methyl Acetate			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	1634-04-4	Methyl tert-butyl ether			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	1.11E+01	No
	108-87-2	Methylcyclohexane			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	55-63-0	Nitroglycerin			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	1.38E-01	No
	78-11-5	Pentaerythritol tetranitrate			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	8.50E+01	No
	14797-73-0	Perchlorate			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	479-45-8	Tetryl			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	156-60-5	trans-1,2-Dichloroethene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	9.70E-01	No
	75-69-4	Trichlorofluoromethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	7440-36-0	Antimony			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	3.00E-02	No

Table F-45
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	7440-48-4	Cobalt			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	2.30E-02	No
	7439-97-6	**Mercury**			**mg/l**		**0/4**	**4.00E-04 - 4.00E-04**	**4.00E-04**	**2.60E-05**	**Yes**
Surface Water	7440-22-4	Silver			mg/l		0/4	5.00E-04 - 5.00E-04	5.00E-04	3.20E-03	No
	131-11-3	Dimethylphthalate			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	120-82-1	1,2,4-Trichlorobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	2.40E-02	No
	95-50-1	**1,2-Dichlorobenzene**			**mg/l**		**0/4**	**1.00E-03 - 1.00E-03**	**1.00E-03**	**7.00E-04**	**Yes**
	541-73-1	1,3-Dichlorobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	1.50E-01	No
	106-46-7	1,4-Dichlorobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	2.60E-02	No
	95-95-4	2,4,5-Trichlorophenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	88-06-2	**2,4,6-Trichlorophenol**			**mg/l**		**0/4**	**5.00E-03 - 5.00E-03**	**5.00E-03**	**4.90E-03**	**Yes**
	120-83-2	2,4-Dichlorophenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	1.10E-02	No
	105-67-9	2,4-Dimethylphenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	51-28-5	2,4-Dinitrophenol			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	121-14-2	2,4-Dinitrotoluene			mg/l		0/4	6.50E-04 - 6.50E-04	6.50E-04	4.40E-02	No
	606-20-2	2,6-Dinitrotoluene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	8.10E-02	No
	91-58-7	2-Chloronaphthalene			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	95-57-8	2-Chlorophenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	2.40E-02	No
	91-57-6	**2-Methylnaphthalene**			**mg/l**		**0/4**	**5.00E-03 - 5.00E-03**	**5.00E-03**	**4.70E-03**	**Yes**
	88-74-4	2-Nitroaniline			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	88-75-5	2-Nitrophenol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	1.92E+00	No
	91-94-1	**3,3'-Dichlorobenzidine**			**mg/l**		**0/4**	**1.00E-02 - 1.00E-02**	**1.00E-02**	**4.50E-03**	**Yes**
	99-09-2	3-Nitroaniline			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	534-52-1	4,6-Dinitro-o-cresol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	100-01-6	4-Nitroaniline			mg/l		0/4	6.00E-03 - 6.00E-03	6.00E-03	NVA	No
	100-02-7	4-Nitrophenol			mg/l		0/4	1.00E-02 - 1.00E-02	1.00E-02	6.00E-02	No
	83-32-9	Acenaphthene			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	5.80E-03	No
	208-96-8	Acenaphthylene			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	NVA	No
	98-86-2	Acetophenone			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	120-12-7	**Anthracene**			**mg/l**		**0/4**	**1.20E-03 - 1.20E-03**	**1.20E-03**	**1.20E-05**	**Yes**
	100-52-7	Benzaldehyde			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	56-55-3	**Benzo(a)anthracene**			**mg/l**		**0/4**	**6.20E-05 - 6.20E-05**	**6.20E-05**	**1.80E-05**	**Yes**
	50-32-8	**Benzo(a)pyrene**			**mg/l**		**0/4**	**6.20E-05 - 6.20E-05**	**6.20E-05**	**1.50E-05**	**Yes**
	205-99-2	Benzo(b)fluoranthene			mg/l		0/4	9.00E-05 - 9.00E-05	9.00E-05	NVA	No

Table F-45
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	191-24-2	Benzo(g,h,i)perylene			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	NVA	No
	207-08-9	Benzo(k)fluoranthene			mg/l		0/4	1.20E-04 - 1.20E-04	1.20E-04	NVA	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
Surface Water	111-44-4	bis(2-Chloroethyl)ether			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	1.60E-02	No
	85-68-7	Butyl benzyl phthalate			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	1.90E-02	No
	86-74-8	Carbazole			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	218-01-9	Chrysene			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	NVA	No
	84-74-2	**Di-n-butyl phthalate**			**mg/l**		**0/4**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**1.90E-02**	**Yes**
	117-84-0	Di-n-octyl phthalate			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	2.20E-02	No
	53-70-3	Dibenz(a,h)anthracene			mg/l		0/4	2.40E-04 - 2.40E-04	2.40E-04	NVA	No
	132-64-9	**Dibenzofuran**			**mg/l**		**0/4**	**5.00E-03 - 5.00E-03**	**5.00E-03**	**3.70E-03**	**Yes**
	206-44-0	**Fluoranthene**			**mg/l**		**0/4**	**1.20E-03 - 1.20E-03**	**1.20E-03**	**4.00E-05**	**Yes**
	86-73-7	Fluorene			mg/l		0/4	1.20E-03 - 1.20E-03	1.20E-03	3.00E-03	No
	118-74-1	**Hexachlorobenzene**			**mg/l**		**0/4**	**5.00E-03 - 5.00E-03**	**5.00E-03**	**3.00E-07**	**Yes**
	87-68-3	**Hexachlorobutadiene**			**mg/l**		**0/4**	**5.00E-03 - 5.00E-03**	**5.00E-03**	**1.30E-03**	**Yes**
	77-47-4	Hexachlorocyclopentadiene			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	67-72-1	Hexachloroethane			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	1.20E-02	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/l		0/4	6.20E-05 - 6.20E-05	6.20E-05	NVA	No
	78-59-1	Isophorone			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	86-30-6	n-Nitrosodiphenylamine			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	2.10E-01	No
	91-20-3	Naphthalene			mg/l		0/4	6.20E-04 - 6.20E-04	6.20E-04	1.10E-03	No
	98-95-3	Nitrobenzene			mg/l		0/4	6.50E-04 - 6.50E-04	6.50E-04	NVA	No
	95-48-7	o-Cresol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	1.30E-02	No
	59-50-7	p-Chloro-m-cresol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	106-47-8	p-Chloroaniline			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	2.32E-01	No
	106-44-5	p-Cresol			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	5.43E-01	No
	87-86-5	**Pentachlorophenol**			**mg/l**		**0/4**	**1.00E-02 - 1.00E-02**	**1.00E-02**	**5.00E-04**	**Yes**
	85-01-8	**Phenanthrene**			**mg/l**		**0/4**	**1.20E-03 - 1.20E-03**	**1.20E-03**	**4.00E-04**	**Yes**
	108-95-2	**Phenol**			**mg/l**		**0/4**	**5.00E-03 - 5.00E-03**	**5.00E-03**	**4.00E-03**	**Yes**
	129-00-0	**Pyrene**			**mg/l**		**0/4**	**1.20E-03 - 1.20E-03**	**1.20E-03**	**2.50E-05**	**Yes**

Table F-45
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)
	71-55-6	1,1,1-Trichloroethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	1.10E-02	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	6.10E-01	No
	79-00-5	1,1,2-Trichloroethane			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	1.20E+00	No
	75-34-3	1,1-Dichloroethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	4.70E-02	No
Surface Water	75-35-4	1,1-Dichloroethene			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	2.50E-02	No
	107-06-2	1,2-Dichloroethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	1.00E-01	No
	78-87-5	1,2-Dichloropropane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	78-93-3	2-Butanone			mg/l		0/4	2.00E-02 - 2.00E-02	2.00E-02	1.40E+01	No
	591-78-6	2-Hexanone			mg/l		0/4	2.00E-02 - 2.00E-02	2.00E-02	9.90E-02	No
	101-55-3	**4-Bromophenyl phenylether**			**mg/l**		**0/4**	**5.00E-03 - 5.00E-03**	**5.00E-03**	**1.50E-03**	**Yes**
	7005-72-3	4-Chlorophenyl phenylether			mg/l		0/4	5.00E-03 - 5.00E-03	5.00E-03	NVA	No
	108-10-1	4-Methyl-2-pentanone			mg/l		0/4	2.00E-02 - 2.00E-02	2.00E-02	1.70E-01	No
	67-64-1	Acetone			mg/l		0/4	2.00E-02 - 2.00E-02	2.00E-02	1.50E+00	No
	71-43-2	Benzene			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	3.70E-01	No
	75-27-4	Bromodichloromethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	74-83-9	Bromomethane			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	75-15-0	**Carbon disulfide**			**mg/l**		**0/4**	**2.00E-02 - 2.00E-02**	**2.00E-02**	**9.20E-04**	**Yes**
	56-23-5	Carbon tetrachloride			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	1.33E-02	No
	108-90-7	Chlorobenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	1.30E-03	No
	75-00-3	Chloroethane			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	74-87-3	Chloromethane			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	10061-01-5	**cis-1,3-Dichloro-1-propene**			**mg/l**		**0/4**	**1.00E-03 - 1.00E-03**	**1.00E-03**	**5.50E-05**	**Yes**
	124-48-1	Dibromochloromethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	100-41-4	Ethylbenzene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	9.00E-02	No
	75-09-2	Methylene chloride			mg/l		0/4	4.00E-03 - 4.00E-03	4.00E-03	9.81E-02	No
	100-42-5	Styrene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	7.20E-02	No
	127-18-4	Tetrachloroethene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	1.11E-01	No
	108-88-3	Toluene			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	2.00E-03	No
	10061-02-6	**trans-1,3-Dichloropropene**			**mg/l**		**0/4**	**2.00E-03 - 2.00E-03**	**2.00E-03**	**5.50E-05**	**Yes**
	75-25-2	Tribromomethane			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	3.20E-01	No
	79-01-6	Trichloroethene			mg/l		0/4	2.00E-03 - 2.00E-03	2.00E-03	2.10E-02	No
	75-01-4	Vinyl Chloride			mg/l		0/4	1.00E-03 - 1.00E-03	1.00E-03	9.30E-01	No
	1330-20-7	Xylenes (total)			mg/l		0/4	3.00E-03 - 3.00E-03	3.00E-03	1.30E-02	No

Table F-45
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Water at SWMU 41 Area B

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value (Y/N)

(1) Maximum non-detect limit value used for screening.

(2) Screening toxicity values from USEPA Region III BTAG Screening Table (January 2009).

Definitions: N/A = Not Applicable or Not Available
NVA = No Value Available

Appendix G

National Environmental Policy Act Compliance Evaluation

Appendix G

Compliance With NEPA Requirements
SWMU 41

Environmental Consideration **(i.e., Attributes)**	**Alternative One:** No Further Action	**Alternative Two:** Monitored Natural Attenuation and LTM	**Alternative Three:** In-Situ Enhanced Bioremediation (ISEB) and MNA
Ecology – Impact on Wetlands	No wetlands identified at SWMU 41. No impact to wetlands.	No wetlands identified at SWMU 41. No impact to wetlands.	No wetlands identified at SWMU 41. No impact to wetlands.
Ecology – Impact on Endangered and/or Threatened Species	No endangered and/or threatened species affected.	No endangered and/or threatened species affected.	While not observed during site reconnaissance, several threatened and endangered species have been found within the grassland community type at RFAAP. Therefore, effects are expected to be minimal.
Ecology – Impact on Vegetation	No impact.	No impact.	Limited vegetation will be removed during drilling activities. No impact otherwise.
Archeological	None present in SWMU 41.	None present in SWMU 41.	None present in SWMU 41.
Noise	None.	None.	Slight increase in noise levels (dB) due to field activities. Increases will not be significant.
Water – surface water, groundwater	No impact to surface water or groundwater.	No impact to surface water or groundwater.	Contaminants would be removed from groundwater. Therefore, groundwater contaminant concentrations will eventually decrease below screening limits.
Human Aspects	No human impact.	No human impact.	There will be minimal increase in traffic due to field activities.
Land – Soil erosion, land use	No effect.	No effect.	No impacts on current land use.

Appendix G

Compliance With NEPA Requirements
SWMU 41

Environmental Consideration **(i.e., Attributes)**	**Alternative One:** No Further Action	**Alternative Two:** Monitored Natural Attenuation and LTM	**Alternative Three:** In-Situ Enhanced Bioremediation (ISEB) and MNA
Waste disposal – solid waste, hazardous waste	No effect. No waste generated.	No effect. No waste generated.	No effect. No waste generated.
Resources	No effect. No increased use of resources.	No effect. No increased use of resources.	No effect. No increased use of resources.
Air	Essentially no effect. Trichloroethene and/or carbon tetrachloride are not likely to be carried on water particles through air or volatilized into atmosphere.	Essentially no effect. Trichloroethene and/or carbon tetrachloride are not likely to be carried on water particles through air or volatilized into atmosphere.	Slight increase in dust during field activities. Dust suppression measures will be employed to keep dust generation to a minimum.

RFAAP = Radford Army Ammunition Plant
RCRA = Resource Conservation and Recovery Act
dB = Decibels