Appendices for FLFA RFI/CMS Report

Final

November 2008

Appendix A

Quality Assurance/ Quality Control

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) validated 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. Samples are 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 is performed using the m/z 83 peak area. An internal standard of ^{18}O labeled perchlorate is added to each sample to establish the perchlorate peak retention time and used in the quantitation. Confirmation is 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±2%	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 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, 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); and,
- 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. Samples qualified "B" for blank contamination were considered non-detect at the MRL or level of blank contamination, whichever was greater. 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; and,
- **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 FLFA. Laboratory duplicate pairs or laboratory spiked duplicate pairs were within specified precision criteria for each parameter and/or compound except for those compounds listed in the **Table A-4**. Analytical results were qualified as estimated (J) for RPDs exceeding criteria for where the associated compounds were detected. While these parameters were qualified estimated due to the high RPDs, the data was still considered useable, the precision data quality goal was met, and the qualified data did not impact the data quality for the RFI. Further discussion may be found in the data validation reports located in **Appendix A-3**.

Table A-4
Laboratory Duplicate Analysis

Field ID	Analyte	QC Type	Val Qual.	Comments
LFSS13	arsenic	Sample Dupe	J	High RPD
LFSS13	barium	Sample Dupe	J	High RPD
LFSS13	calcium	Sample Dupe	J	High RPD
LFSS13	copper	Sample Dupe	J	High RPD
LFSS13	lead	Sample Dupe	J	High RPD
LFSS13	magnesium	Sample Dupe	J	High RPD
LFSS13	manganese	Sample Dupe	J	High RPD
LFSS13	zinc	Sample Dupe	J	High RPD
LFSS13	mercury	Sample Dupe	J	High RPD
LFSS11	arsenic	Sample Dupe	J	High RPD
LFSS11	calcium	Sample Dupe	J	High RPD
LFSS11	chromium	Sample Dupe	J	High RPD
LFSS11	copper	Sample Dupe	J	High RPD
LFSS11	magnesium	Sample Dupe	J	High RPD
LFSS11	manganese	Sample Dupe	J	High RPD
LFSS11	nickel	Sample Dupe	J	High RPD

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise.

- **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. Field duplicate pairs were within specified precision criteria for each parameter and/or compound except for those compounds listed in the **Table A-5**. Analytical results were qualified as estimated "J" for exceeding criteria. While these noted parameters were qualified estimated due to the high RPDs, the data was still considered useable, the precision data quality goal was met, and the qualified data did not impact the data quality for the RFI.

Table A-5
Field Duplicate Analysis

Field ID	Duplicate Pair	Analyte	Val Qual.	Comments
LFSW01	TMSW01	Total HpCDDs	J	High RPD
LFSW01	TMSW01	Manganese	J	High RPD
LFSW01	TMSW01	Zinc	J	High RPD
LFSD01	TMSD01	2,3,7,8-TCDF	J	High RPD
LFSD01	TMSD01	1,2,3,7,8-PeCDF	J	High RPD
LFSD01	TMSD01	2,3,4,7,8-PeCDF	J	High RPD
LFSD01	TMSD01	1,2,3,6,7,8-HxCDF	J	High RPD
LFSD01	TMSD01	2,3,4,6,7,8-HxCDF	J	High RPD
LFSD01	TMSD01	1,2,3,7,8,9-HxCDF	J	High RPD
LFSD01	TMSD01	Total TCDFs	J	High RPD
LFSD01	TMSD01	Total PeCDFs	J	High RPD
LFSD01	TMSD01	Barium	J	High RPD
LFSD01	TMSD01	Mercury	J	High RPD
LFSD01	TMSD01	alpha-Chlordane	J	High RPD
LFSD01	TMSD01	gamma-chlordane	J	High RPD
LFSD01	TMSD01	aroclor 1260	J	High RPD
LFSS020	TMSS020	Nickel	J	High RPD
LFSS020	TMSS020	Arsenic	J	High RPD
LFSS020	TMSS020	Lead	J	High RPD
LFSS020	TMSS020	Zinc	J	High RPD
LFSS020	TMSS020	Mercury	J	High RPD

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise.

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:

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

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 each parameter and/or compound of interest except for aluminum, antimony, beryllium, copper, iron, magnesium, nickel, potassium, selenium, sodium, silver, thallium, zinc, and mercury for select sample delivery groups (SDGs). For solid matrices, the method blanks were non-detect for each parameter and/or compound of interest except for 1,2,3,4,6,7,8-HpCDD, 1,2,3,4,6,7,8-HpCDF, OCDD, 2,3,7,8-TCDD, 2,3,7,8-TCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, OCDF, Total HpCDDs, Total HpCDDs, Total TCDDs, Total TCDFs, Total PeCDDs, Total PeCDFs, Total HxCDFs, Total HpCDFs, antimony, copper, lead, nickel, iron, potassium, selenium, sodium, thallium, zinc, and mercury for select SDGs. The "B" flagged sample data from the evaluation of QC blanks is presented in **Table A-6**. 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-6**, 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-6
B-Qualified Data Summary

Field ID	Analyte	Result	LQ	Units	Field ID	Analyte	Result	LQ	Units
17MW02	Potassium	3610	J	UG/L	LFSS18	Antimony	1.4	J	MG/KG
17MW02	Silver	6.2	J	UG/L	LFSS18	Beryllium	1.4		MG/KG
17MW02	Beryllium	1.3	J	UG/L	LFSS19	Thallium	2.9		MG/KG
17MW03	Potassium	4520	J	UG/L	LFSS19	Antimony	1.3	J	MG/KG
17PZ01	Potassium	2810	J	UG/L	LFSS19	Beryllium	0.79		MG/KG
17PZ01	Sodium	5690	J	UG/L	LFSS20	Beryllium	0.64		MG/KG
17PZ01	Beryllium	1.2	J	UG/L	LFSS21	Antimony	3.8		MG/KG
LFMW01	Potassium	6120	J	UG/L	LFSS21	Beryllium	1.6		MG/KG
LFMW01	Beryllium	1.9	J	UG/L	TMSS20	Beryllium	0.76		MG/KG
LFSS04	Antimony	1.0	J	MG/KG	LFSD01	Potassium	1180		MG/KG
LFSS04	Beryllium	1.5		MG/KG	LFSD01	Sodium	222	J	MG/KG
LFSS05	Antimony	0.94	J	MG/KG	LFSD01	Antimony	1.8	J	MG/KG
LFSS05	Beryllium	1.6		MG/KG	LFSD01	Mercury	0.076	J	MG/KG
LFSS06	Antimony	0.89	J	MG/KG	LFSW01	Potassium	4320	J	UG/L
LFSS06	Beryllium	0.98		MG/KG	TMSD01	Potassium	996		MG/KG
LFSS07	Sodium	264	J	MG/KG	TMSD01	Sodium	200	J	MG/KG
LFSS07	Thallium	0.78	J	MG/KG	TMSD01	Antimony	1.3	J	MG/KG
LFSS07	Antimony	0.34	J	MG/KG	TMSD01	Mercury	0.045	J	MG/KG
LFSS07	Beryllium	0.80		MG/KG	TMSW01	Aluminum	50.7	J	UG/L
LFSS08	2,3,7,8-TCDD	0.682	J	PG/G	LFSS15	Thallium	0.78	J	MG/KG
LFSS08	Sodium	214	J	MG/KG	LFSS15	Antimony	0.74	J	MG/KG
LFSS08	Thallium	0.83	J	MG/KG	LFSS15	Beryllium	0.70		MG/KG
LFSS08	Antimony	0.42	J	MG/KG	LFSS16	Antimony	1.1	J	MG/KG
LFSS08	Beryllium	0.90		MG/KG	LFSS16	Beryllium	1.4		MG/KG
LFSS09	Thallium	1.3		MG/KG	LFSS17	Beryllium	1.6		MG/KG
LFSS09	Antimony	1.0	J	MG/KG	LFSS18	Antimony	1.4	J	MG/KG
LFSS09	Beryllium	1.5		MG/KG	LFSS18	Beryllium	1.4		MG/KG
LFSS10	Thallium	2.0		MG/KG	LFSS19	Thallium	2.9		MG/KG
LFSS10	Antimony	0.88	J	MG/KG	LFSS19	Antimony	1.3	J	MG/KG
LFSS10	Beryllium	1.7		MG/KG	LFSS19	Beryllium	0.79		MG/KG
LFSS11	Antimony	0.89	J	MG/KG	LFSS20	Beryllium	0.64		MG/KG
LFSS11	Beryllium	0.70		MG/KG	LFSS21	Antimony	3.8		MG/KG
LFSS12	Antimony	0.86	J	MG/KG	LFSS21	Beryllium	1.6		MG/KG
LFSS12	Beryllium	1.2		MG/KG	TMSS20	Beryllium	0.76		MG/KG
LFSS13	Antimony	1.4	J	MG/KG	LFSD01	Potassium	1180		MG/KG
LFSS13	Beryllium	1.3		MG/KG	LFSD01	Sodium	222	J	MG/KG
LFSS14	Sodium	228	J	MG/KG	LFSD01	Antimony	1.8	J	MG/KG
LFSS14	Thallium	1.7		MG/KG	LFSD01	Mercury	0.076	J	MG/KG
LFSS14	Antimony	0.65	J	MG/KG	LFSW01	Potassium	4320	J	UG/L
LFSS14	Beryllium	0.64		MG/KG	TMSD01	Potassium	996		MG/KG
LFSS15	Thallium	0.78	J	MG/KG	TMSD01	Sodium	200	J	MG/KG
LFSS15	Antimony	0.74	J	MG/KG	TMSD01	Antimony	1.3	J	MG/KG
LFSS15	Beryllium	0.70		MG/KG	TMSD01	Mercury	0.045	J	MG/KG

Table A-6
B-Qualified Data Summary, Continued

Field ID	Analyte	Result	LQ	Units	Field ID	Analyte	Result	LQ	Units
LFSS16	Antimony	1.1	J	MG/KG	TMSW01	Aluminum	50.7	J	UG/L
LFSS16	Beryllium	1.4		MG/KG	TMSW01	Potassium	4450	J	UG/L
LFSS17	Beryllium	1.6		MG/KG					

J (All) = Indicates an estimated value for estimating a concentration <MRL and ≥ MDL.

- **Rinse Blank Analysis:** Rinse blank RB083007 (low-flow pump) applies to the groundwater samples collected at the FLFA. The surface water samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the surface water samples. Rinse blank 080207R applies to the surface soil samples and rinse blank RB071807 applies to the sediment samples collected at the FLFA. These rinse blanks were taken from the stainless steel bowl and trowel used to collect the field soil samples. For rinse blank RB083007, all analytes were non-detect for each parameter and/or compound of concern except for potassium and sodium. For rinse blank 080207R, all analytes were non-detect for each parameter and/or compound of concern except for 2,3,7,8-TCDD, 1,2,3,4,6,7,8-HpCDD, OCDD, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,6,7,8-HpCDF, OCDF, Total TCDDs, Total PeCDDs, Total HpCDDs, Total TCDFs, Total PeCDFs, Total HpCDFs, magnesium, potassium, and sodium. For rinse blank RB071807, all analytes were non-detect for each parameter and/or compound 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-6**. 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-6**, 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 TB071907W applies to the surface water samples and TB071907S applies to the sediment samples collected 07/19/07. The trip blank TB082107 applies to the ground water samples collected 08/21/07. For trip blanks TB071907S and TB082107, all analytes were non-detect for each parameter and/or compound of concern. For trip blank TB071907W, all analytes were non-detect for each parameter and/or compound of concern except for chloroform. The "B" flagged sample data from the evaluation of QC blanks is presented in **Table A-6**. 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-6**, 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 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 each parameter and/or compound of concern except for acetone, chloromethane, endrin aldehyde, 2,4-D, 2,4,5-TP, 2,4,5-T, dicamba, dinoseb, dichlorprop, 1-methylnaphthalene, and 2-methylnaphthalene for select SDGs. The solid LCS samples were within specified criteria for each parameter and/or compound of concern except for chloromethane, vinyl chloride, endrin aldehyde, dicamba, and dinoseb for select SDGs. Data qualifiers were applied as appropriate to associated samples based upon these outliers. 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, 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 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 FLFA 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 each parameter and/or compound of interest except for OCDD, bromomethane, chloromethane, vinyl chloride, perchlorate, endrin aldehyde, 2,4,5-TP, dicamba, dichlorprop, acenaphthene, acenaphthylene, anthracene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, 4-nitrophenol, phenol, PETN, and nitroglycerin for select SDGs. For solid matrices, MS and MSD samples were within specified criteria for each parameter and/or compound of interest except for OCDD, antimony, arsenic, barium, cadmium, chromium, cobalt, nickel, potassium, selenium, silver, sodium, thallium, vanadium, magnesium, and mercury for select SDGs. 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:** Eighteen surface soil samples, one sediment sample, four groundwater samples, one surface water sample, three field duplicate samples (one surface soil, one sediment, and one surface water), two project wide IDM samples (one aqueous and one solid), three trip blanks, and three rinse blanks were proposed for collection at the FLFA 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. The resulting sampling completeness quotient is 100% and meets the pre-defined goals of 90% for the sampling program.

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 2,988 out of 2,988 data points deemed to be useable, generating an overall analytical completeness quotient of 100%. All other completeness scenarios for all other parameter groups and/or matrices were also 100%. The completeness percentages met the pre-defined goal of 90% for all FLFA 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 FLFA are based on soil applicable or relevant and appropriate requirements (ARARs) and To-Be-Considered (TBC) guidance and are as follows:

The soil and sediment ARAR/TBC guidance includes:

- RFAAP Facility-Wide Background inorganic soil concentrations (IT, 2001); and
- USEPA Region III industrial and residential soil risk based concentrations (October, 2007)

The groundwater and surface water ARAR/TBC guidance includes:

- USEPA Region III tap water risk based concentrations (October, 2007); and,
- 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.

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.

- **FLFA Sensitivity Analysis:** The method sensitivities (i.e., MDLs) were compared to the levels of concern for the samples collected. Comparing the ground water and surface water samples against the USEPA Region III tap water RBCs, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,2-dichloroethane, bromodichloromethane, carbon tetrachloride, chloroform, dibromochloromethane, tetrachloroethene, trichloroethene, vinyl chloride, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, 1,4-dichlorobenzene, 2,4-dinitrophenol, 3,3'-dichlorobenzidine, bis(2-chloroethyl)ether, bis(chloroisopropyl)ether, hexachlorobenzene, hexachlorobutadiene, nitrobenzene, n-nitrosodi-n-propylamine, aldrin, alpha-BHC (SW only), dieldrin, heptachlor epoxide, heptachlor (SW only), toxaphene, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, nitroglycerin, MCPA, MCPP, 2,3,7,8-TCDD, aluminum (GW only), antimony, arsenic, and thallium had MDLs greater than the given tap water RBCs for select samples. Comparing the ground water and surface water samples against the Drinking Water MCLs, hexachlorobenzene, aluminum (GW only), antimony (GW only), 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 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 surface soil and sediment samples against the USEPA Region III residential RBCs, benzo(a)pyrene (sediment only), dibenz(a,h)anthracene (sediment only), n-nitrosodi-n-propylamine (sediment only), and thallium had MDLs greater than the given residential RBCs for select samples. Comparing the surface soil and sediment samples against the USEPA Region III industrial RBCs thallium (sediment only) had MDLs greater than the given industrial RBCs for select samples. Comparing the surface soil and sediment samples against site-wide metals background concentrations, cadmium, thallium (sediment only), and lead (soil high concentration sample) had MDLs greater than the given site-wide metals background for select 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 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

Validation Reports and Form 1s

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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 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 Cont

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 (con)

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: JWC
Date: 08/07/07

Reviewed by: CAD
Date: 8/9/07

Form I copy

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 I Cont

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: 080807

Reviewed by: DD
Date: 8/9/07

Form I Conf

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

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

Form Version:[8290_DB_2.14]Report

Analyzed by: JWS
Date: 08/08/07

Reviewed by: CAP
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	~~12.0~~		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

Form I Copy

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: 08/01/07

Reviewed by: DM
Date: 8/9/07

Form 1 Cont

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

Form I copy

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: JWP
Date: 08/09/07

Reviewed by: CKL
Date: 8/9/07

for I Only

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	

Form 1 Copy

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: JWC
Date: 08/04/07

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

form I only

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 Only

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: MLL
Date: 8/9/07

Form I copy

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

Form I copy

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: _____
Date: 080907

Reviewed by: _____
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

Form I copy

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: 08.2907

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

For I Corp

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 1 Cont

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: 08/9/07

Reviewed by: DLC
Date: 8/9/07

Form I Only

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

Form I Cont

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: 8/8/07

Reviewed by: RM
Date: 8/9/07

Form I Copy

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

Form I Copy

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 1 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: JWO
Date: 081307

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

Form I Copy

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 Cony

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

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 080807

Reviewed by: _____
Date: 8/9/07

Form I Copy

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: 081307

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

Form I Copy

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 Cpn

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 copy

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	

For I Corp

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: _____

Reviewed by: _____
Date: 8/9/07

Form I Copy

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

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: JWP
Date: 080907

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

Form I Corr

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

Form I cont

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: JWP
Date: 080907

Reviewed by: BH
Date: 8/9/07

Form I Corp

SGS Environmental Services

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 Corp

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: 080107

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	~~5.35~~		3.60 J				
Total PeCDDs	~~5.10~~		5.46 J				
Total HxCDDs	30.9						
Total HpCDDs	222						
Total TCDFs	~~5.14~~		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	

Form I con7

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_DB_2.14]Report

Analyzed by: JWC
Date: 080107

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 COM

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: 08/01/07

Reviewed by: _____
Date: 8/9/07

Form I Copy

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

Form I Cont

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: 080107

Reviewed by: DLD
Date: 8/9/07

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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

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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	

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 08/28/07

Reviewed by: _____
Date: 8/29/07

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 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

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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 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

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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 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

Form I Copy

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

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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

Form I copy

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

3.23

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

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 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

Form I Copy

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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

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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
		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

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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

Bmw I Copy

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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

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
		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

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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.

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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

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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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SAMPLE ANALYSIS DATA SHEET

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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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SAMPLE ANALYSIS DATA SHEET

Form RLIMS63A-V1.4
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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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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

Form I Copy

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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 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 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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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

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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

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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

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

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

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 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

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 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

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

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 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

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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 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

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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 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.
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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 – 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

Form I Copy

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 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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Accutest Laboratories

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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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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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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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 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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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 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

Form I Org

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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

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 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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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 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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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 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

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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 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

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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 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

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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 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

For 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 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

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 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

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		

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

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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 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

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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

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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

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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

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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 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

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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 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

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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 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

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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

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		

	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

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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

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 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

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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

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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 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

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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		

	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

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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 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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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

Form I OR

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 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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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		

	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

Form I Org

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

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 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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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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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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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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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		

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

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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 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

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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 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

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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 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

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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		

	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

For 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		

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

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 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

Ana 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 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

Kim Icm

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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Accutest Laboratories

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

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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

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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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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

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		

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

Form I Copy

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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

For I Only

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		

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

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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		

	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 G383-589
(Accutest SDG F51537)

DATE: September 28, 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 2, 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 nineteen solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
LFSS13	F51537-1	LFSS04	F51537-12
LFSS14	F51537-2	LFSS05	F51537-13
LFSS15	F51537-3	LFSS06	F51537-14
LFSS16	F51537-4	LFSS07	F51537-15
LFSS17	F51537-5	LFSS08	F51537-16
LFSS18	F51537-6	LFSS09	F51537-17
LFSS19	F51537-7	LFSS10	F51537-18
LFSS20	F51537-8	LFSS11	F51537-19
TMSS20	F51537-9	LFSS12	F51537-20
LFSS21	F51537-10		

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

10/2/07
Date

RFAAP VALIDATION REPORT
DIOXIN FURAN REVIEW
SDGs G383-589
(Accutest SDG F51537)

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 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 08/02/07, the coolers were received by the primary laboratory (Accutest) on 08/03/07 at 4.8°C and 5.2°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.4°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The aqueous samples were collected on 08/02/07. The dioxins and furans were extracted on 08/09/07 and 08/12/07 and analyzed on 08/13/07, 08/14/07, 08/16/07, 08/17/07, and 08/20/07. 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 080207R (F51537-11) applies to surface soil "SS" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. pg/g	Action Level pg/g	B qualified samples
08/16/07	LMB14406	1,2,3,4,6,7,8-HpCDD	0.352J	1.76	None
08/16/07	LMB14406	OCDD	7.53J	75.3	None
08/16/07	LMB14406	2,3,7,8-TCDD	0.156J, EMPC	0.780	None
08/16/07	LMB14406	2,3,7,8-TCDF	0.176J, EMPC	0.880	None
08/16/07	LMB14406	2,3,4,7,8-PeCDF	0.112J, EMPC	0.560	None
08/16/07	LMB14406	OCDF	0.618J	6.18	None
08/16/07	LMB14406	Total TCDDs	0.156J, EMPC	0.780	None
08/16/07	LMB14406	Total PeCDDs	0.284J, EMPC	1.42	None
08/16/07	LMB14406	Total HpCDDs	0.352	1.76	None
08/16/07	LMB14406	Total TCDFs	0.176J, EMPC	0.880	None
08/16/07	LMB14406	Total PeCDFs	0.112J, EMPC	0.560	None
08/13/07	LMB14408	1,2,3,4,6,7,8-HpCDD	0.274J, EMPC	1.37	None
08/13/07	LMB14408	OCDD	1.09	10.9	None
08/13/07	LMB14408	1,2,3,4,6,7,8-HpCDF	0.200J, EMPC	1.00	None
08/13/07	LMB14408	Total HpCDDs	0.274J, EMPC	1.37	None
08/13/07	LMB14408	Total HpCDFs	0.200J, EMPC	1.00	None
08/20/07	LMB14419	All congeners <EDL	NA	NA	None
08/17/07	080207R	2,3,7,8-TCDD	0.134J, EMPC	0.670	LFSS08
08/17/07	080207R	1,2,3,4,6,7,8-HpCDD	0.326J	1.63	None
08/17/07	080207R	OCDD	3.89	38.9	None
08/17/07	080207R	1,2,3,7,8-PeCDF	0.0639J, EMPC	0.320	None
08/17/07	080207R	2,3,4,7,8-PeCDF	0.0859J, EMPC	0.430	None
08/17/07	080207R	1,2,3,4,6,7,8-HpCDF	0.282J, EMPC	1.41	None
08/17/07	080207R	OCDF	0.286	2.86	None
08/17/07	080207R	Total TCDDs	0.134J, EMPC	0.670	None
08/17/07	080207R	Total PeCDDs	0.308J, EMPC	1.54	None
08/17/07	080207R	Total HpCDDs	0.326	1.63	None
08/17/07	080207R	Total TCDFs	0.0352	0.176	None
08/17/07	080207R	Total PeCDFs	0.163J, EMPC	0.815	None
08/17/07	080207R	Total HpCDFs	0.282J, EMPC	1.41	None

J = Estimated value <MRL and >EDL.
EMPC = Estimated Maximum Possible Concentration.
NA = Not Applicable
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 11/02/06 for all target compounds on instrument HRMS3, all criteria were met. No qualifiers were applied. Samples LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) apply to this initial calibration.

- For initial calibration performed for 2,3,7,8-TCDF confirmation on 04/18/07 for all target compounds on instrument HRMS3, all criteria were met. No qualifiers were applied. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) apply to this initial calibration.

- For initial calibration performed on 08/14/07 for all target compounds on instrument HRMS3, all criteria were met. No qualifiers were applied. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), and LFSS05 (F51537-13) apply to this initial calibration.

- For initial calibration performed on 07/10/07 for all target compounds on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample LFSS13 (F51537-1) applies to this initial calibration. For OCDD, OCDF, and 1,2,3,4,6,7,8-HpCDD, samples LFSS20 (F51537-8) and TMSS20 (F51537-9) also 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 08/18/07 @12:30 on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples LFSS20 (F51537-8) and TMSS20 (F51537-9) for OCDD, OCDF, and 1,2,3,4,6,7,8-HpCDD apply to this continuing calibration.

- For continuing calibration performed on 08/18/07 @23:46 on instrument HRMS1, 1,2,3,4,7,8-HxCDD (21.3%) was outside criteria. For all other congeners, all criteria were met. 1,2,3,4,7,8-HxCDD would be qualified estimated based upon the high %D; however, no samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/19/07 @11:06 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/19/07 @22:27 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/20/07 @09:49 on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample LFSS13 (F51537-1) applies to this continuing calibration.

- For continuing calibration performed on 08/20/07 @21:11 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/13/07 @15:40 on instrument HRMS3, all criteria were met. No qualifiers were applied. Samples LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) apply to this continuing calibration.

- For continuing calibration performed on 08/14/07 @02:41 on instrument HRMS3, 1,2,3,4,7,8-HxCDD (20.7%) was outside criteria. For all other congeners, all criteria were met. 1,2,3,4,7,8-HxCDD would be qualified estimated based upon the high %D; however, no samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/15/07 @10:48 on instrument HRMS3, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/16/07 @09:28 on instrument HRMS3, all criteria were met. No qualifiers were applied. Samples LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), and LFSS21 (F51537-10) apply to this continuing calibration.

- For continuing calibration performed on 08/16/07 @20:50 on instrument HRMS3, all criteria were met. No qualifiers were applied. Samples LFSS04 (F51537-12) and LFSS05 (F51537-13) apply to this continuing calibration.

- For continuing calibration performed on 08/17/07 @05:48 on instrument HRMS3, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For 2,3,7,8-TCDF confirmation continuing calibration performed on 08/20/07 @10:08 on instrument HRMS3, all criteria were met. No qualifiers were applied. Samples LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), and LFSS07 (F51537-15) apply to this continuing calibration.

- For 2,3,7,8-TCDF confirmation continuing calibration performed on 08/20/07 @17:20 on instrument HRMS3, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For 2,3,7,8-TCDF confirmation continuing calibration performed on 08/21/07 @08:04 on instrument HRMS3, all criteria were met. No qualifiers were applied. Samples LFSS13 (F51537-1), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) apply to this continuing calibration.

- For 2,3,7,8-TCDF confirmation continuing calibration performed on 08/21/07 @14:50 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 OPR14406 was used as LCS and LCSD on 08/16/07 analytical run. All criteria were met. No qualifiers were applied. Samples LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), and LFSS05 (F51537-13) apply to this LCS/LCSD.

- Sample OPR14408 was used as LCS and LCSD on 08/13/07 analytical run. All criteria were met. No qualifiers were applied. Samples LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) apply to this LCS/LCSD.

- Sample OPR14419 was used as LCS and LCSD on 08/20/07 analytical run. All criteria were met. No qualifiers were applied. Sample LFSS13 (F51537-1) applies to this LCS/LCSD.

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 LFSS12 (F51537-20) was used for the solid MS/MSD analysis on 08/14/07. OCDD (164%) was 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 LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) 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 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 solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field surface water sample duplicate pair LFSS20 (F51537-8) and TMSS20 (F51537-9) 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 criteria were met. No qualifiers were applied.

Table 3 Field Precision Hits Analysis Summary for Dioxin and Furans for Duplicate Pair LFSS20 (F51537-8) and TMSS20 (F51537-9)

Compound	Original Sample (pg/g)	Duplicate Pair (pg/g)	%RPD
1,2,3,4,6,7,8-HpCDD	18100	19400	6.9
1,2,3,4,6,7,8-HpCDF	2330	2290	1.7
1,2,3,4,7,8,9-HpCDF	159	159	0.0
1,2,3,4,7,8-HxCDD	428	454	5.9
1,2,3,4,7,8-HxCDF	437	432	1.2
1,2,3,6,7,8-HxCDD	821	877	6.6
1,2,3,6,7,8-HxCDF	381	354	7.4
1,2,3,7,8,9-HxCDD	826	879	6.2
1,2,3,7,8,9-HxCDF	83.3	73.1	13.0
1,2,3,7,8-PeCDD	481	518	7.4
1,2,3,7,8-PeCDF	273	254	7.2
2,3,4,6,7,8-HxCDF	484	449	7.5
2,3,4,7,8-PeCDF	507	452	11.5
2,3,7,8-TCDD	166	168	1.2
2,3,7,8-TCDF	245	270	9.7
OCDD	135000	154000	13.2
OCDF	4090	4200	2.7
Total HpCDDs	34500	37800	9.1
Total HpCDFs	6470	6550Q, EMPC	1.2
Total HxCDDs	8090	8560	5.7
Total HxCDFs	3900Q	3780Q	3.1
Total PeCDDs	4130Q	4070Q	1.5
Total PeCDFs	4380Q, EMPC	3860Q, EMPC	12.6
Total TCDDs	2770Q	2780Q, EMPC	0.4
Total TCDFs	6890Q, EMPC	7280Q, EMPC	5.5

Q= Estimated value due to presence of quantitation interference.
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 LFSS04 (F51537-12), Total PeCDDs, Total PeCDFs, and I TCDFs were qualified estimated "J" based upon the presence of quantitation interference.

- For sample LFSS13 (F51537-1), Total PeCDDs, Total PeCDFs, Total TCDDs, and Total TCDFs were qualified estimated non-detect "J" based upon the presence of quantitation interference.

- For sample LFSS17 (F51537-5), Total PeCDFs and Total TCDDs were qualified estimated non-detect "J" based upon the presence of quantitation interference.

- For sample LFSS18 (F51537-6), Total PeCDDs, Total PeCDFs, and Total TCDFs were qualified estimated non-detect "J" based upon the presence of quantitation interference.

- For sample LFSS20 (F51537-8), Total HxCDFs, Total PeCDDs, Total PeCDFs, Total TCDDs, and Total TCDFs were qualified estimated non-detect "J" based upon the presence of quantitation interference.

- For sample TMSS20 (F51537-9), Total HxCDFs, ,Total PeCDDs, Total PeCDFs, Total TCDDs, and Total TCDFs were qualified estimated non-detect "J" based upon the presence of quantitation interference.

- For sample LFSS21 (F51537-10), Total PeCDDs and Total PeCDFs were qualified estimated non-detect "J" based upon the presence of quantitation interference.

- OCDD exceeded upper calibration limit for samples LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS07 (F51537-15), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), LFSS13 (F51537-1), LFSS19 (F51537-7), and LFSS21 (F51537-10). OCDD was qualified estimated "J" for all associated samples based upon these outliers.

Sample: LFSS13 (F51537-1), 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 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.

$$\text{Conc. (ng/kg)} = \frac{(A(x))\ *Q(is)}{A(is)\ *\ W\ *\ \text{Avg. RRF}} = \frac{(321000000+358000000)*4.0*1000}{(21300000+23700000)\ *\ (10.33\ *\ 0.8010)\ *\ 1.0783} =$$

= 6760 ng/kg = 6760 pg/g

Reported Value = 6770 pg/g
% 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

Method 8290
F51537-1
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	12.9			31:40	0.74	
1,2,3,7,8-PeCDD	35.9			34:27	1.56	
1,2,3,4,7,8-HxCDD	27.0			37:07	1.25	
1,2,3,6,7,8-HxCDD	53.8			37:13	1.26	
1,2,3,7,8,9-HxCDD	57.2			37:30	1.27	
1,2,3,4,6,7,8-HpCDD	798			40:43	1.05	
OCDD	6770 J			45:15	0.90	E
2,3,7,8-TCDF	40.3			31:09	0.81	
1,2,3,7,8-PeCDF	40.0			33:39	1.58	
2,3,4,7,8-PeCDF	79.5			34:16	1.57	
1,2,3,4,7,8-HxCDF	82.9			36:25	1.26	
1,2,3,6,7,8-HxCDF	75.5			36:31	1.27	
2,3,4,6,7,8-HxCDF	92.9			37:01	1.24	
1,2,3,7,8,9-HxCDF	16.1			37:51	1.25	
1,2,3,4,6,7,8-HpCDF	457			39:25	1.04	
1,2,3,4,7,8,9-HpCDF	19.5			41:25	1.03	
OCDF	327			45:33	0.88	
Total TCDDs	~~231~~		257 J			Q
Total PeCDDs	~~236~~		370 J			Q
Total HxCDDs	675					
Total HpCDDs	1660					
Total TCDFs	1220					Q
Total PeCDFs	~~1040~~		1040 J			Q
Total HxCDFs	~~849~~		858 J			
Total HpCDFs	667					
WHO-2005 TEQ (ND=0)	133		133			
WHO-2005 TEQ (ND=½)	133		133			

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-1		Weight / Volume:	10.33 g
			Solids / Lipids:	80.1 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14419
Project ID:	G383-589		Instrument:	HRMS1
Sample ID:	G383-589-1C		Filename:	a18aug07a_5-13
Collection Date/Time:	08/02/07	14:45	Retchk:	a18aug07a_4-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	a18aug07a_4-14
Extraction Date:	08/19/07		End ConCal:	a18aug07a_5-14
Analysis Date/Time:	08/20/07	20:22	Initial Cal:	m8290-071007a

Form I Cont

Method 8290
F51537-1
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	1.58	79.0	31:40	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.45	72.5	34:27	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.69	84.5	37:13	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.59	79.4	40:42	1.06	
13C12-OCDD	4.0	2.71	67.8	45:13	0.90	
13C12-2,3,7,8-TCDF	2.0	1.81	90.6	31:07	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.39	69.6	33:37	1.57	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.60	80.1	36:30	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.50	75.0	39:24	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.385	96.4	31:40	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.302	75.6	34:15	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.341	85.3	37:07	1.29	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.360	89.9	36:24	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.271	67.7	41:24	0.44	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:13	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:28	1.26	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-1		Weight / Volume:	10.33 g
			Solids / Lipids:	80.1 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14419
Project ID:	G383-589		Instrument:	HRMS1
Sample ID:	G383-589-1C		Filename:	a18aug07a_5-13
Collection Date/Time:	08/02/07	14:45	Retchk:	a18aug07a_4-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	a18aug07a_4-14
Extraction Date:	08/19/07		End ConCal:	a18aug07a_5-14
Analysis Date/Time:	08/20/07	20:22	Initial Cal:	m8290-071007a

Form Version.[8290_DB_2.15]Report

Analyzed by: JVP
Date: 08-21-07

Reviewed by: MM
Date: 8/31/07

Form I Copy

TCDF Confirmation - Method 8290
F51537-1
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	44.9	0.193		20.82	0.79	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.81	0.79	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-1		Weight / Volume:	10.33	g
			Solids / Lipids:	80.10	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14419	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-1C		Filename:	c21aug07a-4	
Collection Date/Time:	08/02/07	14:45	Retchk:	c21aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c21aug07a-1	
Extraction Date:	08/19/07		End ConCal:	c21aug07a-18	
Analysis Date/Time:	08/21/07	9:16	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 24Aug07

Reviewed by: MC
Date: 8/31/07

Form I Copy

Method 8290
F51537-2
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	~~0.143~~	1.01 J	31.67	0.63 *	A
1,2,3,7,8-PeCDD	2.76 J			34.46	1.45	A
1,2,3,4,7,8-HxCDD	2.85 J			37.11	1.22	A
1,2,3,6,7,8-HxCDD	5.01 J			37.20	1.27	A
1,2,3,7,8,9-HxCDD	5.47 J			37.46	1.12	A
1,2,3,4,6,7,8-HpCDD	123			40.63	1.03	
OCDD	4270			45.02	0.89	
2,3,7,8-TCDF	2.77			31.10	0.80	
1,2,3,7,8-PeCDF	2.15 J			33.64	1.74	A
2,3,4,7,8-PeCDF	3.63 J			34.26	1.73	A
1,2,3,4,7,8-HxCDF	4.53 J			36.39	1.30	A
1,2,3,6,7,8-HxCDF	3.88 J			36.49	1.22	A
2,3,4,6,7,8-HxCDF	4.44 J			37.00	1.29	A
1,2,3,7,8,9-HxCDF	0.955 J			37.82	1.39	A
1,2,3,4,6,7,8-HpCDF	25.9			39.31	1.06	
1,2,3,4,7,8,9-HpCDF	2.15 J			41.33	1.13	A
OCDF	41.3			45.33	0.89	
Total TCDDs	~~10.5~~		15.3 J			
Total PeCDDs	~~26.0~~		30.1 J			
Total HxCDDs	57.9					
Total HpCDDs	314					
Total TCDFs	~~38.4~~		41.4 J			
Total PeCDFs	~~26.4~~		29.0 J			
Total HxCDFs	~~36.6~~		37.3 J			
Total HpCDFs	57.8					
WHO-2005 TEQ (ND=0)	9.71		10.7			
WHO-2005 TEQ (ND=½)	9.78		10.7			

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-2		Weight / Volume:	10.68 g
			Solids / Lipids:	65.7 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-2B		Filename:	c15aug07b_3-5
Collection Date/Time:	08/02/07	14:50	Retchk:	c15aug07b_2-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14
Analysis Date/Time:	08/16/07	13:36	Initial Cal:	m8290-c110206a

Form 1 Copy

Method 8290
F51537-2
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	1.18	58.8	31.65	0.81	
13C12-1,2,3,7,8-PeCDD	2.0	1.32	65.9	34.45	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.31	65.5	37.19	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.41	70.4	40.60	1.06	
13C12-OCDD	4.0	2.62	65.5	45.00	0.92	
13C12-2,3,7,8-TCDF	2.0	1.49	74.3	31.09	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.34	67.1	33.63	1.61	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.34	67.1	36.48	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.25	62.4	39.30	0.46	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.264	66.1	31.67	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.255	63.7	34.25	1.58	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.251	62.7	37.10	1.25	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.273	68.3	36.38	0.53	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.241	60.3	41.32	0.46	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.23	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.44	1.26	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-2		Weight / Volume:	10.68 g
			Solids / Lipids:	65.7 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-2B		Filename:	c15aug07b_3-5
Collection Date/Time:	08/02/07	14:50	Retchk:	c15aug07b_2-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14
Analysis Date/Time:	08/16/07	13:36	Initial Cal:	m8290-c110206a

Form Version:[8290_DB_2.15]Report

Analyzed by: HMP
Date: 17Aug07

Reviewed by: CM
Date: 8/17/07

Form I Copy

TCDF Confirmation - Method 8290
F51537-2
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	3.26	0.382		20.81	0.77	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.79	0.79	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-2		Weight / Volume:	10.68	g
			Solids / Lipids:	65.69	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-2B		Filename:	c20aug07a-5	
Collection Date/Time:	08/02/07	14:50	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/09/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	11:43	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: [illegible]
Date: 8/21/07

Form I Copy

Method 8290
F51537-3
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	1.84			31.65	0.70	
1,2,3,7,8-PeCDD	5.60 J			34.44	1.65	A
1,2,3,4,7,8-HxCDD	4.95 J			37.10	1.30	A
1,2,3,6,7,8-HxCDD	9.97			37.19	1.24	
1,2,3,7,8,9-HxCDD	11.2			37.43	1.20	
1,2,3,4,6,7,8-HpCDD	203			40.62	1.05	
OCDD	3430			45.00	0.90	
2,3,7,8-TCDF	3.83			31.09	0.75	
1,2,3,7,8-PeCDF	3.26 J			33.63	1.49	A
2,3,4,7,8-PeCDF	4.30 J			34.25	1.61	A
1,2,3,4,7,8-HxCDF	5.97 J			36.37	1.25	A
1,2,3,6,7,8-HxCDF	4.69 J			36.48	1.28	A
2,3,4,6,7,8-HxCDF	5.07 J			36.98	1.25	A
1,2,3,7,8,9-HxCDF	1.22 J			37.80	1.25	A
1,2,3,4,6,7,8-HpCDF	38.9			39.30	1.04	
1,2,3,4,7,8,9-HpCDF	3.12 J			41.32	1.02	A
OCDF	80.6			45.32	0.89	
Total TCDDs	~~23.6~~		28.2 J			
Total PeCDDs	~~51.4~~		53.5 J			
Total HxCDDs	106					
Total HpCDDs	463					
Total TCDFs	~~46.7~~		53.7 J			
Total PeCDFs	~~32.8~~		37.5 J			
Total HxCDFs	~~50.9~~		51.8 J			
Total HpCDFs	106					
WHO-2005 TEQ (ND=0)	17.0		17.0			
WHO-2005 TEQ (ND=½)	17.0		17.0			

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-3		Weight / Volume:	11.50	g
			Solids / Lipids:	62.9	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-3B		Filename:	c15aug07b_3-6	
Collection Date/Time:	08/02/07	14:55	Retchk:	c15aug07b_2-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14	
Analysis Date/Time:	08/16/07	14:24	Initial Cal:	m8290-c110206a	

Form I (cont)

Method 8290
F51537-3
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	0.983	49.1	31.64	0.80	
13C12-1,2,3,7,8-PeCDD	2.0	1.01	50.4	34.43	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	0.998	49.9	37.18	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.24	62.0	40.59	1.03	
13C12-OCDD	4.0	2.11	52.8	44.99	0.91	
13C12-2,3,7,8-TCDF	2.0	1.25	62.4	31.08	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.00	50.1	33.62	1.62	
13C12-1,2,3,6,7,8-HxCDF	2.0	0.948	47.4	36.47	0.54	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.03	51.4	39.29	0.47	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.237	59.3	31.65	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.209	52.2	34.24	1.62	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.202	50.5	37.09	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.212	52.9	36.35	0.53	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.240	60.1	41.29	0.46	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.22	0.80	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.42	1.25	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-3		Weight / Volume:	11.50	g
			Solids / Lipids:	62.9	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-3B		Filename:	c15aug07b_3-6	
Collection Date/Time:	08/02/07	14:55	Retchk:	c15aug07b_2-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14	
Analysis Date/Time:	08/16/07	14:24	Initial Cal:	m8290-c110206a	

Form Version:[8290_DB_2.15]Report

Analyzed by: HMP
Date: 17Aug07

Reviewed by: [signature]
Date: 8/17/07

Form I Copy

TCDF Confirmation - Method 8290
F51537-3
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	4.51	0.282		20.81	0.82	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.80	0.79	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-3		Weight / Volume:	11.50	g
			Solids / Lipids:	62.94	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-3B		Filename:	c20aug07a-6	
Collection Date/Time:	08/02/07	14:55	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/09/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	12:07	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: [signature]
Date: 8/21/07

Form 1 Copy

Method 8290
F51537-4
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	1.11 J			31.64	0.72		A
1,2,3,7,8-PeCDD	3.20 J			34.45	1.52		A
1,2,3,4,7,8-HxCDD	EMPC	~~0.570~~	2.91 J	37.10	1.47	*	A
1,2,3,6,7,8-HxCDD	6.89			37.19	1.22		
1,2,3,7,8,9-HxCDD	6.57			37.44	1.21		
1,2,3,4,6,7,8-HpCDD	144			40.62	1.04		
OCDD	1780			45.01	0.91		
2,3,7,8-TCDF	6.29			31.09	0.76		
1,2,3,7,8-PeCDF	3.44 J			33.63	1.60		A
2,3,4,7,8-PeCDF	4.65 J			34.25	1.58		A
1,2,3,4,7,8-HxCDF	24.0			36.35	1.27		
1,2,3,6,7,8-HxCDF	4.95 J			36.48	1.28		A
2,3,4,6,7,8-HxCDF	5.98			36.98	1.25		
1,2,3,7,8,9-HxCDF	1.59 J			37.80	1.28		A
1,2,3,4,6,7,8-HpCDF	49.2			39.30	1.04		
1,2,3,4,7,8,9-HpCDF	4.11 J			41.32	1.03		A
OCDF	72.5			45.33	0.91		
Total TCDDs	~~15.3~~		21.5 J				
Total PeCDDs	~~20.9~~		36.3 J				
Total HxCDDs	~~57.8~~		64.0 J				
Total HpCDDs	321						
Total TCDFs	~~70.1~~		73.3 J				
Total PeCDFs	~~103~~		108 J				
Total HxCDFs	84.3						
Total HpCDFs	110						
WHO-2005 TEQ (ND=0)	14.0		14.3				
WHO-2005 TEQ (ND=½)	14.0		14.3				

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-4		Weight / Volume:	10.36	g
			Solids / Lipids:	84.7	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-4B		Filename:	c15aug07b_3-7	
Collection Date/Time:	08/02/07	15:00	Retchk:	c15aug07b_2-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14	
Analysis Date/Time:	08/16/07	15:13	Initial Cal:	m8290-c110206a	

Form I copy

Method 8290
F51537-4
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	1.37	68.3	31.64	0.80	
13C12-1,2,3,7,8-PeCDD	2.0	1.20	59.9	34.44	1.57	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.40	70.1	37.19	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.70	84.8	40.59	1.06	
13C12-OCDD	4.0	2.76	69.0	45.00	0.89	
13C12-2,3,7,8-TCDF	2.0	1.70	84.8	31.08	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.23	61.5	33.62	1.56	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.30	65.1	36.47	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.48	73.8	39.29	0.46	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.306	76.4	31.65	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.246	61.5	34.24	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.295	73.8	37.09	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.297	74.3	36.37	0.53	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.305	76.4	41.29	0.47	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.22	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.43	1.26	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-4		Weight / Volume:	10.36	g
			Solids / Lipids:	84.7	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-4B		Filename:	c15aug07b_3-7	
Collection Date/Time:	08/02/07	15:00	Retchk:	c15aug07b_2-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14	
Analysis Date/Time:	08/16/07	15:13	Initial Cal:	m8290-c110206a	

Form Version:[8290_DB_2.15]Report

Analyzed by: HMP
Date: 17Aug07

Reviewed by: MD
Date: 8/17/07

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TCDF Confirmation - Method 8290
F51537-4
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	5.66	0.231		20.81	0.86	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.80	0.79	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-4		Weight / Volume:	10.36	g
			Solids / Lipids:	84.71	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-4B		Filename:	c20aug07a-7	
Collection Date/Time:	08/02/07	15:00	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/09/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	12:30	Initial Cal:	mcf-c041807a	

Analyzed by: LMP
Date: 21Aug07

Reviewed by: CRL
Date: 8/21/07

Form I copy

Method 8290
F51537-5
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	5.67			31.67	0.73	
1,2,3,7,8-PeCDD	21.4			34.45	1.55	
1,2,3,4,7,8-HxCDD	23.0			37.12	1.27	
1,2,3,6,7,8-HxCDD	46.5			37.21	1.29	
1,2,3,7,8,9-HxCDD	40.3			37.46	1.28	
1,2,3,4,6,7,8-HpCDD	509			40.62	1.05	
OCDD	3760			45.03	0.91	
2,3,7,8-TCDF	41.8			31.11	0.71	
1,2,3,7,8-PeCDF	63.2			33.64	1.58	
2,3,4,7,8-PeCDF	79.5			34.26	1.58	
1,2,3,4,7,8-HxCDF	107			36.38	1.27	
1,2,3,6,7,8-HxCDF	97.0			36.49	1.26	
2,3,4,6,7,8-HxCDF	116			36.99	1.27	
1,2,3,7,8,9-HxCDF	29.8			37.81	1.30	
1,2,3,4,6,7,8-HpCDF	567			39.31	1.04	
1,2,3,4,7,8,9-HpCDF	42.4			41.32	1.06	
OCDF	414			45.34	0.92	
Total TCDDs	241					
Total PeCDDs	355 J					Q
Total HxCDDs	534					
Total HpCDDs	1290					
Total TCDFs	~~851~~		882 J			
Total PeCDFs	~~552~~		715 J			Q
Total HxCDFs	820					
Total HpCDFs	903					
WHO-2005 TEQ (ND=0)	115		115			
WHO-2005 TEQ (ND=½)	115		115			

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-5		Weight / Volume:	11.30	g
			Solids / Lipids:	57.3	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-5B		Filename:	c15aug07b_3-8	
Collection Date/Time:	08/02/07	15:05	Retchk:	c15aug07b_2-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14	
Analysis Date/Time:	08/16/07	16:01	Initial Cal:	m8290-c110206a	

Form I com

Method 8290
F51537-5
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	1.33	66.7	31.65	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.29	64.7	34.44	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.37	68.3	37.19	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.39	69.5	40.59	1.06	
13C12-OCDD	4.0	2.32	58.0	45.01	0.88	
13C12-2,3,7,8-TCDF	2.0	1.66	83.0	31.10	0.80	
13C12-1,2,3,7,8-PeCDF	2.0	1.23	61.6	33.63	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.34	67.1	36.48	0.54	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.39	69.3	39.30	0.46	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.296	74.0	31.67	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.251	62.9	34.25	1.56	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.287	71.6	37.11	1.25	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.280	70.0	36.37	0.53	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.246	61.6	41.29	0.47	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.23	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.44	1.26	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-5		Weight / Volume:	11.30	g
			Solids / Lipids:	57.3	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-5B		Filename:	c15aug07b_3-8	
Collection Date/Time:	08/02/07	15:05	Retchk:	c15aug07b_2-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14	
Analysis Date/Time:	08/16/07	16:01	Initial Cal:	m8290-c110206a	

Form Version:[8290_DB_2.15]Report

Analyzed by: HMP
Date: 17Aug07

Reviewed by: CBL
Date: 8/17/07

Form 1 Copy

TCDF Confirmation - Method 8290
F51537-5
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	49.9	3.78		20.82	0.79	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.80	0.80	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-5		Weight / Volume:	11.30	g
			Solids / Lipids:	57.34	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-5B		Filename:	c20aug07a-8	
Collection Date/Time:	08/02/07	15:05	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/09/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	12:54	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: [illegible]
Date: 8/21/07

For 1 copy

Method 8290
F51537-6
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	3.32			31.70	0.66	
1,2,3,7,8-PeCDD	15.4			34.47	1.69	
1,2,3,4,7,8-HxCDD	23.7			37.18	1.26	
1,2,3,6,7,8-HxCDD	37.1			37.27	1.31	
1,2,3,7,8,9-HxCDD	33.6			37.52	1.30	
1,2,3,4,6,7,8-HpCDD	507			40.66	1.05	
OCDD	4400			45.11	0.89	
2,3,7,8-TCDF	19.5			31.14	0.80	
1,2,3,7,8-PeCDF	24.6			33.65	1.54	
2,3,4,7,8-PeCDF	43.3			34.29	1.60	
1,2,3,4,7,8-HxCDF	61.9			36.42	1.31	
1,2,3,6,7,8-HxCDF	50.2			36.52	1.23	
2,3,4,6,7,8-HxCDF	59.5			37.04	1.29	
1,2,3,7,8,9-HxCDF	16.4			37.87	1.21	
1,2,3,4,6,7,8-HpCDF	300			39.36	1.04	
1,2,3,4,7,8,9-HpCDF	27.7			41.35	1.04	
OCDF	257			45.41	0.88	
Total TCDDs	135					
Total PeCDDs	~~207~~		218 J			Q
Total HxCDDs	447					
Total HpCDDs	1170					
Total TCDFs	~~312~~		353 J			Q
Total PeCDFs	~~288~~		314 J			Q
Total HxCDFs	459					
Total HpCDFs	525					
WHO-2005 TEQ (ND=0)	72.4		72.4			
WHO-2005 TEQ (ND=½)	72.4		72.4			

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-6		Weight / Volume:	11.42 g
			Solids / Lipids:	63.5 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-6B		Filename:	c15aug07b_3-9
Collection Date/Time:	08/02/07	15:10	Retchk:	c15aug07b_2-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14
Analysis Date/Time:	08/16/07	16:49	Initial Cal:	m8290-c110206a

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Method 8290
F51537-6
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	69.2	31.68	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.39	69.6	34.46	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.42	71.1	37.26	1.28	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.74	86.8	40.64	1.05	
13C12-OCDD	4.0	3.04	76.1	45.09	0.92	
13C12-2,3,7,8-TCDF	2.0	1.80	89.9	31.13	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.30	65.0	33.65	1.55	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.51	75.3	36.51	0.54	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.52	76.1	39.35	0.47	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.306	76.5	31.70	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.280	70.1	34.28	1.61	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.498	124	37.17	1.28	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.374	93.6	36.41	0.54	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.315	78.7	41.34	0.45	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.26	0.81	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.51	1.26	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-6		Weight / Volume:	11.42 g	
			Solids / Lipids:	63.5	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-6B		Filename:	c15aug07b_3-9	
Collection Date/Time:	08/02/07	15:10	Retchk:	c15aug07b_2-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14	
Analysis Date/Time:	08/16/07	16:49	Initial Cal:	m8290-c110206a	

Form Version:[8290_DB_2.15]Report

Analyzed by: HMP
Date: 17Aug07

Reviewed by: CH
Date: 8/17/07

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TCDF Confirmation - Method 8290
F51537-6
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	27.1	0.848		20.82	0.80	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.81	0.79	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-6		Weight / Volume:	11.42	g
			Solids / Lipids:	63.46	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-6B		Filename:	c20aug07a-9	
Collection Date/Time:	08/02/07	15:10	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/09/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	13:18	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: [illegible]
Date: 8/21/07

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Method 8290
F51537-7
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	2.78			31.67	0.78	
1,2,3,7,8-PeCDD	7.19			34.46	1.67	
1,2,3,4,7,8-HxCDD	7.29			37.12	1.27	
1,2,3,6,7,8-HxCDD	13.7			37.21	1.26	
1,2,3,7,8,9-HxCDD	13.2			37.46	1.29	
1,2,3,4,6,7,8-HpCDD	215			40.63	1.05	
OCDD	7090 J			45.03	0.89	E
2,3,7,8-TCDF	12.6			31.11	0.80	
1,2,3,7,8-PeCDF	12.2			33.65	1.66	
2,3,4,7,8-PeCDF	18.8			34.28	1.61	
1,2,3,4,7,8-HxCDF	25.1			36.39	1.26	
1,2,3,6,7,8-HxCDF	19.3			36.49	1.29	
2,3,4,6,7,8-HxCDF	24.7			36.99	1.26	
1,2,3,7,8,9-HxCDF	6.79			37.82	1.33	
1,2,3,4,6,7,8-HpCDF	108			39.33	1.05	
1,2,3,4,7,8,9-HpCDF	9.47			41.33	1.05	
OCDF	86.3			45.35	0.87	
Total TCDDs	~~36.8~~		53.9 J			
Total PeCDDs	92.3					
Total HxCDDs	149					
Total HpCDDs	526					
Total TCDFs	~~160~~		160 J			
Total PeCDFs	~~135~~		145 J			
Total HxCDFs	~~172~~		175 J			
Total HpCDFs	186					
WHO-2005 TEQ (ND=0)	33.7		33.7			
WHO-2005 TEQ (ND=½)	33.7		33.7			

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-7		Weight / Volume:	10.22 g
			Solids / Lipids:	78.8 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-7B		Filename:	c15aug07b_3-10
Collection Date/Time:	08/02/07	15:15	Retchk:	c15aug07b_2-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14
Analysis Date/Time:	08/16/07	17:37	Initial Cal:	m8290-c110206a

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Method 8290
F51537-7
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	1.34	67.2	31.65	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.24	62.2	34.45	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.37	68.7	37.20	1.27	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.58	79.2	40.62	1.05	
13C12-OCDD	4.0	2.62	65.6	45.02	0.90	
13C12-2,3,7,8-TCDF	2.0	1.66	83.2	31.10	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.25	62.3	33.63	1.54	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.29	64.7	36.48	0.54	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.39	69.7	39.31	0.46	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.290	72.6	31.67	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.247	61.9	34.26	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.265	66.1	37.11	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.270	67.4	36.38	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.270	67.5	41.32	0.47	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.23	0.80	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.44	1.28	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-7		Weight / Volume:	10.22 g
			Solids / Lipids:	78.8 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-7B		Filename:	c15aug07b_3-10
Collection Date/Time:	08/02/07	15:15	Retchk:	c15aug07b_2-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14
Analysis Date/Time:	08/16/07	17:37	Initial Cal:	m8290-c110206a

Form Version:[8290_DB_2.15]Report

Analyzed by: HMP
Date: 17Aug07

Reviewed by: [signature]
Date: 8/17/07

Form 1 copy

TCDF Confirmation - Method 8290
F51537-7
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	14.3	0.640		20.82	0.80	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.80	0.80	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-7		Weight / Volume:	10.22	g
			Solids / Lipids:	78.76	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-7B		Filename:	c20aug07a-10	
Collection Date/Time:	08/02/07	15:15	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/09/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	13:42	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by:
Date: 8/21/07

Form I Copy

Method 8290
F51537-8
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	166			31.72	0.79	
1,2,3,7,8-PeCDD	481			34.49	1.49	
1,2,3,4,7,8-HxCDD	428			37.17	1.32	
1,2,3,6,7,8-HxCDD	821			37.26	1.21	
1,2,3,7,8,9-HxCDD	826			37.51	1.26	
2,3,7,8-TCDF	245			31.17	0.82	
1,2,3,7,8-PeCDF	273			33.67	1.58	
2,3,4,7,8-PeCDF	507			34.30	1.58	
1,2,3,4,7,8-HxCDF	437			36.43	1.27	
1,2,3,6,7,8-HxCDF	381			36.53	1.28	
2,3,4,6,7,8-HxCDF	484			37.03	1.26	
1,2,3,7,8,9-HxCDF	83.3			37.86	1.24	
1,2,3,4,6,7,8-HpCDF	2330			39.38	1.04	
1,2,3,4,7,8,9-HpCDF	159			41.38	1.05	
Total TCDDs	2770 J					Q
Total PeCDDs	4130 J					Q
Total HxCDDs	8090					
Total TCDFs	~~6880~~		6890 J			Q
Total PeCDFs	~~4060~~		4380 J			Q
Total HxCDFs	3900 J					Q
Total HpCDFs	6470					
WHO-2005 TEQ (ND=0)	1200		1200			~
WHO-2005 TEQ (ND=½)	1200		1200			~

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-8		Weight / Volume:	10.26 g
			Solids / Lipids:	78.0 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-8B		Filename:	c15aug07b_3-11
Collection Date/Time:	08/02/07	15:20	Retchk:	c15aug07b_2-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14
Analysis Date/Time:	08/16/07	18:25	Initial Cal:	m8290-c110206a

Form 1 Copy

Method 8290
F51537-8
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	1.39	69.4	31.69	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.35	67.7	34.47	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.39	69.4	37.24	1.26	
13C12-2,3,7,8-TCDF	2.0	1.83	91.4	31.15	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.18	59.2	33.66	1.56	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.38	68.8	36.52	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.58	79.1	39.37	0.46	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.322	80.5	31.70	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.275	68.8	34.29	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.371	92.7	37.16	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.324	80.9	36.41	0.53	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.325	81.4	41.36	0.45	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.28	0.80	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.50	1.25	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-8		Weight / Volume:	10.26 g
			Solids / Lipids:	78.0 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-8B		Filename:	c15aug07b_3-11
Collection Date/Time:	08/02/07	15:20	Retchk:	c15aug07b_2-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14
Analysis Date/Time:	08/16/07	18:25	Initial Cal:	m8290-c110206a

Form Version:[G383-589-8B]Report

Analyzed by: JWP
Date: 082107

Reviewed by: CRL
Date: 8/24/07

For I Conf

TCDF Confirmation - Method 8290
F51537-8
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	343	1.29		20.87	0.79	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.87	0.79	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-8		Weight / Volume:	10.26	g
			Solids / Lipids:	77.98	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-8B		Filename:	c20aug07a-11	
Collection Date/Time:	08/02/07	15:20	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/09/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	14:06	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: [signature]
Date: 8/24/07

Conf Cal

Method 8290
F51537-8
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
1,2,3,4,6,7,8-HpCDD	18100			40:40	1.05	
OCDD	135000			45:10	0.89	
OCDF	4090			45:28	0.89	
Total HpCDDs	34500					
WHO-2005 TEQ (ND=0)	223		223			~
WHO-2005 TEQ (ND=½)	223		223			~

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-8		Weight / Volume:	10.26 g
			Solids / Lipids:	78.0 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS1
Sample ID:	G383-589-8C	D50	Filename:	a18aug07a-13
Collection Date/Time:	08/02/07	15:20	Retchk:	a18aug07a-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	a18aug07a-1
Extraction Date:	08/09/07		End ConCal:	a18aug07a-15
Analysis Date/Time:	08/18/07	22:09	Initial Cal:	m8290cc-081807a

Form 1 Cry

Method 8290
F51537-8
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.75	87.3	40:39	1.02	
13C12-OCDD	4.0	3.32	83.1	45:10	0.89	
Injection Standards						
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.18	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-8		Weight / Volume:	10.26 g	
			Solids / Lipids:	78.0	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS1	
Sample ID:	G383-589-8C	D50	Filename:	a18aug07a-13	
Collection Date/Time:	08/02/07	15:20	Retchk:	a18aug07a-1	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	a18aug07a-1	
Extraction Date:	08/09/07		End ConCal:	a18aug07a-15	
Analysis Date/Time:	08/18/07	22:09	Initial Cal:	m8290cc-081807a	

Form Version:[8290_DB_2.15]Report

Analyzed by: JVD
Date: 08-21-07

Reviewed by: DD
Date: 8/31/07

Form I Copy

Method 8290
F51537-9
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	168			31.72	0.78	
1,2,3,7,8-PeCDD	518			34.50	1.52	
1,2,3,4,7,8-HxCDD	454			37.22	1.31	
1,2,3,6,7,8-HxCDD	877			37.31	1.25	
1,2,3,7,8,9-HxCDD	879			37.57	1.27	
2,3,7,8-TCDF	270			31.18	0.81	
1,2,3,7,8-PeCDF	254			33.69	1.56	
2,3,4,7,8-PeCDF	452			34.31	1.56	
1,2,3,4,7,8-HxCDF	432			36.47	1.27	
1,2,3,6,7,8-HxCDF	354			36.57	1.27	
2,3,4,6,7,8-HxCDF	449			37.09	1.26	
1,2,3,7,8,9-HxCDF	73.1			37.90	1.32	
1,2,3,4,6,7,8-HpCDF	2290			39.39	1.05	
1,2,3,4,7,8,9-HpCDF	159			41.38	1.07	
Total TCDDs	~~2780~~		2780 J			Q
Total PeCDDs	4070 J					Q
Total HxCDDs	8560					
Total TCDFs	~~7050~~		7280 J			Q
Total PeCDFs	~~3580~~		3860 J			Q
Total HxCDFs	3780 J					Q
Total HpCDFs	~~6550~~		6550 J			
WHO-2005 TEQ (ND=0)	1230		1230			~
WHO-2005 TEQ (ND=½)	1230		1230			~

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-9		Weight / Volume:	10.24 g
			Solids / Lipids:	77.4 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-9B		Filename:	c15aug07b_3-12
Collection Date/Time:	08/02/07	15:20	Retchk:	c15aug07b_2-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14
Analysis Date/Time:	08/16/07	19:14	Initial Cal:	m8290-c110206a

Form 1 Copy

Method 8290
F51537-9
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	1.36	68.2	31.70	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.37	68.6	34.49	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.44	72.2	37.30	1.27	
13C12-2,3,7,8-TCDF	2.0	1.86	92.9	31.17	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.25	62.3	33.67	1.50	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.38	68.9	36.56	0.56	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.76	88.0	39.38	0.46	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.308	77.1	31.72	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.267	66.8	34.30	1.62	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.449	112	37.20	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.451	113	36.46	0.54	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.354	88.6	41.37	0.46	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.30	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.56	1.26	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-9		Weight / Volume:	10.24 g
			Solids / Lipids:	77.4 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-9B		Filename:	c15aug07b_3-12
Collection Date/Time:	08/02/07	15:20	Retchk:	c15aug07b_2-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14
Analysis Date/Time:	08/16/07	19:14	Initial Cal:	m8290-c110206a

Form Version:[G383-589-9B]Report

Analyzed by: JWP
Date: 08/20/07

Reviewed by: CMT
Date: 8/21/07

for 1 copy

TCDF Confirmation - Method 8290
F51537-9
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	355	7.57		20.85	0.79	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.84	0.84	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-9		Weight / Volume:	10.24	g
			Solids / Lipids:	77.36	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-9B		Filename:	c20aug07a-12	
Collection Date/Time:	08/02/07	15:20	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/09/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	14:30	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: MDL
Date: 8/21/07

Form I Copy

Method 8290
F51537-9
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
1,2,3,4,6,7,8-HpCDD	19400			40:40	1.04	
OCDD	154000			45:10	0.89	
OCDF	4200			45:28	0.88	
Total HpCDDs	37800					
WHO-2005 TEQ (ND=0)	241		241			~
WHO-2005 TEQ (ND=½)	241		241			~

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-9		Weight / Volume:	10.24 g
			Solids / Lipids:	77.4 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS1
Sample ID:	G383-589-9C	D50	Filename:	a18aug07a-14
Collection Date/Time:	08/02/07	15:20	Retchk:	a18aug07a-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	a18aug07a-1
Extraction Date:	08/09/07		End ConCal:	a18aug07a-15
Analysis Date/Time:	08/18/07	22:57	Initial Cal:	m8290cc-081807a

Form 1 Copy

Method 8290
F51537-9
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.76	88.2	40:39	1.04	
13C12-OCDD	4.0	3.51	87.9	45:09	0.93	
Injection Standards						
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:27	1.24	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-9		Weight / Volume:	10.24 g
			Solids / Lipids:	77.4 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS1
Sample ID:	G383-589-9C	D50	Filename:	a18aug07a-14
Collection Date/Time:	08/02/07	15:20	Retchk:	a18aug07a-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	a18aug07a-1
Extraction Date:	08/09/07		End ConCal:	a18aug07a-15
Analysis Date/Time:	08/18/07	22:57	Initial Cal:	m8290cc-081807a

Form Version:[8290_DB_2.15]Report

Analyzed by: JWP
Date: 08.21.07

Reviewed by: MDL
Date: 8/31/07

Form I Copy

Method 8290
F51537-10
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	8.08			31.68	0.75	
1,2,3,7,8-PeCDD	39.0			34.47	1.62	
1,2,3,4,7,8-HxCDD	52.1			37.16	1.26	
1,2,3,6,7,8-HxCDD	75.4			37.24	1.29	
1,2,3,7,8,9-HxCDD	70.3			37.50	1.26	
1,2,3,4,6,7,8-HpCDD	1010			40.68	1.05	
OCDD	6530 J			45.18	0.91	E
2,3,7,8-TCDF	43.5			31.13	0.81	
1,2,3,7,8-PeCDF	57.5			33.65	1.60	
2,3,4,7,8-PeCDF	99.2			34.28	1.60	
1,2,3,4,7,8-HxCDF	137			36.41	1.27	
1,2,3,6,7,8-HxCDF	117			36.52	1.26	
2,3,4,6,7,8-HxCDF	157			37.02	1.26	
1,2,3,7,8,9-HxCDF	37.5			37.86	1.27	
1,2,3,4,6,7,8-HpCDF	727			39.38	1.05	
1,2,3,4,7,8,9-HpCDF	60.2			41.38	1.04	
OCDF	565			45.48	0.87	
Total TCDDs	333					
Total PeCDDs	~~545~~		545 J			Q
Total HxCDDs	953					
Total HpCDDs	2340					
Total TCDFs	~~898~~		972 J			
Total PeCDFs	~~717~~		873 J			Q
Total HxCDFs	1110					
Total HpCDFs	1220					
WHO-2005 TEQ (ND=0)	168		168			
WHO-2005 TEQ (ND=½)	168		168			

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-10		Weight / Volume:	10.1	g
			Solids / Lipids:	73.0	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-10B		Filename:	c15aug07b_3-13	
Collection Date/Time:	08/02/07	15:25	Retchk:	c15aug07b_2-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14	
Analysis Date/Time:	08/16/07	20:02	Initial Cal:	m8290-c110206a	

Form I Copy

Method 8290
F51537-10
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	1.42	71.2	31.67	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.33	66.7	34.45	1.56	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.36	68.1	37.23	1.27	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.88	94.0	40.67	1.06	
13C12-OCDD	4.0	3.21	80.3	45.16	0.92	
13C12-2,3,7,8-TCDF	2.0	1.85	92.6	31.11	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.23	61.6	33.64	1.52	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.37	68.4	36.50	0.54	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.58	79.2	39.37	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.316	78.9	31.68	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.260	64.9	34.26	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.410	102	37.15	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.319	79.8	36.40	0.53	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.319	79.9	41.36	0.46	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.25	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.49	1.26	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-10		Weight / Volume:	10.1	g
			Solids / Lipids:	73.0	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-10B		Filename:	c15aug07b_3-13	
Collection Date/Time:	08/02/07	15:25	Retchk:	c15aug07b_2-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_2-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_3-14	
Analysis Date/Time:	08/16/07	20:02	Initial Cal:	m8290-c110206a	

Form Version:[8290_DB_2.15]Report

Analyzed by: HMP
Date: 17Aug07

Reviewed by: CAO
Date: 8/17/07

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TCDF Confirmation - Method 8290
F51537-10
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	59.5	3.28		20.84	0.78	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.82	0.81	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-10		Weight / Volume:	10.15	g
			Solids / Lipids:	73.03	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-10B		Filename:	c20aug07a-13	
Collection Date/Time:	08/02/07	15:25	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/09/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	14:54	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: [illegible]
Date: 8/21/07

Form I Com

Method 8290
F51537-12
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	11.0			31.67	0.76		
1,2,3,7,8-PeCDD	EMPC	~~0.584~~	38.8 J	34.45	1.23	*	
1,2,3,4,7,8-HxCDD	43.8			37.12	1.26		
1,2,3,6,7,8-HxCDD	85.6			37.21	1.29		
1,2,3,7,8,9-HxCDD	80.7			37.46	1.24		
1,2,3,4,6,7,8-HpCDD	1730			40.63	1.06		
OCDD	11500 J			45.07	0.90		E
2,3,7,8-TCDF	29.9			31.10	0.81		
1,2,3,7,8-PeCDF	26.1			33.64	1.61		
2,3,4,7,8-PeCDF	45.3			34.26	1.64		
1,2,3,4,7,8-HxCDF	59.3			36.39	1.28		
1,2,3,6,7,8-HxCDF	47.7			36.49	1.28		
2,3,4,6,7,8-HxCDF	58.0			36.99	1.28		
1,2,3,7,8,9-HxCDF	15.0			37.82	1.28		
1,2,3,4,6,7,8-HpCDF	467			39.33	1.06		
1,2,3,4,7,8,9-HpCDF	33.3			41.33	1.05		
OCDF	1000			45.37	0.88		
Total TCDDs	~~138~~		166 J				
Total PeCDDs	~~308~~		347 J				Q
Total HxCDDs	828						
Total HpCDDs	3880						
Total TCDFs	~~402~~		408 J				Q
Total PeCDFs	~~297~~		362 J				Q
Total HxCDFs	542						
Total HpCDFs	1330						
WHO-2005 TEQ (ND=0)	93.4		132				
WHO-2005 TEQ (ND=½)	93.7		132				

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-12		Weight / Volume:	10.92	g
			Solids / Lipids:	78.4	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-12B		Filename:	c15aug07b_4-9	
Collection Date/Time:	08/02/07	15:30	Retchk:	c15aug07b_3-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_3-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_4-11	
Analysis Date/Time:	08/17/07	4:11	Initial Cal:	m8290-c110206a	

Form I copy

Method 8290
F51537-12
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	1.39	69.3	31.65	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.41	70.5	34.44	1.60	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.36	67.8	37.20	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.67	83.5	40.62	1.08	
13C12-OCDD	4.0	2.89	72.2	45.05	0.89	
13C12-2,3,7,8-TCDF	2.0	1.74	87.2	31.09	0.80	
13C12-1,2,3,7,8-PeCDF	2.0	1.34	67.0	33.63	1.53	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.32	66.1	36.48	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.45	72.6	39.31	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.308	77.1	31.67	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.281	70.3	34.25	1.57	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.298	74.5	37.11	1.28	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.289	72.3	36.38	0.57	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.290	72.4	41.31	0.46	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.23	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.44	1.26	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-12		Weight / Volume:	10.92	g
			Solids / Lipids:	78.4	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-12B		Filename:	c15aug07b_4-9	
Collection Date/Time:	08/02/07	15:30	Retchk:	c15aug07b_3-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_3-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_4-11	
Analysis Date/Time:	08/17/07	4:11	Initial Cal:	m8290-c110206a	

Form Version:[8290_DB_2.15]Report

Analyzed by: HMP
Date: 17Aug07

Reviewed by: CRB
Date: 8/17/07

Form 1 Copy

TCDF Confirmation - Method 8290
F51537-12
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	38.4	3.51		20.83	0.81	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.82	0.80	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-12		Weight / Volume:	10.92	g
			Solids / Lipids:	78.41	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-12B		Filename:	c20aug07a-14	
Collection Date/Time:	08/02/07	15:30	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/09/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	15:18	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by:
Date: 8/21/07

Form I Copy

Method 8290
F51537-13
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	2.88			31.65	0.81	
1,2,3,7,8-PeCDD	3.54 J			34.45	1.69	A
1,2,3,4,7,8-HxCDD	3.75 J			37.11	1.17	A
1,2,3,6,7,8-HxCDD	8.13			37.20	1.27	
1,2,3,7,8,9-HxCDD	7.67			37.44	1.26	
1,2,3,4,6,7,8-HpCDD	158			40.62	1.07	
OCDD	5280 J			45.02	0.89	E
2,3,7,8-TCDF	6.95			31.10	0.77	
1,2,3,7,8-PeCDF	3.42 J			33.64	1.60	A
2,3,4,7,8-PeCDF	7.92			34.26	1.51	
1,2,3,4,7,8-HxCDF	12.1			36.37	1.30	
1,2,3,6,7,8-HxCDF	7.36			36.48	1.27	
2,3,4,6,7,8-HxCDF	9.75			36.98	1.27	
1,2,3,7,8,9-HxCDF	2.73 J			37.81	1.25	A
1,2,3,4,6,7,8-HpCDF	52.3			39.31	1.05	
1,2,3,4,7,8,9-HpCDF	4.06 J			41.32	1.01	A
OCDF	60.1			45.33	0.90	
Total TCDDs	~~20.1~~		27.6 J			
Total PeCDDs	46.1					
Total HxCDDs	80.6					
Total HpCDDs	373					
Total TCDFs	~~75.1~~		77.5 J			
Total PeCDFs	~~61.6~~		66.9 J			
Total HxCDFs	~~74.4~~		76.3 J			
Total HpCDFs	100					
WHO-2005 TEQ (ND=0)	18.5		18.5			
WHO-2005 TEQ (ND=½)	18.5		18.5			

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-13		Weight / Volume:	10.47 g
			Solids / Lipids:	78.6 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-13B		Filename:	c15aug07b_4-10
Collection Date/Time:	08/02/07	13:40	Retchk:	c15aug07b_3-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_3-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_4-11
Analysis Date/Time:	08/17/07	4:59	Initial Cal:	m8290-c110206a

Form I Copy

Method 8290
F51537-13
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	1.36	68.1	31.64	0.81	
13C12-1,2,3,7,8-PeCDD	2.0	1.36	67.8	34.44	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.40	70.0	37.19	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.64	82.2	40.60	1.05	
13C12-OCDD	4.0	2.98	74.4	45.00	0.92	
13C12-2,3,7,8-TCDF	2.0	1.70	84.8	31.09	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.37	68.6	33.62	1.56	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.26	63.2	36.47	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.44	72.1	39.30	0.46	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.304	75.9	31.65	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.268	66.9	34.25	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.267	66.8	37.10	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.264	66.1	36.37	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.277	69.3	41.31	0.46	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.22	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.43	1.27	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-13		Weight / Volume:	10.47 g
			Solids / Lipids:	78.6 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14406
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-13B		Filename:	c15aug07b_4-10
Collection Date/Time:	08/02/07	13:40	Retchk:	c15aug07b_3-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_3-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_4-11
Analysis Date/Time:	08/17/07	4:59	Initial Cal:	m8290-c110206a

Form Version:[8290_DB_2.15]Report

Analyzed by: HMP
Date: 17Aug07

Reviewed by: [illegible]
Date: 8/17/07

from I. Cary

TCDF Confirmation - Method 8290
F51537-13
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	7.89	0.373		20.81	0.80	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.80	0.80	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-13		Weight / Volume:	10.47	g
			Solids / Lipids:	78.62	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14406	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-13B		Filename:	c20aug07a-15	
Collection Date/Time:	08/02/07	13:40	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/09/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	15:41	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: MRD
Date: 8/21/07

Form I Copy

Method 8290
F51537-14
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	2.67			30.60	0.68	
1,2,3,7,8-PeCDD	5.17 J			33.76	1.47	A
1,2,3,4,7,8-HxCDD	6.11			36.27	1.33	
1,2,3,6,7,8-HxCDD	9.98			36.35	1.23	
1,2,3,7,8,9-HxCDD	10.2			36.57	1.17	
1,2,3,4,6,7,8-HpCDD	155			39.49	1.03	
OCDD	2670			43.47	0.88	
2,3,7,8-TCDF	7.60			29.65	0.81	
1,2,3,7,8-PeCDF	6.31			32.96	1.57	
2,3,4,7,8-PeCDF	8.67			33.57	1.54	
1,2,3,4,7,8-HxCDF	10.8			35.58	1.24	
1,2,3,6,7,8-HxCDF	7.82			35.67	1.22	
2,3,4,6,7,8-HxCDF	10.6			36.15	1.26	
1,2,3,7,8,9-HxCDF	2.79 J			36.91	1.13	A
1,2,3,4,6,7,8-HpCDF	47.3			38.29	1.05	
1,2,3,4,7,8,9-HpCDF	3.52 J			40.10	1.00	A
OCDF	52.0			43.74	0.89	
Total TCDDs	~~40.0~~		40.4 J			
Total PeCDDs	73.3					
Total HxCDDs	113					
Total HpCDDs	370					
Total TCDFs	~~79.5~~		81.4 J			
Total PeCDFs	~~65.9~~		73.2 J			
Total HxCDFs	86.0					
Total HpCDFs	~~88.9~~		95.7 J			
WHO-2005 TEQ (ND=0)	20.1		20.1			
WHO-2005 TEQ (ND=½)	20.1		20.1			

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-14		Weight / Volume:	10.28 g
			Solids / Lipids:	82.6 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-14B		Filename:	c13aug07b-6
Collection Date/Time:	08/02/07	13:50	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/13/07	19:35	Initial Cal:	m8290cc-c081307b

Form I Copy

Method 8290
F51537-14
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	79.1	30.57	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.54	77.0	33.75	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.58	79.2	36.34	1.29	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.83	91.4	39.47	1.05	
13C12-OCDD	4.0	3.53	88.3	43.46	0.90	
13C12-2,3,7,8-TCDF	2.0	1.87	93.3	29.64	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.57	78.7	32.95	1.54	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.59	79.7	35.66	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.76	87.8	38.28	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.359	89.8	30.60	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.321	80.3	33.56	1.57	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.359	89.7	36.25	1.29	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.344	86.1	35.56	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.328	81.9	40.09	0.44	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	29.85	0.80	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	36.56	1.30	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-14		Weight / Volume:	10.28 g
			Solids / Lipids:	82.6 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-14B		Filename:	c13aug07b-6
Collection Date/Time:	08/02/07	13:50	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/13/07	19:35	Initial Cal:	m8290cc-c081307b

Form Version:[8290_DB_2.15]Report

Analyzed by: JWP
Date: 08-Aug

Reviewed by:
Date: 8/14/07

Form 1 GAY

TCDF Confirmation - Method 8290
F51537-14
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	8.25	0.550		20.81	0.85	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.79	0.80	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-14		Weight / Volume:	10.28	g
			Solids / Lipids:	82.63	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14408	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-14B		Filename:	c20aug07a-16	
Collection Date/Time:	08/02/07	13:50	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/12/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	16:05	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: BRD
Date: 8/21/07

Form 1 Copy

Method 8290
F51537-15
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	1.25			30.61	0.75	
1,2,3,7,8-PeCDD	4.60 J			33.77	1.40	A
1,2,3,4,7,8-HxCDD	4.71 J			36.27	1.17	A
1,2,3,6,7,8-HxCDD	8.42			36.35	1.27	
1,2,3,7,8,9-HxCDD	8.88			36.58	1.25	
1,2,3,4,6,7,8-HpCDD	167			39.49	1.04	
OCDD	4700 J			43.49	0.90	E
2,3,7,8-TCDF	3.60			29.65	0.74	
1,2,3,7,8-PeCDF	4.91 J			32.97	1.62	A
2,3,4,7,8-PeCDF	6.99			33.57	1.55	
1,2,3,4,7,8-HxCDF	11.6			35.58	1.26	
1,2,3,6,7,8-HxCDF	8.51			35.67	1.23	
2,3,4,6,7,8-HxCDF	10.1			36.15	1.27	
1,2,3,7,8,9-HxCDF	2.84 J			36.91	1.21	A
1,2,3,4,6,7,8-HpCDF	61.4			38.30	1.04	
1,2,3,4,7,8,9-HpCDF	5.15			40.11	1.00	
OCDF	101			43.77	0.92	
Total TCDDs	27.6					
Total PeCDDs	56.6					
Total HxCDDs	94.4					
Total HpCDDs	399					
Total TCDFs	~~63.4~~		63.8 J			
Total PeCDFs	~~55.6~~		62.4 J			
Total HxCDFs	~~91.9~~		92.8 J			
Total HpCDFs	142					
WHO-2005 TEQ (ND=0)	17.7		17.7			
WHO-2005 TEQ (ND=½)	17.7		17.7			

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-15		Weight / Volume:	11.17 g
			Solids / Lipids:	87.1 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-15B		Filename:	c13aug07b-7
Collection Date/Time:	08/02/07	14:00	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/13/07	20:23	Initial Cal:	m8290cc-c081307b

Form I copy

Method 8290
F51537-15
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	1.53	76.5	30.57	0.80	
13C12-1,2,3,7,8-PeCDD	2.0	1.61	80.3	33.75	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.55	77.4	36.35	1.27	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.64	82.1	39.48	1.08	
13C12-OCDD	4.0	3.37	84.1	43.48	0.92	
13C12-2,3,7,8-TCDF	2.0	1.80	90.1	29.63	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.64	81.9	32.96	1.53	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.56	77.9	35.67	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.55	77.6	38.29	0.46	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.358	89.6	30.60	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.343	85.8	33.57	1.55	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.319	79.7	36.26	1.25	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.358	89.4	35.57	0.53	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.304	76.0	40.10	0.46	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	29.85	0.80	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	36.57	1.32	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-15		Weight / Volume:	11.17 g
			Solids / Lipids:	87.1 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-15B		Filename:	c13aug07b-7
Collection Date/Time:	08/02/07	14:00	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/13/07	20:23	Initial Cal:	m8290cc-c081307b

Form Version:[8290_DB_2.15]Report

Analyzed by: JWA
Date: 08-14-07

Reviewed by: CDP
Date: 8/14/07

Form 1 Com

TCDF Confirmation - Method 8290
F51537-15
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	4.08	0.267		20.81	0.86	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.80	0.79	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-15		Weight / Volume:	11.17	g
			Solids / Lipids:	87.10	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14408	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-15B		Filename:	c20aug07a-17	
Collection Date/Time:	08/02/07	14:00	Retchk:	c20aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c20aug07a-1	
Extraction Date:	08/12/07		End ConCal:	c20aug07a-18	
Analysis Date/Time:	08/20/07	16:29	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: [signature]
Date: 8/21/07

Form I Copy

Method 8290
F51537-16
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	0.682 B			30.58	0.71		A
1,2,3,7,8-PeCDD	0.932 J			33.76	1.44		A
1,2,3,4,7,8-HxCDD	1.29 J			36.25	1.39		A
1,2,3,6,7,8-HxCDD	2.32 J			36.34	1.22		A
1,2,3,7,8,9-HxCDD	2.76 J			36.56	1.25		A
1,2,3,4,6,7,8-HpCDD	57.2			39.48	0.98		
OCDD	1440			43.47	0.89		
2,3,7,8-TCDF	1.62			29.64	0.85		
1,2,3,7,8-PeCDF	1.80 J			32.95	1.53		A
2,3,4,7,8-PeCDF	EMPC	~~0.528~~	1.37 J	33.56	1.81	*	A
1,2,3,4,7,8-HxCDF	2.15 J			35.56	1.16		A
1,2,3,6,7,8-HxCDF	EMPC	~~0.528~~	1.40 J	35.67	1.52	*	A
2,3,4,6,7,8-HxCDF	1.76 J			36.13	1.17		A
1,2,3,7,8,9-HxCDF	EMPC	~~0.528~~	0.387 J	36.88	1.51	*	A
1,2,3,4,6,7,8-HpCDF	12.1			38.29	1.05		
1,2,3,4,7,8,9-HpCDF	0.845 J			40.09	1.08		A
OCDF	23.1			43.73	0.88		
Total TCDDs	~~1.70~~		4.61 J				
Total PeCDDs	~~10.8~~		12.8 J				
Total HxCDDs	~~24.5~~		25.5 J				
Total HpCDDs	137						
Total TCDFs	~~12.4~~		14.4 J				
Total PeCDFs	~~10.3~~		14.1 J				
Total HxCDFs	~~13.9~~		18.0 J				
Total HpCDFs	32.0						
WHO-2005 TEQ (ND=0)	4.00		4.59				
WHO-2005 TEQ (ND=½)	4.13		4.59				

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-16		Weight / Volume:	10.49 g	
			Solids / Lipids:	90.3	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14408	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-16B		Filename:	c13aug07b-8	
Collection Date/Time:	08/02/07	14:10	Retchk:	c13aug07b-1	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1	
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15	
Analysis Date/Time:	08/13/07	21:10	Initial Cal:	m8290cc-c081307b	

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Method 8290
F51537-16
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	1.53	76.4	30.56	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.60	79.8	33.74	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.58	79.1	36.33	1.22	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.82	91.1	39.47	1.03	
13C12-OCDD	4.0	3.59	89.6	43.45	0.92	
13C12-2,3,7,8-TCDF	2.0	1.77	88.7	29.61	0.78	
13C12-1,2,3,7,8-PeCDF	2.0	1.67	83.4	32.94	1.52	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.65	82.3	35.65	0.54	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.64	82.1	38.28	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.344	85.9	30.58	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.338	84.6	33.55	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.353	88.4	36.25	1.25	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.350	87.5	35.55	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.346	86.5	40.08	0.46	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	29.84	0.80	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	36.56	1.27	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-16		Weight / Volume:	10.49 g	
			Solids / Lipids:	90.3	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14408	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-16B		Filename:	c13aug07b-8	
Collection Date/Time:	08/02/07	14:10	Retchk:	c13aug07b-1	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1	
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15	
Analysis Date/Time:	08/13/07	21:10	Initial Cal:	m8290cc-c081307b	

Form Version:[8290_DB_2.15]Report

Analyzed by: JVP
Date: 08-14-07

Reviewed by: [signature]
Date: 8/14/07

Form I Copy

TCDF Confirmation - Method 8290
F51537-16
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	1.57	0.561		20.82	0.78	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.80	0.80	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-16		Weight / Volume:	10.49	g
			Solids / Lipids:	90.26	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14408	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-16B		Filename:	c21aug07a-5	
Collection Date/Time:	08/02/07	14:10	Retchk:	c21aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c21aug07a-1	
Extraction Date:	08/12/07		End ConCal:	c21aug07a-18	
Analysis Date/Time:	08/21/07	9:40	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: CC
Date: 8/21/07

Form I only

Method 8290
F51537-17
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	3.03			30.58	0.73	
1,2,3,7,8-PeCDD	4.80 J			33.75	1.37	A
1,2,3,4,7,8-HxCDD	6.10			36.26	1.28	
1,2,3,6,7,8-HxCDD	9.94			36.34	1.27	
1,2,3,7,8,9-HxCDD	10.6			36.57	1.29	
1,2,3,4,6,7,8-HpCDD	250			39.48	1.06	
OCDD	7270 J			43.47	0.91	E
2,3,7,8-TCDF	6.94			29.63	0.82	
1,2,3,7,8-PeCDF	5.28 J			32.95	1.72	A
2,3,4,7,8-PeCDF	5.60 J			33.56	1.61	A
1,2,3,4,7,8-HxCDF	8.36			35.57	1.26	
1,2,3,6,7,8-HxCDF	5.46 J			35.66	1.25	A
2,3,4,6,7,8-HxCDF	6.04			36.14	1.22	
1,2,3,7,8,9-HxCDF	1.51 J			36.88	1.09	A
1,2,3,4,6,7,8-HpCDF	44.6			38.29	1.07	
1,2,3,4,7,8,9-HpCDF	3.15 J			40.10	0.98	A
OCDF	84.9			43.74	0.89	
Total TCDDs	~~33.6~~		34.1 J			
Total PeCDDs	~~52.6~~		53.0 J			
Total HxCDDs	108					
Total HpCDDs	619					
Total TCDFs	~~62.5~~		63.3 J			
Total PeCDFs	~~43.9~~		53.8 J			
Total HxCDFs	67.1					
Total HpCDFs	~~111~~		116 J			
WHO-2005 TEQ (ND=0)	20.3		20.3			
WHO-2005 TEQ (ND=½)	20.3		20.3			

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-17		Weight / Volume:	10.43 g
			Solids / Lipids:	83.5 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-17B		Filename:	c13aug07b-9
Collection Date/Time:	08/02/07	14:20	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/13/07	21:57	Initial Cal:	m8290cc-c081307b

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Method 8290
F51537-17
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	1.61	80.4	30.56	0.77	
13C12-1,2,3,7,8-PeCDD	2.0	1.69	84.6	33.74	1.60	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.56	78.0	36.33	1.22	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.60	80.1	39.47	1.07	
13C12-OCDD	4.0	3.47	86.7	43.46	0.88	
13C12-2,3,7,8-TCDF	2.0	1.81	90.3	29.61	0.80	
13C12-1,2,3,7,8-PeCDF	2.0	1.61	80.7	32.94	1.52	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.60	80.1	35.65	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.62	81.0	38.28	0.46	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.361	90.1	30.57	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.328	82.0	33.55	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.351	87.8	36.25	1.21	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.338	84.6	35.56	0.50	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.299	74.9	40.08	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	29.84	0.80	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	36.56	1.17	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-17		Weight / Volume:	10.43 g
			Solids / Lipids:	83.5 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-17B		Filename:	c13aug07b-9
Collection Date/Time:	08/02/07	14:20	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/13/07	21:57	Initial Cal:	m8290cc-c081307b

Form Version:[8290_DB_2.15]Report

Analyzed by: JW?
Date: 8/14/07

Reviewed by: [illegible]
Date: 8/14/07

Form I Cay

TCDF Confirmation - Method 8290
F51537-17
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	6.66	0.274		20.82	0.80	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.81	0.79	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-17		Weight / Volume:	10.43	g
			Solids / Lipids:	83.46	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14408	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-17B		Filename:	c21aug07a-6	
Collection Date/Time:	08/02/07	14:20	Retchk:	c21aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c21aug07a-1	
Extraction Date:	08/12/07		End ConCal:	c21aug07a-18	
Analysis Date/Time:	08/21/07	10:04	Initial Cal:	mcf-c041807a	

Analyzed by: LMP
Date: 21Aug07

Reviewed by: MCL
Date: 8/31/07

Form I Copy

Method 8290
F51537-18
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	16.1			30.60	0.75	
1,2,3,7,8-PeCDD	12.1			33.75	1.50	
1,2,3,4,7,8-HxCDD	12.9			36.26	1.23	
1,2,3,6,7,8-HxCDD	21.0			36.34	1.21	
1,2,3,7,8,9-HxCDD	23.3			36.57	1.30	
1,2,3,4,6,7,8-HpCDD	395			39.48	1.05	
OCDD	7690 J			43.47	0.90	E
2,3,7,8-TCDF	13.4			29.65	0.75	
1,2,3,7,8-PeCDF	10.5			32.95	1.63	
2,3,4,7,8-PeCDF	14.1			33.56	1.60	
1,2,3,4,7,8-HxCDF	20.8			35.57	1.29	
1,2,3,6,7,8-HxCDF	13.6			35.66	1.26	
2,3,4,6,7,8-HxCDF	15.1			36.14	1.25	
1,2,3,7,8,9-HxCDF	3.64 J			36.88	1.16	A
1,2,3,4,6,7,8-HpCDF	89.9			38.29	1.04	
1,2,3,4,7,8,9-HpCDF	5.89 J			40.09	0.94	A
OCDF	133			43.73	0.86	
Total TCDDs	~~92.6~~		96.0 J			
Total PeCDDs	147					
Total HxCDDs	245					
Total HpCDDs	984					
Total TCDFs	~~150~~		155 J			
Total PeCDFs	~~106~~		123 J			
Total HxCDFs	~~146~~		148 J			
Total HpCDFs	187					
WHO-2005 TEQ (ND=0)	52.4		52.4			
WHO-2005 TEQ (ND=½)	52.4		52.4			

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-18		Weight / Volume:	10.23 g
			Solids / Lipids:	74.8 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-18B		Filename:	c13aug07b-10
Collection Date/Time:	08/02/07	14:30	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/13/07	22:44	Initial Cal:	m8290cc-c081307b

Form I Corr

Method 8290
F51537-18
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	1.62	81.1	30.56	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.76	88.1	33.74	1.53	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.50	75.0	36.33	1.24	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.58	78.9	39.46	1.03	
13C12-OCDD	4.0	3.59	89.6	43.45	0.90	
13C12-2,3,7,8-TCDF	2.0	1.77	88.5	29.63	0.77	
13C12-1,2,3,7,8-PeCDF	2.0	1.76	88.1	32.95	1.50	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.51	75.3	35.65	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.51	75.7	38.28	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.360	90.0	30.60	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.359	89.6	33.55	1.55	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.322	80.5	36.25	1.25	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.349	87.2	35.56	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.289	72.2	40.08	0.45	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	29.84	0.80	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	36.56	1.25	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-18		Weight / Volume:	10.23 g
			Solids / Lipids:	74.8 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-18B		Filename:	c13aug07b-10
Collection Date/Time:	08/02/07	14:30	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/13/07	22:44	Initial Cal:	m8290cc-c081307b

Form Version:[8290_DB_2.15]Report

Analyzed by: JMD
Date: 081407

Reviewed by: [signature]
Date: 8/14/07

Form I Copy

TCDF Confirmation - Method 8290
F51537-18
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	15.6	0.530		20.82	0.82	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.81	0.79	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-18		Weight / Volume:	10.23	g
			Solids / Lipids:	74.78	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14408	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-18B		Filename:	c21aug07a-7	
Collection Date/Time:	08/02/07	14:30	Retchk:	c21aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c21aug07a-1	
Extraction Date:	08/12/07		End ConCal:	c21aug07a-18	
Analysis Date/Time:	08/21/07	10:27	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: [signature]
Date: 8/21/07

Form I Copy

Method 8290
F51537-19
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	3.94			30.60	0.77	
1,2,3,7,8-PeCDD	14.3			33.76	1.45	
1,2,3,4,7,8-HxCDD	14.1			36.27	1.25	
1,2,3,6,7,8-HxCDD	22.8			36.35	1.24	
1,2,3,7,8,9-HxCDD	25.3			36.58	1.27	
1,2,3,4,6,7,8-HpCDD	458			39.49	1.05	
OCDD	7440 J			43.48	0.88	E
2,3,7,8-TCDF	9.35			29.65	0.81	
1,2,3,7,8-PeCDF	10.6			32.96	1.42	
2,3,4,7,8-PeCDF	14.6			33.57	1.63	
1,2,3,4,7,8-HxCDF	20.0			35.57	1.27	
1,2,3,6,7,8-HxCDF	13.8			35.67	1.24	
2,3,4,6,7,8-HxCDF	17.3			36.14	1.25	
1,2,3,7,8,9-HxCDF	4.41 J			36.90	1.22	A
1,2,3,4,6,7,8-HpCDF	112			38.29	1.04	
1,2,3,4,7,8,9-HpCDF	7.39			40.10	1.02	
OCDF	191			43.75	0.90	
Total TCDDs	~~83.5~~		85.0 J			
Total PeCDDs	163					
Total HxCDDs	255					
Total HpCDDs	1080					
Total TCDFs	~~186~~		187 J			
Total PeCDFs	~~108~~		127 J			
Total HxCDFs	~~171~~		172 J			
Total HpCDFs	282					
WHO-2005 TEQ (ND=0)	43.7		43.7			
WHO-2005 TEQ (ND=½)	43.7		43.7			

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-19		Weight / Volume:	10.11 g
			Solids / Lipids:	88.2 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-19B		Filename:	c13aug07b-11
Collection Date/Time:	08/02/07	14:35	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/13/07	23:32	Initial Cal:	m8290cc-c081307b

Form I Cont

Method 8290
F51537-19
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	1.72	85.9	30.57	0.80	
13C12-1,2,3,7,8-PeCDD	2.0	1.64	82.2	33.75	1.60	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.61	80.5	36.34	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.82	91.0	39.47	1.07	
13C12-OCDD	4.0	3.93	98.3	43.47	0.89	
13C12-2,3,7,8-TCDF	2.0	1.92	95.9	29.63	0.78	
13C12-1,2,3,7,8-PeCDF	2.0	1.67	83.5	32.95	1.51	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.60	80.0	35.66	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.73	86.3	38.28	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.390	97.5	30.60	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.338	84.6	33.56	1.55	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.355	88.7	36.26	1.24	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.352	88.0	35.56	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.330	82.4	40.09	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	29.85	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	36.57	1.25	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-19		Weight / Volume:	10.11 g
			Solids / Lipids:	88.2 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-19B		Filename:	c13aug07b-11
Collection Date/Time:	08/02/07	14:35	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/13/07	23:32	Initial Cal:	m8290cc-c081307b

Form Version:[8290_DB_2.15]Report

Analyzed by: _____
Date: 08-14-07

Reviewed by: _____
Date: 8/14/07

Form I Copy

TCDF Confirmation - Method 8290
F51537-19
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	11.8	0.245		20.81	0.79	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.79	0.80	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-19		Weight / Volume:	10.11	g
			Solids / Lipids:	88.23	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14408	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-19B		Filename:	c21aug07a-8	
Collection Date/Time:	08/02/07	14:35	Retchk:	c21aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c21aug07a-1	
Extraction Date:	08/12/07		End ConCal:	c21aug07a-18	
Analysis Date/Time:	08/21/07	10:51	Initial Cal:	mcf-c041807a	

Analyzed by: HMP
Date: 21Aug07

Reviewed by: CLH
Date: 8/21/07

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Method 8290
F51537-20
Accutest

Analytical Data Summary Sheet

Analyte	Amount pg/g	EDL pg/g	EMPC pg/g	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	1.79			30.60	0.83	
1,2,3,7,8-PeCDD	5.60 J			33.76	1.47	A
1,2,3,4,7,8-HxCDD	5.98 J			36.26	1.37	A
1,2,3,6,7,8-HxCDD	10.3			36.35	1.16	
1,2,3,7,8,9-HxCDD	11.1			36.57	1.21	
1,2,3,4,6,7,8-HpCDD	171			39.49	1.06	
OCDD	1300 K			43.47	0.89	
2,3,7,8-TCDF	7.34			29.67	0.80	
1,2,3,7,8-PeCDF	6.02 J			32.96	1.57	A
2,3,4,7,8-PeCDF	7.40			33.57	1.64	
1,2,3,4,7,8-HxCDF	8.77			35.58	1.25	
1,2,3,6,7,8-HxCDF	6.47			35.67	1.23	
2,3,4,6,7,8-HxCDF	8.26			36.14	1.33	
1,2,3,7,8,9-HxCDF	2.25 J			36.88	1.31	A
1,2,3,4,6,7,8-HpCDF	47.6			38.29	1.04	
1,2,3,4,7,8,9-HpCDF	3.58 J			40.10	1.15	A
OCDF	74.5			43.74	0.90	
Total TCDDs	40.2					
Total PeCDDs	68.7					
Total HxCDDs	~~106~~		109 J			
Total HpCDDs	384					
Total TCDFs	~~86.6~~		87.9 J			
Total PeCDFs	~~60.1~~		66.1 J			
Total HxCDFs	77.4					
Total HpCDFs	~~109~~		115 J			
WHO-2005 TEQ (ND=0)	18.5		18.5			
WHO-2005 TEQ (ND=½)	18.5		18.5			

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-20		Weight / Volume:	10.19 g
			Solids / Lipids:	81.1 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-20B		Filename:	c13aug07b-12
Collection Date/Time:	08/02/07	14:40	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/14/07	0:19	Initial Cal:	m8290cc-c081307b

For I Corp

Method 8290
F51537-20
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	1.50	74.9	30.57	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.69	84.6	33.75	1.55	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.57	78.5	36.34	1.20	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.66	82.9	39.47	1.07	
13C12-OCDD	4.0	3.23	80.6	43.46	0.92	
13C12-2,3,7,8-TCDF	2.0	1.71	85.6	29.63	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.64	81.8	32.95	1.50	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.62	80.8	35.66	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.55	77.3	38.28	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.375	93.7	30.58	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.383	95.7	33.56	1.54	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.405	101	36.26	1.25	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.376	93.9	35.56	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.321	80.3	40.09	0.45	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	29.84	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	36.56	1.24	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Dry
			Matrix:	Soil
Sample ID:	F51537-20		Weight / Volume:	10.19 g
			Solids / Lipids:	81.1 %
			Original pH :	NA
Laboratory Information			Batch ID:	WG14408
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-20B		Filename:	c13aug07b-12
Collection Date/Time:	08/02/07	14:40	Retchk:	c13aug07b-1
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c13aug07b-1
Extraction Date:	08/12/07		End ConCal:	c13aug07b-15
Analysis Date/Time:	08/14/07	0:19	Initial Cal:	m8290cc-c081307b

Form Version:[8290_DB_2.15]Report

Analyzed by: _____
Date: 08.1407

Reviewed by: _____
Date: 8/14/07

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TCDF Confirmation - Method 8290
F51537-20
Accutest

Analytical Data Summary Sheet

Analyte	Amount (pg/g)	EDL (pg/g)	EMPC (pg/g)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDF	9.34	0.357		20.81	0.79	

Labeled Standard	Spiked Amount (ng)	RT (min.)	Ratio	Qualifier
Extraction Standards				
$^{13}C_{12}$-2,3,7,8-TCDF	2.00	20.79	0.80	

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Dry	
			Matrix:	Soil	
Sample ID:	F51537-20		Weight / Volume:	10.19	g
			Solids / Lipids:	81.09	%
			Original pH :	NA	
Laboratory Information			Batch ID:	WG14408	
Project ID:	G383-589		Instrument:	hrms3	
Sample ID:	G383-589-20B		Filename:	c21aug07a-9	
Collection Date/Time:	08/02/07	14:40	Retchk:	c21aug07a-2	
Receipt Date:	08/07/07	10:05	Begin ConCal:	c21aug07a-1	
Extraction Date:	08/12/07		End ConCal:	c21aug07a-18	
Analysis Date/Time:	08/21/07	11:15	Initial Cal:	mcf-c041807a	

Analyzed by: LMP
Date: 21Aug07

Reviewed by: [signature]
Date: 8/31/07

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Method 8290
F51537-11 QB0207R
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	~~0.00110~~	0.00134 J	31.65	0.27	*	A
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	0.00326 J			40.63	0.95		A
OCDD	0.0389 J			45.03	0.98		A
2,3,7,8-TCDF	ND	0.00110					
1,2,3,7,8-PeCDF	EMPC	~~0.00551~~	0.000639 J	33.63	0.95	*	A
2,3,4,7,8-PeCDF	EMPC	~~0.00551~~	0.000859 J	34.25	1.24	*	A
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	EMPC	~~0.00551~~	0.00282 J	39.30	1.27	*	A
1,2,3,4,7,8,9-HpCDF	ND	0.00551					
OCDF	0.00286 J			45.34	0.87		A
Total TCDDs	ND	~~0.00110~~	0.00134 J				
Total PeCDDs	0.00121		0.00308 J				
Total HxCDDs	ND	0.00551					
Total HpCDDs	0.00326						
Total TCDFs	0.000352						
Total PeCDFs	0.00150		0.00163 J				
Total HxCDFs	ND	0.00551					
Total HpCDFs	ND	~~0.00551~~	0.00282 J				
WHO-2005 TEQ (ND=0)	0.0000451		0.00169				
WHO-2005 TEQ (ND=½)	0.00630		0.00645				

Client Information			**Sample Information**		
Project Name:	F51537		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F51537-11		Weight / Volume:	908 mL	
			Solids / Lipids:	NA	%
			Original pH :	7	
Laboratory Information			Batch ID:	WG14407	
Project ID:	G383-589		Instrument:	HRMS3	
Sample ID:	G383-589-11C		Filename:	c15aug07b_4-4	
Collection Date/Time:	08/02/07	08:00	Retchk:	c15aug07b_3-14	
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_3-14	
Extraction Date:	08/09/07		End ConCal:	c15aug07b_4-11	
Analysis Date/Time:	08/17/07	0:10	Initial Cal:	m8290-c110206a	

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Method 8290
F51537-11
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	1.34	67.0	31.64	0.81	
13C12-1,2,3,7,8-PeCDD	2.0	1.40	70.1	34.44	1.60	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.53	76.6	37.19	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.83	91.6	40.59	1.04	
13C12-OCDD	4.0	3.70	92.5	45.01	0.92	
13C12-2,3,7,8-TCDF	2.0	1.71	85.7	31.08	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.38	68.8	33.62	1.60	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.46	73.1	36.47	0.54	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.68	83.8	39.30	0.47	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.337	84.2	31.65	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.322	80.6	34.25	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.345	86.3	37.10	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.358	89.5	36.37	0.53	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.381	95.2	41.31	0.47	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31.22	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37.43	1.24	

Client Information			**Sample Information**	
Project Name:	F51537		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F51537-11		Weight / Volume:	908 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14407
Project ID:	G383-589		Instrument:	HRMS3
Sample ID:	G383-589-11C		Filename:	c15aug07b_4-4
Collection Date/Time:	08/02/07	08:00	Retchk:	c15aug07b_3-14
Receipt Date/Time:	08/07/07	10:05	Begin ConCal:	c15aug07b_3-14
Extraction Date:	08/09/07		End ConCal:	c15aug07b_4-11
Analysis Date/Time:	08/17/07	0:10	Initial Cal:	m8290-c110206a

Form Version:[8290_DB_2.15]Report

Analyzed by: HMP
Date: 17Aug07

Reviewed by:
Date: 8/17/07

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
Accutest Laboratories, Inc., SDG F51537

DATE: October 2, 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 2, 2007. 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 nineteen solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
LFSS13	F51537-1	LFSS04	F51537-12
LFSS14	F51537-2	LFSS05	F51537-13
LFSS15	F51537-3	LFSS06	F51537-14
LFSS16	F51537-4	LFSS07	F51537-15
LFSS17	F51537-5	LFSS08	F51537-16
LFSS18	F51537-6	LFSS09	F51537-17
LFSS19	F51537-7	LFSS10	F51537-18
LFSS20	F51537-8	LFSS11	F51537-19
TMSS20	F51537-9	LFSS12	F51537-20
LFSS21	F51537-10		

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

10/2/07
Date

RFAAP VALIDATION REPORT
METALS REVIEW
SDG F51537

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 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 08/02/07, the coolers were received by the primary laboratory (Accutest) on 08/03/07 at 4.8°C and 5.2°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.4°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: Samples were collected 08/02/07 for metals analysis. The solid samples were digested on 08/09/07 and analyzed on 08/09/07 for ICP metals, 08/10/07 for aluminum, iron, lead, manganese, barium, copper, and zinc, and 08/13/07 copper. The solid samples were digested on 08/10/07 and analyzed on 08/10/07 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 solid samples were analyzed for ICP metals on 08/09/07, 08/10/07 for aluminum, iron, lead, manganese, barium, copper, and zinc, and 08/13/07 copper. Mercury was analyzed for the solid samples on 08/10/07 with a correlation coefficient of 0.9999. All 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 (mg/kg)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
08/09/07	ICP-Sb	3.0	126%, 142%	LFSS04, LFSS05, LFSS06, LFSS07, LFSS08, LFSS09, LFSS10, LFSS11, LFSS12, LFSS13, LFSS14, LFSS15, LFSS16, LFSS17, LFSS18, LFSS19, LFSS20, LFSS21	K
08/09/07	ICP-Be	0.50	170%	LFSS06, LFSS07, LFSS08, LFSS11, LFSS12, LFSS14, LFSS15, LFSS19, LFSS20, TMSS20	K
08/09/07	ICP-Tl	1.0	147%	LFSS07, LFSS08, LFSS09, LFSS10, LFSS14, LFSS15	K
08/09/07	ICP-Zn	1.0	129%, 139%	None	K
08/10/07	ICP-Zn	1.0	130%, 121%	None	K
08/13/07	ICP-Cu	1.0	All within criteria	None	None
08/10/07	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 080207R (F51537-11) applies to surface soil "SS" samples in this SDG.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
08/09/07	Antimony	ICB/CCBs	0.69J	3.45	LFSS04, LFSS05, LFSS06, LFSS07, LFSS08, LFSS09, LFSS10, LFSS11, LFSS12, LFSS13, LFSS14, LFSS15, LFSS16, LFSS18, LFSS19, LFSS21
08/09/07	Beryllium	ICB/CCBs	0.42J	2.10	LFSS04, LFSS05, LFSS06, LFSS07, LFSS08, LFSS09, LFSS10, LFSS11, LFSS12, LFSS13, LFSS14, LFSS15, LFSS16, LFSS17, LFSS18, LFSS19, LFSS20, LFSS21, TMSS20
08/09/07	Copper	ICB/CCBs	0.27J	1.35	None
08/09/07	Potassium	ICB/CCBs	45.7J	229	None
08/10/07	Zinc	ICB/CCBs	1.4J	7.0	None
08/13/07	Copper	ICB/CCBs	<2*MDL	NA	None
08/10/07	Mercury	ICB/CCBs	<2*MDL	NA	None
08/09/07	Potassium	MP12683-MB	22.3J	112	None
08/09/07	Thallium	MP12683-MB	0.63J	3.15	LFSS07, LFSS08, LFSS09, LFSS10, LFSS14, LFSS15, LFSS19
08/09/07	Iron	MP12684-MB	2.0	10.0	None
08/09/07	Potassium	MP12684-MB	21.6J	108	None
08/09/07	Thallium	MP12684-MB	0.63J	3.15	None
08/10/07	Mercury	MP12696-MB	<2*MDL	NA	None
08/08/07	Magnesium	080207R	0.16J	0.80	None
08/08/07	Potassium	080207R	46.9J	235	None
08/08/07	Sodium	080207R	51.8J	259	LFSS07, LFSS08, LFSS14
08/06/07	Mercury	080207R	<2*MDL	NA	None

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

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%).

- For 8/10/07 ICS, calcium (78.0%, 78.8%) was outside criteria due to baseline drift, however, only aluminum, iron, lead, manganese, barium, copper, and zinc were analyzed for this run. No qualifiers were applied based upon this outlier.

- For 8/13/07 ICS, copper (20.3%) was outside criteria due to baseline drift, however, only copper was analyzed for this run. No qualifiers were applied based upon this outlier.

- For all other ICS's, 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 MP12683-BS was used as solid LCS for ICP metals analysis on 08/09/07. All criteria were met. No qualifiers were applied. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), and LFSS10 (F51537-18) apply to this LCS.

- Sample MP12684-BS was used as solid LCS for ICP metals analysis on 08/09/07. All criteria were met. No qualifiers were applied. Samples LFSS11 (F51537-19) and LFSS12 (F51537-20) apply to this LCS.

- Sample MP12696-BS was used as solid LCS for mercury analysis performed on 08/09/07. All criteria were met. No qualifiers were applied. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) 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 LFSS13 (F51537-1) was used as solid laboratory duplicate for ICP metals analysis on 08/09/07. Antimony (25.0%), arsenic (50.8%), barium (32.8%), cadmium (83.3%), calcium (46.9%), copper (124%), lead (39.0%), magnesium (31.0%), manganese (32.4%), and zinc (29.5%) were above criteria. Antimony and cadmium were outside due to low sample concentrations (i.e. <MRL); therefore, no qualifiers were applied based upon these outliers. Arsenic, barium, calcium, copper, lead, magnesium, manganese, and zinc were qualified estimated "J" based upon the high %RPDs. All other metals were within criteria. No qualifiers were applied. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), and LFSS10 (F51537-18) apply to this laboratory duplicate.

- Sample LFSS11 (F51537-19) was used as solid laboratory duplicate for ICP metals analysis on 08/09/07. Arsenic (21.9%), calcium (29.3%), chromium (20.7%), copper (71.4%), magnesium (43.1%), manganese (74.1%), nickel (42.7%), and silver (24.4%) were above criteria. Silver was outside due to low sample concentrations (i.e. <MRL); therefore, no qualifiers were applied based upon these outliers. Arsenic, calcium, chromium, copper, magnesium, manganese, and nickel were qualified estimated "J" based upon the high %RPDs. All other metals were within criteria. No qualifiers were applied. Samples LFSS11 (F51537-19) and LFSS12 (F51537-20) apply to this laboratory duplicate.

- Sample LFSS13 (F51537-1) was used as solid laboratory duplicate for mercury analysis on 08/10/07. Mercury (23.4%) was above criteria. Mercury was qualified estimated "J" based upon the high %RPD. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) 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 LFSS13 (F51537-1) was used as solid laboratory MS/MSD for ICP metals analysis on 08/09/07. Aluminum (48.7, -66.3%), antimony (13.8%, 16.6%), arsenic (68.7%, 59.1%), barium (79.7%, 76.5%), cadmium (76.8%), calcium (296%, 45.6%; RPD=28.8%), chromium (39.9%), cobalt (75.3%, 79.1%), copper (-24600%, -24600%), iron (25.3%, -100.2%), lead (55.4%), magnesium (172%, 170%), manganese (-365%, -553%), nickel (40.1%, 37.8%), potassium (62.5%), selenium (61.4%, 54.9%), silver (77.9%, 77.2%), sodium (79.6%), thallium (71.1%, 71.0%), vanadium (75.0%, 66.1%), and zinc (-1105%, -1110%) were outside criteria. The sample concentration was >4 times the spike added for aluminum, calcium, copper, iron, lead, magnesium, manganese, and zinc; therefore, no qualifiers were applied based upon these outliers. Antimony, arsenic, barium, cadmium, chromium, cobalt, 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. All other metals were within criteria. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), and LFSS10 (F51537-18) apply to this MS/MSD.

- Sample LFSS11 (F51537-19) was used as solid laboratory MS/MSD for ICP metals analysis on 08/09/07. Aluminum (146%), antimony (14.1%, 15.8%), barium (72.3%), cadmium (75.7%, 71.2%), calcium (1323%, 499%; RPD=56.1%), chromium (73.9%, 147%; RPD=20.7%), copper (345%; RPD=29.4%), iron (-194%, 130%; RPD=21.5%), lead (-97.3%, 1334%; RPD=71.4%), magnesium (774%, 241%; RPD=65.9%), manganese (-1495%, -1409%), nickel (34.6%, 39.7%), potassium (139%), selenium (77.9%, 76.7%), silver (222%; RPD=71.1%), vanadium (72.4%), and zinc (151%, 154%) were outside criteria. The sample concentration was >4 times the spike added for aluminum, calcium, copper, iron, lead, manganese, and zinc; therefore, no qualifiers were applied based upon these outliers. Antimony, barium, cadmium, nickel, selenium, and vanadium were qualified bias low "L" for detects and "UL" for non-detects based upon the low recoveries. Magnesium, potassium, and silver were qualified bias high "K" for detects and no qualifier for non-detects based upon the high recoveries. Chromium was qualified estimated "J" for detects and UJ for non-detects based upon the high/low recoveries. All other metals were within criteria. Samples LFSS11 (F51537-19) and LFSS12 (F51537-20) apply to this MS/MSD.

- Sample LFSS13 (F51537-1) was used as laboratory solid MS/MSD for mercury analysis on 08/10/07. Mercury (121%, 126%) was outside criteria. Mercury was qualified bias high "K" for detects and no qualifier for non-detects based upon the high recoveries. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) 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 08/09/07 using aqueous sample LFSS13 (F51537-1). Aluminum (38.1%), antimony (10.9%), arsenic (33.8%), barium (32.5%), beryllium (67.3%), cadmium (100%), calcium (40.6%), chromium (36.7%), cobalt (37.3%), copper (50.6%), iron (41.3%), lead (41.7%), magnesium (44.5%), manganese (44.5%), nickel (42.0%), potassium (25.3%), selenium (475%), silver (36.0%), sodium (49.5%), thallium (398%), vanadium (35.7%), and zinc (183%) were outside of criteria limits. Sample concentrations were <50 times MDL for antimony, beryllium, cadmium, selenium, silver, sodium, and thallium; therefore, no qualifiers were applied based upon these outliers. For aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, vanadium, and zinc, all detects were qualified estimated "J" and non-detects no qualifier based upon this outlier. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), and LFSS10 (F51537-18) apply to this serial dilution.

- The serial dilution for ICP metals was analyzed on 08/09/07 using aqueous sample LFSS11 (F51537-19). Aluminum (17.8%), antimony (100%), barium (15.7%), beryllium (102%), calcium (20.8%), chromium (18.1%), cobalt (17.0%), iron (21.7%), lead (22.7%), magnesium (25.8%), manganese (26.4%), nickel (21.7%), selenium (320%), silver (40.5%), sodium (17.7%), vanadium (17.8%), and zinc (22.1%) were outside of criteria limits. Sample concentrations were <50 times MDL for antimony, beryllium, selenium, silver, and sodium; therefore, no qualifiers were applied based upon these outliers. For aluminum, barium, calcium, chromium, cobalt, iron, lead, magnesium, manganese, nickel, vanadium, and zinc, all detects were qualified estimated "J" and non-detects no qualifier based upon this outlier. Samples LFSS11 (F51537-19) and LFSS12 (F51537-20) apply to this serial dilution.

- The serial dilution for mercury was analyzed using aqueous sample LFSS13 (F51537-1) on 08/10/07. Mercury (20.1%) was outside criteria limits. Sample concentrations were <50 times MDL for mercury; therefore, no qualifiers were applied based upon this outlier. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) 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 solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field surface soil sample duplicate pair LFSS20 (F51537-8) and TMSS20 (F51537-9) was collected for TAL metals. All detected TAL metals found in the sample and its duplicate pair and associated %RPD are noted in **Table 3**. All other TAL metals target compounds were non-detect. Nickel (39.2%), arsenic (160%), lead (82.4%), zinc (90.1%), and mercury (40.0%) were above criteria due to sample in-homogeneity and/or matrix effects. Nickel arsenic, lead, zinc, 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 3 Field Precision Hits Analysis Summary for TAL Metals for Duplicate Pair LFSS20 (F51537-8) and TMSS20 (F51537-9)

Compound	Original Sample (mg/kg)	Duplicate Pair (mg/kg)	%RPD
Magnesium	4880	6040	21.3
Nickel	123	82.7	39.2
Potassium	2320	2710	15.5
Silver	7.5	8.6	13.7
Sodium	3230	3100	4.1
Antimony	6.2	7.6	20.3
Arsenic	13.8	124	160
Beryllium	0.64	0.76	17.1
Cadmium	6.6	6.9	4.4
Chromium	162	122	28.2
Cobalt	13.7	11.8	14.9
Vanadium	35.1	47.5	30.0
Calcium	8950	11300	23.2
Selenium	0.27U	1.5J	NA
Aluminum	35600	41900	16.3
Iron	40800	39900	2.2
Lead	36500	15200	82.4
Manganese	906	840	7.6
Barium	824	927	11.8
Copper	37200	10400	113
Zinc	22100	8370	90.1
Mercury	0.15	0.10	40.0

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
U = Non-detect as <MDL.
NA = Not Applicable

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: LFSS13 (F51537-1), Barium

Conc. (mg/kg) = {(conc. µg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(1409 µg/L)*(0.050 L)*(1)} / {(1.03 g)*(0.8140)} = 84.0 µg/g = 84.0 mg/kg

Reported concentration = 84.0 mg/kg
%D = 0.0%
Values were within 10% difference.

Hg Sample: LFSS13 (F51537-1), Mercury

Conc. (mg/kg) = {(conc. µg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(0.877 µg/L)*(0.050 L)*(1)} / {(0.62 g)*(0.8140)} = 0.087 µg/g = 0.087 mg/kg

Reported concentration = 0.087 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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Report of Analysis

Client Sample ID:	LFSS13		
Lab Sample ID:	F51537-1	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	81.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	20400 J	12	2.9	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Antimony	1.4 J B	3.6	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Arsenic	31.4 J	0.48	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Barium	84.0 J	12	0.30	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Beryllium [a]	1.3 B	0.60	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Cadmium	0.14 J L	0.24	0.060	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Calcium	10600 J	300	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Chromium	44.0 J	0.60	0.083	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Cobalt	11.2 J	3.0	0.066	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Copper	7560 J	75	5.7	mg/kg	50	08/09/07	08/13/07	LM	SW846 6010B [4]	SW846 3050B [5]
Iron	24600 J	6.0	0.83	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Lead	161 J	6.0	0.14	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Magnesium	9290 J	300	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Manganese	794 J	18	1.2	mg/kg	20	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [5]
Mercury	0.087 J J	0.099	0.012	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [3]	SW846 7471A [6]
Nickel	34.9 J	2.4	0.15	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Potassium	2250 J	600	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Selenium	0.39 J J L	6.0	0.27	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Silver	0.53 J J L	0.60	0.083	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Sodium	527 J J L	600	30	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Thallium [b]	0.66 U	1.2	0.66	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Vanadium	48.1 J	3.0	0.060	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [5]
Zinc	2820 J	24	6.0	mg/kg	20	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [5]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5904
(3) Instrument QC Batch: MA5905
(4) Instrument QC Batch: MA5907
(5) Prep QC Batch: MP12683
(6) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(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

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Report of Analysis

Client Sample ID:	LFSS14		
Lab Sample ID:	F51537-2	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	83.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	14400 J	11	2.7	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Antimony	0.65 J B	3.4	0.22	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Arsenic	4.3 J	0.45	0.22	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Barium	52.9 J	11	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Beryllium [a]	0.64 B	0.56	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cadmium [b]	1.1 U VL	2.3	1.1	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Calcium	1590 J	280	5.7	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Chromium	27.6 J	0.57	0.079	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cobalt	6.9 J	2.8	0.062	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Copper	37.5 J	1.4	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Iron	20400 J	5.7	0.79	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Lead	35.9 J	5.7	0.14	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Magnesium	1070 J	280	5.7	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Manganese	548 J	0.85	0.057	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Mercury	0.10 J	0.095	0.012	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [2]	SW846 7471A [4]
Nickel	7.5 J	2.3	0.14	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Potassium	712 J	570	5.7	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Selenium	1.3 J L	5.7	0.26	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Silver	0.19 J L	0.57	0.079	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Sodium	228 J B	570	28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Thallium [c]	1.7 B	1.1	0.64	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Vanadium	45.2 J	2.8	0.057	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Zinc	60.5 J	1.1	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5905
(3) Prep QC Batch: MP12683
(4) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.
(c) 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

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Report of Analysis

Client Sample ID:	LFSS15		
Lab Sample ID:	F51537-3	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	91.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	17900 J	11	2.6	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Antimony	0.74 J B	3.2	0.20	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Arsenic	4.9 J	0.43	0.21	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Barium	75.5 J	11	0.27	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Beryllium [a]	0.70 B	0.54	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cadmium [b]	1.1 U VL	2.1	1.1	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Calcium	6850 J	270	5.3	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Chromium	29.9 J	0.53	0.075	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cobalt	7.1 J	2.7	0.059	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Copper	33.4 J	1.3	0.10	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Iron	23100 J	5.3	0.75	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Lead	186 J	5.3	0.13	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Magnesium	3500 J	270	5.3	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Manganese	680 J	8.0	0.53	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Mercury	0.14 J	0.086	0.011	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [3]	SW846 7471A [5]
Nickel	10.4 J	2.1	0.13	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Potassium	957 J	530	5.3	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Selenium	0.79 J L	5.3	0.24	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Silver	0.075 U VL	0.53	0.075	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Sodium	304 J L	530	27	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Thallium [c]	0.78 J B	1.0	0.60	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Vanadium	51.3 J	2.7	0.053	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Zinc	111 J	1.1	0.27	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5904
(3) Instrument QC Batch: MA5905
(4) Prep QC Batch: MP12683
(5) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.
(c) 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

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Report of Analysis

Client Sample ID:	LFSS16		
Lab Sample ID:	F51537-4	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	89.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	20000 J	11	2.7	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Antimony	1.1 J B	3.3	0.21	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Arsenic	3.0 J	0.44	0.22	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Barium	68.3 J	11	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Beryllium [a]	1.4 B	0.56	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cadmium	0.056 U VL	0.22	0.056	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Calcium	14200 J	280	5.6	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Chromium	30.5 J	0.56	0.078	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cobalt	8.3 J	2.8	0.061	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Copper	97.3 J	1.4	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Iron	20600 J	5.6	0.78	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Lead	1550 J	56	1.3	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Magnesium	24100 J	280	5.6	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Manganese	355 J	8.3	0.56	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Mercury	0.048 J J	0.086	0.011	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [3]	SW846 7471A [5]
Nickel	19.8 J	2.2	0.14	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Potassium	3590 J	560	5.6	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Selenium	0.25 U VL	5.6	0.25	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Silver	0.36 J L	0.56	0.078	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Sodium	362 J L	560	28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Thallium [b]	0.62 U VL	1.1	0.62	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Vanadium	44.6 J	2.8	0.056	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Zinc	135 J	1.1	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5904
(3) Instrument QC Batch: MA5905
(4) Prep QC Batch: MP12683
(5) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(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

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Report of Analysis

Client Sample ID:	LFSS17		
Lab Sample ID:	F51537-5	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	81.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	19300 J	12	2.8	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Antimony	5.3 J L	3.5	0.22	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Arsenic	10.7 J	0.47	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Barium	2420 J	230	5.9	mg/kg	20	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Beryllium [a]	1.6 B	0.58	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cadmium	5.1 L	0.23	0.059	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Calcium	12400 J	290	5.9	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Chromium	59.1 J	0.59	0.082	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cobalt	10.2 J	2.9	0.065	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Copper	3090 J	29	2.2	mg/kg	20	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Iron	25500 J	5.9	0.82	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Lead	1660 J	120	2.8	mg/kg	20	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Magnesium	12100 J	290	5.9	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Manganese	907 J	18	1.2	mg/kg	20	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Mercury	0.89 J	0.29	0.036	mg/kg	3	08/10/07	08/10/07	RS	SW846 7471A [3]	SW846 7471A [5]
Nickel	48.3 J	2.3	0.15	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Potassium	2250 J	590	5.9	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Selenium	0.68 J L	5.9	0.26	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Silver	65.2 L	0.59	0.082	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Sodium	915 L	590	29	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Thallium [b]	0.66 U VL	1.2	0.66	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Vanadium	39.0 J	2.9	0.059	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Zinc	3150 J	23	5.9	mg/kg	20	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5904
(3) Instrument QC Batch: MA5905
(4) Prep QC Batch: MP12683
(5) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(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

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Report of Analysis

Client Sample ID:	LFSS18		
Lab Sample ID:	F51537-6	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	85.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	16100 J	11	2.7	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Antimony	1.4 J B	3.4	0.22	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Arsenic	5.3 J	0.46	0.22	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Barium [a]	438 C J	11	0.29	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Beryllium [b]	1.4 B	0.58	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cadmium	0.45 L	0.23	0.057	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Calcium	11300 J	290	5.7	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Chromium	33.2 J	0.57	0.080	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cobalt	26.9 J	2.9	0.063	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Copper	179 J	1.4	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Iron	26200 J	5.7	0.80	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Lead [a]	294 C J	5.7	0.14	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Magnesium	8400 J	290	5.7	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Manganese	1940 J	8.6	0.57	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Mercury	0.45 J	0.091	0.011	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [3]	SW846 7471A [5]
Nickel	20.3 J	2.3	0.14	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Potassium	2030 J	570	5.7	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Selenium	0.49 J L	5.7	0.26	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Silver	6.2 L	0.57	0.080	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Sodium	435 J L	570	29	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Thallium [c]	0.64 U VL	1.2	0.64	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Vanadium	37.3 J	2.9	0.057	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Zinc [a]	369 C J	1.1	0.29	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5904
(3) Instrument QC Batch: MA5905
(4) Prep QC Batch: MP12683
(5) Prep QC Batch: MP12696

(a) Within linear range.
(b) Elevated RL/MDL due to instrument baseline drift.
(c) 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

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Report of Analysis

Client Sample ID:	LFSS19		
Lab Sample ID:	F51537-7	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	83.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	18500 J	12	2.9	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Antimony	1.3 J B	3.6	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Arsenic	7.3 J	0.48	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Barium	72.3 J	12	0.30	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Beryllium [a]	0.79 B	0.60	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cadmium [b]	1.5 U VL	2.4	1.5	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Calcium	1740 J	300	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Chromium	59.1 J	0.60	0.084	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cobalt	18.0 J	3.0	0.066	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Copper	55.1 J	1.5	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Iron	40900 J	60	8.4	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Lead	105 J	6.0	0.14	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Magnesium	1280 J	300	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Manganese	732 J	9.0	0.60	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Mercury	0.21 J	0.091	0.011	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [3]	SW846 7471A [5]
Nickel	10.2 J	2.4	0.15	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Potassium	945 J	600	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Selenium	1.3 J L	6.0	0.27	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Silver	2.5 L	0.60	0.084	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Sodium	376 J L	600	30	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Thallium [c]	2.9 B	1.2	0.64	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Vanadium	75.6 J	3.0	0.060	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Zinc	133 J	1.2	0.30	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5904
(3) Instrument QC Batch: MA5905
(4) Prep QC Batch: MP12683
(5) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.
(c) 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

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Report of Analysis

Client Sample ID:	LFSS20		
Lab Sample ID:	F51537-8	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	82.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	35600 J	120	29	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Antimony	6.2 L	3.6	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Arsenic	13.8 J	0.48	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Barium	824 J	120	3.0	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Beryllium [a]	0.64 B	0.60	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cadmium	6.6 L	0.24	0.060	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Calcium	8950 J	300	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Chromium	162 J	0.60	0.084	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cobalt	13.7 J	3.0	0.066	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Copper	37200 J	300	23	mg/kg	200	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Iron	40800 J	60	8.4	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Lead	36500 J	1200	29	mg/kg	200	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Magnesium	4880 J	300	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Manganese	906 J	9.0	0.60	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Mercury	0.15 J	0.091	0.011	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [3]	SW846 7471A [5]
Nickel	123 J	2.4	0.15	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Potassium	2320 J	600	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Selenium	0.27 U UL	6.0	0.27	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Silver	7.5 L	0.60	0.084	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Sodium	3230 L	600	30	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Thallium [b]	0.64 U UL	1.2	0.64	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Vanadium	35.1 J	3.0	0.060	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Zinc	22100 J	240	60	mg/kg	200	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5904
(3) Instrument QC Batch: MA5905
(4) Prep QC Batch: MP12683
(5) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(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

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Report of Analysis

Client Sample ID:	TMSS20		
Lab Sample ID:	F51537-9	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	81.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	41900 J	120	29	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Antimony	7.6 L	3.7	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Arsenic	124 J	0.49	0.24	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Barium	927 J	120	3.1	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Beryllium [a]	0.76 B	0.62	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cadmium	6.9 L	0.24	0.061	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Calcium	11300 J	310	6.1	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Chromium	122 J	0.61	0.085	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cobalt	11.8 J	3.1	0.067	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Copper	10400 J	150	12	mg/kg	100	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Iron	39900 J	61	8.5	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Lead	15200 J	610	15	mg/kg	100	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Magnesium	6040 J	310	6.1	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Manganese	840 J	9.2	0.61	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Mercury	0.10 J	0.098	0.012	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [3]	SW846 7471A [5]
Nickel	82.7 J	2.4	0.15	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Potassium	2710 J	610	6.1	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Selenium	1.5 J L	6.1	0.27	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Silver	8.6 L	0.61	0.085	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Sodium	3100 L	610	31	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Thallium [b]	2.6 U VL	4.8	2.6	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Vanadium	47.5 J	3.1	0.061	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Zinc	8370 J	120	31	mg/kg	100	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5904
(3) Instrument QC Batch: MA5905
(4) Prep QC Batch: MP12683
(5) Prep QC Batch: MP12696

(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:	LFSS21		
Lab Sample ID:	F51537-10	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	76.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	21800 J	13	3.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Antimony	3.8 B	3.8	0.24	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Arsenic	14.1 J	0.50	0.24	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Barium	776 J	130	3.1	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Beryllium [a]	1.6 B	0.62	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cadmium	4.4 L	0.25	0.063	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Calcium	19200 J	310	6.3	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Chromium	55.8 J	0.63	0.088	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cobalt	12.4 J	3.1	0.069	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Copper	1130 J	16	1.2	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Iron	48900 J	63	8.8	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Lead	1230 J	63	1.5	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Magnesium	15600 J	310	6.3	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Manganese	809 J	9.4	0.63	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Mercury	2.2 J	0.54	0.066	mg/kg	5	08/10/07	08/10/07	RS	SW846 7471A [3]	SW846 7471A [5]
Nickel	49.4 J	2.5	0.16	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Potassium	1970 J	630	6.3	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Selenium	0.28 U UL	6.3	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Silver	24.2 L	0.63	0.088	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Sodium	850 L	630	31	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Thallium [b]	0.70 U UL	1.2	0.70	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Vanadium	40.5 J	3.1	0.063	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Zinc	2090 J	13	3.1	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5904
(3) Instrument QC Batch: MA5905
(4) Prep QC Batch: MP12683
(5) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(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

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Report of Analysis

Client Sample ID:	LFSS04		
Lab Sample ID:	F51537-12	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	78.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	16300 J	12	3.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Antimony	1.0 J B	3.7	0.24	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Arsenic	12.2 J	0.50	0.24	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Barium	90.0 J	12	0.31	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Beryllium [a]	1.5 B	0.62	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cadmium	0.062 U VL	0.25	0.062	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Calcium	5420 J	310	6.2	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Chromium	30.2 J	0.62	0.087	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cobalt	11.9 J	3.1	0.068	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Copper	160 J	1.6	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Iron	22300 J	6.2	0.87	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Lead	118 J	6.2	0.15	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Magnesium	4450 J	310	6.2	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Manganese [b]	435 C J	0.93	0.062	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Mercury	0.21 J	0.10	0.012	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [2]	SW846 7471A [4]
Nickel	16.4 J	2.5	0.16	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Potassium	1920 J	620	6.2	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Selenium	0.61 J L	6.2	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Silver	0.91 L	0.62	0.087	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Sodium	465 J L	620	31	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Thallium [c]	0.70 U VL	1.2	0.70	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Vanadium	44.6 J	3.1	0.062	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Zinc [b]	290 C J	1.2	0.31	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5905
(3) Prep QC Batch: MP12683
(4) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Within linear range.
(c) 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

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Report of Analysis

Client Sample ID:	LFSS05		
Lab Sample ID:	F51537-13	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	82.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	17800 J	12	2.8	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Antimony	0.94 J B	3.5	0.22	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Arsenic	3.7 J	0.47	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Barium	90.3 J	12	0.29	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Beryllium [a]	1.6 B	0.58	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cadmium [b]	0.59 U VL	1.2	0.59	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Calcium	4140 J	290	5.9	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Chromium	32.7 J	0.59	0.082	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cobalt	9.4 J	2.9	0.064	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Copper	54.3 J	1.5	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Iron	21100 J	5.9	0.82	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Lead	94.5 J	5.9	0.14	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Magnesium	11000 J	290	5.9	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Manganese [c]	360 C J	0.88	0.059	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Mercury	0.16 J	0.094	0.012	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [2]	SW846 7471A [4]
Nickel	19.3 J	2.3	0.15	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Potassium	2550 J	590	5.9	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Selenium	0.53 J L	5.9	0.26	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Silver	0.62 L	0.59	0.082	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Sodium	328 J L	590	29	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Thallium [d]	0.66 U VL	1.2	0.66	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Vanadium	44.8 J	2.9	0.059	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Zinc	165 J	1.2	0.29	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5905
(3) Prep QC Batch: MP12683
(4) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.
(c) Within linear range.
(d) 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

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Report of Analysis

Client Sample ID:	LFSS06		
Lab Sample ID:	F51537-14	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	86.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	10200 J	11	2.7	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Antimony	0.89 J B	3.4	0.21	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Arsenic	5.9 J	0.45	0.22	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Barium [a]	253 C J	11	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Beryllium [b]	0.98 B	0.56	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cadmium [c]	0.28 U VL	0.44	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Calcium	1520 J	280	5.6	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Chromium	20.6 J	0.56	0.078	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cobalt	22.5 J	2.8	0.061	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Copper	64.2 J	1.4	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Iron	19600 J	5.6	0.78	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Lead	135 J	5.6	0.13	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Magnesium	4490 J	280	5.6	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Manganese	2060 J	8.4	0.56	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Mercury	0.081 J J	0.088	0.011	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [3]	SW846 7471A [5]
Nickel	12.8 J	2.2	0.14	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Potassium	1440 J	560	5.6	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Selenium	1.1 J L	5.6	0.25	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Silver	0.60 L	0.56	0.078	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Sodium	307 J L	560	28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Thallium [d]	0.62 U VL	1.0	0.62	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Vanadium	32.7 J	2.8	0.056	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Zinc [a]	327 C J	1.1	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5904
(3) Instrument QC Batch: MA5905
(4) Prep QC Batch: MP12683
(5) Prep QC Batch: MP12696

(a) Within linear range.
(b) Elevated RL/MDL due to instrument baseline drift.
(c) Elevated reporting limit(s) due to matrix interference.
(d) 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

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Report of Analysis

Client Sample ID:	LFSS07		
Lab Sample ID:	F51537-15	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	89.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	14300 J	11	2.7	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Antimony	0.34 J B	3.3	0.21	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Arsenic	1.9 J	0.44	0.22	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Barium	79.9 J	11	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Beryllium [a]	0.80 B	0.56	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cadmium [b]	0.55 U VL	0.88	0.55	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Calcium	5540 J	280	5.5	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Chromium	18.5 J	0.55	0.078	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cobalt	8.7 J	2.8	0.061	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Copper	46.4 J	1.4	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Iron	17800 J	5.5	0.78	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Lead	51.1 J	5.5	0.13	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Magnesium	4910 J	280	5.5	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Manganese [c]	417 C J	0.83	0.055	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Mercury	0.049 J J	0.086	0.011	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [2]	SW846 7471A [4]
Nickel	12.3 J	2.2	0.14	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Potassium	1520 J	550	5.5	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Selenium	0.51 J L	5.5	0.25	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Silver	6.1 L	0.55	0.078	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Sodium	264 J B	550	28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Thallium [d]	0.78 J B	1.0	0.62	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Vanadium	33.1 J	2.8	0.055	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Zinc	123 J	1.1	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5905
(3) Prep QC Batch: MP12683
(4) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.
(c) Within linear range.
(d) 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

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Report of Analysis

Client Sample ID:	LFSS08		
Lab Sample ID:	F51537-16	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	92.3
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	9770 J	10	2.5	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Antimony	0.42 J B	3.1	0.20	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Arsenic	2.6 J	0.41	0.20	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Barium	65.1 J	10	0.26	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Beryllium [a]	0.90 B	0.56	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cadmium [b]	1.0 U UL	2.1	1.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Calcium	3740 J	260	5.2	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Chromium	13.1 J	0.52	0.072	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cobalt	6.4 J	2.6	0.057	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Copper	30.3 J	1.3	0.098	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Iron	14100 J	5.2	0.72	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Lead	37.1 J	5.2	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Magnesium	2720 J	260	5.2	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Manganese [c]	247 C J	0.77	0.052	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Mercury	0.030 J J	0.086	0.011	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [2]	SW846 7471A [4]
Nickel	7.7 J	2.1	0.13	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Potassium	1130 J	520	5.2	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Selenium	0.50 J L	5.2	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Silver	0.11 J L	0.52	0.072	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Sodium	214 J B	520	26	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Thallium [d]	0.83 J B	1.0	0.60	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Vanadium	21.6 J	2.6	0.052	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Zinc	44.0 J	1.0	0.26	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5905
(3) Prep QC Batch: MP12683
(4) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.
(c) Within linear range.
(d) 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

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Report of Analysis

Client Sample ID:	LFSS09		
Lab Sample ID:	F51537-17	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	83.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	16400 J	12	2.9	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Antimony	1.0 J B	3.6	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Arsenic	5.1 J	0.48	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Barium	70.6 J	12	0.30	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Beryllium [a]	1.5 B	0.60	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cadmium [b]	1.2 U VL	2.4	1.2	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Calcium	1580 J	300	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Chromium	35.7 J	0.60	0.083	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cobalt	12.1 J	3.0	0.066	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Copper	62.1 J	1.5	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Iron	25000 J	6.0	0.83	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Lead	126 J	6.0	0.14	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Magnesium	5160 J	300	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Manganese [c]	467 C J	0.89	0.060	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Mercury	0.12 J	0.096	0.012	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [2]	SW846 7471A [4]
Nickel	16.3 J	2.4	0.15	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Potassium	1530 J	600	6.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Selenium	0.70 J L	6.0	0.27	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Silver	0.19 J L	0.60	0.083	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Sodium	341 J L	600	30	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Thallium [d]	1.3 B	1.2	0.66	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Vanadium	53.0 J	3.0	0.060	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Zinc	145 J	1.2	0.30	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5905
(3) Prep QC Batch: MP12683
(4) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.
(c) Within linear range.
(d) 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

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Report of Analysis

Client Sample ID:	LFSS10		
Lab Sample ID:	F51537-18	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	75.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	14400 J	13	3.1	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Antimony	0.88 J B	3.9	0.25	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Arsenic	3.7 J	0.52	0.25	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Barium	69.7 J	13	0.33	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Beryllium [a]	1.7 B	0.66	0.13	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cadmium [b]	1.3 U VL	2.6	1.3	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Calcium	2070 J	330	6.5	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Chromium	29.9 J	0.65	0.091	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cobalt	13.7 J	3.3	0.072	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Copper	92.3 J	1.6	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Iron	28700 J	6.5	0.91	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Lead	86.2 J	6.5	0.16	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Magnesium	4540 J	330	6.5	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Manganese [c]	500 C J	0.98	0.065	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Mercury	0.12 J	0.10	0.013	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [2]	SW846 7471A [4]
Nickel	18.7 J	2.6	0.16	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Potassium	1440 J	650	6.5	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Selenium	0.78 J L	6.5	0.29	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Silver	0.50 J L	0.65	0.091	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Sodium	357 J L	650	33	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Thallium [d]	2.0 B	1.2	0.74	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Vanadium	45.0 J	3.3	0.065	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Zinc	223 J	1.3	0.33	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5905
(3) Prep QC Batch: MP12683
(4) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.
(c) Within linear range.
(d) 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

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Report of Analysis

Client Sample ID:	LFSS11		
Lab Sample ID:	F51537-19	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	90.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	17300 J	11	2.6	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Antimony	0.89 J B	3.2	0.20	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Arsenic	6.1 J	0.43	0.21	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Barium	89.8 J	11	0.27	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Beryllium [a]	0.70 B	0.54	0.11	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cadmium [b]	1.1 U UL	2.2	1.1	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Calcium	8340 J	270	5.4	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Chromium	24.3 J	0.54	0.075	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Cobalt	6.3 J	2.7	0.059	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Copper	86.2 J	1.3	0.10	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Iron	21900 J	5.4	0.75	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Lead [c]	372 C J	5.4	0.13	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Magnesium	4460 J	270	5.4	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Manganese	823 J	8.1	0.54	mg/kg	10	08/09/07	08/10/07	RS	SW846 6010B [2]	SW846 3050B [4]
Mercury	0.16 J	0.090	0.011	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [3]	SW846 7471A [5]
Nickel	25.6 J	2.2	0.13	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Potassium	1400 K	540	5.4	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Selenium	0.37 J L	5.4	0.24	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Silver	0.18 J K	0.54	0.075	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Sodium	344 J J	540	27	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Thallium [d]	0.60 U	1.0	0.60	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Vanadium	45.3 J	2.7	0.054	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]
Zinc	132 J	1.1	0.27	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5904
(3) Instrument QC Batch: MA5905
(4) Prep QC Batch: MP12684
(5) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.
(c) Within linear range.
(d) 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 Cay

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSS12		
Lab Sample ID:	F51537-20	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
		Percent Solids:	81.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	18700 J	12	3.0	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Antimony	0.86 J B	3.7	0.23	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Arsenic	6.8 J	0.49	0.24	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Barium	112 J	12	0.31	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Beryllium [a]	1.2 B	0.62	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cadmium [b]	1.2 U VL	2.5	1.2	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Calcium	2930 J	310	6.2	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Chromium	32.1 J	0.62	0.086	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Cobalt	10.6 J	3.1	0.068	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Copper	121 J	1.5	0.12	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Iron	25200 J	6.2	0.86	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Lead	241 J	6.2	0.15	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Magnesium	15000 J	310	6.2	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Manganese	607 J	0.92	0.062	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Mercury	0.10 J	0.098	0.012	mg/kg	1	08/10/07	08/10/07	RS	SW846 7471A [2]	SW846 7471A [4]
Nickel	19.5 J	2.5	0.15	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Potassium	3510 K	620	6.2	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Selenium	0.34 J L	6.2	0.28	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Silver	0.39 J K	0.62	0.086	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Sodium	397 J J	620	31	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Thallium [c]	0.64 U	1.2	0.64	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Vanadium	40.2 J	3.1	0.062	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]
Zinc	172 J	1.2	0.31	mg/kg	1	08/09/07	08/09/07	DM	SW846 6010B [1]	SW846 3050B [3]

(1) Instrument QC Batch: MA5903
(2) Instrument QC Batch: MA5905
(3) Prep QC Batch: MP12684
(4) Prep QC Batch: MP12696

(a) Elevated RL/MDL due to instrument baseline drift.
(b) Elevated reporting limit(s) due to matrix interference.
(c) 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

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Report of Analysis

Client Sample ID:	080207R		
Lab Sample ID:	F51537-11	**Date Sampled:**	08/02/07
Matrix:	AQ - Equipment Blank	**Date Received:**	08/03/07
		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	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony [a]	6.6 U	12	6.6	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	3.7 U	10	3.7	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	5.0 U	200	5.0	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	100 U	1000	100	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	0.92 U	10	0.92	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	50	1.0	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.2 U	25	1.2	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	15 U	300	15	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead	2.1 U	5.0	2.1	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	100 U	5000	100	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	1.6 J	15	1.0	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.11 U	1.0	0.11	ug/l	1	08/06/07	08/06/07	LM	SW846 7470A [1]	SW846 7470A [3]
Nickel	1.0 U	40	1.0	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	469 J	10000	100	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	4.0 U	10	4.0	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.77 U	10	0.77	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	518 J	10000	500	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	13 U	20	13	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.1 U	50	1.1	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	5.0 U	20	5.0	ug/l	1	08/08/07	08/08/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5895
(2) Instrument QC Batch: MA5899
(3) Prep QC Batch: MP12653
(4) Prep QC Batch: MP12678

(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.
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 – PCBs
Accutest Laboratories, Inc., SDG F51537

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 August 2, 2007. Solid samples were analyzed for PCBs using USEPA Method 3550B/8082. A total of nineteen solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
LFSS13	F51537-1	LFSS04	F51537-12
LFSS14	F51537-2	LFSS05	F51537-13
LFSS15	F51537-3	LFSS06	F51537-14
LFSS16	F51537-4	LFSS07	F51537-15
LFSS17	F51537-5	LFSS08	F51537-16
LFSS18	F51537-6	LFSS09	F51537-17
LFSS19	F51537-7	LFSS10	F51537-18
LFSS20	F51537-8	LFSS11	F51537-19
TMSS20	F51537-9	LFSS12	F51537-20
LFSS21	F51537-10		

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	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
PCBs REVIEW
SDG F51537

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 solid samples, 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 08/02/07, the coolers were received by the primary laboratory (Accutest) on 08/03/07 at 4.8°C and 5.2°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.4°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: For the solid samples collected 08/02/07, the PCBs were extracted on 08/15/07 and 08/16/07 and were analyzed on 08/17/07, 08/18/07, 08/21/07, and 08/22/07. All criteria were met. No qualifiers were applied.

II-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument 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 PCB initial calibration performed on 08/13/07 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this initial calibration.

- For the PCB initial calibration performed on 08/17/07 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) 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 PCB 1016/1260 initial calibration verification performed on 08/13/07 @14:16 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 08/14/07 @23:45 on instrument ECD3, all criteria were met for signal #1. For signal #2, PCB1016-B (20.4%) was outside criteria; however, the average PCB1016 %D was 16.0%. No qualifiers were applied based upon this outlier. No soil samples reported analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/15/07 @02:40 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/15/07 @05:17 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 08/17/07 @15:17 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this initial calibration verification.

- For PCB 1016/1260 continuing calibration performed on 08/17/07 @18:28 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), and LFSS09 (F51537-17), were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/17/07 @21:58 on instrument ECD3, all criteria were met. No qualifiers were applied. Sample LFSS10 (F51537-18) was analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/18/07 @01:27 on instrument ECD3, all criteria were met. No qualifiers were applied. Sample LFSS12 (F51537-20) was analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/18/07 @04:57 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples LFSS13 (F51537-1) and LFSS14 (F51537-2) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/18/07 @08:27 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples LFSS17 (F51537-5), LFSS18 (F51537-6), and LFSS19 (F51537-7) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/18/07 @10:47 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/21/07 @08:56 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples TMSS20 (F51537-9) and LFSS21 (F51537-10) were analyzed using this continuing calibration.

- For PCB 1248 continuing calibration performed on 08/21/07 @09:24 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1242 continuing calibration performed on 08/21/07 @09:41 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1232/1268 continuing calibration performed on 08/21/07 @09:59 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1221/1254 continuing calibration performed on 08/21/07 @10:16 on instrument ECD3, all criteria were met for signal #2. For signal #1, PCB1221-B (27.2%) was outside criteria; however, the average PCB1221 %D was 10.6%. No qualifiers were applied based upon this outlier. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/21/07 @13:47 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples LFSS08 (F51537-16) and LFSS11 (F51537-19) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/21/07 @15:33 on instrument ECD3, all criteria were met. No qualifiers were applied. Samples LFSS15 (F51537-3), LFSS16 (F51537-4), and LFSS20 (F51537-8) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/21/07 @18:11 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/22/07 @10:00 on instrument ECD3, all criteria were met. No qualifiers were applied. Sample LFSS04 (F51537-12) was analyzed using this continuing calibration.

- For PCB 1248 continuing calibration performed on 08/22/07 @10:17 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1242 continuing calibration performed on 08/22/07 @10:35 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1232/1268 continuing calibration performed on 08/22/07 @10:52 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1221/1254 continuing calibration performed on 08/21/07 @11:10 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 08/22/07 @14:28 on instrument ECD3, all criteria were met. No qualifiers were applied. No soil 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 080207R (F51537-11) applies to surface soil "SS" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	08/18/07	OP21912-MB	All target <½MRL	NA	NA	None
PCBs	08/21/07	OP21912-MB	All target <½MRL	NA	NA	None
PCBs	08/17/07	OP21917-MB	All target <½MRL	NA	NA	None
PCBs	08/21/07	OP21917-MB	All target <½MRL	NA	NA	None
PCBs	08/22/07	OP21917-MB	All target <½MRL	NA	NA	None
PCBs	08/15/07	080207R	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.

Solid Criteria: Tetrachloro-m-xylene: PCBs: 44-126% (DoD QSM Not Listed)
Decachlorobiphenyl: PCBs: 39-157% (DoD QSM 60-125%)

- For PCBs sample LFSS18 (F51537-6), decachlorobiphenyl (53.0%) 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 LFSS21 (F51537-10), 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 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 solid LCS recovery limits are specified in Table D-17 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP21912-BS was used as the solid LCS for the PCB analysis on 08/18/07. All criteria were met. No qualifiers were applied. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), and LFSS20 (F51537-8) apply to this LCS.

- Sample OP21917-BS was used as the solid LCS for the PCB analysis on 08/17/07. All criteria were met. No qualifiers were applied. Samples TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) apply to this LCS.

- Sample OP21917-BS was used as the solid LCS for the PCB analysis on 08/21/07. All criteria were met. No qualifiers were applied. Samples TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) apply to this LCS.

- Sample OP21917-BS was used as the solid LCS for the PCB analysis on 08/22/07. All criteria were met. No qualifiers were applied. Samples TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) 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 solid MS/MSD recovery limits follow the LCS criteria and are specified in Table D-17 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample LFSS14 (F51537-2) was used as the solid matrix MS/MSD for the PCB analysis on 08/18/07. All criteria were met. No qualifiers were applied. Samples LFSS13 (F51537-1), LFSS14 (F51537-2), LFSS15 (F51537-3), LFSS16 (F51537-4), LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS19 (F51537-7), and LFSS20 (F51537-8) apply to this MS/MSD.

- Sample F51556-3 was used as the solid matrix MS/MSD for the PCB analysis on 08/17/07. The spiked sample was not a site sample; therefore, was not evaluated. Samples TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS05 (F51537-13), LFSS06 (F51537-14), LFSS07 (F51537-15), LFSS08 (F51537-16), LFSS09 (F51537-17), LFSS10 (F51537-18), LFSS11 (F51537-19), and LFSS12 (F51537-20) 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 solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field surface soil sample duplicate pair LFSS20 (F51537-8) and TMSS20 (F51537-9) was collected for chlorinated pesticides and PCBs. All detected PCB target compounds found in the sample and its duplicate pair and associated %RPD are noted in **Table 3**. All other PCB target compounds were non-detect. All criteria were met. No qualifiers were applied.

Table 3 Field Precision Hits Analysis Summary for PCBs for Duplicate Pair LFSS20 (F51537-8) and TMSS20 (F51537-9)

Compound	Original Sample (µg/kg)	Duplicate Pair (µg/kg)	%RPD
Aroclor 1254	331J	299J	10.2
Aroclor 1260	125J	123J	1.6

J = Estimated value <MRL and >MDL.

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 all samples with detected PCBs, the %D (average %D for multi-peak compounds) between the primary and secondary columns was within criteria. No qualifiers were applied.

- For samples LFSS17 (F51537-5), LFSS18 (F51537-6), LFSS20 (F51537-8), TMSS20 (F51537-9), LFSS21 (F51537-10), LFSS04 (F51537-12), LFSS09 (F51537-17), LFSS10 (F51537-18), the data was qualified estimated "J" for PCB1254 and PCB1260 due to the presence of multiple overlapping Aroclor patterns

Sample: LFSS16 (F51537-4), 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 = (3212381*10000*10) / (10690*(1000)*1*31.8*0.8910) = 1060.58 µg/kg
Conc2 µg/kg = (4681093*10000*10) / (13950*(1000)*1*31.8*0.8910) = 1184.32 µg/kg
Conc3 µg/kg = (5659726*10000*10) / (14210*(1000)*1*31.8*0.8910) = 1405.71 µg/kg
Conc4 µg/kg = (2504620*10000*10) / (9770*(1000)*1*31.8*0.8910) = 904.78 µg/kg
Conc5 µg/kg = (6621856*10000*10) / (25350*(1000)*1*31.8*0.8910) = 921.93 µg/kg
Conc6 µg/kg = (4163760*10000*10) / (14150*(1000)*1*31.8*0.8910) = 1038.54 µg/kg
Average concentration = 1090 µg/kg

Signal #2
Conc1 µg/kg = (430941*10000*10) / (1291*(1000)*1*31.8*0.8910) = 1178.11 µg/kg
Conc2 µg/kg = (630277*10000*10) / (1627*(1000)*1*31.8*0.8910) = 1367.22 µg/kg
Conc3 µg/kg = (687330*10000*10) / (1495*(1000)*1*31.8*0.8910) = 1622.63 µg/kg
Conc4 µg/kg = (303583*10000*10) / (1100*(1000)*1*31.8*0.8910) = 974.05 µg/kg
Conc5 µg/kg = (808336*10000*10) / (2677*(1000)*1*31.8*0.8910) = 1065.71 µg/kg
Conc6 µg/kg = (387417*10000*10) / (1051*(1000)*1*31.8*0.8910) = 1300.98 µg/kg
Average concentration = 1250 µg/kg

Reported Value = 1090 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: ST65112.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSS13		
Lab Sample ID:	F51537-1	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	81.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65112.D	1	08/18/07	JB	08/15/07	OP21912	GST1711
Run #2							

	Initial Weight	Final Volume
Run #1	29.0 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	21	11	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	11	ug/kg	
12672-29-6	Aroclor 1248	ND	21	11	ug/kg	
11097-69-1	Aroclor 1254	111	21	11	ug/kg	
11096-82-5	Aroclor 1260	ND	21	11	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%		44-126%
2051-24-3	Decachlorobiphenyl	77%		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: ST65113.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSS14		
Lab Sample ID:	F51537-2	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	83.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65113.D	1	08/18/07	JB	08/15/07	OP21912	GST1711
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	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	53.3	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	71%		44-126%
2051-24-3	Decachlorobiphenyl	85%		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: ST65190.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSS15		
Lab Sample ID:	F51537-3	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	91.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65190.D	2	08/21/07	JB	08/15/07	OP21912	GST1713
Run #2							

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

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	37	18	ug/kg	
11104-28-2	Aroclor 1221	ND	37	29	ug/kg	
11141-16-5	Aroclor 1232	ND	37	29	ug/kg	
53469-21-9	Aroclor 1242	ND	37	18	ug/kg	
12672-29-6	Aroclor 1248	ND	37	18	ug/kg	
11097-69-1	Aroclor 1254	151	37	18	ug/kg	
11096-82-5	Aroclor 1260	ND	37	18	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	79%		44-126%
2051-24-3	Decachlorobiphenyl	86%		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

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Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSS16		
Lab Sample ID:	F51537-4	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	89.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65191.D	10	08/21/07	JB	08/15/07	OP21912	GST1713
Run #2							

	Initial Weight	Final Volume
Run #1	31.8 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	180	88	ug/kg	
11104-28-2	Aroclor 1221	ND	180	140	ug/kg	
11141-16-5	Aroclor 1232	ND	180	140	ug/kg	
53469-21-9	Aroclor 1242	ND	180	88	ug/kg	
12672-29-6	Aroclor 1248	ND	180	88	ug/kg	
11097-69-1	Aroclor 1254	ND	180	88	ug/kg	
11096-82-5	Aroclor 1260	1090	180	88	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	83%		44-126%
2051-24-3	Decachlorobiphenyl	101%		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: ST65120.D

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Report of Analysis

Client Sample ID:	LFSS17		
Lab Sample ID:	F51537-5	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	81.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65120.D	1	08/18/07	JB	08/15/07	OP21912	GST1711
Run #2							

	Initial Weight	Final Volume
Run #1	32.6 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	19	9.4	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]	64.2 J	19	9.4	ug/kg	J
11096-82-5	Aroclor 1260 [b]	133 J	19	9.4	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	76%		44-126%
2051-24-3	Decachlorobiphenyl	90%		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

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Report of Analysis

Client Sample ID:	LFSS18		
Lab Sample ID:	F51537-6	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	85.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65121.D	1	08/18/07	JB	08/15/07	OP21912	GST1711
Run #2							

	Initial Weight	Final Volume
Run #1	29.4 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	20	9.9	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	9.9	ug/kg	
12672-29-6	Aroclor 1248	ND	20	9.9	ug/kg	
11097-69-1	Aroclor 1254 [b]	110 J	20	9.9	ug/kg	J
11096-82-5	Aroclor 1260 [b]	67.7 J	20	9.9	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	71%		44-126%
2051-24-3	Decachlorobiphenyl	53%		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

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Report of Analysis

Client Sample ID:	LFSS19		
Lab Sample ID:	F51537-7	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	83.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65122.D	1	08/18/07	JB	08/15/07	OP21912	GST1711
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	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	34.3	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	72%		44-126%
2051-24-3	Decachlorobiphenyl	80%		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

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Report of Analysis

Client Sample ID:	LFSS20		
Lab Sample ID:	F51537-8	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	82.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65193.D	5	08/21/07	JB	08/15/07	OP21912	GST1713
Run #2							

	Initial Weight	Final Volume
Run #1	29.6 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	100	51	ug/kg	
11104-28-2	Aroclor 1221	ND	100	82	ug/kg	
11141-16-5	Aroclor 1232	ND	100	82	ug/kg	
53469-21-9	Aroclor 1242	ND	100	51	ug/kg	
12672-29-6	Aroclor 1248	ND	100	51	ug/kg	
11097-69-1	Aroclor 1254 [b]	331 J	100	51	ug/kg	J
11096-82-5	Aroclor 1260 [b]	125 J	100	51	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	75%		44-126%
2051-24-3	Decachlorobiphenyl	72%		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

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Report of Analysis

Client Sample ID:	TMSS20		
Lab Sample ID:	F51537-9	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	81.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65178.D	5	08/21/07	JB	08/16/07	OP21917	GST1713
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	100	51	ug/kg	
11104-28-2	Aroclor 1221	ND	100	82	ug/kg	
11141-16-5	Aroclor 1232	ND	100	82	ug/kg	
53469-21-9	Aroclor 1242	ND	100	51	ug/kg	
12672-29-6	Aroclor 1248	ND	100	51	ug/kg	
11097-69-1	Aroclor 1254 [b]	299 J	100	51	ug/kg	J
11096-82-5	Aroclor 1260 [b]	123 J	100	51	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	85%		44-126%
2051-24-3	Decachlorobiphenyl	80%		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

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Report of Analysis

Client Sample ID:	LFSS21		
Lab Sample ID:	F51537-10	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	76.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65179.D	5	08/21/07	JB	08/16/07	OP21917	GST1713
Run #2							

	Initial Weight	Final Volume
Run #1	31.3 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	110	53	ug/kg	
11104-28-2	Aroclor 1221	ND	110	84	ug/kg	
11141-16-5	Aroclor 1232	ND	110	84	ug/kg	
53469-21-9	Aroclor 1242	ND	110	53	ug/kg	
12672-29-6	Aroclor 1248	ND	110	53	ug/kg	
11097-69-1	Aroclor 1254 [b]	206 J	110	53	ug/kg	J
11096-82-5	Aroclor 1260 [b]	179 J	110	53	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	63%		44-126%
2051-24-3	Decachlorobiphenyl	59%		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: ST65228.D

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Report of Analysis

Client Sample ID:	LFSS04		
Lab Sample ID:	F51537-12	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	78.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65228.D	2	08/22/07	JB	08/16/07	OP21917	GST1714
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	42	21	ug/kg	
11104-28-2	Aroclor 1221	ND	42	34	ug/kg	
11141-16-5	Aroclor 1232	ND	42	34	ug/kg	
53469-21-9	Aroclor 1242	ND	42	21	ug/kg	
12672-29-6	Aroclor 1248	ND	42	21	ug/kg	
11097-69-1	Aroclor 1254 [b]	161 J	42	21	ug/kg	J
11096-82-5	Aroclor 1260 [b]	56.8 J	42	21	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	69%		44-126%
2051-24-3	Decachlorobiphenyl	64%		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

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Report of Analysis

Client Sample ID:	LFSS05		
Lab Sample ID:	F51537-13	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	82.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65076.D	1	08/17/07	JB	08/16/07	OP21917	GST1711
Run #2							

	Initial Weight	Final Volume
Run #1	29.1 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	28.5 J	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	75%		44-126%
2051-24-3	Decachlorobiphenyl	73%		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

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Report of Analysis

Client Sample ID:	LFSS06		
Lab Sample ID:	F51537-14	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	86.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65077.D	1	08/17/07	JB	08/16/07	OP21917	GST1711
Run #2							

	Initial Weight	Final Volume
Run #1	30.4 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	24.3 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	82%		44-126%
2051-24-3	Decachlorobiphenyl	74%		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

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Report of Analysis

Client Sample ID:	LFSS07		
Lab Sample ID:	F51537-15	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	89.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65078.D	1	08/17/07	JB	08/16/07	OP21917	GST1711
Run #2							

	Initial Weight	Final Volume
Run #1	31.0 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	18	9.0	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	9.0	ug/kg	
12672-29-6	Aroclor 1248	ND	18	9.0	ug/kg	
11097-69-1	Aroclor 1254	13.5 J	18	9.0	ug/kg	J
11096-82-5	Aroclor 1260	ND	18	9.0	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%		44-126%
2051-24-3	Decachlorobiphenyl	66%		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

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Report of Analysis

Client Sample ID:	LFSS08		
Lab Sample ID:	F51537-16	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	92.3
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65183.D	5	08/21/07	JB	08/16/07	OP21917	GST1713
Run #2							

	Initial Weight	Final Volume
Run #1	31.3 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	87	43	ug/kg	
11104-28-2	Aroclor 1221	ND	87	69	ug/kg	
11141-16-5	Aroclor 1232	ND	87	69	ug/kg	
53469-21-9	Aroclor 1242	ND	87	43	ug/kg	
12672-29-6	Aroclor 1248	ND	87	43	ug/kg	
11097-69-1	Aroclor 1254	309	87	43	ug/kg	
11096-82-5	Aroclor 1260	ND	87	43	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	81%		44-126%
2051-24-3	Decachlorobiphenyl	89%		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

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Report of Analysis

Client Sample ID:	LFSS09		
Lab Sample ID:	F51537-17	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	83.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65080.D	1	08/17/07	JB	08/16/07	OP21917	GST1711
Run #2							

	Initial Weight	Final Volume
Run #1	30.4 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	20	9.8	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	9.8	ug/kg	
12672-29-6	Aroclor 1248	ND	20	9.8	ug/kg	
11097-69-1	Aroclor 1254 [b]	45.3 J	20	9.8	ug/kg	J
11096-82-5	Aroclor 1260 [b]	62.1 J	20	9.8	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	71%		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: ST65083.D

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Report of Analysis

Client Sample ID:	LFSS10		
Lab Sample ID:	F51537-18	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	75.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65083.D	1	08/17/07	JB	08/16/07	OP21917	GST1711
Run #2							

	Initial Weight	Final Volume
Run #1	29.8 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	22	11	ug/kg	
11104-28-2	Aroclor 1221	ND	22	18	ug/kg	
11141-16-5	Aroclor 1232	ND	22	18	ug/kg	
53469-21-9	Aroclor 1242	ND	22	11	ug/kg	
12672-29-6	Aroclor 1248	ND	22	11	ug/kg	
11097-69-1	Aroclor 1254 [b]	67.0 J	22	11	ug/kg	J
11096-82-5	Aroclor 1260 [b]	37.3 J	22	11	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	70%		44-126%
2051-24-3	Decachlorobiphenyl	71%		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: ST65184.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSS11		
Lab Sample ID:	F51537-19	**Date Sampled:**	08/02/07
Matrix:	SQ - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	90.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65184.D	5	08/21/07	JB	08/16/07	OP21917	GST1713
Run #2							

	Initial Weight	Final Volume
Run #1	29.3 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	95	47	ug/kg	
11104-28-2	Aroclor 1221	ND	95	76	ug/kg	
11141-16-5	Aroclor 1232	ND	95	76	ug/kg	
53469-21-9	Aroclor 1242	ND	95	47	ug/kg	
12672-29-6	Aroclor 1248	ND	95	47	ug/kg	
11097-69-1	Aroclor 1254	402	95	47	ug/kg	
11096-82-5	Aroclor 1260	ND	95	47	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	82%		44-126%
2051-24-3	Decachlorobiphenyl	90%		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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSS12		
Lab Sample ID:	F51537-20	**Date Sampled:**	08/02/07
Matrix:	SO - Soil	**Date Received:**	08/03/07
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	81.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	ST65096.D	1	08/18/07	JB	08/16/07	OP21917	GST1711
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	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	117	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	70%		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: ST64906.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	080207R		
Lab Sample ID:	F51537-11	**Date Sampled:**	08/02/07
Matrix:	AQ - Equipment Blank	**Date Received:**	08/03/07
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	ST64906.D	1	08/15/07	JB	08/09/07	OP21802	GST1708
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	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	95%		38-127%
2051-24-3	Decachlorobiphenyl	84%		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 – Dioxin Furans
SGS Paradigm Analytical Laboratories, Inc. SDGs G383-595
(Accutest SDG F51975)

DATE: October 2, 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 21, 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 four aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
LFMW01	F51975-1	17MW02	F51975-3
17MW03	F51975-2	17PZ01	F51975-4

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

10/2/07
Date

RFAAP VALIDATION REPORT
DIOXIN FURAN REVIEW
SDGs G383-595
(Accutest SDG F51975)

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 08/21/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 1.2°C, 1.2°C, 0.8°C, 0.4°C, 1.0°C, 0.4°C, 0.6°C, and 2.0°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 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 0.6°C. Even though some of the receipt temperatures were below criteria, there were no impacts to the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/21/07, 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
08/30/07	LMB14440	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 LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 08/29/07 @15:56 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 08/29/07 @03:12 on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply to this continuing calibration.

- For continuing calibration performed on 08/30/07 @14:34 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 OPR14440 was used as LCS and LCSD on 08/30/07 analytical run. All criteria were met. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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: LFMW01 (F51975-1), 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.

$$\text{Conc. (ng/L)} = \frac{(A(x)) * Q(is) * 1000}{A(is) * W * \text{Avg. RRF}} = \frac{(407000+457000) * 4.0 * 1000}{(21600000+24100000) * 1023 * 1.0783} = 0.0686 \text{ ng/L}$$

Reported Value = 0.0686 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

Method 8290
F51975-1
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	0.00262					
1,2,3,7,8-PeCDD	ND	0.00489					
1,2,3,4,7,8-HxCDD	ND	0.00489					
1,2,3,6,7,8-HxCDD	ND	0.00489					
1,2,3,7,8,9-HxCDD	0.00268 J			37:22	1.20		A
1,2,3,4,6,7,8-HpCDD	ND	0.00602					
OCDD	0.0686 J			45:03	0.89		A
2,3,7,8-TCDF	ND	0.00204					
1,2,3,7,8-PeCDF	EMPC	~~0.00489~~	0.00127 J	33:34	1.18	*	A
2,3,4,7,8-PeCDF	0.00154 J			34:10	1.40		A
1,2,3,4,7,8-HxCDF	ND	0.00489					
1,2,3,6,7,8-HxCDF	ND	0.00489					
2,3,4,6,7,8-HxCDF	ND	0.00489					
1,2,3,7,8,9-HxCDF	ND	0.00489					
1,2,3,4,6,7,8-HpCDF	ND	0.00489					
1,2,3,4,7,8,9-HpCDF	ND	0.00489					
OCDF	ND	0.0130					
Total TCDDs	ND	0.00262					
Total PeCDDs	ND	0.00489					
Total HxCDDs	0.00268						
Total HpCDDs	ND	0.00602					
Total TCDFs	ND	0.00204					
Total PeCDFs	~~0.00154~~		0.00282 J				
Total HxCDFs	ND	0.00489					
Total HpCDFs	ND	0.00489					
WHO-2005 TEQ (ND=0)	0.000751		0.000789				
WHO-2005 TEQ (ND=½)	0.00623		0.00619				

Client Information			**Sample Information**		
Project Name:	F51975		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F51975-1		Weight / Volume:	1023 mL	
			Solids / Lipids:	NA	%
			Original pH :	7	
Laboratory Information			Batch ID:	WG14440	
Project ID:	G383-595		Instrument:	HRMS1	
Sample ID:	G383-595-1C		Filename:	a29aug07a_2-4	
Collection Date/Time:	08/21/07	9:30	Retchk:	a29aug07a-15	
Receipt Date/Time:	08/24/07	10:10	Begin ConCal:	a29aug07a-15	
Extraction Date:	08/27/07		End ConCal:	a29aug07a_2-14	
Analysis Date/Time:	08/30/07	6:30	Initial Cal:	m8290-071007a	

Form 5 Cpg

Method 8290
F51975-1
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	1.65	82.5	31:33	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.69	84.4	34:21	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.84	92.0	37:06	1.24	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.72	86.1	40:33	1.05	
13C12-OCDD	4.0	2.65	66.4	45:03	0.90	
13C12-2,3,7,8-TCDF	2.0	1.78	89.2	30:58	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.50	75.2	33:34	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.66	83.0	36:24	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.59	79.6	39:15	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.389	97.2	31:34	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.332	83.1	34:10	1.58	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.359	89.8	37:01	1.29	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.364	91.0	36:18	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.288	72.1	41:13	0.44	
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	1.26	

Client Information			**Sample Information**	
Project Name:	F51975		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F51975-1		Weight / Volume:	1023 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14440
Project ID:	G383-595		Instrument:	HRMS1
Sample ID:	G383-595-1C		Filename:	a29aug07a_2-4
Collection Date/Time:	08/21/07	9:30	Retchk:	a29aug07a-15
Receipt Date/Time:	08/24/07	10:10	Begin ConCal:	a29aug07a-15
Extraction Date:	08/27/07		End ConCal:	a29aug07a_2-14
Analysis Date/Time:	08/30/07	6:30	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.16]Report

Analyzed by: _____
Date: 08-31-07

Reviewed by: _____
Date: 8/31/07

Form I copy

Method 8290
F51975-2
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	0.00232				
1,2,3,7,8-PeCDD	ND	0.00483				
1,2,3,4,7,8-HxCDD	ND	0.00483				
1,2,3,6,7,8-HxCDD	ND	0.00483				
1,2,3,7,8,9-HxCDD	ND	0.00483				
1,2,3,4,6,7,8-HpCDD	ND	0.00483				
OCDD	ND	0.00965				
2,3,7,8-TCDF	ND	0.00149				
1,2,3,7,8-PeCDF	ND	0.00483				
2,3,4,7,8-PeCDF	ND	0.00483				
1,2,3,4,7,8-HxCDF	ND	0.00483				
1,2,3,6,7,8-HxCDF	ND	0.00483				
2,3,4,6,7,8-HxCDF	ND	0.00483				
1,2,3,7,8,9-HxCDF	ND	0.00483				
1,2,3,4,6,7,8-HpCDF	ND	0.00483				
1,2,3,4,7,8,9-HpCDF	ND	0.00483				
OCDF	ND	0.00965				
Total TCDDs	ND	0.00232				
Total PeCDDs	ND	0.00483				
Total HxCDDs	ND	0.00483				
Total HpCDDs	ND	0.00483				
Total TCDFs	ND	0.00149				
Total PeCDFs	ND	0.00483				
Total HxCDFs	ND	0.00483				
Total HpCDFs	ND	0.00483				
WHO-2005 TEQ (ND=0)	ND		ND			
WHO-2005 TEQ (ND=½)	0.00621		0.00621			

Client Information			**Sample Information**	
Project Name:	F51975		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F51975-2		Weight / Volume:	1036 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14440
Project ID:	G383-595		Instrument:	HRMS1
Sample ID:	G383-595-3C		Filename:	a29aug07a_2-6
Collection Date/Time:	08/21/07	11:40	Retchk:	a29aug07a-15
Receipt Date/Time:	08/24/07	10:10	Begin ConCal:	a29aug07a-15
Extraction Date:	08/27/07		End ConCal:	a29aug07a_2-14
Analysis Date/Time:	08/30/07	8:07	Initial Cal:	m8290-071007a

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Method 8290
F51975-2
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	1.55	77.4	31:33	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.56	78.0	34:21	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.77	88.3	37:06	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.68	83.9	40:33	1.06	
13C12-OCDD	4.0	2.68	67.0	45:01	0.89	
13C12-2,3,7,8-TCDF	2.0	1.70	84.9	30:58	0.78	
13C12-1,2,3,7,8-PeCDF	2.0	1.44	71.8	33:34	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.63	81.3	36:24	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.56	78.1	39:15	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.374	93.6	31:34	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.316	79.1	34:10	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.351	87.8	37:01	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.345	86.3	36:16	0.54	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.290	72.5	41:13	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:06	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:22	1.25	

Client Information			**Sample Information**	
Project Name:	F51975		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F51975-2		Weight / Volume:	1036 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14440
Project ID:	G383-595		Instrument:	HRMS1
Sample ID:	G383-595-3C		Filename:	a29aug07a_2-6
Collection Date/Time:	08/21/07	11:40	Retchk:	a29aug07a-15
Receipt Date/Time:	08/24/07	10:10	Begin ConCal:	a29aug07a-15
Extraction Date:	08/27/07		End ConCal:	a29aug07a_2-14
Analysis Date/Time:	08/30/07	8:07	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.16]Report

Analyzed by: DMD
Date: 08.31.07

Reviewed by: MH
Date: 8/31/07

Form I Copy

Method 8290
F51975-3
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	0.00234				
1,2,3,7,8-PeCDD	ND	0.00527				
1,2,3,4,7,8-HxCDD	ND	0.00527				
1,2,3,6,7,8-HxCDD	ND	0.00527				
1,2,3,7,8,9-HxCDD	ND	0.00527				
1,2,3,4,6,7,8-HpCDD	ND	0.00599				
OCDD	EMPC	~~0.0164~~	0.0142 J	45:03	1.04 *	A
2,3,7,8-TCDF	ND	0.00199				
1,2,3,7,8-PeCDF	ND	0.00527				
2,3,4,7,8-PeCDF	ND	0.00527				
1,2,3,4,7,8-HxCDF	ND	0.00527				
1,2,3,6,7,8-HxCDF	ND	0.00527				
2,3,4,6,7,8-HxCDF	ND	0.00527				
1,2,3,7,8,9-HxCDF	ND	0.00527				
1,2,3,4,6,7,8-HpCDF	ND	0.00527				
1,2,3,4,7,8,9-HpCDF	ND	0.00527				
OCDF	ND	0.0105				
Total TCDDs	ND	0.00234				
Total PeCDDs	ND	0.00527				
Total HxCDDs	ND	0.00527				
Total HpCDDs	ND	0.00599				
Total TCDFs	ND	0.00199				
Total PeCDFs	ND	0.00527				
Total HxCDFs	ND	0.00527				
Total HpCDFs	ND	0.00527				
WHO-2005 TEQ (ND=0)	ND		0.00000426			
WHO-2005 TEQ (ND=½)	0.00671		0.00671			

Client Information			**Sample Information**	
Project Name:	F51975		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F51975-3		Weight / Volume:	948 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14440
Project ID:	G383-595		Instrument:	HRMS1
Sample ID:	G383-595-4C		Filename:	a29aug07a_2-7
Collection Date/Time:	08/21/07	14:50	Retchk:	a29aug07a-15
Receipt Date/Time:	08/24/07	10:10	Begin ConCal:	a29aug07a-15
Extraction Date:	08/27/07		End ConCal:	a29aug07a_2-14
Analysis Date/Time:	08/30/07	8:55	Initial Cal:	m8290-071007a

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Method 8290
F51975-3
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	1.62	81.2	31:33	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.60	79.9	34:21	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.78	89.1	37:06	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.69	84.5	40:33	1.06	
13C12-OCDD	4.0	2.71	67.7	45:03	0.90	
13C12-2,3,7,8-TCDF	2.0	1.74	87.1	30:58	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.50	75.0	33:34	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.63	81.6	36:24	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.57	78.3	39:15	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.396	98.9	31:34	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.328	82.0	34:10	1.58	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.363	90.7	37:01	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.371	92.7	36:16	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.308	77.1	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	1.24	

Client Information			**Sample Information**	
Project Name:	F51975		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F51975-3		Weight / Volume:	948 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14440
Project ID:	G383-595		Instrument:	HRMS1
Sample ID:	G383-595-4C		Filename:	a29aug07a_2-7
Collection Date/Time:	08/21/07	14:50	Retchk:	a29aug07a-15
Receipt Date/Time:	08/24/07	10:10	Begin ConCal:	a29aug07a-15
Extraction Date:	08/27/07		End ConCal:	a29aug07a_2-14
Analysis Date/Time:	08/30/07	8:55	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.16]Report

Analyzed by: JWP
Date: 08/31/07

Reviewed by: [illegible]
Date: 8/31/07

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Method 8290
F51975-4
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	0.00279				
1,2,3,7,8-PeCDD	ND	0.00534				
1,2,3,4,7,8-HxCDD	ND	0.00534				
1,2,3,6,7,8-HxCDD	ND	0.00534				
1,2,3,7,8,9-HxCDD	ND	0.00534				
1,2,3,4,6,7,8-HpCDD	ND	0.00618				
OCDD	0.0102 J			45:01	0.88	A
2,3,7,8-TCDF	ND	0.00232				
1,2,3,7,8-PeCDF	ND	0.00534				
2,3,4,7,8-PeCDF	ND	0.00534				
1,2,3,4,7,8-HxCDF	ND	0.00534				
1,2,3,6,7,8-HxCDF	ND	0.00534				
2,3,4,6,7,8-HxCDF	ND	0.00534				
1,2,3,7,8,9-HxCDF	ND	0.00534				
1,2,3,4,6,7,8-HpCDF	ND	0.00534				
1,2,3,4,7,8,9-HpCDF	ND	0.00534				
OCDF	ND	0.0132				
Total TCDDs	ND	0.00279				
Total PeCDDs	ND	0.00534				
Total HxCDDs	ND	0.00534				
Total HpCDDs	ND	0.00618				
Total TCDFs	ND	0.00232				
Total PeCDFs	ND	0.00534				
Total HxCDFs	ND	0.00534				
Total HpCDFs	ND	0.00534				
WHO-2005 TEQ (ND=0)	0.00000306		0.00000306			
WHO-2005 TEQ (ND=½)	0.00701		0.00701			

Client Information			**Sample Information**	
Project Name:	F51975		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F51975-4		Weight / Volume:	937 mL
			Solids / Lipids:	NA %
			Original pH :	7
Laboratory Information			Batch ID:	WG14440
Project ID:	G383-595		Instrument:	HRMS1
Sample ID:	G383-595-2C		Filename:	a29aug07a_2-5
Collection Date/Time:	08/21/07	15:00	Retchk:	a29aug07a-15
Receipt Date/Time:	08/24/07	10:10	Begin ConCal:	a29aug07a-15
Extraction Date:	08/27/07		End ConCal:	a29aug07a_2-14
Analysis Date/Time:	08/30/07	7:19	Initial Cal:	m8290-071007a

Form 1 CDM

Method 8290
F51975-4
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	1.51	75.7	31:33	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.56	78.1	34:21	1.57	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.74	86.9	37:06	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.71	85.3	40:33	1.05	
13C12-OCDD	4.0	2.54	63.4	45:03	0.90	
13C12-2,3,7,8-TCDF	2.0	1.66	83.0	30:58	0.78	
13C12-1,2,3,7,8-PeCDF	2.0	1.44	72.2	33:34	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.63	81.3	36:24	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.57	78.7	39:15	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.364	91.0	31:34	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.318	79.5	34:10	1.57	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.354	88.5	37:01	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.365	91.3	36:16	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.301	75.2	41:13	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:06	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:22	1.24	

Client Information			**Sample Information**		
Project Name:	F51975		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F51975-4		Weight / Volume:	937 mL	
			Solids / Lipids:	NA	%
			Original pH :	7	
Laboratory Information			Batch ID:	WG14440	
Project ID:	G383-595		Instrument:	HRMS1	
Sample ID:	G383-595-2C		Filename:	a29aug07a_2-5	
Collection Date/Time:	08/21/07	15:00	Retchk:	a29aug07a-15	
Receipt Date/Time:	08/24/07	10:10	Begin ConCal:	a29aug07a-15	
Extraction Date:	08/27/07		End ConCal:	a29aug07a_2-14	
Analysis Date/Time:	08/30/07	7:19	Initial Cal:	m8290-071007a	

Form Version:[8290_DB_2.16]Report

Analyzed by: JWP
Date: 08/31/07

Reviewed by: MB
Date: 9/13/07

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 F51975

DATE: October 5, 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 21, 2007. Aqueous samples were analyzed for explosives, nitroglycerin, and PETN using USEPA SW-846 3535A/8330A. A total of four aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
LFMW01	F51975-1	17MW02	F51975-3
17MW03	F51975-2	17PZ01	F51975-4

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

10/5/07
Date

RFAAP VALIDATION REPORT
EXPLOSIVES REVIEW
SDG F51975

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 08/21/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 1.2°C, 1.2°C, 0.8°C, 0.4°C, 1.0°C, 0.4°C, 0.6°C, and 2.0°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 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 0.6°C. Even though some of the receipt temperatures were below criteria, there were no impacts to the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/21/07, the explosives were extracted on 08/28/07 and analyzed on 08/29/07 and 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
08/29/07	OP22080-MB	All target explosives <½MRL	NA	NA	None
08/30/07	OP22080-MB	All target explosives <½MRL	NA	NA	None
08/31/07	OP22080-MB	All target explosives <½MRL	NA	NA	None
08/30/07	OP22080-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 08/21/06 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 LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 10/20/06 @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 08/29/07 @09:56 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), and 17MW02 (F51975-3) apply to this continuing calibration.

- For explosives continuing calibration performed on 08/29/07 @14:59 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Sample LFMW01 (F51975-1) applies to this continuing calibration.

- For explosives continuing calibration performed on 08/29/07 @20:38 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 @10:44 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Sample 17PZ01 (F51975-4) applies 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. 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. No samples reported apply 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 @10:12 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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.

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 OP22080-BS was used as aqueous LCS for explosives analyzed on 08/29/07. All criteria were met. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply to this LCS.

- Sample OP22080-BS was used as aqueous LCS for explosives analyzed on 08/31/07. All criteria were met. No qualifiers were applied. No samples reported apply to this LCS.

- Sample OP22080-BS2 was used as aqueous LCS for PETN and nitroglycerin analyzed on 08/30/07. All criteria were met. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 F52012-1 was used as the aqueous MS/MSD for the explosive analysis on 08/29/07. Since the spiked sample was not a site sample, it was not evaluated. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply to this MS/MSD.

- Sample 17PZ01 (F51975-4) was used as the aqueous MS/MSD for the PETN and nitroglycerin analysis on 08/30/07. PETN (126%) and nitroglycerin (125%) were above lab criteria. All samples were non-detect for PETN and nitroglycerin; therefore, no qualifiers were applied based upon these outliers. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 explosives, PETN, and nitroglycerin were non-detect. No confirmations were required.

Sample: OP22080-BS, 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 = (4110025 * 10 * 1) / (7292 * 1000) = 5.6 µg/L (Signal #1)

Reported Value = 5.6 µg/L
% Difference = 0.0%
Values were within 10% difference

Sample: OP22080-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 = (3414149 * 10 * 1) / (1228 * 1000) = 27.8 µg/L (Signal #1)

Reported Value = 27.8 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:	LFMW01		
Lab Sample ID:	F51975-1	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	GG023836.D	1	08/29/07	NAF	08/28/07	OP22080	GGG1012
Run #2	PP022655.D	1	08/30/07	NAF	08/28/07	OP22080	GPP789

	Initial Volume	Final Volume
Run #1	1020 ml	10.0 ml
Run #2	1020 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	0.095	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.20	0.20	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	0.076	ug/l	
99-99-0	p-Nitrotoluene	ND	0.20	0.099	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	0.049	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.0	0.49	ug/l	
78-11-5	PETN	ND [a]	2.0	0.49	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	109%	94%	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

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Accutest Laboratories

Report of Analysis

Client Sample ID:	17MW03		
Lab Sample ID:	F51975-2	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	GG023831.D	1	08/29/07	NAF	08/28/07	OP22080	GGG1012
Run #2	PP022656.D	1	08/30/07	NAF	08/28/07	OP22080	GPP789

	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	0.19	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 [a]	1.9	0.48	ug/l	
78-11-5	PETN	ND [a]	1.9	0.48	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	105%	94%	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: GG023832.D PP022657.D

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Accutest Laboratories

Report of Analysis

Client Sample ID:	17MW02		
Lab Sample ID:	F51975-3	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	GG023832.D	1	08/29/07	NAF	08/28/07	OP22080	GGG1012
Run #2	PP022657.D	1	08/30/07	NAF	08/28/07	OP22080	GPP789

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

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.20	0.051	ug/l	
121-82-4	RDX	ND	0.20	0.060	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.20	0.056	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.20	0.071	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.20	0.097	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.20	0.20	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.20	0.056	ug/l	
98-95-3	Nitrobenzene	ND	0.20	0.073	ug/l	
88-72-2	o-Nitrotoluene	ND	0.20	0.12	ug/l	
99-08-1	m-Nitrotoluene	ND	0.20	0.078	ug/l	
99-99-0	p-Nitrotoluene	ND	0.20	0.10	ug/l	
479-45-8	Tetryl	ND	0.20	0.068	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.20	0.065	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	118%	118%	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

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Accutest Laboratories

Report of Analysis

Client Sample ID:	17PZ01		
Lab Sample ID:	F51975-4	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	GG023853.D	1	08/30/07	NAF	08/28/07	OP22080	GGG1013
Run #2	PP022658.D	1	08/30/07	NAF	08/28/07	OP22080	GPP789

	Initial Volume	Final Volume
Run #1	1050 ml	10.0 ml
Run #2	1050 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	0.057	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.19	0.053	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.19	0.068	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.19	0.092	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.19	0.19	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.19	0.053	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	0.074	ug/l	
99-99-0	p-Nitrotoluene	ND	0.19	0.096	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 [a]	1.9	0.48	ug/l	
78-11-5	PETN	ND [a]	1.9	0.48	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	107%	93%	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.
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 F51975

DATE: October 3, 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 21, 2007. Aqueous samples were analyzed for chlorinated herbicides using USEPA SW846 Method 3510C/8151A. A total of four aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
LFMW01	F51975-1	17MW02	F51975-3
17MW03	F51975-2	17PZ01	F51975-4

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

10/03/07
Date

RFAAP VALIDATION REPORT
CHLORINATED HERBICIDES REVIEW
SDG F51975

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 08/21/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 1.2°C, 1.2°C, 0.8°C, 0.4°C, 1.0°C, 0.4°C, 0.6°C, and 2.0°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 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 0.6°C. Even though some of the receipt temperatures were below criteria, there were no impacts to the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For aqueous samples collected 08/21/07, the herbicides were extracted on 08/27/07 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 LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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. 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	OP7950-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 OP7950-BS was used as the aqueous LCS for the 09/01/07 run. Compounds 2,4-D (120%), 2,4,5-TP (130%), 2,4,5-T (110%), dicamba (123%), dinoseb (110%), and dichlorprop (130%) were above DoD QSM criteria and/or laboratory criteria. All samples were non-detect for these herbicides; therefore, no qualifiers were applied based upon these outliers. All other herbicides were within criteria. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 17MW03 (F51975-2) was used for the aqueous MS analysis on 09/01/07. Instead of a MSD, the lab performed a sample duplicate (SD). Compounds 2,4,5-TP (125%), dicamba (115%), and dichlorprop (125%) were above DoD QSM criteria and/or laboratory criteria. All samples were non-detect for these herbicides; therefore, no qualifiers were applied based upon these outliers. All other herbicides were within criteria. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply to this MS/SD.

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: 17MW03MS (F51975-2MS), 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 = (3866212 ng/mL * 1 * 10 mL) / (7872* 1000 mL)
= 4.9 ng/mL = 4.9 µg/L

Reported Conc. = 4.9 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: DD67068.D

Form I OM

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFMW01		
Lab Sample ID:	F51975-1	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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]	DD67068.D	1	09/01/07	ATX	08/27/07	T:OP7950	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 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	99%		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: DD67069.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	17MW03		
Lab Sample ID:	F51975-2	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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]	DD67069.D	1	09/01/07	ATX	08/27/07	T:OP7950	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 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	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

Raw Data: DD67070.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	17MW02		
Lab Sample ID:	F51975-3	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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]	DD67070.D	1	09/01/07	ATX	08/27/07	T:OP7950	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 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	78%		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

From I Corp

Accutest Laboratories

Report of Analysis

Client Sample ID:	17PZ01		
Lab Sample ID:	F51975-4	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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]	DD67071.D	1	09/01/07	ATX	08/27/07	T:OP7950	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 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	98%		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
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 F51975

DATE: October 3, 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 21, 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 four aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
LFMW01	F51975-1	17MW02	F51975-3
17MW03	F51975-2	17PZ01	F51975-4

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

10/3/07
Date

RFAAP VALIDATION REPORT
METALS REVIEW
SDG F51975

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 08/21/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 1.2°C, 1.2°C, 0.8°C, 0.4°C, 1.0°C, 0.4°C, 0.6°C, and 2.0°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 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 0.6°C. Even though some of the receipt temperatures were below criteria, there were no impacts to the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For aqueous samples collected 08/21/07, they were digested on 09/05/07 and analyzed on 09/06/07 for ICP metals. For aqueous samples collected 08/21/07, they were digested on 08/28/07 and analyzed on 08/28/07 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 09/06/07. Mercury was analyzed for the aqueous samples on 08/28/07 with a correlation coefficient of 0.9997. 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
08/28/07	Hg	1.0	All within criteria	None	None
09/06/07	ICP-Sb	12	121%	None	K
09/06/07	ICP-Se	10	124%	None	K

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.

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	17MW02, 17PZ01, LFMW01
09/06/07	Iron	ICB/CCBs	37.0J	185	None
09/06/07	Potassium	ICB/CCBs	1730J	8650	17MW02, 17MW03, 17PZ01, LFMW01
09/06/07	Sodium	ICB/CCBs	1960J	9800	17PZ01
08/28/07	Mercury	ICB/CCBs	<2*MDL	NA	None
08/28/07	Mercury	MP12829-MB	<2*MDL	NA	None
09/06/07	Beryllium	MP12877-MB	2.2J	11.0	17MW02, 17PZ01, LFMW01
09/06/07	Potassium	MP12877-MB	1720J	8600	17MW02, 17MW03, 17PZ01, LFMW01
09/06/07	Silver	MP12877-MB	2.2J	11.0	17MW02
09/06/07	Sodium	MP12877-MB	1880J	9400	17PZ01
09/17/07	Potassium	RB083007	1740J	8700	17MW02, 17MW03, 17PZ01, LFMW01
09/17/07	Sodium	RB083007	1860J	9300	17PZ01
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 MP12877-BS was used as aqueous LCS for ICP metals analysis on 09/06/07. All criteria were met. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply to this LCS.

- Sample MP12829-BS was used as aqueous LCS for mercury analysis performed on 08/28/07. All criteria were met. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 F51982-1 was used as aqueous laboratory duplicate for ICP metals analysis on 09/06/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply to this laboratory duplicate.

- Sample LFMW01 (F51975-1) was used as aqueous laboratory duplicate for mercury analysis on 08/28/07. All criteria were met. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 F51982-1 was used as laboratory aqueous MS/MSD for ICP metals analysis on 09/06/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply to this MS/MSD.

- Sample LFMW01 (F51975-1) was used as laboratory aqueous MS/MSD for mercury analysis on 08/28/07. All criteria were met. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 F51982-1 on 09/06/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply to this serial dilution.

- The serial dilution for mercury was analyzed using aqueous sample LFMW01 (F51975-1) on 08/28/07. All criteria were met. No qualifiers were applied. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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: LFMW01 (F51975-1), Barium

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (93.0 µg/L)*(50 mL)*(1) / (50 mL) = 93.0 µg/L

Reported concentration = 93.0 µg/L
%D = 0.0%
Values were within 10% difference.

CVAA Sample: LFMW01MS (F51975-1MS), Mercury

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (2.93 µg/L)*(50 mL)*(1) / (50 mL) = 2.9 µg/L

Reported concentration = 2.9 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 Corr

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFMW01		
Lab Sample ID:	F51975-1	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
		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	9320	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	93.0 J J	200	5.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.9 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	120000	1000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Chromium	43.0	10	0.92	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Cobalt	4.6 J J	50	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Copper	6.9 J J	25	1.2	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Iron	10100	300	15	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Lead	3.6 J J	5.0	2.1	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Magnesium	56700	5000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Manganese	78.3	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	08/28/07	08/28/07	LM	SW846 7470A [1]	SW846 7470A [3]
Nickel	30.5 J J	40	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Potassium	6120 J B	10000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Selenium	4.0 U	10	4.0	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	12100	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	20.0 J J	50	1.1	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Zinc	60.4	20	5.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5938
(2) Instrument QC Batch: MA5956
(3) Prep QC Batch: MP12829
(4) Prep QC Batch: MP12877

(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:	17MW03		
Lab Sample ID:	F51975-2	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
		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	176 J J	200	5.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	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	110000	1000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Chromium	32.4	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	1.9 J J	25	1.2	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Iron	15 U	300	15	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	39900	5000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Manganese	42.4	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	08/28/07	08/28/07	LM	SW846 7470A [1]	SW846 7470A [3]
Nickel	27.6 J J	40	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Potassium	4520 J B	10000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Selenium [b]	16 U	20	16	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	19500	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	13.2 J J	20	5.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5938
(2) Instrument QC Batch: MA5956
(3) Prep QC Batch: MP12829
(4) Prep QC Batch: MP12877

(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:	17MW02		
Lab Sample ID:	F51975-3	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
		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	222	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	54.4 J J	200	5.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.3 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	76100	1000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Chromium	29.5	10	0.92	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Cobalt	26.9 J J	50	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Copper	7.9 J J	25	1.2	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Iron	644	300	15	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	28400	5000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Manganese	12.8 J J	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	08/28/07	08/28/07	LM	SW846 7470A [1]	SW846 7470A [3]
Nickel	18.1 J J	40	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Potassium	3610 J B	10000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Selenium	4.0 U	10	4.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Silver	6.2 J B	10	0.77	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Sodium	14600	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	1.5 J J	50	1.1	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Zinc	11.9 J J	20	5.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5938
(2) Instrument QC Batch: MA5956
(3) Prep QC Batch: MP12829
(4) Prep QC Batch: MP12877

(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:	17PZ01		
Lab Sample ID:	F51975-4	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
		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	296	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	69.7 J J	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	76700	1000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Chromium	11.0	10	0.92	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	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	15 U	300	15	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	29800	5000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Manganese	5.3 J J	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	08/28/07	08/28/07	LM	SW846 7470A [1]	SW846 7470A [3]
Nickel	6.4 J J	40	1.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Potassium	2810 J B	10000	100	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]
Selenium	4.0 U	10	4.0	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	5690 J B	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	10 J J	20	5.0	ug/l	1	09/05/07	09/06/07	DM	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5938
(2) Instrument QC Batch: MA5956
(3) Prep QC Batch: MP12829
(4) Prep QC Batch: MP12877

(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.
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 – Perchlorate
Datachem Laboratories, Inc. SDG 07E-0759-01
(Accutest Laboratories, Inc., SDG F51975)

DATE: October 4, 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 21, 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 four aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
LFMW01	F51975-1	17MW02	F51975-3
17MW03	F51975-2	17PZ01	F51975-4

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

10/4/07
Date

RFAAP VALIDATION REPORT
PERCHLORATE REVIEW
SDG 07E-0759-01 (F51975)

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 08/21/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 1.2°C, 1.2°C, 0.8°C, 0.4°C, 1.0°C, 0.4°C, 0.6°C, and 2.0°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 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 0.6°C. Even though some of the receipt temperatures were below criteria, there were no impacts to the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: The aqueous samples were collected on 08/21/07. 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 LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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
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.

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 LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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: LFMW01 (F51975-1), Perchlorate

y (area ratio) = (Sample Area/Area EIC89) = (73508.4/54080.7) = 1.359235 = 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 - 1.359235 = -1.3601357

amount ratio ={-1.23841± [SQRT{(1.23841^2) – (4*0.0350178*-1.3601357)}] / (2*0.0350178)
= (-1.23841±1.31307) / (0.0700356)
= 1.066

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)
= (1.066* 5 µg/L * 1) = 5.33 µg/L

Reported concentration = 5.33 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

S077R02T

Date Printed.....: 06-SEP-07 09:15

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F51975
Release Number.....: Not Provided

Date Received.....: 24-AUG-07 00:00

Client Sample Name: **F51975-1**
DCL Sample Name...: **07E04391**
DCL Report Group..: **07E-0759-01**

Matrix.....: WATER
Date Sampled.....: 21-AUG-07 09:30
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 19:51	0.112	5.33			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

S077R02V

Date Printed.....: 06-SEP-07 09:15

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F51975
Release Number.....: Not Provided

Date Received.....: 24-AUG-07 00:00

Client Sample Name: **F51975-2**
DCL Sample Name...: **07E04392**
DCL Report Group..: **07E-0759-01**

Matrix.....: WATER
Date Sampled.....: 21-AUG-07 11:40
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 20:11	0.112	4.02			1	0.200

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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
09060709154447

S077R02W

Date Printed.....: 06-SEP-07 09:15

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F51975
Release Number.....: Not Provided

Date Received.....: 24-AUG-07 00:00

Client Sample Name: **F51975-3**
DCL Sample Name...: **07E04393**
DCL Report Group..: **07E-0759-01**

Matrix.....: WATER
Date Sampled.....: 21-AUG-07 14:50
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 20:30	0.112	5.40			1	0.200

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FORM A (TYPE I)
SINGLE METHOD ANALYSES

SAMPLE ANALYSIS DATA SHEET

S077R02X

Date Printed.....: 06-SEP-07 09:15

Client Name.....: ACCUTEST Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F51975
Release Number.....: Not Provided

Date Received.....: 24-AUG-07 00:00

Client Sample Name: **F51975-4**
DCL Sample Name...: **07E04394**
DCL Report Group..: **07E-0759-01**

Matrix.....: WATER
Date Sampled.....: 21-AUG-07 15:00
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 20:50	0.112	1.09			1	0.200

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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 – Pesticides and PCBs
Accutest Laboratories, Inc., SDG F51975

DATE: October 8, 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 21, 2007. Aqueous samples were analyzed for pesticides and PCBs using USEPA Method 3510C/8081A and 3510C/8082, respectively. A total of four aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
LFMW01	F51975-1	17MW02	F51975-3
17MW03	F51975-2	17PZ01	F51975-4

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

10/8/07
Date

RFAAP VALIDATION REPORT
PESTICIDE/PCB REVIEW
SDG F51975

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 08/21/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 1.2°C, 1.2°C, 0.8°C, 0.4°C, 1.0°C, 0.4°C, 0.6°C, and 2.0°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 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 0.6°C. Even though some of the receipt temperatures were below criteria, there were no impacts to the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For aqueous samples collected 08/21/07, 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) were 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) were 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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. 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 pesticides sample LFMW01 (F51975-1), decachlorobiphenyl (29.0%) 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 LFMW01 (F51975-1), 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 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). 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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: 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.

Raw Data: KK21402.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFMW01		
Lab Sample ID:	F51975-1	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	KK21402.D	1	09/06/07	FS	08/28/07	OP22089	GKK780
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	0.0098	ug/l	
319-84-6	alpha-BHC	ND	0.049	0.0098	ug/l	
319-85-7	beta-BHC	ND	0.049	0.011	ug/l	
319-86-8	delta-BHC	ND	0.049	0.0098	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.049	0.0098	ug/l	
5103-71-9	alpha-Chlordane	ND	0.049	0.0098	ug/l	
5103-74-2	gamma-Chlordane	ND	0.049	0.0098	ug/l	
60-57-1	Dieldrin	ND	0.049	0.0098	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	0.020	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.098	0.020	ug/l	
7421-93-4	Endrin aldehyde	ND UL	0.098	0.029	ug/l	
53494-70-5	Endrin ketone	ND	0.098	0.020	ug/l	
959-98-8	Endosulfan-I	ND	0.049	0.0098	ug/l	
33213-65-9	Endosulfan-II	ND	0.098	0.0098	ug/l	
76-44-8	Heptachlor	ND	0.049	0.0098	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.049	0.0098	ug/l	
72-43-5	Methoxychlor	ND	0.098	0.020	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	79%		42-127%
2051-24-3	Decachlorobiphenyl	29%		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: ST66070.D

Form 1 Corg

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFMW01		
Lab Sample ID:	F51975-1	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	ST66070.D	1	09/07/07	JB	08/28/07	OP22088	GST1724
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	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	84%		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

Raw Data: KK21403.D

Form I Cor

Accutest Laboratories

Report of Analysis

Client Sample ID:	17MW03		
Lab Sample ID:	F51975-2	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	KK21403.D	1	09/06/07	FS	08/28/07	OP22089	GKK780
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 VL	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	79%		42-127%
2051-24-3	Decachlorobiphenyl	91%		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: ST66071.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	17MW03		
Lab Sample ID:	F51975-2	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	ST66071.D	1	09/07/07	JB	08/28/07	OP22088	GST1724
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	93%		38-127%
2051-24-3	Decachlorobiphenyl	96%		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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Accutest Laboratories

Report of Analysis

Client Sample ID:	17MW02		
Lab Sample ID:	F51975-3	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	KK21404.D	1	09/06/07	FS	08/28/07	OP22089	GKK780
Run #2							

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

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.050	0.0099	ug/l	
319-84-6	alpha-BHC	ND	0.050	0.0099	ug/l	
319-85-7	beta-BHC	ND	0.050	0.011	ug/l	
319-86-8	delta-BHC	ND	0.050	0.0099	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	0.0099	ug/l	
5103-71-9	alpha-Chlordane	ND	0.050	0.0099	ug/l	
5103-74-2	gamma-Chlordane	ND	0.050	0.0099	ug/l	
60-57-1	Dieldrin	ND	0.050	0.0099	ug/l	
72-54-8	4,4'-DDD	ND	0.099	0.020	ug/l	
72-55-9	4,4'-DDE	ND	0.099	0.020	ug/l	
50-29-3	4,4'-DDT	ND	0.099	0.020	ug/l	
72-20-8	Endrin	ND	0.099	0.020	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.099	0.020	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.099	0.030	ug/l	
53494-70-5	Endrin ketone	ND	0.099	0.020	ug/l	
959-98-8	Endosulfan-I	ND	0.050	0.0099	ug/l	
33213-65-9	Endosulfan-II	ND	0.099	0.0099	ug/l	
76-44-8	Heptachlor	ND	0.050	0.0099	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	0.0099	ug/l	
72-43-5	Methoxychlor	ND	0.099	0.020	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	77%		42-127%
2051-24-3	Decachlorobiphenyl	79%		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: ST66072.D

Form I COM

Accutest Laboratories

Report of Analysis

Client Sample ID:	17MW02		
Lab Sample ID:	F51975-3	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	ST66072.D	1	09/07/07	JB	08/28/07	OP22088	GST1724
Run #2							

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

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	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	83%		38-127%
2051-24-3	Decachlorobiphenyl	83%		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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Accutest Laboratories

Report of Analysis

Client Sample ID:	17PZ01		
Lab Sample ID:	F51975-4	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	KK21405.D	1	09/06/07	FS	08/28/07	OP22089	GKK780
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	0.0096	ug/l	
319-84-6	alpha-BHC	ND	0.048	0.0096	ug/l	
319-85-7	beta-BHC	ND	0.048	0.011	ug/l	
319-86-8	delta-BHC	ND	0.048	0.0096	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.048	0.0096	ug/l	
5103-71-9	alpha-Chlordane	ND	0.048	0.0096	ug/l	
5103-74-2	gamma-Chlordane	ND	0.048	0.0096	ug/l	
60-57-1	Dieldrin	ND	0.048	0.0096	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	0.019	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.096	0.019	ug/l	
7421-93-4	Endrin aldehyde	ND UL	0.096	0.029	ug/l	
53494-70-5	Endrin ketone	ND	0.096	0.019	ug/l	
959-98-8	Endosulfan-I	ND	0.048	0.0096	ug/l	
33213-65-9	Endosulfan-II	ND	0.096	0.0096	ug/l	
76-44-8	Heptachlor	ND	0.048	0.0096	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.048	0.0096	ug/l	
72-43-5	Methoxychlor	ND	0.096	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	71%		42-127%
2051-24-3	Decachlorobiphenyl	62%		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

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Accutest Laboratories

Report of Analysis

Client Sample ID:	17PZ01		
Lab Sample ID:	F51975-4	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	ST66073.D	1	09/07/07	JB	08/28/07	OP22088	GST1724
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	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	64%		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 F51975

DATE: October 4, 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 21, 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 four aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
LFMW01	F51975-1	17MW02	F51975-3
17MW03	F51975-2	17PZ01	F51975-4

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

10/4/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F51975

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) compou nds, 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 08/21/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 1.2°C, 1.2°C, 0.8°C, 0.4°C, 1.0°C, 0.4°C, 0.6°C, and 2.0°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 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 0.6°C. Even though some of the receipt temperatures were below criteria, there were no impacts to the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/21/07, 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 09/12/07. 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) were 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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. 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. 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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).

- 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) apply 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 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: OP22083-BS, 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 = (423825 * 40 * 1000 * 1) / (490183 * 0.769 * 1000 * 1) = 45.0 ng/mL
= 45.0 µg/L

Reported Value = 45.0 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: R10422.D

Form I Copy

Accutest Laboratories

Report of Analysis

3.1

3

Client Sample ID:	LFMW01		
Lab Sample ID:	F51975-1	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	R10422.D	1	09/08/07	NJ	08/28/07	OP22083	SR487
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 I COPY

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFMW01		
Lab Sample ID:	F51975-1	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	27%		14-62%
4165-62-2	Phenol-d5	18%		10-40%
118-79-6	2,4,6-Tribromophenol	59%		33-118%
4165-60-0	Nitrobenzene-d5	57%		42-108%
321-60-8	2-Fluorobiphenyl	55%		40-106%
1718-51-0	Terphenyl-d14	63%		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: W036812.D

Form I Cmy

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFMW01		
Lab Sample ID:	F51975-1	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	W036812.D	1	09/12/07	RB	08/28/07	OP22084	SW1898
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: R10423.D

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Report of Analysis

Client Sample ID:	17MW03		
Lab Sample ID:	F51975-2	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	R10423.D	1	09/08/07	NJ	08/28/07	OP22083	SR487
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	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:	17MW03		
Lab Sample ID:	F51975-2	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	27%		14-62%
4165-62-2	Phenol-d5	18%		10-40%
118-79-6	2,4,6-Tribromophenol	62%		33-118%
4165-60-0	Nitrobenzene-d5	59%		42-108%
321-60-8	2-Fluorobiphenyl	56%		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: W036813.D

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Report of Analysis

Client Sample ID:	17MW03		
Lab Sample ID:	F51975-2	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	W036813.D	1	09/12/07	RB	08/28/07	OP22084	SW1898
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

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Report of Analysis

Client Sample ID:	17MW02		
Lab Sample ID:	F51975-3	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	R10424.D	1	09/08/07	NJ	08/28/07	OP22083	SR487
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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Report of Analysis

Client Sample ID:	17MW02		
Lab Sample ID:	F51975-3	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	28%		14-62%
4165-62-2	Phenol-d5	20%		10-40%
118-79-6	2,4,6-Tribromophenol	63%		33-118%
4165-60-0	Nitrobenzene-d5	58%		42-108%
321-60-8	2-Fluorobiphenyl	57%		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

Raw Data: W036814.D

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Report of Analysis

Client Sample ID:	17MW02		
Lab Sample ID:	F51975-3	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	W036814.D	1	09/12/07	RB	08/28/07	OP22084	SW1898
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 VL	1.0	0.50	ug/l	
208-96-8	Acenaphthylene	ND VL	1.0	0.50	ug/l	
120-12-7	Anthracene	ND VL	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 VL	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 VL	0.20	0.050	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND VL	1.0	0.25	ug/l	
91-20-3	Naphthalene	ND VL	1.0	0.25	ug/l	
85-01-8	Phenanthrene	ND VL	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

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Report of Analysis

Client Sample ID:	17PZ01		
Lab Sample ID:	F51975-4	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	R10425.D	1	09/08/07	NJ	08/28/07	OP22083	SR487
Run #2							

	Initial Volume	Final Volume
Run #1	1050 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	9.5	ug/l	
95-57-8	2-Chlorophenol	ND	4.8	0.95	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	0.95	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.8	1.9	ug/l	
51-28-5	2,4-Dinitrophenol	ND	24	9.5	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.5	1.9	ug/l	
95-48-7	2-Methylphenol	ND	4.8	0.95	ug/l	
	3&4-Methylphenol	ND	4.8	1.2	ug/l	
88-75-5	2-Nitrophenol	ND	4.8	0.95	ug/l	
100-02-7	4-Nitrophenol	ND	24	9.5	ug/l	
87-86-5	Pentachlorophenol	ND	24	9.5	ug/l	
108-95-2	Phenol	ND	4.8	1.9	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.8	0.95	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.8	0.95	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.8	1.1	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.8	1.9	ug/l	
100-51-6	Benzyl Alcohol	ND	4.8	0.95	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	0.95	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.8	0.95	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.8	0.95	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.8	0.95	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	4.8	1.5	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	4.8	1.4	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.8	0.95	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.8	0.95	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.5	1.9	ug/l	
132-64-9	Dibenzofuran	ND	4.8	0.95	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:	17PZ01		
Lab Sample ID:	F51975-4	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	1.1	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	0.95	ug/l	
88-74-4	2-Nitroaniline	ND	9.5	1.9	ug/l	
99-09-2	3-Nitroaniline	ND	9.5	1.9	ug/l	
100-01-6	4-Nitroaniline	ND	9.5	1.9	ug/l	
98-95-3	Nitrobenzene	ND	4.8	0.95	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.8	0.95	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.8	0.95	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	28%		14-62%
4165-62-2	Phenol-d5	19%		10-40%
118-79-6	2,4,6-Tribromophenol	66%		33-118%
4165-60-0	Nitrobenzene-d5	61%		42-108%
321-60-8	2-Fluorobiphenyl	60%		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

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Report of Analysis

Client Sample ID:	17PZ01		
Lab Sample ID:	F51975-4	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	W036817.D	1	09/12/07	RB	08/28/07	OP22084	SW1898
Run #2							

	Initial Volume	Final Volume
Run #1	1050 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.95	0.48	ug/l	
208-96-8	Acenaphthylene	ND	0.95	0.48	ug/l	
120-12-7	Anthracene	ND	0.95	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	0.095	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	0.095	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.19	0.095	ug/l	
218-01-9	Chrysene	ND	0.19	0.095	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.19	0.048	ug/l	
206-44-0	Fluoranthene	ND	0.95	0.24	ug/l	
86-73-7	Fluorene	ND	0.95	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	0.95	0.24	ug/l	
91-57-6	2-Methylnaphthalene	ND	0.95	0.24	ug/l	
91-20-3	Naphthalene	ND	0.95	0.24	ug/l	
85-01-8	Phenanthrene	ND	0.95	0.48	ug/l	
129-00-0	Pyrene	ND	0.95	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

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 F51975

DATE: October 5, 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 21, 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 four aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
LFMW01	F51975-1	17MW02	F51975-3
17MW03	F51975-2	17PZ01	F51975-4

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

10/5/07
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.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/21/07, the coolers were received by the primary laboratory (Accutest) on 08/22/07 at 1.2°C, 1.2°C, 0.8°C, 0.4°C, 1.0°C, 0.4°C, 0.6°C, and 2.0°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 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 0.6°C. Even though some of the receipt temperatures were below criteria, there were no impacts to the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/21/07, the VOCs were prepped and analyzed on 08/30/07. 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 08/22/07 on instrument MSVOA5, target compounds vinyl chloride (21.7%), acetone (45.5%; grossly exceeding), 1,1-dichloroethene (15.1%), carbon disulfide (16.8%), methylene chloride (54.1%; grossly exceeding), trans-1,2-dichloroethene (15.2%), 1,1,1-trichloroethane (16.4%), carbon tetrachloride (20.2%), trichloroethene (16.6%), cis-1,3-dichloropropene (15.7%), o-xylene (17.8%), styrene (22.5%), and bromoform (18.4%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds vinyl chloride (r=0.9984), acetone (r=0.9981), 1,1-dichloroethene (r=0.9993), carbon disulfide (r=0.9987), methylene chloride (r=0.9995), trans-1,2-dichloroethene (r=0.9997), 1,1,1-trichloroethane (r=0.9996), carbon tetrachloride (r=0.9995), trichloroethene (r=0.9995), cis-1,3-dichloropropene (r=0.9994), o-xylene (r=0.9997), and styrene (r=0.9998) 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 08/22/07 @12:22 on instrument MSVOA5, target compounds bromomethane (22.5%), chloroethane (21.2%), acetone (21.3%), trans-1,3-dichloropropene (27.0%), 2-hexanone (22.1%), and bromoform (28.2%) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Bromomethane, chloroethane, acetone, trans-1,3-dichloropropene, 2-hexanone, and bromoform were non-detect for all samples; therefore, no qualifiers were applied based upon the high %Ds/%Drifts. No samples reported apply to this initial calibration verification. No qualifiers were applied based upon this outlier.

- For continuing calibration performed on 08/30/07 @12:16 on instrument MSVOA5, target compound acetone (55.2%; grossly exceeding) was 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. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. The trip blank TB082107 (F51975-5) applies to the aqueous samples collected 08/21/07.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
08/30/07	VC2050-MB	All target <½MRL	NA	NA	None
09/13/07	RB083007	All target <½MRL	NA	NA	None
08/30/07	TB082107	All target <½MRL	NA	NA	None

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 VC2050-BS was used as the aqueous LCS for the VOC analysis on 08/30/07. Acetone (138%) and chloromethane (144%) were above laboratory limits and/or DoD QSM criteria. Acetone and chloromethane were non-detect for all associated samples; therefore, no qualifiers were applied for these compounds based upon these outliers. All other percent recoveries were within criteria for all target compounds. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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 LFMW01 (F51975-1) was used for the aqueous MS/MSD analysis on 08/30/07. Chloromethane (136%, 148%) and vinyl chloride (149%) were 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 samples were non-detect for these compounds; therefore, no qualifiers were applied based upon these outliers. All other percent recoveries were within criteria for all target compounds. Samples LFMW01 (F51975-1), 17MW03 (F51975-2), 17MW02 (F51975-3), and 17PZ01 (F51975-4) 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.

- For sample LFMW01 (F51975-1), 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 17MW02 (F51975-3), 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 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 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: 17MW03 (F51975-2), toluene

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 = (5481 * 50 µg/L * 1) / (449790 * 1.599) = 0.38 µg/L

Reported Conc. = 0.38 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: C0050643.D

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Report of Analysis

Client Sample ID:	LFMW01		
Lab Sample ID:	F51975-1	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	C0050643.D	1	08/30/07	LD	n/a	n/a	VC2050
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 UJ	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:	LFMW01		
Lab Sample ID:	F51975-1	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	108%		87-116%
17060-07-0	1,2-Dichloroethane-D4	112%		76-127%
2037-26-5	Toluene-D8	100%		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

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Report of Analysis

Client Sample ID:	17MW03		
Lab Sample ID:	F51975-2	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	C0050644.D	1	08/30/07	LD	n/a	n/a	VC2050
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 UJ	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	0.38 J	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:	17MW03		
Lab Sample ID:	F51975-2	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	106%		87-116%
17060-07-0	1,2-Dichloroethane-D4	114%		76-127%
2037-26-5	Toluene-D8	103%		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

Raw Data: C0050645.D

Form I copy

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Report of Analysis

Client Sample ID:	17MW02		
Lab Sample ID:	F51975-3	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	C0050645.D	1	08/30/07	LD	n/a	n/a	VC2050
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 UJ	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	5.9	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	2.6	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:	17MW02		
Lab Sample ID:	F51975-3	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	111%		87-116%
17060-07-0	1,2-Dichloroethane-D4	119%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	101%		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: C0050646.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	17PZ01		
Lab Sample ID:	F51975-4	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	C0050646.D	1	08/30/07	LD	n/a	n/a	VC2050
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 UJ	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	2.7	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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	17PZ01		
Lab Sample ID:	F51975-4	**Date Sampled:**	08/21/07
Matrix:	AQ - Ground Water	**Date Received:**	08/22/07
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	106%		87-116%
17060-07-0	1,2-Dichloroethane-D4	115%		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

Form I OA7

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB082107		
Lab Sample ID:	F51975-5	**Date Sampled:**	08/21/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/22/07
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	C0050647.D	1	08/30/07	LD	n/a	n/a	VC2050
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 Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB082107		
Lab Sample ID:	F51975-5	**Date Sampled:**	08/21/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/22/07
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	109%		87-116%
17060-07-0	1,2-Dichloroethane-D4	118%		76-127%
2037-26-5	Toluene-D8	100%		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

Appendix B

Field Forms

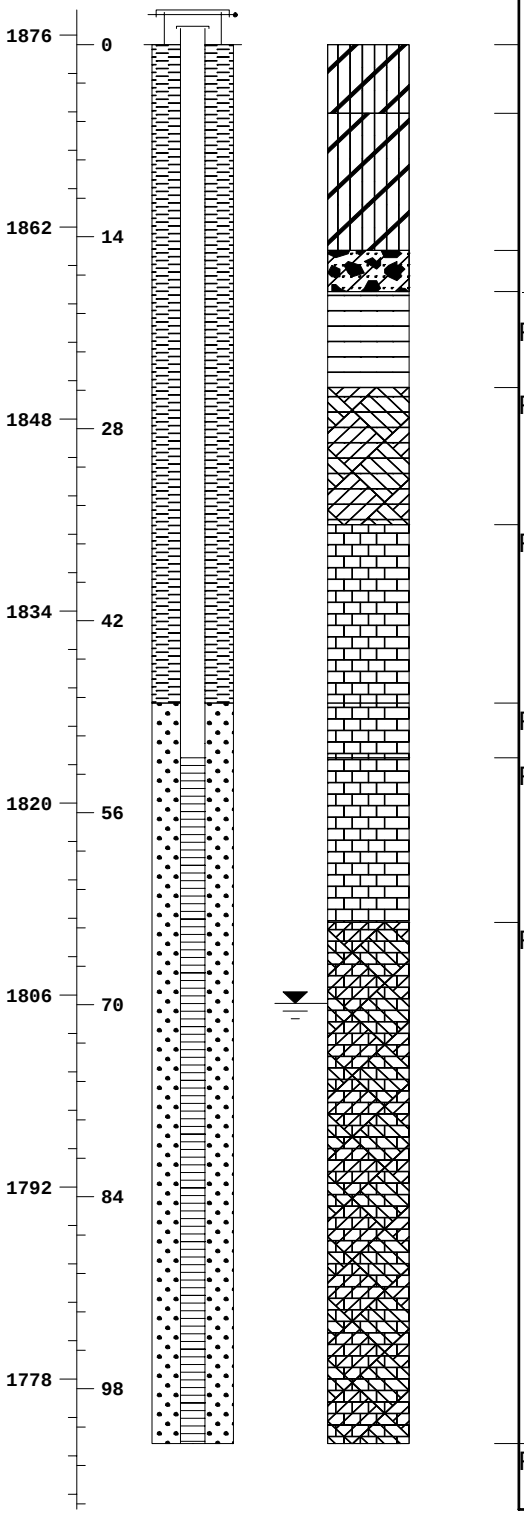
Appendix B-1

Boring Logs and Well Construction Diagrams

DRILL HOLE LOG
DRILL HOLE NO.: LFMW01

PROJECT: WPA 019 Groundwater Investigation
CLIENT/OWNER: RFAAP
HOLE LOCATION: RFAAP Radford, VA
DRILLER: Bedford Well Drilling
DRILL RIG: T3 Air Rotary
DEPTH TO WATER: 69.9
HOLE DIAMETER: 6 Inch

PROJECT NO.: 123461
DATE: 8/10/07
TOC ELEV.: 1877.9
GS ELEV.: 1875.3
LOGGED BY: J. Choynowski
HOLE NO.: LFMW01



ELEVATION / DEPTH	USCS	DESCRIPTION	Sample Number	Recovery	Water Content
		4" Protective case.			
0	CL-ML	Dark brown clay and silt, little(+) gravel. 2" PVC well pipe.			
5	CL-ML	Yellowish brown clay & silt.			
15	GC-SC	Yellowish brown clay w/ gravel, little(-) silt, some(+) coarse to medium sand.			
18	ROCK	Pale brown shale.			
25	ROCK	Pale brown shale & dolostone.			
35	ROCK	Pale brown limestone			
48	ROCK	Top of sand filter layer.			
52	ROCK	Top of well screen, 0.010" slot.			
64	ROCK	Alternating layers of Limestone and dolostone.			
102	ROCK	Bottom of screen and well.			

FIGURE NO.

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silt
	Inorganic silts and clays
	Silty low plasticity clay
	Well graded gravel with silt
	Generic rock
	Low plasticity organic silts
	Well graded gravel and sand
	Variable gravel and silty sand mix
	Clayey sand
	Silty gravel
	Low plasticity clay
	Silty sand
	Clayey gravel
	Well graded sand
	Dolomite

Symbol	Description
	Well graded sand with clay
	Shale
	Clayey sand and gravel
	Shale and dolostone.
	Limestone
	Limestone and dolostone.
Misc. Symbols	
	Boring continues
	Water table at boring completion
Monitor Well Details	
	Capped riser with locking cover
	Bentonite pellets
	Silica sand, blank PVC
	Slotted pipe w/ sand

Notes:

1. Borings were drilled on 8/10/07 using a 6-inch diameter air rotary T3 drill rig.

2. These logs are subject to the limitations, conclusions, and recommendations in this report.

Appendix B-2

Well Purging/Field Water Quality Measurement Forms

Well Purging-Field Water Quality Measurements Form

Location (Site / Facility Name) RFAAP
Well Number LFMW01 Date 8-21-07
Field Personnel Jones
Sample Organization Shaw Environmental
Identify MP TOC
Depth to 52 (top) / 102 (bottom) of screen (below MP)
Pump Intake at (ft. below MP)
Purging Device (e.g., Redi Flo2) Redi Flo2
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
	69.9										
0750	72.1	201.2	300		6.79	0.664	999	5.12	15.25	67	
0755	72.25	202.0			6.91	0.652	999	4.53	17.57	68	
0800	72.25	210.4			7.07	0.660	999	5.25	18.07	68	
0805	72.25	210.6			7.08	0.652	999	5.31	18.81	57	
0810	72.25	210.6			7.09	0.650	999	6.12	18.43	56	
0815	72.25	210.6			7.06	0.650	999	6.98	15.82	62	
0820	72.27	210.7			7.05	0.645	999	7.41	14.58	71	
0825	72.27	197.0			7.04	0.643	999	7.97	14.45	80	
0830	72.27	196.7			7.04	0.642	999	6.98	15.37	87	
0835	72.27	196.7			7.06	0.626	999	6.82	17.55	75	
0840	72.15	196.7			7.09	0.647	999	7.51	16.93	83	
0845	72.15	196.8			7.09	0.641	999	7.10	17.62	78	
0850	72.15	196.8			7.11	0.643	999	7.40	18.02	76	
0855	72.15	196.7			7.12	0.643	999	7.36	17.93	76	
0900	72.15	196.7			7.12	0.642	999	7.54	17.87	74	
0905	72.15	196.7			7.13	0.642	999	7.43	17.22	71	
0910	72.15	196.7			7.13	0.642	999	7.35	17.55	71	
0915	72.15	196.7			7.14	0.642	999	7.32	17.48	74	

[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 17PZ01 Date 8-21-07
Field Personnel CS & BS
Sample Organization Shaw Environmental
Identify MP

Depth to 112.5 (top) / 132.5 (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
1415	101.0	234.6			6.97	.650	72.2	9.69	16.60	75	
1420	100.98	234.6			6.88	.653	64.8	7.93	16.29	69	
1425	100.97	234.6			6.85	.647	65.0	7.13	16.69	47	
1430	100.77	234.6			6.88	.649	65.0	7.00	17.09	47	
1435	Sample	Taken									

[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 17HW2 Date 8.21.07
Field Personnel BD
Sample Organization Shaw Environmental
Identify MP TOC

Depth to 150 / 170 of screen (below MP)
top bottom
Pump Intake at (ft. below MP)
Purging Device (e.g., Redi Flo2) RF2
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
	NA										
1415	NA	233.5	300		6.97	0.502	61.4	2.79	16.40	98	
1420	NA	233.5			6.97	0.499	98.9	7.48	17.35	100	
1425	NA	233.5			6.99	0.501	95.4	7.25	17.48	95	
1430	NA	233.5			7.02	0.499	90.1	7.05	17.81	93	
1435	NA	233.5			7.05	0.499	88.7	6.58	18.50	93	
1440	NA	233.5			7.07	0.499	87.2	6.50	18.91	92	

[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 17MW03 Date 8.21.07
Field Personnel CJ, BS
Sample Organization Shaw Environmental
Identify MP TOC

Depth to 159 (top) / 179 (bottom) of screen (below MP)
Pump Intake at (ft. below MP)
Purging Device (e.g., Redi Flo2) RF2
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
	147.97										
1110	NA	285.9	300		6.76	0.760	186.0	5.54	16.49	135	
1115	NA	285.8			6.79	0.758	92.5	5.25	16.70	88	
1120	NA	285.7			6.79	0.756	95.5	4.86	16.38	82	
1125	NA	285.8			6.78	0.758	63.2	4.37	17.30	79	
1130	NA	285.8			6.79	0.757	71.0	4.23	17.95	71	
1135	NA				6.82	0.755	65.3	4.58	17.98	69	

[1] Pump dial setting (e.g., hertz, cycles/min., etc.)
[2] Oxidation reduction potential (stand in for Eh)

Appendix C

Location Coordinates and Elevations

Appendix C
FLFA Sample Location Coordinates and Elevations

Site ID	Northing*	Easting*	Elevation**
LFSS04	3594107.21	10886893.15	1888.24
LFSS05	3594144.78	10886883.55	1885.25
LFSS06	3594144.78	10886873.52	1877.52
LFSS07	3594154.04	10886894.16	1874.32
LFSS08	3594157.08	10886952.75	1875.71
LFSS09	3594205.00	10886781.91	1874.73
LFSS10	3594162.68	10886806.61	1877.84
LFSS11	3594207.59	10886989.28	1882.48
LFSS12	3594221.69	10886985.46	1880.81
LFSS13	3594252.26	10886962.00	1874.13
LFSS14	3594120.66	10886958.13	1888.70
LFSS15	3594200.23	10886972.72	1877.42
LFSS16	3594238.47	10886972.89	1877.98
LFSS17	3594118.47	10886910.85	1887.31
LFSS18	3594098.08	10886937.00	1895.94
LFSS19	3594122.20	10886949.43	1885.84
LFSS20	3594175.73	10886797.77	1872.02
LFSS21	3594109.78	10886921.12	1887.83
LFMW01	3594157.02	10886938.27	1877.91

* Coordinates in Virginia State Plane (NAD 83)

**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.

$$RX + H_2O \rightarrow ROH + HX \ (or\ H^+, X^-) \qquad Equation\ 6$$

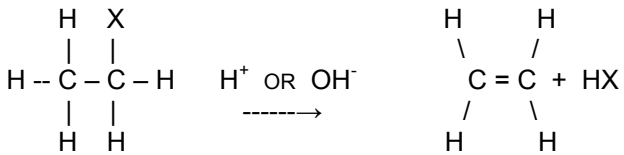
These reactions are catalyzed mainly by hydronium (H_3O^+) and/or hydroxyl ions (OH^-). Therefore, as mentioned above, hydrolysis reactions are pH dependent. Selected metals may also catalyze a hydrolysis reaction (Olsen and Davis, 1990).

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 concentrations 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 mechanism 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

Human Health Risk Assessment Tables and Statistical Comparison Results

Appendix E-1

RAGS Part D Tables

Table E.1-1
Selection of Exposure Pathways

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	FLFA	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact surface soil at the FLFA and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact surface soil at the FLFA 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 FLFA on a daily basis.
						Dermal	On-site	None	There are no workers currently exposed to surface soil at FLFA 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	FLFA	Maintenance Worker	Adult	Inhalation	On-site	Quant	Maintenance workers could be exposed to airborne volatiles or particulate matter released from surface soil at the FLFA.
				Industrial Worker	Adult	Inhalation	On-site	None	There are no workers currently exposed to surface soil at FLFA 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)	FLFA	None	None	None	On-site	None	Current excavation or construction activities are not occurring at the FLFA.
	Groundwater	Groundwater	FLFA	None	None	None	On-site	None	Groundwater is not currently being used at FLFA. 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	FLFA	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact surface soil at the FLFA and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact surface soil at the FLFA and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial workers could contact surface soil at the FLFA and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Industrial workers could contact surface soil at the FLFA 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.

Table E.1-1
Selection of Exposure Pathways

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)	Surface Soil	Air	FLFA	Maintenance Worker	Adult	Inhalation	On-site	Quant	Maintenance workers could be exposed to airborne volatiles or particulate matter released from surface soil at the FLFA.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Industrial workers could be exposed to airborne volatiles or particulate matter released from surface soil at the FLFA.
				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)	FLFA	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact soil at the FLFA and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact soil at the FLFA and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial workers could contact soil at the FLFA and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Industrial workers could contact soil at the FLFA and be exposed to COPCs via dermal absorption.
				Excavation Worker	Adult	Ingestion	On-site	Quant	Excavation workers could contact soil at the FLFA and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Excavation workers could contact soil at the FLFA and be exposed to COPCs via dermal absorption.
				Resident	Adult	Ingestion	On-site	Quant	If FLFA 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 the FLFA 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 FLFA 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 the FLFA 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	FLFA	Maintenance Worker	Adult	Inhalation	On-site	Quant	Maintenance workers could be exposed to airborne volatiles or particulate matter released from soils at the FLFA.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Industrial workers could be exposed to airborne volatiles or particulate matter released from soils at the FLFA.
				Excavation Worker	Adult	Inhalation	On-site	Quant	Excavation workers could be exposed to airborne volatiles or particulate matter released from soils at the FLFA.
				Resident	Adult	Inhalation	On-site	Quant	If the FLFA were to be further developed for residential purposes, residents could be exposed to airborne volatiles or particulate matter released from total soil.

Table E.1-1
Selection of Exposure Pathways

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)	Air	FLFA	Resident	Child	Inhalation	On-site	Quant	If the FLFA 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.
	Groundwater	Groundwater	FLFA	Maintenance Worker	Adult	Ingestion	On-site	None	Maintenance workers would not contact groundwater at FLFA.
						Dermal	On-site	None	Maintenance workers would not contact groundwater at FLFA.
				Industrial Worker	Adult	Ingestion	On-site	Quant	If FLFA 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 FLFA.
						Dermal	On-site	None	Based on the depth to groundwater, excavation workers would not contact groundwater at FLFA.
				Resident	Adult	Ingestion	On-site	Quant	If FLFA 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 FLFA 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 FLFA 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 FLFA 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	FLFA	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.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Volatiles could be released from groundwater into ambient air. Industrial workers could be exposed via inhalation.

Table E.1-1
Selection of Exposure Pathways

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	Air	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.
			Indoor Vapors	Industrial Worker	Adult	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into buildings via vapor intrusion. Workers could be exposed while working indoors.
				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.
			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.
		Groundwater	Off-site	Resident	Adult	Ingestion	Off-site	Quant	If COPCs from FLFA 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 FLFA 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 FLFA 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 FLFA groundwater were to migrate off-site in the future, off-site residents could be exposed to COPCs in groundwater via dermal absorption.
		Homegrown fruits and vegetables	Off-site	Resident	Adult	Ingestion	Off-site	Quant	If COPCs from FLFA 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 FLFA 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	Volatiles at Showerhead	Resident	Adult	Inhalation	Off-site	Quant	If COPCs from FLFA 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 FLFA 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 FLFA groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into off-site residences via vapor intrusion.

Table E.1-2
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Current/Future - Surface Soil - Radford - FLFA

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)
	N/A	2,3,7,8-TCDD-TE	1.05E-06	1.45E-03	mg/kg	LFSS20	25/25	N/A	1.45E-03	N/A	4.3E-06 C	N/A	N/A	Yes	ASL
Surface Soil	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	5.91E-06	2.31E-03	mg/kg	LFSS20	25/25	N/A	2.31E-03	N/A	N/A	N/A	N/A	No	TEQ
	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	2.28E-05	1.88E-02	mg/kg	LFSS20	25/25	N/A	1.88E-02	N/A	N/A	N/A	N/A	No	TEQ
	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	5.63E-07 J	1.59E-04	mg/kg	LFSS20	25/25	N/A	1.59E-04	N/A	N/A	N/A	N/A	No	TEQ
	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	1.20E-06 J	7.57E-04	mg/kg	LFSB15A	25/25	N/A	7.57E-04	N/A	N/A	N/A	N/A	No	TEQ
	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.29E-06 J	4.41E-04	mg/kg	LFSS20	24/25	2.11E-07 - 2.11E-07	4.41E-04	N/A	N/A	N/A	N/A	No	TEQ
	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	1.06E-06 J	3.68E-04	mg/kg	LFSS20	24/25	1.41E-07 - 1.41E-07	3.68E-04	N/A	N/A	N/A	N/A	No	TEQ
	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	8.01E-07	8.49E-04	mg/kg	LFSS20	25/25	N/A	8.49E-04	N/A	N/A	N/A	N/A	No	TEQ
	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	3.87E-07 J	7.82E-05	mg/kg	LFSS20	20/25	7.70E-08 - 2.94E-07	7.82E-05	N/A	N/A	N/A	N/A	No	TEQ
	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.16E-06 J	8.53E-04	mg/kg	LFSS20	25/25	N/A	8.53E-04	N/A	N/A	N/A	N/A	No	TEQ
	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	3.20E-07 J	2.64E-04	mg/kg	LFSS20	24/25	1.81E-07 - 1.81E-07	2.64E-04	N/A	N/A	N/A	N/A	No	TEQ
	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	6.22E-07 J	5.00E-04	mg/kg	LFSS20	24/25	2.55E-07 - 2.55E-07	5.00E-04	N/A	N/A	N/A	N/A	No	TEQ
	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	4.37E-07 J	2.58E-04	mg/kg	LFSS20	24/25	2.29E-07 - 2.29E-07	2.58E-04	N/A	N/A	N/A	N/A	No	TEQ
	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	1.28E-06 J	4.67E-04	mg/kg	LFSS20	24/25	1.65E-07 - 1.65E-07	4.67E-04	N/A	N/A	N/A	N/A	No	TEQ
	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	7.88E-07 J	4.80E-04	mg/kg	LFSS20	24/25	1.89E-07 - 1.89E-07	4.80E-04	N/A	N/A	N/A	N/A	No	TEQ
	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.44E-07	1.67E-04	mg/kg	LFSS20	21/24	4.10E-08 - 1.66E-07	1.67E-04	N/A	N/A	N/A	N/A	No	TEQ
	3268-87-9	Octachlorodibenzodioxin	7.55E-04 J	1.45E-01	mg/kg	LFSS20	25/25	N/A	1.45E-01	N/A	N/A	N/A	N/A	No	TEQ
	39001-02-0	Octachlorodibenzofuran	1.62E-05	4.15E-03	mg/kg	LFSS20	25/25	N/A	4.15E-03	N/A	N/A	N/A	N/A	No	TEQ
	120-82-1	1,2,4-Trichlorobenzene	1.20E-02 J	5.45E-02 J	mg/kg	LFSS01	3/9	1.70E-01 - 2.00E-01	5.45E-02	N/A	7.8E+01 N	N/A	N/A	No	BSL
	95-50-1	1,2-Dichlorobenzene	3.00E-02 J	5.10E-02 J	mg/kg	LFSS01	2/9	1.70E-01 - 2.00E-01	5.10E-02	N/A	7.0E+02 N	N/A	N/A	No	BSL
	541-73-1	1,3-Dichlorobenzene	1.20E-02 J	5.10E-02 J	mg/kg	LFSS01	3/9	1.70E-01 - 2.00E-01	5.10E-02	N/A	2.3E+01 N	N/A	N/A	No	BSL
	106-46-7	1,4-Dichlorobenzene	1.30E-02 J	5.25E-02 J	mg/kg	LFSS01	3/9	1.70E-01 - 2.00E-01	5.25E-02	N/A	2.7E+01 C	N/A	N/A	No	BSL
	95-95-4	2,4,5-Trichlorophenol	1.20E-02 J	1.20E-02 J	mg/kg	LFSB16B	1/9	1.70E-01 - 2.00E-01	1.20E-02	N/A	7.8E+02 N	N/A	N/A	No	BSL
	88-06-2	2,4,6-Trichlorophenol	1.80E-02 J	1.80E-02 J	mg/kg	LFSB16B	1/9	1.70E-01 - 2.00E-01	1.80E-02	N/A	7.8E+00 N	N/A	N/A	No	BSL
	120-83-2	2,4-Dichlorophenol	2.20E-02 J	4.69E-02 J	mg/kg	LFSS01	2/9	1.70E-01 - 2.00E-01	4.69E-02	N/A	2.3E+01 N	N/A	N/A	No	BSL
	121-14-2	2,4-Dinitrotoluene	8.10E-02 J	1.20E-01 J	mg/kg	LFSS03	2/9	1.80E-01 - 4.00E-01	1.20E-01	N/A	9.4E-01 C	N/A	N/A	No	BSL
	91-58-7	2-Chloronaphthalene	8.00E-03 J	4.80E-02 J	mg/kg	LFSS01	3/9	1.70E-01 - 2.00E-01	4.80E-02	N/A	6.3E+02 N	N/A	N/A	No	BSL
	95-57-8	2-Chlorophenol	8.20E-03 J	4.90E-02 J	mg/kg	LFSS01	3/9	1.70E-01 - 2.00E-01	4.90E-02	N/A	3.9E+01 N	N/A	N/A	No	BSL
	91-57-6	2-Methylnaphthalene	4.20E-03	6.20E-02	mg/kg	LFSB12A	7/9	2.00E-01 - 2.00E-01	6.20E-02	N/A	3.1E+01 N	N/A	N/A	No	BSL
	88-75-5	2-Nitrophenol	1.10E-02 J	5.50E-02 J	mg/kg	LFSS01	3/9	1.70E-01 - 2.00E-01	5.50E-02	N/A	N/A	N/A	N/A	Yes	NTX
	72-54-8	4,4'-DDD	4.23E-04 J	5.93E-03	mg/kg	LFSB15A	3/3	N/A	5.93E-03	N/A	2.7E+00 C	N/A	N/A	No	BSL
	72-55-9	4,4'-DDE	2.32E-03	4.93E-02	mg/kg	LFSB15A	2/2	N/A	4.93E-02	N/A	1.9E+00 C	N/A	N/A	No	BSL
	50-29-3	4,4'-DDT	1.54E-02	8.32E-02	mg/kg	LFSS03	3/3	N/A	8.32E-02	N/A	1.9E+00 C	N/A	N/A	No	BSL
	7005-72-3	4-Chlorophenyl phenylether	1.20E-02 J	1.20E-02 J	mg/kg	LFSB16B	1/9	1.70E-01 - 2.00E-01	1.20E-02	N/A	N/A	N/A	N/A	Yes	NTX
	83-32-9	Acenaphthene	1.30E-02 J	1.30E-02 J	mg/kg	LFSB16B	1/5	1.70E-03 - 2.00E-01	1.30E-02	N/A	4.7E+02 N	N/A	N/A	No	BSL
	208-96-8	Acenaphthylene	8.55E-04 J	1.30E-02 J	mg/kg	LFSB16B	5/9	1.80E-03 - 2.00E-01	1.30E-02	N/A	2.3E+02 N	N/A	N/A	No	BSL
	120-12-7	Anthracene	1.90E-03	5.60E-03	mg/kg	LFSS03	5/9	1.80E-01 - 2.10E-01	5.60E-03	N/A	2.3E+03 N	N/A	N/A	No	BSL
	11097-69-1	Aroclor 1254	1.35E-02 J	4.02E-01	mg/kg	LFSS11	17/18	1.80E-01 - 1.80E-01	1.58E+00	N/A	1.56E-01 N	N/A	N/A	Yes	ASL

Table E.1-2
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Current/Future - Surface Soil - Radford - FLFA

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)
	11096-82-5	Aroclor 1260	3.73E-02 J	1.09E+00	mg/kg	LFSS16	8/18	1.80E-02 - 9.50E-02	1.09E+00	N/A	3.2E-01 C	N/A	N/A	Yes	ASL
	56-55-3	Benzo(a)anthracene	7.90E-03 J	2.80E-02	mg/kg	LFSS01	8/9	2.10E-01 - 2.10E-01	2.80E-02	N/A	2.2E-01 C	N/A	N/A	No	BSL
	50-32-8	Benzo(a)pyrene	9.70E-03	2.80E-02	mg/kg	LFSS03	6/9	2.00E-01 - 2.10E-01	2.80E-02	N/A	2.2E-02 C	N/A	N/A	Yes	ASL
	205-99-2	Benzo(b)fluoranthene	1.80E-02	6.70E-02	mg/kg	LFSS03	6/9	2.00E-01 - 2.10E-01	6.70E-02	N/A	2.2E-01 C	N/A	N/A	No	BSL
	191-24-2	Benzo(g,h,i)perylene	4.80E-03 L	2.50E-02 L	mg/kg	LFSS03	6/9	2.00E-01 - 2.10E-01	2.50E-02	N/A	2.3E+02 N	N/A	N/A	No	BSL
	207-08-9	Benzo(k)fluoranthene	5.90E-03	1.85E-02	mg/kg	LFSS01	6/9	2.00E-01 - 2.10E-01	1.85E-02	N/A	2.2E+00 C	N/A	N/A	No	BSL
	111-91-1	bis(2-Chloroethoxy)methane	1.30E-02 J	4.90E-02 J	mg/kg	LFSS01	2/9	1.70E-01 - 2.00E-01	4.90E-02	N/A	N/A	N/A	N/A	Yes	NTX
	111-44-4	bis(2-Chloroethyl)ether	1.90E-02 J	1.90E-02 J	mg/kg	LFSB16B	1/9	1.70E-01 - 2.00E-01	1.90E-02	N/A	5.8E-01 C	N/A	N/A	No	BSL
	108-60-1	bis(2-Chloroisopropyl)ether	8.80E-03 J	4.95E-02 J	mg/kg	LFSS01	3/9	1.70E-01 - 2.00E-01	4.95E-02	N/A	9.1E+00 C	N/A	N/A	No	BSL
	218-01-9	Chrysene	1.20E-02	3.70E-02	mg/kg	LFSS03	6/9	2.00E-01 - 2.10E-01	3.70E-02	N/A	2.2E+01 C	N/A	N/A	No	BSL
	53-70-3	Dibenz(a,h)anthracene	2.60E-03 J	3.50E-03 J	mg/kg	LFSS03	3/9	1.70E-03 - 2.10E-01	3.50E-03	N/A	2.2E-02 C	N/A	N/A	No	BSL
	132-64-9	Dibenzofuran	1.30E-02 J	4.62E-02 J	mg/kg	LFSS01	3/9	1.70E-01 - 2.00E-01	4.62E-02	N/A	7.8E+00 N	N/A	N/A	No	BSL
	117-84-0	Di-n-octyl phthalate	2.00E-02 J	2.00E-02 J	mg/kg	LFSB17A	1/9	1.70E-01 - 2.10E-01	2.00E-02	N/A	N/A	N/A	N/A	Yes	NTX
	33213-65-9	Endosulfan II	1.23E-03	1.99E-02	mg/kg	LFSS03	3/3	N/A	1.99E-02	N/A	4.7E+01 N	N/A	N/A	No	BSL
	7421-93-4	Endrin aldehyde	1.87E-03	3.34E-02	mg/kg	LFSS03	3/3	N/A	3.34E-02	N/A	2.3E+00 N	N/A	N/A	No	BSL
	53494-70-5	Endrin ketone	4.46E-03	4.46E-03	mg/kg	LFSB15A	1/3	6.80E-04 - 6.79E-03	4.46E-03	N/A	2.3E+00 N	N/A	N/A	No	BSL
	206-44-0	Fluoranthene	1.80E-02	5.35E-02 J	mg/kg	LFSS01	6/9	2.00E-01 - 2.10E-01	5.35E-02	N/A	3.1E+02 N	N/A	N/A	No	BSL
	86-73-7	Fluorene	1.20E-03 J	9.00E-03 J	mg/kg	LFSB16B	6/9	1.80E-01 - 2.00E-01	9.00E-03	N/A	3.1E+02 N	N/A	N/A	No	BSL
	5103-74-2	gamma-Chlordane	2.81E-03	2.81E-03	mg/kg	LFSB15A	1/3	6.79E-04 - 6.80E-04	2.81E-03	N/A	1.8E+00 C	N/A	N/A	No	BSL
	118-74-1	Hexachlorobenzene	2.00E-02 J	2.00E-02 J	mg/kg	LFSB15A	1/9	1.70E-01 - 2.10E-01	2.00E-02	N/A	4.0E-01 C	N/A	N/A	No	BSL
	87-68-3	Hexachlorobutadiene	1.00E-02 J	5.20E-02 J	mg/kg	LFSS01	3/9	1.70E-01 - 2.00E-01	5.20E-02	N/A	7.8E+00 N	N/A	N/A	No	BSL
	67-72-1	Hexachloroethane	1.30E-02 J	1.30E-02 J	mg/kg	LFSB16B	1/9	1.70E-01 - 2.00E-01	1.30E-02	N/A	7.8E+00 N	N/A	N/A	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	6.30E-03	2.60E-02	mg/kg	LFSS03	6/9	2.00E-01 - 2.10E-01	2.60E-02	N/A	2.2E-01 C	N/A	N/A	No	BSL
	78-59-1	Isophorone	7.40E-03 J	4.64E-02 J	mg/kg	LFSS01	3/9	1.70E-01 - 2.00E-01	4.64E-02	N/A	6.7E+02 C	N/A	N/A	No	BSL
	72-43-5	Methoxychlor	7.28E-04 J	7.28E-04 J	mg/kg	LFSB15A	1/3	6.79E-04 - 6.80E-04	7.28E-04	N/A	3.9E+01 N	N/A	N/A	No	BSL
	91-20-3	Naphthalene	7.40E-03	3.40E-02	mg/kg	LFSS03	5/7	2.00E-01 - 2.00E-01	3.40E-02	N/A	1.6E+02 N	N/A	N/A	No	BSL
	98-95-3	Nitrobenzene	3.50E-02 J	3.50E-02 J	mg/kg	LFSB16B	1/9	1.80E-01 - 4.00E-01	3.50E-02	N/A	3.9E+00 N	N/A	N/A	No	BSL
	86-30-6	n-Nitrosodiphenylamine	1.50E-01 J	1.50E-01 J	mg/kg	LFSS03	1/9	1.70E-01 - 2.10E-01	1.50E-01	N/A	1.3E+02 C	N/A	N/A	No	BSL
	59-50-7	p-Chloro-m-cresol	1.40E-02 J	1.40E-02 J	mg/kg	LFSB16B	1/9	1.70E-01 - 2.00E-01	1.40E-02	N/A	N/A	N/A	N/A	Yes	NTX
	85-01-8	Phenanthrene	1.40E-02 J	5.50E-02	mg/kg	LFSS03	6/9	2.00E-01 - 2.10E-01	5.50E-02	N/A	2.3E+02 N	N/A	N/A	No	BSL
	129-00-0	Pyrene	1.90E-02	5.05E-02 J	mg/kg	LFSS01	6/9	2.00E-01 - 2.10E-01	5.05E-02	N/A	2.3E+02 N	N/A	N/A	No	BSL
	7429-90-5	Aluminum	9.77E+03 J	4.78E+04	mg/kg	LFSB15A	27/27	N/A	4.78E+04	N/A	7.8E+03 N	N/A	N/A	Yes	ASL
	7440-36-0	Antimony	4.30E-01 J	4.76E+01 J	mg/kg	LFSB15A	7/26	3.40E-01 - 3.80E+00	4.76E+01	N/A	3.1E+00 N	N/A	N/A	Yes	ASL
	7440-38-2	Arsenic	1.79E+00 J	6.89E+01 J	mg/kg	LFSS20	27/27	N/A	6.89E+01	N/A	4.3E-01 C	N/A	N/A	Yes	ASL
	7440-39-3	Barium	2.53E+01	2.63E+03	mg/kg	LFSS03	27/27	N/A	2.63E+03	N/A	1.6E+03 N	N/A	N/A	Yes	ASL
	7440-41-7	Beryllium	4.00E-01 J	1.72E+00	mg/kg	LFSB16B	9/27	6.40E-01 - 1.70E+00	1.72E+00	N/A	1.6E+01 N	N/A	N/A	No	BSL
	7440-43-9	Cadmium	7.20E-02 J	1.98E+01	mg/kg	LFSB15A	11/27	5.60E-02 - 1.50E+00	1.98E+01	N/A	7.8E+00 N	N/A	N/A	Yes	ASL
	7440-70-2	Calcium	1.28E+03 J	5.57E+04 J	mg/kg	LFSB17B	27/27	N/A	5.57E+04	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-47-3	Chromium VI	1.31E+01 J	2.99E+02 J	mg/kg	LFSS03	27/27	N/A	2.99E+02	N/A	2.3E+01 N	N/A	N/A	Yes	ASL
	7440-48-4	Cobalt	3.70E+00 J	4.70E+01 J	mg/kg	LFSB15A	27/27	N/A	4.70E+01	N/A	N/A	N/A	N/A	Yes	NTX
	7440-50-8	Copper	1.08E+01 J	2.38E+04 J	mg/kg	LFSS20	27/27	N/A	2.38E+04	N/A	3.1E+02 N	N/A	N/A	Yes	ASL
	7439-89-6	Iron	1.41E+04 J	9.99E+04 J	mg/kg	LFSB15A	27/27	N/A	9.99E+04	N/A	5.5E+03 N	N/A	N/A	Yes	ASL
	7439-92-1	Lead	1.83E+01	2.59E+04 J	mg/kg	LFSS20	33/33	N/A	2.59E+04	N/A	N/A	4.00E+02	USEPA	Yes	ASL
	7439-95-4	Magnesium	1.07E+03 J	6.04E+04	mg/kg	LFSB17B	27/27	N/A	6.04E+04	N/A	N/A	1.00E+06	RDA	No	BSL

Table E.1-2
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Current/Future - Surface Soil - Radford - FLFA

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)
	7439-96-5	Manganese	1.37E+02 J	2.23E+03 J	mg/kg	LFSB15A	27/27	N/A	2.23E+03	N/A	1.6E+02 N	N/A	N/A	Yes	ASL
	7439-97-6	Mercury	3.00E-02 J	2.20E+00 J	mg/kg	LFSS21	26/27	6.05E-02 - 6.05E-02	2.20E+00	N/A	2.3E+00 N	N/A	N/A	No	BSL
	7440-02-0	Nickel	7.50E+00 J	4.04E+02 J	mg/kg	LFSB15A	27/27	N/A	4.04E+02	N/A	1.6E+02 N	N/A	N/A	Yes	ASL
	7440-09-7	Potassium	7.12E+02 J	7.87E+03	mg/kg	LFSB17B	27/27	N/A	7.87E+03	N/A	N/A	1.00E+06	RDA	No	BSL
	7782-49-2	Selenium	3.40E-01 L	1.30E+00 L	mg/kg	LFSS19	16/27	2.50E-01 - 1.27E+00	1.30E+00	N/A	3.9E+01 N	N/A	N/A	No	BSL
	7440-22-4	Silver	1.10E-01 L	6.52E+01 L	mg/kg	LFSS17	19/27	7.50E-02 - 1.27E+00	6.52E+01	N/A	3.9E+01 N	N/A	N/A	Yes	ASL
	7440-23-5	Sodium	3.95E+01	3.17E+03	mg/kg	LFSS20	23/23	N/A	3.17E+03	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-28-0	Thallium	9.90E-02 J	3.16E-01	mg/kg	LFSS01	9/20	6.00E-01 - 1.62E+00	3.16E-01	N/A	5.5E-01 N	N/A	N/A	No	BSL
	7440-62-2	Vanadium	2.16E+01 J	7.56E+01 J	mg/kg	LFSS19	27/27	N/A	7.56E+01	N/A	7.8E+00 N	N/A	N/A	Yes	ASL
	7440-66-6	Zinc	2.60E+01 J	1.52E+04 J	mg/kg	LFSS20	27/27	N/A	1.52E+04	N/A	2.3E+03 N	N/A	N/A	Yes	ASL

(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 Region 3 RBC Table (October 2007). See text for derivation of Nutrient RDAs.

(4) Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Break Down Product (BDP)
No Toxicity Information (NTX)

Deletion Reason: Infrequent Detection (<= 5%, IFD)
Below 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, L = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

(5) The screening value for dinitrotoluene mixture is based on a carcinogenicity study for 2,4-DNT and 2,6-DNT. Therefore, the RBC for dinitrotoluene mixture is conservatively used as the screening value for the individual compounds.

(6) There are no screening values available for acenaphthylene, benzo(g,h,i)perylene, and phenanthrene. Therefore, the screening value for pyrene was used as a surrogate.

Table E.1-3
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at FLFA

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	71-55-6	1,1,1-Trichloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+04 N	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	3.2E+00 C	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.1E+01 C	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+03 N	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	3.9E+02 N	No
	107-06-2	1,2-Dichloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.0E+00 C	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	9.4E+00 C	No
	99-35-4	1,3,5-Trinitrobenzene			mg/kg		0/5	1.00E-01 - 2.00E-01	2.00E-01	N/A	2.3E+02 N	No
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/5	1.00E-01 - 2.00E-01	2.00E-01	N/A	7.8E-01 N	No
	93-76-5	2,4,5-T			mg/kg		0/3	1.02E-01 - 1.20E-01	1.20E-01	N/A	7.8E+01 N	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/3	1.02E-01 - 1.20E-01	1.20E-01	N/A	6.3E+01 N	No
	118-96-7	2,4,6-Trinitrotoluene			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	N/A	3.9E+00 N	No
	94-75-7	2,4-D			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	N/A	7.8E+01 N	No
	94-82-6	2,4-DB			mg/kg		0/3	1.02E+00 - 1.20E+00	1.20E+00	N/A	6.3E+01 N	No
	105-67-9	2,4-Dimethylphenol			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	1.6E+02 N	No
	51-28-5	2,4-Dinitrophenol			mg/kg		0/9	8.50E-01 - 1.10E+00	1.10E+00	N/A	1.6E+01 N	No
	606-20-2	2,6-Dinitrotoluene			mg/kg		0/9	1.80E-01 - 4.00E-01	4.00E-01	N/A	9.4E-01 C	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	N/A	1.6E+00 N	No
	78-93-3	2-Butanone			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	4.7E+03 N	No
	591-78-6	2-Hexanone			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	N/A	NTX
	88-74-4	2-Nitroaniline			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	N/A	NTX
	88-72-2	2-Nitrotoluene			mg/kg		0/5	4.00E-01 - 8.00E-01	8.00E-01	N/A	7.8E+01 N	No
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	N/A	7.8E+00 N	No
	91-94-1	3,3'-Dichlorobenzidine			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	1.4E+00 C	No
	99-09-2	3-Nitroaniline			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	N/A	NTX
	99-08-1	3-Nitrotoluene			mg/kg		0/5	4.00E-01 - 8.00E-01	8.00E-01	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/9	8.50E-01 - 1.10E+00	1.10E+00	N/A	N/A	NTX
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	N/A	1.6E+00 N	No
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	N/A	NTX
	100-01-6	4-Nitroaniline			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	N/A	NTX
	100-02-7	4-Nitrophenol			mg/kg		0/9	8.50E-01 - 1.10E+00	1.10E+00	N/A	N/A	NTX
	99-99-0	4-Nitrotoluene			mg/kg		0/5	4.00E-01 - 8.00E-01	8.00E-01	N/A	3.1E+01 N	No
	67-64-1	Acetone			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.0E+03 N	No
	309-00-2	Aldrin			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	3.8E-02 C	No
	319-84-6	alpha-BHC			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	1.0E-01 C	No

Table E.1-3
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at FLFA

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)
	5103-71-9	alpha-Chlordane			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	1.8E+00 N	No
	12674-11-2	Aroclor 1016			mg/kg		0/23	1.80E-02 - 1.80E-01	1.80E-01	N/A	5.5E-01 N	No
	11104-28-2	Aroclor 1221			mg/kg		0/23	1.80E-02 - 1.80E-01	1.80E-01	N/A	3.2E-01 C	No
	11141-16-5	Aroclor 1232			mg/kg		0/23	1.80E-02 - 1.80E-01	1.80E-01	N/A	3.2E-01 C	No
Surface Soil	53469-21-9	Aroclor 1242			mg/kg		0/23	1.80E-02 - 1.80E-01	1.80E-01	N/A	3.2E-01 C	No
	12672-29-6	Aroclor 1248			mg/kg		0/23	1.80E-02 - 1.80E-01	1.80E-01	N/A	3.2E-01 C	No
	71-43-2	Benzene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.2E+01 C	No
	65-85-0	Benzoic Acid			mg/kg		0/9	8.50E-01 - 1.10E+00	1.10E+00	N/A	3.1E+04 N	No
	100-51-6	Benzyl alcohol			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	3.9E+03 N	No
	319-85-7	beta-BHC			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	3.5E-01 C	No
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/kg		0/9	1.50E-02 - 2.10E-01	2.10E-01	N/A	4.6E+01 C	No
	75-27-4	Bromodichloromethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.0E+01 C	No
	74-83-9	Bromomethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.1E+01 N	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/7	1.70E-01 - 2.10E-01	2.10E-01	N/A	1.6E+03 N	No
	86-74-8	Carbazole			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	3.2E+01 C	No
	75-15-0	Carbon disulfide			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.8E+02 N	No
	56-23-5	Carbon tetrachloride			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	4.9E+00 C	No
	108-90-7	Chlorobenzene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+02 N	No
	75-00-3	Chloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	2.2E+02 C	No
	67-66-3	Chloroform			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.8E+01 N	No
	67-66-3	Chloroform			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.8E+01 N	No
	74-87-3	Chloromethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	N/A	NTX
	156-59-2	cis-1,2-Dichloroethene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.8E+01 N	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	N/A	NTX
	121-82-4	Cyclonite			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	N/A	5.8E+00 C	No
	75-99-0	Dalapon			mg/kg		0/3	1.02E+00 - 1.20E+00	1.20E+00	N/A	2.3E+02 N	No
	319-86-8	delta-BHC			mg/kg		0/2	6.79E-04 - 7.99E-04	7.99E-04	N/A	N/A	NTX
	124-48-1	Dibromochloromethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.6E+00 C	No
	1918-00-9	Dicamba			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	N/A	2.3E+02 N	No
	120-36-5	Dichloroprop			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	N/A	N/A	NTX
	60-57-1	Dieldrin			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	4.0E-02 C	No
	84-66-2	Diethyl phthalate			mg/kg		0/7	1.70E-01 - 2.10E-01	2.10E-01	N/A	6.3E+03 N	No
	131-11-3	Dimethylphthalate			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	N/A	NTX
	84-74-2	Di-n-butyl phthalate			mg/kg		0/8	1.70E-01 - 2.10E-01	2.10E-01	N/A	7.8E+02 N	No
	959-98-8	Endosulfan I			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	4.7E+01 N	No
	1031-07-8	Endosulfan sulfate			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	4.7E+01 N	No
	72-20-8	Endrin			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	2.3E+00 N	No
	100-41-4	Ethylbenzene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.8E+02 N	No
	58-89-9	gamma-BHC (Lindane)			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	4.9E-01 C	No
	76-44-8	Heptachlor			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	1.4E-01 C	No
	1024-57-3	Heptachlor epoxide			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	7.0E-02 C	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	4.7E+01 N	No
	2691-41-0	HMX			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	N/A	3.9E+02 N	No

Table E.1-3
Summary of Screening for Non-Detected Chemicals
Current/Future - Surface Soil at FLFA

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)
	N/A	m+p-Xylenes			mg/kg		0/5	1.00E-02 - 2.40E-02	2.40E-02	N/A	1.6E+03 N	No
	94-74-6	MCPA			mg/kg		0/3	1.02E+02 - 1.20E+02	1.20E+02	N/A	3.9E+00 N	Yes
	93-65-2	MCPP			mg/kg		0/3	1.02E+01 - 1.20E+02	1.20E+02	N/A	7.8E+00 N	Yes
	75-09-2	Methylene chloride			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	8.5E+01 C	No
	55-63-0	Nitroglycerin			mg/kg		0/5	3.05E-01 - 7.19E-01	7.19E-01	N/A	7.8E-01 N	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	9.1E-02 C	Yes
Surface Soil	95-48-7	o-Cresol			mg/kg		0/8	1.70E-01 - 2.00E-01	2.00E-01	N/A	3.9E+02 N	No
	95-47-6	o-Xylene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+03 N	No
	106-47-8	p-Chloroaniline			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	3.1E+01 N	No
	106-44-5	p-Cresol			mg/kg		0/8	1.70E-01 - 2.00E-01	2.00E-01	N/A	3.9E+01 N	No
	87-86-5	Pentachlorophenol			mg/kg		0/9	8.50E-01 - 1.10E+00	1.10E+00	N/A	5.3E+00 C	No
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/5	3.05E-01 - 7.19E-01	7.19E-01	N/A	N/A	NTX
	108-95-2	Phenol			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	2.3E+03 N	No
	110-86-1	Pyridine			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	N/A	7.8E+00 N	No
	100-42-5	Styrene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+03 N	No
	127-18-4	Tetrachloroethene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.2E+00 C	No
	479-45-8	Tetryl			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	N/A	3.1E+01 N	No
	108-88-3	Toluene			mg/kg		0/4	5.10E-03 - 1.20E-02	1.20E-02	N/A	6.3E+02 N	No
	8001-35-2	Toxaphene			mg/kg		0/3	3.39E-02 - 3.99E-02	3.99E-02	N/A	5.8E-01 C	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+02 N	No
	10061-02-6	trans-1,3-Dichloropropene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	N/A	NTX
	75-25-2	Tribromomethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	8.1E+01 C	No
	79-01-6	Trichloroethene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+00 C	No
	75-01-4	Vinyl Chloride			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	N/A	9.0E-02 C	No

(1) Maximum detection limit 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 Region 3 RBC Table (October 2007).
Residential RBCs are based on a risk level of 1.0E-06 and an HQ = 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes: No Toxicity Information Available (NTX)

Definitions: N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Qualifiers: L = Reported value may be biased low
K = Reported value may be biased high
J = Estimated Value

(5) The screening value for dinitrotoluene mixture is based on a carcinogenicity study for 2,4-DNT and 2,6-DNT. Therefore, the RBC for dinitrotoluene mixture is conservatively used as the screening value for the individual compounds.

(6) The screening value for Endosulfan I was used as a surrogate value for Endosulfan sulfate.

Table E.1-4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Current/Future - Total Soil - Radford -FLFA

Scenario Timeframe:
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	1.50E-08	1.45E-03	mg/kg	LFSS20	32/32	N/A	1.45E-03	N/A	4.3E-06 C	N/A	N/A	Yes	ASL
Total Soil	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.65E-07 J	2.31E-03	mg/kg	LFSS20	31/32	1.19E-07 - 1.19E-07	2.31E-03	N/A	N/A	N/A	N/A	No	TEQ
	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.48E-06	1.88E-02	mg/kg	LFSS20	31/32	2.21E-07 - 2.21E-07	1.88E-02	N/A	N/A	N/A	N/A	No	TEQ
	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	5.17E-07	1.59E-04	mg/kg	LFSS20	26/32	9.80E-08 - 1.92E-07	1.59E-04	N/A	N/A	N/A	N/A	No	TEQ
	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	1.20E-06 J	7.57E-04	mg/kg	LFSB15A	26/32	9.50E-08 - 1.91E-07	7.57E-04	N/A	N/A	N/A	N/A	No	TEQ
	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.29E-06 J	4.41E-04	mg/kg	LFSS20	24/32	1.71E-07 - 3.19E-07	4.41E-04	N/A	N/A	N/A	N/A	No	TEQ
	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	6.83E-07	3.68E-04	mg/kg	LFSS20	25/32	9.30E-08 - 1.86E-07	3.68E-04	N/A	N/A	N/A	N/A	No	TEQ
	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	8.01E-07	8.49E-04	mg/kg	LFSS20	25/32	1.34E-07 - 2.50E-07	8.49E-04	N/A	N/A	N/A	N/A	No	TEQ
	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	3.87E-07 J	7.82E-05	mg/kg	LFSS20	20/32	7.70E-08 - 2.94E-07	7.82E-05	N/A	N/A	N/A	N/A	No	TEQ
	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.16E-06 J	8.53E-04	mg/kg	LFSS20	25/32	1.30E-07 - 2.42E-07	8.53E-04	N/A	N/A	N/A	N/A	No	TEQ
	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	3.20E-07 J	2.64E-04	mg/kg	LFSS20	24/32	1.23E-07 - 2.62E-07	2.64E-04	N/A	N/A	N/A	N/A	No	TEQ
	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	6.22E-07 J	5.00E-04	mg/kg	LFSS20	24/32	1.62E-07 - 2.55E-07	5.00E-04	N/A	N/A	N/A	N/A	No	TEQ
	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	4.37E-07 J	2.58E-04	mg/kg	LFSS20	24/32	7.60E-08 - 2.94E-07	2.58E-04	N/A	N/A	N/A	N/A	No	TEQ
	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	9.77E-07	4.67E-04	mg/kg	LFSS20	25/32	1.09E-07 - 2.17E-07	4.67E-04	N/A	N/A	N/A	N/A	No	TEQ
	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	7.88E-07 J	4.80E-04	mg/kg	LFSS20	24/32	1.28E-07 - 2.74E-07	4.80E-04	N/A	N/A	N/A	N/A	No	TEQ
	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.44E-07	1.67E-04	mg/kg	LFSS20	21/31	4.10E-08 - 3.69E-07	1.67E-04	N/A	N/A	N/A	N/A	No	TEQ
	3268-87-9	Octachlorodibenzodioxin	3.08E-05	1.45E-01	mg/kg	LFSS20	32/32	N/A	1.45E-01	N/A	N/A	N/A	N/A	No	TEQ
	39001-02-0	Octachlorodibenzofuran	9.60E-07 J	4.15E-03	mg/kg	LFSS20	29/32	2.74E-07 - 3.94E-07	4.15E-03	N/A	N/A	N/A	N/A	No	TEQ
	120-82-1	1,2,4-Trichlorobenzene	1.20E-02 J	5.45E-02 J	mg/kg	LFSS01	3/17	1.70E-01 - 2.40E-01	5.45E-02	N/A	7.8E+01 N	N/A	N/A	No	BSL
	95-50-1	1,2-Dichlorobenzene	3.00E-02 J	5.10E-02 J	mg/kg	LFSS01	2/17	1.70E-01 - 2.40E-01	5.10E-02	N/A	7.0E+02 N	N/A	N/A	No	BSL
	541-73-1	1,3-Dichlorobenzene	1.20E-02 J	5.10E-02 J	mg/kg	LFSS01	3/17	1.70E-01 - 2.40E-01	5.10E-02	N/A	2.3E+01 N	N/A	N/A	No	BSL
	106-46-7	1,4-Dichlorobenzene	1.30E-02 J	5.25E-02 J	mg/kg	LFSS01	3/17	1.70E-01 - 2.40E-01	5.25E-02	N/A	2.7E+01 C	N/A	N/A	No	BSL
	95-95-4	2,4,5-Trichlorophenol	1.20E-02 J	1.20E-02 J	mg/kg	LFSB16B	1/17	1.70E-01 - 2.40E-01	1.20E-02	N/A	7.8E+02 N	N/A	N/A	No	BSL
	88-06-2	2,4,6-Trichlorophenol	1.80E-02 J	1.80E-02 J	mg/kg	LFSB16B	1/17	1.70E-01 - 2.40E-01	1.80E-02	N/A	7.8E+00 N	N/A	N/A	No	BSL
	120-83-2	2,4-Dichlorophenol	2.20E-02 J	4.69E-02 J	mg/kg	LFSS01	2/17	1.70E-01 - 2.40E-01	4.69E-02	N/A	2.3E+01 N	N/A	N/A	No	BSL
	121-14-2	2,4-Dinitrotoluene	8.10E-02 J	1.20E-01 J	mg/kg	LFSS03	2/17	1.80E-01 - 4.00E-01	1.20E-01	N/A	9.4E-01 C	N/A	N/A	No	BSL
	91-58-7	2-Chloronaphthalene	8.00E-03 J	4.80E-02 J	mg/kg	LFSS01	3/17	1.70E-01 - 2.40E-01	4.80E-02	N/A	6.3E+02 N	N/A	N/A	No	BSL
	95-57-8	2-Chlorophenol	8.20E-03 J	4.90E-02 J	mg/kg	LFSS01	3/17	1.70E-01 - 2.40E-01	4.90E-02	N/A	3.9E+01 N	N/A	N/A	No	BSL
	91-57-6	2-Methylnaphthalene	4.20E-03	6.20E-02	mg/kg	LFSB12A	7/14	2.10E-03 - 2.20E-01	6.20E-02	N/A	3.1E+01 N	N/A	N/A	No	BSL
	88-75-5	2-Nitrophenol	1.10E-02 J	5.50E-02 J	mg/kg	LFSS01	3/17	1.70E-01 - 2.40E-01	5.50E-02	N/A	N/A	N/A	N/A	Yes	NTX
	72-54-8	4,4'-DDD	4.23E-04 J	5.93E-03	mg/kg	LFSB15A	3/3	N/A	5.93E-03	N/A	2.7E+00 C	N/A	N/A	No	BSL
	72-55-9	4,4'-DDE	2.32E-03	4.93E-02	mg/kg	LFSB15A	2/2	N/A	4.93E-02	N/A	1.9E+00 C	N/A	N/A	No	BSL
	50-29-3	4,4'-DDT	1.54E-02	8.32E-02	mg/kg	LFSS03	3/3	N/A	8.32E-02	N/A	1.9E+00 C	N/A	N/A	No	BSL
	7005-72-3	4-Chlorophenyl phenylether	1.20E-02 J	1.20E-02 J	mg/kg	LFSB16B	1/17	1.70E-01 - 2.40E-01	1.20E-02	N/A	N/A	N/A	N/A	Yes	NTX
	83-32-9	Acenaphthene	1.30E-02 J	1.30E-02 J	mg/kg	LFSB16B	1/11	1.70E-03 - 2.20E-01	1.30E-02	N/A	4.7E+02 N	N/A	N/A	No	BSL

Table E.1-4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Current/Future - Total Soil - Radford -FLFA

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)
	208-96-8	Acenaphthylene	8.55E-04 J	1.30E-02 J	mg/kg	LFSB16B	7/17	1.80E-03 - 2.20E-01	1.30E-02	N/A	2.3E+02 N	N/A	N/A	No	BSL
	120-12-7	Anthracene	9.30E-04 J	5.60E-03	mg/kg	LFSS03	6/17	2.00E-03 - 2.20E-01	5.60E-03	N/A	2.3E+03 N	N/A	N/A	No	BSL
	11097-69-1	Aroclor 1254	1.35E-02 J	1.58E+00	mg/kg	LFSS03	17/18	3.90E-02 - 1.80E-01	1.58E+00	N/A	1.56E-01 N	N/A	N/A	Yes	ASL
	11096-82-5	Aroclor 1260	3.73E-02 J	1.09E+00	mg/kg	LFSS16	8/18	1.80E-02 - 9.50E-02	1.09E+00	N/A	3.2E-01 C	N/A	N/A	Yes	ASL
	56-55-3	Benzo(a)anthracene	7.90E-03 J	2.80E-02	mg/kg	LFSS01	8/17	2.00E-03 - 2.20E-01	2.80E-02	N/A	2.2E-01 C	N/A	N/A	No	BSL
	50-32-8	Benzo(a)pyrene	9.70E-03	2.80E-02	mg/kg	LFSS03	6/17	2.00E-03 - 2.20E-01	2.80E-02	N/A	2.2E-02 C	N/A	N/A	Yes	ASL
	205-99-2	Benzo(b)fluoranthene	1.80E-02	6.70E-02	mg/kg	LFSS03	6/17	2.00E-03 - 2.20E-01	6.70E-02	N/A	2.2E-01 C	N/A	N/A	No	BSL
	191-24-2	Benzo(g,h,i)perylene	4.80E-03 L	2.50E-02 L	mg/kg	LFSS03	6/17	2.00E-03 - 2.20E-01	2.50E-02	N/A	2.3E+02 N	N/A	N/A	No	BSL
	207-08-9	Benzo(k)fluoranthene	5.90E-03	1.85E-02	mg/kg	LFSS01	6/17	2.00E-03 - 2.20E-01	1.85E-02	N/A	2.2E+00 C	N/A	N/A	No	BSL
	111-91-1	bis(2-Chloroethoxy)methane	1.30E-02 J	4.90E-02 J	mg/kg	LFSS01	2/17	1.70E-01 - 2.40E-01	4.90E-02	N/A	N/A	N/A	N/A	Yes	NTX
	111-44-4	bis(2-Chloroethyl)ether	1.90E-02 J	1.90E-02 J	mg/kg	LFSB16B	1/17	1.70E-01 - 2.40E-01	1.90E-02	N/A	5.8E-01 C	N/A	N/A	No	BSL
	108-60-1	bis(2-Chloroisopropyl)ether	8.80E-03 J	4.95E-02 J	mg/kg	LFSS01	3/17	1.70E-01 - 2.40E-01	4.95E-02	N/A	9.1E+00 C	N/A	N/A	No	BSL
	218-01-9	Chrysene	1.20E-02	3.70E-02	mg/kg	LFSS03	6/17	2.00E-03 - 2.20E-01	3.70E-02	N/A	2.2E+01 C	N/A	N/A	No	BSL
	53-70-3	Dibenz(a,h)anthracene	2.60E-03 J	3.50E-03 J	mg/kg	LFSS03	3/17	1.70E-03 - 2.20E-01	3.50E-03	N/A	2.2E-02 C	N/A	N/A	No	BSL
	132-64-9	Dibenzofuran	1.30E-02 J	4.62E-02 J	mg/kg	LFSS01	3/17	1.70E-01 - 2.40E-01	4.62E-02	N/A	7.8E+00 N	N/A	N/A	No	BSL
	117-84-0	Di-n-octyl phthalate	2.00E-02 J	2.00E-02 J	mg/kg	LFSB17A	1/17	1.70E-01 - 2.40E-01	2.00E-02	N/A	N/A	N/A	N/A	Yes	NTX
	33213-65-9	Endosulfan II	1.23E-03	1.99E-02	mg/kg	LFSS03	3/3	N/A	1.99E-02	N/A	4.7E+01 N	N/A	N/A	No	BSL
	7421-93-4	Endrin aldehyde	1.87E-03	3.34E-02	mg/kg	LFSS03	3/3	N/A	3.34E-02	N/A	2.3E+00 N	N/A	N/A	No	BSL
	53494-70-5	Endrin ketone	4.46E-03	4.46E-03	mg/kg	LFSB15A	1/3	6.80E-04 - 6.79E-03	4.46E-03	N/A	2.3E+00 N	N/A	N/A	No	BSL
	206-44-0	Fluoranthene	1.80E-02	5.35E-02 J	mg/kg	LFSS01	6/17	2.00E-03 - 2.20E-01	5.35E-02	N/A	3.1E+02 N	N/A	N/A	No	BSL
	86-73-7	Fluorene	8.60E-04 J	9.00E-03 J	mg/kg	LFSB16B	9/17	2.10E-03 - 2.20E-01	9.00E-03	N/A	3.1E+02 N	N/A	N/A	No	BSL
	5103-74-2	gamma-Chlordane	2.81E-03	2.81E-03	mg/kg	LFSB15A	1/3	6.79E-04 - 6.80E-04	2.81E-03	N/A	1.8E+00 C	N/A	N/A	No	BSL
	118-74-1	Hexachlorobenzene	2.00E-02 J	2.00E-02 J	mg/kg	LFSB15A	1/17	1.70E-01 - 2.40E-01	2.00E-02	N/A	4.0E-01 C	N/A	N/A	No	BSL
	87-68-3	Hexachlorobutadiene	1.00E-02 J	5.20E-02 J	mg/kg	LFSS01	3/17	1.70E-01 - 2.40E-01	5.20E-02	N/A	7.8E+00 N	N/A	N/A	No	BSL
	67-72-1	Hexachloroethane	1.30E-02 J	1.30E-02 J	mg/kg	LFSB16B	1/17	1.70E-01 - 2.40E-01	1.30E-02	N/A	7.8E+00 N	N/A	N/A	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	6.30E-03	2.60E-02	mg/kg	LFSS03	6/17	2.00E-03 - 2.20E-01	2.60E-02	N/A	2.2E-01 C	N/A	N/A	No	BSL
	78-59-1	Isophorone	7.40E-03 J	4.64E-02 J	mg/kg	LFSS01	3/17	1.70E-01 - 2.40E-01	4.64E-02	N/A	6.7E+02 C	N/A	N/A	No	BSL
	72-43-5	Methoxychlor	7.28E-04 J	7.28E-04 J	mg/kg	LFSB15A	1/3	6.79E-04 - 6.80E-04	7.28E-04	N/A	3.9E+01 N	N/A	N/A	No	BSL
	91-20-3	Naphthalene	7.40E-03	3.40E-02	mg/kg	LFSS03	5/12	2.10E-03 - 2.20E-01	3.40E-02	N/A	1.6E+02 N	N/A	N/A	No	BSL
	98-95-3	Nitrobenzene	3.50E-02 J	3.50E-02 J	mg/kg	LFSB16B	1/17	1.80E-01 - 4.00E-01	3.50E-02	N/A	3.9E+00 N	N/A	N/A	No	BSL
	86-30-6	n-Nitrosodiphenylamine	1.50E-01 J	1.50E-01 J	mg/kg	LFSS03	1/17	1.70E-01 - 2.40E-01	1.50E-01	N/A	1.3E+02 C	N/A	N/A	No	BSL
	59-50-7	p-Chloro-m-cresol	1.40E-02 J	1.40E-02 J	mg/kg	LFSB16B	1/17	1.70E-01 - 2.40E-01	1.40E-02	N/A	N/A	N/A	N/A	Yes	NTX
	85-01-8	Phenanthrene	1.10E-03 J	5.50E-02	mg/kg	LFSS03	7/17	2.00E-03 - 2.20E-01	5.50E-02	N/A	2.3E+02 N	N/A	N/A	No	BSL
	129-00-0	Pyrene	1.90E-02	5.05E-02 J	mg/kg	LFSS01	6/17	2.00E-03 - 2.20E-01	5.05E-02	N/A	2.3E+02 N	N/A	N/A	No	BSL
	7429-90-5	Aluminum	9.77E+03 J	4.79E+04	mg/kg	LFSB16C	38/38	N/A	4.79E+04	N/A	7.8E+03 N	N/A	N/A	Yes	ASL
	7440-36-0	Antimony	4.30E-01 J	4.76E+01 J	mg/kg	LFSB15A	7/34	3.40E-01 - 7.14E+00	4.76E+01	N/A	3.1E+00 N	N/A	N/A	Yes	ASL
	7440-38-2	Arsenic	1.39E+00 J	6.89E+01 J	mg/kg	LFSS20	36/36	N/A	6.89E+01	N/A	4.3E-01 C	N/A	N/A	Yes	ASL
	7440-39-3	Barium	2.53E+01	2.63E+03	mg/kg	LFSS03	39/39	N/A	2.63E+03	N/A	1.6E+03 N	N/A	N/A	Yes	ASL
	7440-41-7	Beryllium	4.00E-01 J	3.00E+00	mg/kg	LFSB16C	21/39	6.40E-01 - 1.70E+00	3.00E+00	N/A	1.6E+01 N	N/A	N/A	No	BSL
	7440-43-9	Cadmium	7.20E-02 J	1.98E+01	mg/kg	LFSB15A	11/38	5.60E-02 - 1.50E+00	1.98E+01	N/A	7.8E+00 N	N/A	N/A	Yes	ASL
	7440-70-2	Calcium	4.88E+02 J	5.57E+04 J	mg/kg	LFSB17B	35/35	N/A	5.57E+04	N/A	N/A	1.00E+06	RDA	No	BSL

Table E.1-4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Current/Future - Total Soil - Radford -FLFA

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)
	7440-47-3	Chromium VI	1.31E+01 J	2.99E+02 J	mg/kg	LFSS03	39/39	N/A	2.99E+02	N/A	2.3E+01 N	N/A	N/A	Yes	ASL
	7440-48-4	Cobalt	3.70E+00 J	4.70E+01 J	mg/kg	LFSB15A	39/39	N/A	4.70E+01	N/A	N/A	N/A	N/A	Yes	NTX
	7440-50-8	Copper	1.08E+01 J	2.38E+04 J	mg/kg	LFSS20	39/39	N/A	2.38E+04	N/A	3.1E+02 N	N/A	N/A	Yes	ASL
	7439-89-6	Iron	1.41E+04 J	9.99E+04 J	mg/kg	LFSB15A	39/39	N/A	9.99E+04	N/A	5.5E+03 N	N/A	N/A	Yes	ASL
	7439-92-1	Lead	1.08E+01	2.59E+04 J	mg/kg	LFSS20	55/56	1.05E+01 - 1.05E+01	2.59E+04	N/A	N/A	4.00E+02	USEPA	Yes	ASL
	7439-95-4	Magnesium	1.07E+03 J	6.04E+04	mg/kg	LFSB17B	39/39	N/A	6.04E+04	N/A	N/A	1.00E+06	RDA	No	BSL
	7439-96-5	Manganese	1.37E+02 J	2.23E+03 J	mg/kg	LFSB15A	39/39	N/A	2.23E+03	N/A	1.6E+02 N	N/A	N/A	Yes	ASL
	7439-97-6	Mercury	3.00E-02 J	2.20E+00 J	mg/kg	LFSS21	35/39	5.00E-02 - 6.05E-02	2.20E+00	N/A	2.3E+00 N	N/A	N/A	No	BSL
	7440-02-0	Nickel	7.50E+00 J	4.04E+02 J	mg/kg	LFSB15A	39/39	N/A	4.04E+02	N/A	1.6E+02 N	N/A	N/A	Yes	ASL
	7440-09-7	Potassium	7.12E+02 J	8.67E+03	mg/kg	LFSB12B	37/37	N/A	8.67E+03	N/A	N/A	1.00E+06	RDA	No	BSL
	7782-49-2	Selenium	3.40E-01 L	1.30E+00	mg/kg	LFSB14B	16/39	2.50E-01 - 1.44E+00	1.30E+00	N/A	3.9E+01 N	N/A	N/A	No	BSL
	7440-22-4	Silver	1.10E-01 L	6.52E+01 L	mg/kg	LFSS17	22/39	7.50E-02 - 1.44E+00	6.52E+01	N/A	3.9E+01 N	N/A	N/A	Yes	ASL
	7440-23-5	Sodium	3.95E+01	3.17E+03	mg/kg	LFSS20	29/29	N/A	3.17E+03	N/A	N/A	1.00E+06	RDA	No	BSL
	7440-28-0	Thallium	9.90E-02 J	2.69E+01	mg/kg	17SB3B	21/32	6.00E-01 - 1.62E+00	2.69E+01	N/A	5.5E-01 N	N/A	N/A	Yes	ASL
	7440-62-2	Vanadium	2.16E+01 J	9.05E+01	mg/kg	17SB3B	39/39	N/A	9.05E+01	N/A	7.8E+00 N	N/A	N/A	Yes	ASL
	7440-66-6	Zinc	2.60E+01 J	1.52E+04 J	mg/kg	LFSS20	39/39	N/A	1.52E+04	N/A	2.3E+03 N	N/A	N/A	Yes	ASL

(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 Region 3 RBC Table (October 2007). See text for derivation of Nutrient RDAs.

(4) Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Break Down Product (BDP)
No Toxicity Information (NTX)

Deletion Reason: Infrequent Detection (<= 5%, IFD)
Below 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, L = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

(5) The screening value for dinitrotoluene mixture is based on a carcinogenicity study for 2,4-DNT and 2,6-DNT. Therefore, the RBC for dinitrotoluene mixture is conservatively used as the screening value for the individual compounds.

(6) There are no screening values available for acenaphthylene, benzo(g,h,i)perylene, and phenanthrene. Therefore, the screening value for pyrene was used as a surrogate.

Table E.1-5
Summary of Screening for Non-Detected Chemicals
Current/Future - Total Soil at FLFA

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	71-55-6	1,1,1-Trichloroethane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+04 N	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	3.2E+00 C	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.1E+01 C	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+03 N	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	3.9E+02 N	No
	107-06-2	1,2-Dichloroethane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.0E+00 C	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	9.4E+00 C	No
	99-35-4	1,3,5-Trinitrobenzene			mg/kg		0/12	1.00E-01 - 2.00E-01	2.00E-01	N/A	2.3E+02 N	No
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/12	1.00E-01 - 2.00E-01	2.00E-01	N/A	7.8E-01 N	No
	93-76-5	2,4,5-T			mg/kg		0/3	1.02E-01 - 1.20E-01	1.20E-01	N/A	7.8E+01 N	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/3	1.02E-01 - 1.20E-01	1.20E-01	N/A	6.3E+01 N	No
	118-96-7	2,4,6-Trinitrotoluene			mg/kg		0/12	2.00E-01 - 4.00E-01	4.00E-01	N/A	3.9E+00 N	No
	94-75-7	2,4-D			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	N/A	7.8E+01 N	No
	94-82-6	2,4-DB			mg/kg		0/3	1.02E+00 - 1.20E+00	1.20E+00	N/A	6.3E+01 N	No
	105-67-9	2,4-Dimethylphenol			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	1.6E+02 N	No
	51-28-5	2,4-Dinitrophenol			mg/kg		0/17	8.50E-01 - 1.20E+00	1.20E+00	N/A	1.6E+01 N	No
	606-20-2	2,6-Dinitrotoluene			mg/kg		0/17	1.80E-01 - 4.00E-01	4.00E-01	N/A	9.4E-01 C	No
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/12	2.00E-01 - 4.00E-01	4.00E-01	N/A	1.6E+00 N	No
	78-93-3	2-Butanone			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	4.7E+03 N	No
	591-78-6	2-Hexanone			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	N/A	NTX
	88-74-4	2-Nitroaniline			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	N/A	NTX
	88-72-2	2-Nitrotoluene			mg/kg		0/12	4.00E-01 - 8.00E-01	8.00E-01	N/A	7.8E+01 N	No
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	N/A	7.8E+00 N	No
	91-94-1	3,3'-Dichlorobenzidine			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	1.4E+00 C	No
	99-09-2	3-Nitroaniline			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	N/A	NTX
	99-08-1	3-Nitrotoluene			mg/kg		0/12	4.00E-01 - 8.00E-01	8.00E-01	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/17	8.50E-01 - 1.20E+00	1.20E+00	N/A	N/A	NTX
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/12	2.00E-01 - 4.00E-01	4.00E-01	N/A	1.6E+00 N	No
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	N/A	NTX
	100-01-6	4-Nitroaniline			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	N/A	NTX
	100-02-7	4-Nitrophenol			mg/kg		0/17	8.50E-01 - 1.20E+00	1.20E+00	N/A	N/A	NTX
	99-99-0	4-Nitrotoluene			mg/kg		0/12	4.00E-01 - 8.00E-01	8.00E-01	N/A	3.1E+01 N	No
	67-64-1	Acetone			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.0E+03 N	No
	309-00-2	Aldrin			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	3.8E-02 C	No
	319-84-6	alpha-BHC			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	1.0E-01 C	No
	5103-71-9	alpha-Chlordane			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	1.8E+00 N	No
	12674-11-2	Aroclor 1016			mg/kg		0/30	1.80E-02 - 1.80E-01	1.80E-01	N/A	5.5E-01 N	No

Table E.1-5
Summary of Screening for Non-Detected Chemicals
Current/Future - Total Soil at FLFA

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)
	11104-28-2	Aroclor 1221			mg/kg		0/30	1.80E-02 - 1.80E-01	1.80E-01	N/A	3.2E-01 C	No
	11141-16-5	Aroclor 1232			mg/kg		0/30	1.80E-02 - 1.80E-01	1.80E-01	N/A	3.2E-01 C	No
	53469-21-9	Aroclor 1242			mg/kg		0/30	1.80E-02 - 1.80E-01	1.80E-01	N/A	3.2E-01 C	No
Total Soil	12672-29-6	Aroclor 1248			mg/kg		0/30	1.80E-02 - 1.80E-01	1.80E-01	N/A	3.2E-01 C	No
	71-43-2	Benzene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.2E+01 C	No
	65-85-0	Benzoic Acid			mg/kg		0/17	8.50E-01 - 1.20E+00	1.20E+00	N/A	3.1E+04 N	No
	100-51-6	Benzyl alcohol			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	3.9E+03 N	No
	319-85-7	beta-BHC			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	3.5E-01 C	No
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/kg		0/17	1.30E-02 - 2.20E-01	2.20E-01	N/A	4.6E+01 C	No
	75-27-4	Bromodichloromethane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.0E+01 C	No
	74-83-9	Bromomethane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.1E+01 N	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/13	1.70E-01 - 2.40E-01	2.40E-01	N/A	1.6E+03 N	No
	86-74-8	Carbazole			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	3.2E+01 C	No
	75-15-0	Carbon disulfide			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.8E+02 N	No
	56-23-5	Carbon tetrachloride			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	4.9E+00 C	No
	108-90-7	Chlorobenzene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+02 N	No
	75-00-3	Chloroethane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	2.2E+02 C	No
	67-66-3	Chloroform			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.8E+01 N	No
	74-87-3	Chloromethane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	N/A	NTX
	156-59-2	cis-1,2-Dichloroethene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.8E+01 N	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	N/A	NTX
	121-82-4	Cyclonite			mg/kg		0/12	2.00E-01 - 4.00E-01	4.00E-01	N/A	5.8E+00 C	No
	75-99-0	Dalapon			mg/kg		0/3	1.02E+00 - 1.20E+00	1.20E+00	N/A	2.3E+02 N	No
	319-86-8	delta-BHC			mg/kg		0/2	6.79E-04 - 7.99E-04	7.99E-04	N/A	N/A	NTX
	124-48-1	Dibromochloromethane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.6E+00 C	No
	1918-00-9	Dicamba			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	N/A	2.3E+02 N	No
	120-36-5	Dichloroprop			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	N/A	N/A	NTX
	60-57-1	Dieldrin			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	4.0E-02 C	No
	84-66-2	Diethyl phthalate			mg/kg		0/15	1.70E-01 - 2.40E-01	2.40E-01	N/A	6.3E+03 N	No
	131-11-3	Dimethylphthalate			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	N/A	NTX
	84-74-2	Di-n-butyl phthalate			mg/kg		0/16	1.70E-01 - 2.40E-01	2.40E-01	N/A	7.8E+02 N	No
	959-98-8	Endosulfan I			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	4.7E+01 N	No
	1031-07-8	Endosulfan sulfate			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	4.7E+01 N	No
	72-20-8	Endrin			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	2.3E+00 N	No
	100-41-4	Ethylbenzene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	7.8E+02 N	No
	58-89-9	gamma-BHC (Lindane)			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	4.9E-01 C	No
	76-44-8	Heptachlor			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	1.4E-01 C	No
	1024-57-3	Heptachlor epoxide			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	N/A	7.0E-02 C	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	4.7E+01 N	No
	2691-41-0	HMX			mg/kg		0/12	2.00E-01 - 4.00E-01	4.00E-01	N/A	3.9E+02 N	No
	ICF87	m+p-Xylenes			mg/kg		0/12	1.00E-02 - 2.40E-02	2.40E-02	N/A	1.6E+03 N	No
	94-74-6	MCPA			mg/kg		0/3	1.02E+02 - 1.20E+02	1.20E+02	N/A	3.9E+00 N	Yes
	93-65-2	MCPP			mg/kg		0/3	1.02E+01 - 1.20E+02	1.20E+02	N/A	7.8E+00 N	Yes

Table E.1-5
Summary of Screening for Non-Detected Chemicals
Current/Future - Total Soil at FLFA

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	75-09-2	Methylene chloride			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	8.5E+01 C	No
	55-63-0	Nitroglycerin			mg/kg		0/12	3.05E-01 - 7.19E-01	7.19E-01	N/A	7.8E-01 N	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	9.1E-02 C	Yes
	95-48-7	o-Cresol			mg/kg		0/16	1.70E-01 - 2.40E-01	2.40E-01	N/A	3.9E+02 N	No
	95-47-6	o-Xylene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+03 N	No
	106-47-8	p-Chloroaniline			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	3.1E+01 N	No
	106-44-5	p-Cresol			mg/kg		0/16	1.70E-01 - 2.40E-01	2.40E-01	N/A	3.9E+01 N	No
	87-86-5	Pentachlorophenol			mg/kg		0/17	8.50E-01 - 1.20E+00	1.20E+00	N/A	5.3E+00 C	No
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/12	3.05E-01 - 7.19E-01	7.19E-01	N/A	N/A	NTX
	108-95-2	Phenol			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	2.3E+03 N	No
	110-86-1	Pyridine			mg/kg		0/17	1.70E-01 - 2.40E-01	2.40E-01	N/A	7.8E+00 N	No
	100-42-5	Styrene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+03 N	No
	127-18-4	Tetrachloroethene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.2E+00 C	No
	479-45-8	Tetryl			mg/kg		0/12	2.00E-01 - 4.00E-01	4.00E-01	N/A	3.1E+01 N	No
	108-88-3	Toluene			mg/kg		0/11	5.10E-03 - 1.20E-02	1.20E-02	N/A	6.3E+02 N	No
	8001-35-2	Toxaphene			mg/kg		0/3	3.39E-02 - 3.99E-02	3.99E-02	N/A	5.8E-01 C	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+02 N	No
	10061-02-6	trans-1,3-Dichloropropene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	N/A	NTX
	75-25-2	Tribromomethane			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	8.1E+01 C	No
	79-01-6	Trichloroethene			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	1.6E+00 C	No
	75-01-4	Vinyl Chloride			mg/kg		0/12	5.10E-03 - 1.20E-02	1.20E-02	N/A	9.0E-02 C	No

(1) Maximum detection limit 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 Region 3 RBC Table (October 2007).
Residential RBCs are based on a risk level of 1.0E-06 and an HQ = 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes: No Toxicity Information Available (NTX)

Definitions:
N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Qualifiers:
L = Reported value may be biased low
K = Reported value may be biased high
J = Estimated Value

(5) The screening value for dinitrotoluene mixture is based on a carcinogenicity study for 2,4-DNT and 2,6-DNT. Therefore, the RBC for dinitrotoluene mixture is conservatively used as the screening value for the individual compounds.

(6) The screening value for Endosulfan I was used as a surrogate value for Endosulfan sulfate.

Table E.1-6
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Current/Future - Groundwater - Radford, FLFA

Scenario Timeframe:
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)
Groundwater	N/A	2,3,7,8-TCDD-TE	3.06E-12	7.89E-10	mg/L	LFMW01	3/3	N/A	7.89E-10	N/A	4.5E-10 C	N/A	N/A	Yes	ASL
	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	2.68E-09 J	2.68E-09 J	mg/L	LFMW01	1/3	5.27E-09 - 5.34E-09	2.68E-09	N/A	N/A	N/A	N/A	No	TEQ
	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	1.27E-09 J	1.27E-09 J	mg/L	LFMW01	1/3	5.27E-09 - 5.34E-09	1.27E-09	N/A	N/A	N/A	N/A	No	TEQ
	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	1.54E-09 J	1.54E-09 J	mg/L	LFMW01	1/3	5.27E-09 - 5.34E-09	1.54E-09	N/A	N/A	N/A	N/A	No	TEQ
	91-57-6	2-Methylnaphthalene	1.02E-04 J	1.02E-04 J	mg/l	40MW5	1/5	1.50E-05 - 1.00E-03	1.02E-04	N/A	2.4E-03 N	N/A	N/A	No	BSL
	92-52-4	Biphenyl	3.30E-05 J	3.30E-05 J	mg/l	40MW5	1/2	1.50E-05 - 1.50E-05	3.30E-05	N/A	3.0E-02 N	N/A	N/A	No	BSL
	58-89-9	gamma-BHC (Lindane)	9.80E-06 J	9.80E-06 J	mg/l	40MW6	1/5	1.80E-06 - 5.00E-05	9.80E-06	N/A	5.2E-05 C	N/A	N/A	No	BSL
	14797-73-0	Perchlorate	5.20E-04	5.40E-03	mg/l	17MW02	5/5	N/A	5.40E-03	N/A	2.6E-03 N	N/A	N/A	Yes	ASL
	127-18-4	Tetrachloroethene	2.60E-03	2.60E-03	mg/l	17MW02	1/5	1.50E-04 - 1.00E-03	2.60E-03	N/A	1.0E-04 C	N/A	N/A	Yes	ASL
	7429-90-5	Aluminum	2.22E-01	9.32E+00	mg/l	LFMW01	3/5	4.40E-02 - 4.40E-02	9.32E+00	N/A	3.7E+00 N	N/A	N/A	Yes	ASL
	7440-39-3	Barium	3.90E-02	9.30E-02 J	mg/l	LFMW01	5/5	N/A	9.30E-02	N/A	7.3E-01 N	N/A	N/A	No	BSL
	7440-70-2	Calcium	6.90E+01	1.20E+02	mg/l	LFMW01	5/5	N/A	1.20E+02	N/A	N/A	5.00E+02	Nutrient RDA	No	BSL
	67-66-3	Chloroform	2.70E-03	2.40E-02	mg/l	40MW6	4/5	1.00E-03 - 1.00E-03	2.40E-02	N/A	1.5E-04 C	N/A	N/A	Yes	ASL
	7440-47-3	Chromium VI	1.10E-02	4.30E-02	mg/l	LFMW01	3/3	N/A	4.30E-02	N/A	1.1E-02 N	N/A	N/A	Yes	ASL
	7440-48-4	Cobalt	1.25E-04 J	2.69E-02 J	mg/l	17MW02	4/5	1.00E-03 - 1.00E-03	2.69E-02	N/A	N/A	N/A	N/A	Yes	NTX
	7440-50-8	Copper	7.90E-04 J	7.90E-03 J	mg/l	17MW02	4/5	1.20E-03 - 1.20E-03	7.90E-03	N/A	1.5E-01 N	N/A	N/A	No	BSL
	7439-89-6	Iron	6.44E-01	1.01E+01	mg/l	LFMW01	2/3	1.50E-02 - 1.50E-02	1.01E+01	N/A	2.6E+00 N	N/A	N/A	Yes	ASL
	7439-92-1	Lead	3.60E-03 J	3.60E-03 J	mg/l	LFMW01	1/5	3.30E-04 - 2.10E-03	3.60E-03	N/A	N/A	1.50E-02	Treatment Action Level	No	BSL
	7439-95-4	Magnesium	2.15E+01	5.67E+01	mg/l	LFMW01	5/5	N/A	5.67E+01	N/A	N/A	1.75E+02	Nutrient RDA	No	BSL
	7439-96-5	Manganese	5.30E-03 J	7.83E-02	mg/l	LFMW01	3/5	4.30E-04 - 4.30E-04	7.83E-02	N/A	7.3E-02 N	N/A	N/A	Yes	ASL
	91-20-3	Naphthalene	9.7E-05 J	9.7E-05 J	mg/l	40MW5	1/5	2.30E-05 - 1.00E-03	9.70E-05	N/A	6.5E-04 N	N/A	N/A	No	BSL
	7440-02-0	Nickel	9.35E-04 J	3.05E-02 J	mg/l	LFMW01	5/5	N/A	3.05E-02	N/A	7.3E-02 N	N/A	N/A	No	BSL
	7440-09-7	Potassium	1.00E+00	1.20E+00	mg/l	40MW6	2/5	2.81E+00 - 6.12E+00	1.20E+00	N/A	N/A	1.00E+03	Nutrient RDA	No	BSL
	7782-49-2	Selenium	9.30E-04 J	9.30E-04 J	mg/l	40MW5	1/5	9.20E-04 - 4.00E-03	9.30E-04	N/A	1.8E-02 N	N/A	N/A	No	BSL
	7440-23-5	Sodium	6.95E+00	1.46E+01	mg/l	17MW02	4/4	N/A	1.46E+01	N/A	N/A	2.0E+01	Nutrient RDA	No	BSL
	7440-62-2	Vanadium	1.50E-03 J	2.00E-02 J	mg/l	LFMW01	2/5	8.30E-04 - 1.10E-03	2.00E-02	N/A	3.7E-03 N	N/A	N/A	Yes	ASL
	7440-66-6	Zinc	1.00E-02 J	6.04E-02	mg/l	LFMW01	3/3	N/A	6.04E-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 toxicity values from USEPA Region 3 RBC Table (October 2007). See text for derivation of Nutrient RDAs.

(4) Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Break Down Product (BDP)
No Toxicity Information (NTX)

Deletion Reason: Infrequent Detection (<= 5%, IFD)
Below 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, L = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Table E.1-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at FLFA

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)
	71-55-6	1,1,1-Trichloroethane			mg/L		0/5	1.10E-04 - 1.00E-03	1.00E-03	N/A	9.1E-01 N	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/L		0/5	1.00E-04 - 1.00E-03	1.00E-03	N/A	5.3E-05 C	Yes
Groundwater	79-00-5	1,1,2-Trichloroethane			mg/L		0/5	2.10E-04 - 1.00E-03	1.00E-03	N/A	1.9E-04 C	Yes
	75-34-3	1,1-Dichloroethane			mg/L		0/5	7.60E-05 - 1.00E-03	1.00E-03	N/A	9.0E-02 N	No
	75-35-4	1,1-Dichloroethene			mg/L		0/5	1.40E-04 - 1.00E-03	1.00E-03	N/A	3.5E-02 N	No
	87-61-6	1,2,3-Trichlorobenzene			mg/L		0/2	1.30E-04 - 1.30E-04	1.30E-04	N/A	N/A	NTX
	95-94-3	1,2,4,5-Tetrachlorobenzene			mg/L		0/2	2.40E-05 - 2.40E-05	2.40E-05	N/A	1.1E-03 N	No
	120-82-1	1,2,4-Trichlorobenzene			mg/L		0/5	1.60E-04 - 5.00E-03	5.00E-03	N/A	6.1E-03 N	No
	96-12-8	1,2-Dibromo-3-chloropropane			mg/L		0/2	2.90E-04 - 2.90E-04	2.90E-04	N/A	2.0E-07 C	Yes
	106-93-4	1,2-Dibromoethane			mg/L		0/2	2.20E-04 - 2.20E-04	2.20E-04	N/A	5.3E-06 C	Yes
	95-50-1	1,2-Dichlorobenzene			mg/L		0/5	6.50E-05 - 5.00E-03	5.00E-03	N/A	2.7E-02 N	No
	107-06-2	1,2-Dichloroethane			mg/L		0/5	1.50E-04 - 1.00E-03	1.00E-03	N/A	1.2E-04 C	Yes
	78-87-5	1,2-Dichloropropane			mg/L		0/5	1.00E-04 - 1.00E-03	1.00E-03	N/A	2.6E-04 C	Yes
	99-35-4	1,3,5-Trinitrobenzene			mg/L		0/5	4.50E-05 - 2.00E-04	2.00E-04	N/A	1.1E-01 N	No
	541-73-1	1,3-Dichlorobenzene			mg/L		0/5	1.20E-04 - 5.00E-03	5.00E-03	N/A	1.8E-03 N	Yes
	99-65-0	1,3-Dinitrobenzene			mg/L		0/5	7.10E-05 - 2.00E-04	2.00E-04	N/A	3.7E-04 N	No
	106-46-7	1,4-Dichlorobenzene			mg/L		0/5	1.30E-04 - 5.00E-03	5.00E-03	N/A	2.8E-04 C	Yes
	90-12-0	1-Methylnaphthalene			mg/L		0/3	9.50E-04 - 1.00E-03	1.00E-03	N/A	N/A	NTX
	58-90-2	2,3,4,6-Tetrachlorophenol			mg/L		0/2	1.60E-04 - 1.60E-04	1.60E-04	N/A	1.1E-01 N	No
	93-76-5	2,4,5-T			mg/L		0/3	2.00E-04 - 2.00E-04	2.00E-04	N/A	3.7E-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	2.9E-02 N	No
	95-95-4	2,4,5-Trichlorophenol			mg/L		0/5	1.10E-04 - 5.00E-03	5.00E-03	N/A	3.7E-01 N	No
	88-06-2	2,4,6-Trichlorophenol			mg/L		0/5	2.70E-05 - 5.00E-03	5.00E-03	N/A	3.6E-03 N	No
	118-96-7	2,4,6-Trinitrotoluene			mg/L		0/5	1.00E-04 - 2.00E-04	2.00E-04	N/A	1.8E-03 N	No
	94-75-7	2,4-D			mg/L		0/3	1.50E-03 - 1.50E-03	1.50E-03	N/A	3.7E-02 N	No
	94-82-6	2,4-DB			mg/L		0/3	2.00E-03 - 2.00E-03	2.00E-03	N/A	2.9E-02 N	No
	120-83-2	2,4-Dichlorophenol			mg/L		0/5	1.50E-05 - 5.00E-03	5.00E-03	N/A	1.1E-02 N	No
	105-67-9	2,4-Dimethylphenol			mg/L		0/5	3.30E-04 - 5.00E-03	5.00E-03	N/A	7.3E-02 N	No
	51-28-5	2,4-Dinitrophenol			mg/L		0/5	1.50E-03 - 2.50E-02	2.50E-02	N/A	7.3E-03 N	Yes
	121-14-2	2,4-Dinitrotoluene			mg/L		0/12	9.20E-05 - 5.00E-03	5.00E-03	N/A	9.8E-05 C	Yes
	606-20-2	2,6-Dinitrotoluene			mg/L		0/12	5.00E-05 - 5.00E-03	5.00E-03	N/A	9.8E-05 C	Yes
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/L		0/5	1.90E-04 - 2.40E-04	2.40E-04	N/A	7.3E-03 N	No
	78-93-3	2-Butanone			mg/L		0/2	3.30E-04 - 3.30E-04	3.30E-04	N/A	7.0E-01 N	No
	91-58-7	2-Chloronaphthalene			mg/L		0/5	1.20E-05 - 5.00E-03	5.00E-03	N/A	4.9E-02 N	No
	95-57-8	2-Chlorophenol			mg/L		0/5	1.60E-05 - 5.00E-03	5.00E-03	N/A	3.0E-03 N	Yes
	591-78-6	2-Hexanone			mg/L		0/5	4.20E-04 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	88-74-4	2-Nitroaniline			mg/L		0/5	1.20E-04 - 1.00E-02	1.00E-02	N/A	N/A	NTX

Table E.1-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at FLFA

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)
	88-75-5	2-Nitrophenol			mg/L		0/5	2.60E-05 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	88-72-2	2-Nitrotoluene			mg/L		0/5	1.90E-04 - 2.80E-04	2.80E-04	N/A	6.1E-03 N	No
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/L		0/3	2.00E-04 - 2.00E-04	2.00E-04	N/A	3.7E-03 N	No
	N/A	3&4-Methylphenol			mg/L		0/3	4.80E-03 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	91-94-1	3,3'-Dichlorobenzidine			mg/L		0/5	2.10E-04 - 1.00E-02	1.00E-02	N/A	1.5E-04 C	Yes
Groundwater	99-09-2	3-Nitroaniline			mg/L		0/5	1.30E-04 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	99-08-1	3-Nitrotoluene			mg/L		0/5	1.70E-04 - 2.00E-04	2.00E-04	N/A	N/A	NTX
	72-54-8	4,4'-DDD			mg/L		0/5	1.90E-06 - 9.90E-05	9.90E-05	N/A	2.8E-04 C	No
	72-55-9	4,4'-DDE			mg/L		0/5	2.70E-06 - 9.90E-05	9.90E-05	N/A	2.0E-04 C	No
	50-29-3	4,4'-DDT			mg/L		0/5	2.00E-06 - 9.90E-05	9.90E-05	N/A	2.0E-04 C	No
	534-52-1	4,6-Dinitro-o-cresol			mg/L		0/5	1.20E-04 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/L		0/5	1.90E-04 - 2.20E-04	2.20E-04	N/A	7.3E-03 N	No
	101-55-3	4-Bromophenyl phenylether			mg/L		0/5	2.60E-05 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/L		0/5	1.60E-05 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/L		0/5	3.80E-04 - 5.00E-03	5.00E-03	N/A	6.3E-01 N	No
	100-01-6	4-Nitroaniline			mg/L		0/5	1.40E-04 - 1.00E-02	1.00E-02	N/A	N/A	NTX
	100-02-7	4-Nitrophenol			mg/L		0/5	1.30E-03 - 2.50E-02	2.50E-02	N/A	N/A	NTX
	99-99-0	4-Nitrotoluene			mg/L		0/5	1.90E-04 - 4.90E-04	4.90E-04	N/A	4.2E-03 C	No
	83-32-9	Acenaphthene			mg/L		0/5	1.30E-05 - 1.00E-03	1.00E-03	N/A	3.7E-02 N	No
	208-96-8	Acenaphthylene			mg/L		0/5	1.20E-05 - 1.00E-03	1.00E-03	N/A	1.8E-02 N	No
	67-64-1	Acetone			mg/L		0/4	1.20E-03 - 2.50E-02	2.50E-02	N/A	5.5E-01 N	No
	98-86-2	Acetophenone			mg/L		0/2	4.30E-05 - 4.30E-05	4.30E-05	N/A	6.1E-02 N	No
	309-00-2	Aldrin			mg/L		0/5	7.90E-06 - 5.00E-05	5.00E-05	N/A	3.9E-06 C	Yes
	319-84-6	alpha-BHC			mg/L		0/5	1.90E-06 - 5.00E-05	5.00E-05	N/A	1.1E-05 C	Yes
	5103-71-9	alpha-Chlordane			mg/L		0/5	2.10E-06 - 5.00E-05	5.00E-05	N/A	1.9E-04 C	No
	120-12-7	Anthracene			mg/L		0/5	1.40E-05 - 1.00E-03	1.00E-03	N/A	1.8E-01 N	No
	7440-36-0	Antimony			mg/L		0/5	4.40E-04 - 6.60E-03	6.60E-03	0.354	1.5E-03 N	Yes
	12674-11-2	Aroclor 1016			mg/L		0/5	5.00E-05 - 5.00E-04	5.00E-04	N/A	2.6E-04 N	No
	11104-28-2	Aroclor 1221			mg/L		0/5	6.80E-05 - 5.00E-04	5.00E-04	N/A	3.3E-05 C	Yes
	11141-16-5	Aroclor 1232			mg/L		0/5	3.10E-05 - 5.00E-04	5.00E-04	N/A	3.3E-05 C	Yes
	53469-21-9	Aroclor 1242			mg/L		0/5	3.50E-05 - 5.00E-04	5.00E-04	N/A	3.3E-05 C	Yes
	12672-29-6	Aroclor 1248			mg/L		0/5	4.00E-05 - 5.00E-04	5.00E-04	N/A	3.3E-05 C	Yes
	11097-69-1	Aroclor 1254			mg/L		0/5	3.40E-05 - 5.00E-04	5.00E-04	N/A	3.3E-05 C	Yes
	11096-82-5	Aroclor 1260			mg/L		0/5	3.40E-05 - 5.00E-04	5.00E-04	N/A	3.3E-05 C	Yes
	7440-38-2	Arsenic			mg/L		0/5	7.40E-04 - 3.70E-03	3.70E-03	16	4.5E-05 C	Yes
	1912-24-9	Atrazine			mg/L		0/2	2.60E-05 - 2.60E-05	2.60E-05	N/A	3.0E-04 C	No
	100-52-7	Benzaldehyde			mg/L		0/2	5.10E-05 - 5.10E-05	5.10E-05	N/A	3.7E-01 N	No
	71-43-2	Benzene			mg/L		0/5	1.20E-04 - 1.00E-03	1.00E-03	N/A	3.4E-04 C	Yes
	56-55-3	Benzo(a)anthracene			mg/L		0/5	3.70E-05 - 2.00E-04	2.00E-04	N/A	3.0E-05 C	Yes
	50-32-8	Benzo(a)pyrene			mg/L		0/5	2.30E-05 - 2.00E-04	2.00E-04	N/A	3.0E-06 C	Yes
	205-99-2	Benzo(b)fluoranthene			mg/L		0/5	4.00E-05 - 2.00E-04	2.00E-04	N/A	3.0E-05 C	Yes
	191-24-2	Benzo(g,h,i)perylene			mg/L		0/5	2.20E-05 - 2.00E-04	2.00E-04	N/A	1.8E-02 N	No

Table E.1-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at FLFA

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)
	207-08-9	Benzo(k)fluoranthene			mg/L		0/5	3.60E-05 - 2.00E-04	2.00E-04	N/A	3.0E-04 C	No
	65-85-0	Benzoic Acid			mg/L		0/3	2.40E-02 - 2.50E-02	2.50E-02	N/A	1.5E+01 N	No
	100-51-6	Benzyl alcohol			mg/L		0/3	4.80E-03 - 5.00E-03	5.00E-03	N/A	1.8E+00 N	No
	7440-41-7	Beryllium			mg/L		0/5	3.10E-04 - 1.90E-03	1.90E-03	1.55	7.3E-03 N	No
	319-85-7	beta-BHC			mg/L		0/5	3.20E-06 - 5.00E-05	5.00E-05	N/A	3.7E-05 C	Yes
	111-91-1	bis(2-Chloroethoxy)methane			mg/L		0/5	1.60E-05 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	111-44-4	bis(2-Chloroethyl)ether			mg/L		0/5	1.60E-05 - 5.00E-03	5.00E-03	N/A	9.6E-06 C	Yes
	108-60-1	bis(2-Chloroisopropyl)ether			mg/L		0/5	4.70E-05 - 5.00E-03	5.00E-03	N/A	2.6E-04 C	Yes
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/L		0/5	4.10E-04 - 5.00E-03	5.00E-03	N/A	4.8E-03 C	Yes
Groundwater	75-27-4	Bromodichloromethane			mg/L		0/5	1.90E-04 - 1.00E-03	1.00E-03	N/A	1.7E-04 C	Yes
	74-83-9	Bromomethane			mg/L		0/5	1.90E-04 - 2.00E-03	2.00E-03	N/A	8.5E-04 N	Yes
	85-68-7	Butyl benzyl phthalate			mg/L		0/4	2.90E-05 - 5.00E-03	5.00E-03	N/A	7.3E-01 N	No
	7440-43-9	Cadmium			mg/L		0/5	6.20E-05 - 1.00E-03	1.00E-03	1.7	3.7E-03 N	No
	105-60-2	Caprolactam			mg/L		0/2	1.40E-04 - 1.40E-04	1.40E-04	N/A	1.8E+00 N	No
	86-74-8	Carbazole			mg/L		0/5	1.80E-05 - 5.00E-03	5.00E-03	N/A	3.3E-03 C	Yes
	75-15-0	Carbon disulfide			mg/L		0/5	2.80E-04 - 2.00E-03	2.00E-03	N/A	1.0E-01 N	No
	56-23-5	Carbon tetrachloride			mg/L		0/5	1.50E-04 - 1.00E-03	1.00E-03	N/A	1.6E-04 C	Yes
	108-90-7	Chlorobenzene			mg/L		0/5	1.20E-04 - 1.00E-03	1.00E-03	N/A	9.0E-03 N	No
	74-97-5	Chlorobromomethane			mg/L		0/2	2.00E-04 - 2.00E-04	2.00E-04	N/A	N/A	NTX
	75-00-3	Chloroethane			mg/L		0/5	2.00E-04 - 2.00E-03	2.00E-03	N/A	3.6E-03 C	No
	74-87-3	Chloromethane			mg/L		0/5	6.00E-05 - 2.00E-03	2.00E-03	N/A	1.9E-02 N	No
	218-01-9	Chrysene			mg/L		0/5	2.00E-05 - 2.00E-04	2.00E-04	N/A	3.0E-03 C	No
	156-59-2	cis-1,2-Dichloroethene			mg/L		0/5	1.70E-04 - 1.00E-03	1.00E-03	N/A	6.1E-03 N	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/L		0/5	1.40E-04 - 1.00E-03	1.00E-03	N/A	N/A	NTX
	110-82-7	Cyclohexane			mg/L		0/2	1.40E-04 - 1.40E-04	1.40E-04	N/A	1.2E+00 N	No
	121-82-4	Cyclonite			mg/L		0/5	9.20E-05 - 2.00E-04	2.00E-04	N/A	6.1E-04 C	No
	75-99-0	Dalapon			mg/L		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.1E-01 N	No
	319-86-8	delta-BHC			mg/L		0/5	2.30E-06 - 5.00E-05	5.00E-05	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/L		0/5	2.60E-05 - 2.00E-04	2.00E-04	N/A	3.0E-06 C	Yes
	132-64-9	Dibenzofuran			mg/L		0/5	1.60E-05 - 5.00E-03	5.00E-03	N/A	3.7E-03 N	Yes
	124-48-1	Dibromochloromethane			mg/L		0/5	1.40E-04 - 1.00E-03	1.00E-03	N/A	1.3E-04 C	Yes
	1918-00-9	Dicamba			mg/L		0/3	2.00E-04 - 2.00E-04	2.00E-04	N/A	1.1E-01 N	No
	75-71-8	Dichlorodifluoromethane			mg/L		0/2	1.70E-04 - 1.70E-04	1.70E-04	N/A	3.5E-02 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		0/5	2.00E-06 - 5.00E-05	5.00E-05	N/A	4.2E-06 C	Yes
	84-66-2	Diethyl phthalate			mg/L		0/5	3.40E-05 - 5.00E-03	5.00E-03	N/A	2.9E+00 N	No
	131-11-3	Dimethylphthalate			mg/L		0/5	1.60E-05 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	84-74-2	Di-n-butyl phthalate			mg/L		0/5	3.80E-04 - 5.00E-03	5.00E-03	N/A	3.7E-01 N	No
	117-84-0	Di-n-octyl phthalate			mg/L		0/5	3.40E-04 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	959-98-8	Endosulfan I			mg/L		0/5	2.30E-06 - 5.00E-05	5.00E-05	N/A	2.2E-02 N	No
	33213-65-9	Endosulfan II			mg/L		0/5	1.80E-06 - 9.90E-05	9.90E-05	N/A	2.2E-02 N	No
	1031-07-8	Endosulfan sulfate			mg/L		0/5	3.30E-06 - 9.90E-05	9.90E-05	N/A	2.2E-02 N	No

Table E.1-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at FLFA

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)
	72-20-8	Endrin			mg/L		0/5	2.00E-06 - 9.90E-05	9.90E-05	N/A	1.1E-03 N	No
	7421-93-4	Endrin aldehyde			mg/L		0/5	2.90E-06 - 9.90E-05	9.90E-05	N/A	1.1E-03 N	No
	53494-70-5	Endrin ketone			mg/L		0/5	3.30E-06 - 9.90E-05	9.90E-05	N/A	1.1E-03 N	No
	100-41-4	Ethylbenzene			mg/L		0/5	1.30E-04 - 1.00E-03	1.00E-03	N/A	1.3E-01 N	No
	206-44-0	Fluoranthene			mg/L		0/5	1.60E-05 - 1.00E-03	1.00E-03	N/A	1.5E-01 N	No
	86-73-7	Fluorene			mg/L		0/5	1.10E-05 - 1.00E-03	1.00E-03	N/A	2.4E-02 N	No
	76-13-1	Freon 113			mg/L		0/2	1.40E-04 - 1.40E-04	1.40E-04	N/A	5.9E+00 N	No
	5103-74-2	gamma-Chlordane			mg/L		0/5	2.10E-06 - 5.00E-05	5.00E-05	N/A	1.9E-04 C	No
	76-44-8	Heptachlor			mg/L		0/5	3.00E-06 - 5.00E-05	5.00E-05	N/A	1.5E-05 C	Yes
	1024-57-3	Heptachlor epoxide			mg/L		0/5	2.10E-06 - 5.00E-05	5.00E-05	N/A	7.4E-06 C	Yes
	118-74-1	Hexachlorobenzene			mg/L		0/5	1.90E-05 - 5.00E-03	5.00E-03	N/A	4.2E-05 C	Yes
	87-68-3	Hexachlorobutadiene			mg/L		0/5	1.80E-05 - 5.00E-03	5.00E-03	N/A	8.6E-04 C	Yes
	77-47-4	Hexachlorocyclopentadiene			mg/L		0/5	1.30E-04 - 5.00E-03	5.00E-03	N/A	2.2E-02 N	No
Groundwater	67-72-1	Hexachloroethane			mg/L		0/5	3.80E-05 - 5.00E-03	5.00E-03	N/A	3.7E-03 N	Yes
	2691-41-0	HMX			mg/L		0/5	1.90E-04 - 2.00E-04	2.00E-04	N/A	1.8E-01 N	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/L		0/5	1.40E-05 - 2.00E-04	2.00E-04	N/A	3.0E-05 C	Yes
	78-59-1	Isophorone			mg/L		0/5	3.10E-05 - 5.00E-03	5.00E-03	N/A	7.0E-02 C	No
	98-82-8	Isopropylbenzene			mg/L		0/2	1.20E-04 - 1.20E-04	1.20E-04	N/A	6.6E-02 N	No
	N/A	m+p-Xylenes			mg/L		0/3	2.00E-03 - 2.00E-03	2.00E-03	N/A	2.1E-02 N	No
	94-74-6	MCPA			mg/L		0/3	5.00E-02 - 5.00E-02	5.00E-02	N/A	1.8E-03 N	Yes
	93-65-2	MCPP			mg/L		0/3	5.00E-02 - 5.00E-02	5.00E-02	N/A	3.7E-03 N	Yes
	7439-97-6	Mercury			mg/L		0/5	3.90E-05 - 1.10E-04	1.10E-04	0.249	1.1E-03 N	No
	72-43-5	Methoxychlor			mg/L		0/5	5.20E-06 - 9.90E-05	9.90E-05	N/A	1.8E-02 N	No
	79-20-9	Methyl Acetate			mg/L		0/2	1.60E-04 - 1.60E-04	1.60E-04	N/A	6.1E-01 N	No
	1634-04-4	Methyl tert-butyl ether			mg/L		0/2	9.60E-05 - 9.60E-05	9.60E-05	N/A	2.6E-03 C	No
	108-87-2	Methylcyclohexane			mg/L		0/2	1.50E-04 - 1.50E-04	1.50E-04	N/A	6.3E-01 N	No
	75-09-2	Methylene chloride			mg/L		0/5	5.10E-05 - 5.00E-03	5.00E-03	N/A	4.1E-03 C	Yes
	98-95-3	Nitrobenzene			mg/L		0/12	2.60E-05 - 5.00E-03	5.00E-03	N/A	3.5E-04 N	Yes
	55-63-0	Nitroglycerin			mg/L		0/5	5.80E-04 - 2.00E-03	2.00E-03	N/A	3.7E-04 N	Yes
	621-64-7	n-Nitroso-di-n-propylamine			mg/L		0/5	3.00E-05 - 5.00E-03	5.00E-03	N/A	9.6E-06 C	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/L		0/5	1.90E-05 - 5.00E-03	5.00E-03	N/A	1.4E-02 C	No
	95-48-7	o-Cresol			mg/L		0/5	1.40E-04 - 5.00E-03	5.00E-03	N/A	1.8E-01 N	No
	95-47-6	o-Xylene			mg/L		0/3	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.1E-02 N	No
	106-47-8	p-Chloroaniline			mg/L		0/5	2.10E-05 - 5.00E-03	5.00E-03	N/A	1.5E-02 N	No
	59-50-7	p-Chloro-m-cresol			mg/L		0/5	2.10E-05 - 5.00E-03	5.00E-03	N/A	N/A	NTX
	106-44-5	p-Cresol			mg/L		0/2	1.60E-04 - 1.60E-04	1.60E-04	N/A	1.8E-02 N	No
	87-86-5	Pentachlorophenol			mg/L		0/8	5.00E-05 - 2.50E-02	2.50E-02	N/A	5.6E-04 C	Yes
	78-11-5	Pentaerythritol tetranitrate			mg/L		0/5	6.10E-04 - 2.00E-03	2.00E-03	N/A	N/A	NTX
	85-01-8	Phenanthrene			mg/L		0/5	1.50E-05 - 1.00E-03	1.00E-03	N/A	1.8E-02 N	No
	108-95-2	Phenol			mg/L		0/5	2.80E-05 - 5.00E-03	5.00E-03	N/A	1.1E+00 N	No
	1336-36-3	Polychlorinated biphenyls			mg/L		0/4	2.20E-05 - 4.90E-05	4.90E-05	N/A	3.3E-05 C	Yes
	129-00-0	Pyrene			mg/L		0/5	4.70E-05 - 1.00E-03	1.00E-03	N/A	1.8E-02 N	No

Table E.1-7
Summary of Screening for Non-Detected Chemicals
Current/Future - Groundwater at FLFA

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)
	7440-22-4	Silver			mg/L		0/4	1.20E-04 - 7.70E-04	7.70E-04	0.801	1.8E-02 N	No
	100-42-5	Styrene			mg/L		0/5	1.10E-04 - 1.00E-03	1.00E-03	N/A	1.6E-01 N	No
	479-45-8	Tetryl			mg/L		0/5	1.50E-04 - 2.00E-04	2.00E-04	N/A	1.5E-02 N	No
	7440-28-0	Thallium			mg/L		0/5	1.70E-04 - 6.50E-03	6.50E-03	0.844	2.6E-04 N	Yes
	108-88-3	Toluene			mg/L		0/4	7.20E-05 - 1.00E-03	1.00E-03	N/A	2.3E-01 N	No
	8001-35-2	Toxaphene			mg/L		0/5	1.00E-04 - 2.50E-03	2.50E-03	N/A	6.1E-05 C	Yes
	156-60-5	trans-1,2-Dichloroethene			mg/L		0/5	1.60E-04 - 1.00E-03	1.00E-03	N/A	1.1E-02 N	No
	10061-02-6	trans-1,3-Dichloropropene			mg/L		0/5	1.60E-04 - 1.00E-03	1.00E-03	N/A	N/A	NTX
	75-25-2	Tribromomethane			mg/L		0/5	2.30E-04 - 1.00E-03	1.00E-03	N/A	8.5E-03 C	No
	79-01-6	Trichloroethene			mg/L		0/5	1.70E-04 - 1.00E-03	1.00E-03	N/A	2.6E-05 C	Yes
	75-69-4	Trichlorofluoromethane			mg/L		0/2	1.80E-04 - 1.80E-04	1.80E-04	N/A	1.3E-01 N	No
	75-01-4	Vinyl Chloride			mg/L		0/5	1.70E-04 - 1.00E-03	1.00E-03	N/A	1.5E-05 C	Yes
	1330-20-7	Xylenes (total)			mg/L		0/2	3.60E-04 - 3.60E-04	3.60E-04	N/A	2.1E-02 N	No
	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran			mg/L		0/3	4.89E-09 - 5.34E-09	5.34E-09	N/A	N/A	NTX
	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin			mg/L		0/3	5.99E-09 - 6.18E-09	6.18E-09	N/A	N/A	NTX
	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran			mg/L		0/3	4.89E-09 - 5.34E-09	5.34E-09	N/A	N/A	NTX
	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran			mg/L		0/3	4.89E-09 - 5.34E-09	5.34E-09	N/A	N/A	NTX
Groundwater	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin			mg/L		0/3	4.89E-09 - 5.34E-09	5.34E-09	N/A	N/A	NTX
	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran			mg/L		0/3	4.89E-09 - 5.34E-09	5.34E-09	N/A	N/A	NTX
	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin			mg/L		0/3	4.89E-09 - 5.34E-09	5.34E-09	N/A	N/A	NTX
	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran			mg/L		0/3	4.89E-09 - 5.34E-09	5.34E-09	N/A	N/A	NTX
	40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin			mg/L		0/3	4.89E-09 - 5.34E-09	5.34E-09	N/A	N/A	NTX
	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran			mg/L		0/3	1.64E-09 - 2.32E-09	2.32E-09	N/A	N/A	NTX
	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran			mg/L		0/3	4.89E-09 - 5.34E-09	5.34E-09	N/A	N/A	NTX
	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin			mg/L		0/3	2.34E-09 - 2.79E-09	2.79E-09	N/A	4.5E-10 C	Yes
	39001-02-0	Octachlorodibenzofuran			mg/L		0/3	1.05E-08 - 1.32E-08	1.32E-08	N/A	N/A	NTX

(1) Maximum detection limit 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 Region 3 RBC Table (October 2007).
Residential RBCs are based on a risk level of 1.0E-06 and an HQ = 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes: No Toxicity Information Available (NTX)

Definitions: N/A = Not Applicable or Not Available
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
C = Carcinogenic
N = Non-Carcinogenic
RDA = Recommended Daily Allowance

Qualifiers: L = Reported value may be biased low
K = Reported value may be biased high
J = Estimated Value

(5) The screening value for dinitrotoluene mixture is based on a carcinogenicity study for 2,4-DNT and 2,6-DNT. Therefore, the RBC for dinitrotoluene mixture is conservatively used as the screening value for the individual compounds.
(6) There are no screening values available for acenaphthylene, benzo(g,h,i)perylene, and phenanthrene. Therefore, the screening value for pyrene was used as a surrogate.
(7) The screening value for Endosulfan I was used as a surrogate value for Endosulfan II and Endosulfan sulfate.
(8) The screening value for Endrin was used as the surrogate value for Endrin aldehyde and Endrin ketone.

Table E.1-8
Medium-Specific Exposure Point Concentration Summary for FLFA

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	2,3,7,8-TCDD-TE	mg/kg	1.09E-04	No	2.52E-04 (L)	1.45E-03	2.52E-04	mg/kg	95% Cheby, MVUE	Test (5)
	2-Nitrophenol	mg/kg	3.07E-02	Yes	5.47E-02 (N)	5.50E-02	5.47E-02	mg/kg	95% KM-t	Test (1)
	p-Chloro-m-cresol	mg/kg	8.32E-02	Yes	1.17E-01 (NP)	1.40E-02	1.40E-02	mg/kg	Max	Test (2)
	4-Chlorophenyl phenyl ether	mg/kg	8.30E-02	Yes	1.16E-01 (NP)	1.20E-02	1.20E-02	mg/kg	Max	Test (2)
	Aroclor 1254	mg/kg	2.01E-01	No	4.88E-01 (G)	1.58E+00	4.88E-01	mg/kg	95% KM-Cheby	Test (6)
	Aroclor 1260	mg/kg	2.19E-01	Yes	2.19E-01 (L)	1.09E+00	2.19E-01	mg/kg	95% KM-BCA	Test (1)
	Benzo(a)pyrene	mg/kg	1.87E-02	Yes	2.47E-02 (N)	2.80E-02	2.47E-02	mg/kg	95% KM-t	Test (1)
	bis(2-Chloroethoxy)methane	mg/kg	3.10E-02	Yes	6.45E-02 (NP)	4.90E-02	4.90E-02	mg/kg	Max	Test (2)
	Di-n-octylphthalate	mg/kg	8.56E-02	Yes	1.17E-01 (NP)	2.00E-02	2.00E-02	mg/kg	Max	Test (2)
	Aluminum	mg/kg	2.02E+04	No	2.28E+04 (G)	4.78E+04	2.28E+04	mg/kg	95% Approx. Gamma	Test (6)
	Antimony	mg/kg	1.24E+01	Yes	7.25E+00 (G)	4.76E+01	7.25E+00	mg/kg	95% KM-t	Test (1)
	Arsenic	mg/kg	9.93E+00	No	1.40E+01 (L)	6.89E+01	1.40E+01	mg/kg	95% H-UCL	Test (5)
	Barium	mg/kg	4.12E+02	No	1.88E+03 (NP)	2.63E+03	1.88E+03	mg/kg	99% Cheby, Mean, SD	Test (3)
	Cadmium	mg/kg	4.26E+00	Yes	3.27E+00 (G)	1.98E+01	3.27E+00	mg/kg	95% KM-t	Test (1)
	Chromium VI	mg/kg	5.71E+01	No	1.17E+02 (NP)	2.99E+02	1.17E+02	mg/kg	95% Cheby, Mean, SD	Test (3)
	Cobalt	mg/kg	1.35E+01	No	1.64E+01 (G)	4.70E+01	1.64E+01	mg/kg	95% Approx. Gamma	Test (6)
	Copper	mg/kg	1.55E+03	No	1.06E+04 (NP)	2.38E+04	1.06E+04	mg/kg	99% Cheby, Mean, SD	Test (3)
	Iron	mg/kg	2.98E+04	No	3.58E+04 (NP)	9.99E+04	3.58E+04	mg/kg	95% Modified-t	Test (3)
	Lead	mg/kg	1.21E+03	No	8.97E+03 (NP)	2.59E+04	8.97E+03	mg/kg	99% Cheby, Mean, SD	Test (3)
	Manganese	mg/kg	7.11E+02	No	9.05E+02 (G)	2.23E+03	9.05E+02	mg/kg	95% Approx. Gamma	Test (6)
	Nickel	mg/kg	4.08E+01	No	1.06E+02 (NP)	4.04E+02	1.06E+02	mg/kg	95% Cheby, Mean, SD	Test (3)
	Silver	mg/kg	9.48E+00	Yes	3.63E+01 (L)	6.52E+01	3.63E+01	mg/kg	99% KM-Cheby	Test (1)
	Vanadium	mg/kg	4.29E+01	No	4.62E+01 (N)	7.56E+01	4.62E+01	mg/kg	95% Student's-t	Test (4)
	Zinc	mg/kg	1.37E+03	No	7.44E+03 (NP)	1.52E+04	7.44E+03	mg/kg	99% Cheby, Mean, SD	Test (3)

Table E.1-8
Medium-Specific Exposure Point Concentration Summary for FLFA

[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 (MVUE) UCL (95% Cheby, MVUE); 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 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.1-9
Medium-Specific Exposure Point Concentration Summary for FLFA

Scenario Timeframe: Current
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	8.54E-05	No	1.70E-04 (G)	1.45E-03	1.70E-04	mg/kg	95% Adjust. Gamma	Test (6)
	2-Nitrophenol	mg/kg	3.07E-02	Yes	5.32E-02 (N)	5.50E-02	5.32E-02	mg/kg	95% KM-t	Test (1)
	p-Chloro-m-cresol [5]	mg/kg	9.46E-02	Yes	1.20E-01 (NP)	1.40E-02	1.40E-02	mg/kg	Max	Test (2)
	4-Chlorophenyl Phenyl Ether [5]	mg/kg	9.45E-02	Yes	1.21E-01 (NP)	1.20E-02	1.20E-02	mg/kg	Max	Test (2)
	Aroclor 1254	mg/kg	2.01E-01	Yes	3.88E-01 (G)	1.58E+00	3.88E-01	mg/kg	95% KM-Cheby	Test (1)
	Aroclor 1260	mg/kg	2.19E-01	Yes	1.81E-01 (L)	1.09E+00	1.81E-01	mg/kg	95% KM-BCA	Test (1)
	Benzo(a)pyrene	mg/kg	1.87E-02	Yes	1.96E-02 (N)	2.80E-02	1.96E-02	mg/kg	95% KM-% Btstrp	Test (1)
	bis(2-Chloroethoxy)methane	mg/kg	3.10E-02	Yes	6.24E-02 (NP)	4.90E-02	6.24E-02	mg/kg	95% KM-t	Test (1)
	Di-n-octylphthalate [5]	mg/kg	9.59E-02	Yes	1.22E-01 (NP)	2.00E-02	2.00E-02	mg/kg	Max	Test (2)
	Aluminum	mg/kg	2.34E+04	No	2.63E+04 (L)	4.79E+04	2.63E+04	mg/kg	95% H-UCL	Test (5)
	Antimony	mg/kg	1.24E+01	Yes	5.70E+00 (G)	4.76E+01	5.70E+00	mg/kg	95% KM-t	Test (1)
	Arsenic	mg/kg	8.11E+00	No	1.71E+01 (NP)	6.89E+01	1.71E+01	mg/kg	95% Cheby, Mean, SD	Test (3)
	Barium	mg/kg	3.09E+02	No	1.35E+03 (NP)	2.63E+03	1.35E+03	mg/kg	99% Cheby, Mean, SD	Test (3)
	Cadmium	mg/kg	4.26E+00	Yes	2.36E+00 (G)	1.98E+01	2.36E+00	mg/kg	95% KM-t	Test (1)
	Chromium VI	mg/kg	5.24E+01	No	9.40E+01 (NP)	2.99E+02	9.40E+01	mg/kg	95% Cheby, Mean, SD	Test (3)
	Cobalt	mg/kg	1.29E+01	No	1.51E+01 (L)	4.70E+01	1.51E+01	mg/kg	95% Modified-t	Test (5)
	Copper	mg/kg	1.08E+03	No	7.41E+03 (NP)	2.38E+04	7.41E+03	mg/kg	99% Cheby, Mean, SD	Test (3)
	Iron	mg/kg	3.17E+04	No	3.61E+04 (L)	9.99E+04	3.61E+04	mg/kg	95% Modified-t	Test (5)
	Lead	mg/kg	7.63E+02	No	3.64E+03 (L)	2.59E+04	3.64E+03	mg/kg	97.5% KM-Cheby	Test (5)
	Manganese	mg/kg	6.10E+02	No	7.34E+02 (G)	2.23E+03	7.34E+02	mg/kg	95% Approx. Gamma	Test (6)
	Nickel	mg/kg	3.81E+01	No	8.30E+01 (NP)	4.04E+02	8.30E+01	mg/kg	95% Cheby, Mean, SD	Test (3)
	Silver	mg/kg	8.32E+00	Yes	2.58E+01 (L)	6.52E+01	2.58E+01	mg/kg	99% KM-Cheby	Test (1)
	Thallium	mg/kg	3.77E+00	Yes	1.43E+01 (NP)	2.69E+01	1.43E+01	mg/kg	99% KM-Cheby	Test (1)
	Vanadium	mg/kg	4.91E+01	No	5.33E+01 (G)	9.05E+01	5.33E+01	mg/kg	95% Approx. Gamma	Test (6)
	Zinc	mg/kg	9.69E+02	No	5.26E+03 (NP)	1.52E+04	5.26E+03	mg/kg	99% Cheby, Mean, SD	Test (3)

[1] ProUCL software (version 4.0, USEPA, 2007) recommends use of Kaplan-Meier method if there are multiple detection limits.

Table E.1-9
Medium-Specific Exposure Point Concentration Summary for FLFA

[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% Adjust. Gamma UCL (95% Adjust. 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 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 de

Table E.1-10
Medium-Specific Exposure Point Concentration Summary for FLFA

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	2,3,7,8-TCDD-TE	mg/L	2.65E-10	N/A	N/A	7.89E-10	7.89E-10	mg/L	Max	Test (7)
	Chloroform	mg/L	9.92E-03	N/A	N/A	2.40E-02	2.40E-02	mg/L	Max	Test (7)
	Perchlorate	mg/L	2.60E-03	N/A	N/A	5.40E-03	5.40E-03	mg/L	Max	Test (7)
	Tetrachloroethene	mg/L	9.80E-04	N/A	N/A	2.60E-03	2.60E-03	mg/L	Max	Test (7)
	Aluminum	mg/L	1.98E+00	N/A	N/A	9.32E+00	9.32E+00	mg/L	Max	Test (7)
	Chromium VI	mg/L	4.80E-05	N/A	N/A	4.30E-02	4.30E-02	mg/L	Max	Test (7)
	Cobalt	mg/L	6.60E-03	N/A	N/A	2.69E-02	2.69E-02	mg/L	Max	Test (7)
	Iron	mg/L	3.58E+00	N/A	N/A	1.01E+01	1.01E+01	mg/L	Max	Test (7)
	Manganese	mg/L	1.94E-02	N/A	N/A	7.83E-02	7.83E-02	mg/L	Max	Test (7)
	Vanadium	mg/L	4.58E-03	N/A	N/A	2.00E-02	2.00E-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).

[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 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.1-11
Medium-Specific Exposure Point Concentration Summary -
Inhalation of Groundwater Contaminants in Outdoor Ambient Air
by Industrial and Maintenance Workers at FLFA

Medium: Groundwater
Exposure Medium: Air (Outdoor Ambient Air)
Receptor Populations: Industrial and Maintenance Workers

Chemical of Potential Concern	Exposure Point Concentration (Groundwater)	Units	Exposure Medium	Exposure Medium Concentration	Units	Reference for Exposure Medium Calculation
Chloroform	2.40E-02	mg/L	Air	7.65E-09	mg/m^3	ASTM, 1995
Tetrachloroethene	2.60E-03	mg/L	Air	1.82E-09	mg/m^3	ASTM, 1995

Table E.1-12
Medium-Specific Exposure Point Concentration Summary -
Inhalation of Groundwater Contaminants in Trench Air
by Excavation Workers at FLFA

Medium: Groundwater
Exposure Medium: Air (Trench Air)
Receptor Populations: Excavation Workers

Chemical of Potential Concern	Exposure Point Concentration (Groundwater)	Units	Exposure Medium	Exposure Medium Concentration	Units	Reference for Exposure Medium Calculation
Chloroform	2.40E-02	mg/L	Air	4.65E-05	mg/m^3	VDEQ, 2007
Tetrachloroethene	2.60E-03	mg/L	Air	1.75E-05	mg/m^3	VDEQ, 2007

Table E.1-13
Medium-Specific Exposure Point Concentration Summary -
Inhalation of Groundwater Contaminants in Indoor Air (via Vapor Intrusion)
by Industrial Workers and Residents at FLFA

Medium: Groundwater
Exposure Medium: Air (Indoor Air - Vapor Intrusion)
Receptor Populations: Industrial Workers and Future Residents

Chemical of Potential Concern	Exposure Point Concentration (Groundwater)	Units	Exposure Medium	Exposure Medium Concentration[a]	Units	Reference for Exposure Medium Calculation
Chloroform	2.40E-02	mg/L	Air	4.93E-05	mg/m^3	Johnson & Ettinger, 1991
Tetrachloroethene	2.60E-03	mg/L	Air	1.23E-05	mg/m^3	Johnson & Ettinger, 1991

[a] Value from $C_{building}$ term from the Johnson & Ettinger Model (1991).

Table E.1-14
Medium-Specific Exposure Point Concentration Summary - Inhalation of Groundwater Contaminants in Shower Air by Adult Residents at FLFA

Medium: Groundwater
Exposure Medium: Air (Shower Air)
Receptor Populations: Future Adult Resident

Chemical of Potential Concern	Exposure Point Concentration (Groundwater)	Units	Exposure Medium	Exposure Medium Concentration	Units	Reference for Exposure Medium Calculation
Chloroform	2.40E-02	mg/L	Air	3.27E-01	mg/m^3	Foster and Chrostowski, 1987, 2003
Tetrachloroethene	2.60E-03	mg/L	Air	1.25E-02	mg/m^3	Foster and Chrostowski, 1987, 2003

Table E.1-15
Values Used for Daily Intake Calculations- Current and Future Exposures to Surface Soil
FLFA

Scenario Timeframe:	Current and 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	FLFA	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	FLFA	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.1-25**.
(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.1-16
Values Used for Daily Intake Calculations- Future Exposures to Total Soil
FLFA

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	FLFA	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	FLFA	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	FLFA	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	FLFA	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	FLFA	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.1-16
Values Used for Daily Intake Calculations- Future Exposures to Total Soil
FLFA

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	FLFA	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	$\frac{CS \times SSAF \times DABS \times SA \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				ED	Exposure Duration	1	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)	1	years	USEPA, 2002	
				CF2	Conversion Factor 2	365	days/year	---	
	Resident	Adult	FLFA	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	$\frac{CS \times SSAF \times DABS \times SA \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				ED	Exposure Duration	30	years	USEPA, 1991a	
				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	FLFA	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	$\frac{CS \times SSAF \times DABS \times SA \times EF \times ED \times CF1}{BW \times AT \times CF2}$
				ED	Exposure Duration	6	years	USEPA, 1991a	
				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.1-25**.
(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.1-17
Values Used for Daily Intake Calculations- Current/Future Exposures to Surface Soil- Air
FLFA

Scenario Timeframe:	Current and 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	FLFA	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				PEF	Particulate Emission Factor	2.16E+09	m^3/kg	Site-Specific PEF	
				IN	Inhalation Rate	2.5	m^3/h	(1)	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	50	days/year	(2)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				ET	Exposure Time	8	hr/day	USEPA, 2002	$\frac{CS \times (1/PEF) \times IN \times EF \times ED \times ET}{BW \times AT \times CF1}$
				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	
				CF1	Conversion Factor 1	365	days/year	---	
Inhalation (Volatiles)	Maintenance Worker	Adult	FLFA	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				VF	Volatilization Factor	Chemical-Specific	m^3/kg	Chemical-Specific	
				IN	Inhalation Rate	2.5	m^3/h	(1)	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	50	days/year	(2)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				ET	Exposure Time	8	hr/day	USEPA, 2002	$\frac{CS \times (1/VF) \times IN \times EF \times ED \times ET}{BW \times AT \times CF1}$
				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	
				CF1	Conversion Factor 1	365	days/year	---	

(1) The hourly inhalation rate was derived by dividing the adult's daily 20 m^3/day USEPA (2002) inhalation rate by 8 hours per day.
(2) Best professional judgement. Based on site maintenance/inspection activities conducted 1day/week and assuming 2 weeks on vacation.

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table E.1-18
Values Used for Daily Intake Calculations- Future Exposures to Total Soil - Air
FLFA

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)	Maintenance Worker	Adult	FLFA	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				PEF	Particulate Emission Factor	2.16E+09	m^3/kg	Site-Specific PEF	
				IN	Inhalation Rate	2.5	m^3/h	(1)	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	50	days/year	(2)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				ET	Exposure Time	8	hr/day	USEPA, 2002	CS x (1/PEF) x IN x EF x ED x ET
				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	FLFA	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				PEF	Particulate Emission Factor	1.17E+07	m^3/kg	Site-Specific PEF	
				IN	Inhalation Rate	2.5	m^3/h	(1)	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	
				ET	Exposure Time	8	hr/day	USEPA, 2002	CS x (1/PEF) x IN x EF x ED x ET
				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	FLFA	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				PEF	Particulate Emission Factor	2.16E+09	m^3/kg	Site-Specific PEF	
				IN	Inhalation Rate	0.83	m^3/h	(3)	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	
				ET	Exposure Time	1	hr/day	(4)	CS x (1/PEF) x IN x EF x ED x ET
				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	FLFA	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				PEF	Particulate Emission Factor	2.16E+09	m^3/kg	Site-Specific PEF	
				IN	Inhalation Rate	1	m^3/h	(5)	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	
				ET	Exposure Time	1	hr/day	(6)	CS x (1/PEF) x IN x EF x ED x ET
				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	---	

Table E.1-18
Values Used for Daily Intake Calculations- Future Exposures to Total Soil - Air
FLFA

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Volatiles)	Maintenance Worker	Adult	FLFA	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				VF	Volatilization Factor	Chemical-Specific	m^3/kg	Chemical-Specific	
				IN	Inhalation Rate	2.5	m^3/h	(1)	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	50	days/year	(2)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				ET	Exposure Time	8	hr/day	USEPA, 2002	$\frac{CS \times (1/VF) \times IN \times EF \times ED \times ET}{BW \times AT \times CF1}$
				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	
				CF1	Conversion Factor 1	365	days/year	---	
Inhalation (Volatiles) (con't)	Excavation Worker	Adult	FLFA	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				VF	Volatilization Factor	Chemical-Specific	m^3/kg	Chemical-Specific	
				IN	Inhalation Rate	2.5	m^3/h	(1)	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	
				ET	Exposure Time	8	hr/day	USEPA, 2002	$\frac{CS \times (1/VF) \times IN \times EF \times ED \times ET}{BW \times AT \times CF1}$
				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	
				CF1	Conversion Factor 1	365	days/year	---	
	Resident	Adult	FLFA	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				VF	Volatilization Factor	Chemical-Specific	m^3/kg	Chemical-Specific	
				IN	Inhalation Rate	0.83	m^3/h	(3)	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	
				EDc	Exposure Duration	24	years	USEPA, 1991b	
				ET	Exposure Time	1	hr/day	(4)	$\frac{CS \times (1/VF) \times IN \times EF \times ED \times ET}{BW \times AT \times CF1}$
				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	
				CF1	Conversion Factor 1	365	days/year	---	
		Child	FLFA	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				VF	Volatilization Factor	Chemical-Specific	m^3/kg	Chemical-Specific	
				IN	Inhalation Rate	1	m^3/h	(5)	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	
				ET	Exposure Time	1	hr/day	(6)	$\frac{CS \times (1/VF) \times IN \times EF \times ED \times ET}{BW \times AT \times CF1}$
				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	
				CF1	Conversion Factor 1	365	days/year	---	

(1) The maintenance worker and excavation worker hourly inhalation rate was derived by dividing the adult's daily 20 m^3/day USEPA (1991) inhalation rate by 8 hours per day.

(2) Best professional judgement. Based on site maintenance/inspection activities conducted 1day/week and assuming 2 weeks on vacation.

(3) The adult resident hourly inhalation rate was derived by dividing the adult daily 20 m^3/day USEPA (1991) inhalation rate by 24 hours per day.

(4) Exposure time is based upon the average time an adult spends outdoors, assuming 1.5 hours/day (USEPA, 1997) with the exception of the three coldest months of the year (1.5 hours/day x 260 days/year = 390 hours/year. The total exposure time was averaged over 350 days/year. Therefore, the ET= 1 hour/day (rounded to the nearest whole number).

(5) The child resident hourly inhalation rate was based on light activities (USEPA, 1997).

(6) Exposure time is based upon the assumption that children (ages 6 years and under) would be accompanied or supervised by an adult during time spent outdoors. Therefore, the exposure time for the child is is equivalent to the adult, i.e., an average time of 1.5 hours/day (USEPA, 1997) with the exception of the coldest months of the year (1.5 hours/day x 260 days/year = 390 hours/year. The total exposure time was averaged over 350 days/year. Therefore, the ET= 1 hour/day (rounded to the nearest whole number).

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 9285.7-01 B.
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.

Table E.1-19
Values Used for Daily Intake Calculations - Future Exposures to Surface and Total Soil
FLFA

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	Adult	FLFA	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	Adult	FLFA	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.1-25.**
(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.1-20
Values Used for Daily Intake Calculations - Future Exposures to Surface and Total Soil - Air
FLFA

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)	Industrial Worker (Outdoor)	Adult	FLFA	CS	Chemical Concentration in Soil	See site-specific EPC tables	mg/kg	See site-specific EPC tables	
				PEF	Particulate Emission Factor	2.16E+09	m^3/kg	Site-Specific PEF	
				IN	Inhalation Rate	2.5	m^3/h	(1)	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	
				ET	Exposure Time	8	hr/day	USEPA, 2002	$\frac{CS \times (1/PEF) \times IN \times EF \times ED \times ET}{BW \times AT \times CF1}$
				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	
				CF1	Conversion Factor 1	365	days/year	---	

(1) The hourly inhalation rate was derived by dividing the worker's daily 20 m^3/day USEPA (2002) inhalation rate by 8 hours per day.

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 - Current/Future Exposures to Groundwater, Inhalation
FLFA

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	FLFA	CA	Modeled Ambient Air Concentration	(1)	mg/m^3	(1)	
				IN	Inhalation Rate	2.5	m^3/hr	(2)	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	50	days/year	(3)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	25	years	USEPA, 2002	
				ET	Exposure Time (Ambient Air)	8	hr/day	USEPA, 2002	$\frac{CA \times IN \times EF \times ED \times ET}{BW \times AT \times CF1}$
				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	
				CF1	Conversion Factor 1	365	days/year	---	

(1) Ambient air concentrations were modeled by a volatilization model (ASTM, 1995). A discussion of the model is provided in **Table E.1-31.**

(2) The hourly inhalation rate was derived by dividing the adult's daily 20 m^3/day USEPA (1991) inhalation rate by 8 hours per day.

(3) Best professional judgement. Based on site maintenance/inspection activities conducted 1 day/week and assuming 2 weeks for vacation.

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.
USEPA, 1991: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table E.1-22
Values Used for Daily Intake Calculations - Future Exposures to Groundwater
FLFA

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	Adult	FLFA	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	FLFA	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	FLFA	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	FLFA	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	FLFA	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	---	

Table E.1-22
Values Used for Daily Intake Calculations - Future Exposures to Groundwater
FLFA

(1) Value is calculated using the equations presented in **Table E.1-35** and assuming an exposure time of 30 minutes (ET = 0.50 hr; USEPA, 2004). Region III has adopted the high-end shower/bath times presented in RAGS E as default recommendations (USEPA, 2005).
(2) Value is calculated using the equations presented in **Table E.1-35** and assuming an exposure time of 60 minutes (ET = 1.0 hr; USEPA, 2004). Region III has adopted the high-end shower/bath times presented in RAGS E as default recommendations (USEPA, 2005).

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, 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.1-23
Values Used for Daily Intake Calculations - Future Exposures to Groundwater, Inhalation
FLFA

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	Adult	FLFA	CA	Modeled Ambient Air Concentration or Indoor Air Concentration	(1, 2)	mg/m^3	(1, 2)	
				IN	Inhalation Rate	2.5	m^3/hr	(3)	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	
				ET	Exposure Time (Ambient Air)	8	hr/day	USEPA, 2002	CA x IN x EF x ED x ET
				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	FLFA	CA	Modeled Trench Air Concentration	(4)	mg/m^3	(4)	
				IN	Inhalation Rate	2.5	m^3/hr	(5)	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	125	days/year	(6)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	1	years	(6)	
				ET	Exposure Time (Trench Air)	4	hr/day	(6)	CA x IN x EF x ED x ET
				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 (On-site and Off-site)	Adult	FLFA	CA	Indoor Air Concentration or Modeled Shower Room Air Concentration	(2, 7)	mg/m^3	(2, 7)	
				IN	Inhalation Rate	0.83	m^3/hr	(8)	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	
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b	
				ET	Exposure Time (Shower Room Air/Indoor Air)	1.08/24	hr/day	(9); Johnson and Ettinger (1991)	CA x IN x EF x ED x ET
				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	FLFA	CA	Modeled Indoor Air Concentration	(2)	mg/m^3	(2)	
				IN	Inhalation Rate	1	m^3/hr	(10)	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	
				ET	Exposure Time (Indoor Air)	24	hr/day	Johnson and Ettinger (1991)	CA x IN x EF x ED x ET
				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) Ambient air concentrations were modeled by a volatilization model (ASTM, 1995). A discussion of the model is provided i**Table E.1-31.**
(2) Indoor air concentrations were modeled using the Johnson and Ettinger (1991) model. Assumptions for the model are presented i**Table E.1-33.**
(3) The hourly inhalation rate was derived by dividing the adult's daily 20 m^3/day USEPA (1991a) inhalation rate by 8 hours per day.
(4) Trench air concentrations were modeled by the Trench Model (VDEQ, 2007). A discussion of the model is provided i**Table E.1-34.**
(5) The excavation worker inhalation rate is based on the outdoor worker inhalation rate (i.e., the mean value for heavy activities from Table 5-23; USEPA, 1997).
(6) 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, 200
(7) Shower room air concentrations were modeled using the Foster and Chrostowski (1987) Shower Inhalation Model. Modeled concentrations were calculated i**Table E.1-35** using data from site-specific EPC tables.
(8) The adult resident hourly inhalation rate was derived by dividing the adult daily 20 m^3/day USEPA (1991a) inhalation rate by 24 hours per day.
(9) An exposure time of 65 minutes (ET = 1.08 hr) is assumed - 30 minutes spent showering (based on the 95th percentile value for overall showering time; Table 15-21, USEPA 2004) with an additional 30 minutes in the shower room (USEPA, 2004). Region III has adopted the high-end shower/bath times presented in RAGS E as default recommendations (USEPA, 2005). The exposure time for indoor air exposure to COCs via vapor intrusion is 24 hours/day.
(10) The child resident hourly inhalation rate was based on light activities (USEPA, 1997).

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, 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, 2002: Supplemental Guidance for Developing Soil Screening 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.
USEPA, 2005: EPA Region 3 web site - http://www.epa.gov/reg3hwmd/risk/human/index.htm.
VDEQ, 2007: Voluntary Remediation Program Risk Assessment Guidance, Virginia Department of Environmental Quality.

Table E.1-24
Values Used for Daily Intake Calculations
Future Exposures to Home Grown Produce for Residents
FLFA

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	FLFA	CV	Chemical Concentration in Produce	---	mg/kg	(1)	
				ABS	Chemical-Specific	---	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	FLFA	CV	Chemical Concentration in Produce	---	mg/kg	(1)	
				ABS	Chemical-Specific	---	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) No COPCs were identified for this pathway
(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.1-25
Dermal Absorption Fractions and Volatilization Factors for Soil - FLFA
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	NA	NA	NA	NA	NA	NA
Antimony	7440-36-0	1.0E-02	NA	NA	NA	NA	NA	NA
Arsenic	7440-38-2	3.0E-02	NA	NA	NA	NA	NA	NA
Barium	7440-39-3	1.0E-02	NA	NA	NA	NA	NA	NA
Cadmium	7440-43-9	1.0E-03	NA	NA	NA	NA	NA	NA
Chromium III	7440-47-3	1.0E-02	NA	NA	NA	NA	NA	NA
Cobalt	7440-48-4	1.0E-02	NA	NA	NA	NA	NA	NA
Copper	7440-50-8	1.0E-02	NA	NA	NA	NA	NA	NA
Iron	7439-89-6	1.0E-02	NA	NA	NA	NA	NA	NA
Lead	7439-92-1	1.0E-02	NA	NA	NA	NA	NA	NA
Manganese	7439-96-5	1.0E-02	NA	NA	NA	NA	NA	NA
Nickel	7440-02-0	1.0E-02	NA	NA	NA	NA	NA	NA
Silver	7440-22-4	1.0E-02	NA	NA	NA	NA	NA	NA
Thallium	7440-28-0	1.0E-02	NA	NA	NA	NA	NA	NA
Vanadium	7440-62-2	1.0E-02	NA	NA	NA	NA	NA	NA
Zinc	7440-66-6	1.0E-02	NA	NA	NA	NA	NA	NA
2-Nitrophenol	88-75-5	1.0E-01	NA	NA	NA	NA	NA	NA
p-Chloro-m-cresol	59-50-7	1.0E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl phenylether	7005-72-3	1.0E-01	NA	NA	NA	NA	NA	NA
Acenaphthylene	208-96-8	1.3E-01	NA	NA	NA	NA	NA	NA
Aroclor 1254	11097-69-1	1.4E-01	NA	NA	NA	NA	NA	NA
Arorclor 1260	11096-82-5	1.4E-01	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	50-32-8	1.3E-01	NA	NA	NA	NA	NA	NA
bis(2-Chlorethoxy)methane	111-91-1	1.0E-01	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	117-84-0	1.0E-01	NA	NA	NA	NA	NA	NA
TCDD TE	N/A	3.0E-02	NA	NA	NA	NA	NA	NA

CAS No. = Chemical Abstract Service No.
ABS_d = Dermal Absorption Factor
NA = Not Applicable
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, 2003.

Table E.1-26
Summary of PEF and VF Values
Radford Army Ammunition Plant - FLFA

Receptor	PEF[a] m^3/kg	VF[b] m^3/kg
Industrial worker	2.16E+09	No volatile COPCs in soil
Maintenance worker	2.16E+09	
Adult Resident	2.16E+09	
Child Resident	2.16E+09	
Construction Worker	1.17E+07	No volatile COPCs in soil

a) PEF Calculations are provided in **Tables E.1-27 and E.1-28.**

b) VF Calculations are provided in Table **E.1-29 and E.1-30**. Chemical-specific properties are provided in **Table E.1-25**.

Table E.1-27
PEF Calculations - Construction Worker
Radford Army Ammunition Plant - FLFA

Site Name: **Radford FLFA**

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} =	**24.45**	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 =	**0.36**	acres	Site-specific
Surface area of site =	1,456.9	m^2	
Length of side of area configured as a square =	38.2	m	equal to the square root of the area of the site
L_R =	125	ft	side of area configured as a square
W_R =	20	ft	width of roadway segment - default
A_R =	232.7	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 Roanoke, VA (NOAA, 2007)
Number of vehicles on site	**4**	cars	value based on assumptions for W
VKT =	19.1	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} = 1.17E+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 =	**0.36**	acres	Site specific area
A =	12.9351		default constant
B =	5.7383		default constant
C =	71.7711		default constant

Q/C_{sr} = 24.45 g/m^2-s per kg/m^3

A_s is site-specific and a value should be entered for each site

Table E.1-28
PEF Calculation - Commercial/Industrial Worker
Radford Army Ammunition Plant - FLFA

Site name: Radford FLFA

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

$$PEF = \frac{Q}{C_{wind}} \; x \; \frac{3{,}600 \text{ sec/hr}}{0.036 \; x \; (1-V) \; x \; (U_m/U_t)^3 \; x \; F(x)}$$

Variable	Value	Units	Description
Q/C_{wind} =	61.80	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 = 2.16E+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 =	0.36	acres	Contaminated site area

Q/C_{wind} = 61.80 g/m^2-s/kg/m^3

Table E.1-29
VF Calculation - Construction Worker
Radford Army Ammunition Plant - FLFA

Site Name: Radford FLFA

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: **No VOCs present in soil**

Variable	Value	Units	Description
θ_a =	0.28	L_{air}/L_{soil}	default
θ_w =	0.15	L_{water}/L_{soil}	default
D_i =	**#N/A**	cm^2/s	**chemical-specific from VF table**
D_w =	**#N/A**	cm^2/s	**chemical-specific from VF table**
H =	**#N/A**	unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =	**#N/A**	cm^3/g	**chemical-specific from VF table**
K_{oc} =	**#N/A**	cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = #N/A cm^2/s

This equation is chemical-specific. Bold variables - information is required for each chemica
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 for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. USEPA, 2002. Equation 5-14 fron 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} =	15.26	g/m^2-s/kg/m^3	calculated below
F_D =	0.185	unitless	default
D_A =	#N/A	cm^2/s	**chemical specific - calculated above**
T =	**7,488,000**	**seconds**	Receptor-specific exposure interval (example: T= ED (yrs)*365 days/yr*24hr/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} = #N/A 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 =	**0.36**	acres	**site-specific**

A_c is site specific - area should change for each site

Q/C_{sa} = 15.26 g/m^2-s/kg/m^3

Table E.1-30
VF Calculation - Other Receptors
Radford Army Ammunition Plant - FLFA

Site Name: Radford FLFA

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: No VOCs in Soil

Variable	Value	Units	Description
θ_a =	0.28	L_{air}/L_{soil}	default
θ_w =	0.15	L_{water}/L_{soil}	default
D_i =	**#N/A**	cm^2/s	**chemical-specific from VF table**
D_w =	**#N/A**	cm^2/s	**chemical-specific from VF table**
H	**#N/A**	unitless	**chemical-specific from VF table**
n =	0.43	L_{pore}/L_{soil}	default
ρ_b =	1.5	g/cm^3	default
K_d =	**#N/A**	cm^3/g	**chemical-specific from VF table**
K_{oc} =	**#N/A**	cm^3/g	**chemical-specific from VF table**
f_{oc} =	0.006	g/g	

D_A = #N/A cm^2/s

VF (soil only) values for commercial/industrial worker, adult resident, child resident (and adolescent trespasser) 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} =	61.80	g/m^2-s)/kg/m^3	calculated below
D_A =	#N/A	cm^2/s	chemical specific - calculated above
T =	**1,440,000**	seconds	**Receptor-specific exposure interval (T= ED (yrs)*50 days/yr*8hr/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 = #N/A 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 =	9.9253		Site-specific value - see tab D-3 for values
B =	18.6636		Site-specific value - see tab D-3 for values
C =	211.8862		Site-specific value - see tab D-3 for values
A_s =	0.36	acres	Contaminated site area

Q/C_{vol} = 61.80 g/m^2-s/kg/m^3

Table E.1-31
Parameter Values Used for Groundwater - FLFA

Dermal Absorption - Chemicals of Potential Concern (COPC) in Groundwater

COPC	CAS No.	FA	Kp (cm/hr)	tau_{event} (hr)	B	t* (hr)	COPC Assessed? (1)
Organics							
Chloroform (2)	67-66-3	1.0	6.8E-03	0.50	0.00	1.19	No
TCDD TE (3)	N/A	0.5	8.1E-01	6.82	5.60	30.1	Yes
Tetrachloroethene (2)	127-18-4	1.0	3.3E-02	0.91	0.20	2.18	Yes
Inorganics							
Aluminum (4)	7429-90-5		1.0E-03				No
Chromium III	7440-47-3		1.0E-03				Yes
Cobalt (4)	7440-48-4		1.0E-03				No
Iron (4)	7439-89-6		1.0E-03				No
Manganese	7439-96-5		1.0E-03				No
Perchlorate (4)	14797-73-0		1.0E-03				No
Vanadium	7440-62-2		1.0E-03				Yes

(1) Dermal exposure is less than 10% of drinking water exposure. COPC is not included in the dermal risk assessment based on Exhibits B-3 and B-4 (USEPA, 2004).

(2) COPC is a halogenated compound. The K_p correlation based on molecular weight of the hydrocarbon will tend to under estimate the permeability coefficient (Exhibit B-2; USEPA, 2004).

(3) COPC is outside the effective predictive domain (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. 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, 2001. Inorganic parameter values are taken from Worksheet to Calculate Dermal Absorption of Inorganic 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.1-32
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - FLFA

$$VF_{wamb} = (H / 1 + (U_a d_{air} L_{GW} / WD_{effws})) X 10^3 L / m^3$$

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 ($7.5x10^{-1}$ for tetrachloroethene)
U_a (cm/sec) =	353	Wind speed above ground surface (Based on 30-year data windspeed for Roanoke, VA; NOAA
d_{air} (cm) =	200	Ambient air mixing zone height (ASTM, 1995)
L_{GW} (cm) =	2,131	Depth to groundwater - site specific measurement from field investigation
W (cm) =	1,524	Width of source area parallel to wind flow direction (site-specific; measured from GIS mappin
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) =	122	Thickness of capillary fringe (assumed from site specific conditions)
h_v (cm) =	610	Thickness of vadose zone (assumed from site specific conditions)
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.1-32
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - FLFA

$$D_{effcap} = D^{air} \frac{\theta_{acap}^{3.33}}{\theta_T^2} + D^{wat} \frac{1}{H} \frac{\theta_{wcap}^{3.33}}{\theta_T^2}$$

Where:

D_{effcap} (cm^2/sec) =	calculated	Effective diffusion coefficient through capillary fringe
D_{air} (cm^2/sec) =	chemical-specific	Diffusion coefficient in air (chemical-specific)
D_{wat} (cm^2/sec) =	chemical-specific	Diffusion coefficient in water (chemical-specific)
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

$$D_{effs} = D^{air} \frac{\theta_{as}^{3.33}}{\theta_T^2} + D^{wat} \frac{1}{H} \frac{\theta_{ws}^{3.33}}{\theta_T^2}$$

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 (chemical-specific)
D_{wat} (cm^2/sec) =	chemical-specific	Diffusion coefficient in water (chemical-specific)
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
H (cm^3-water per cm^3-air) =	chemical-specific	Henry's Law Constant (chemical-specific)
θ_T (cm^3/cm^3-soil)	0.481	Total soil porosity

Table E.1-32
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - FLFA

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.1-32
Calculation of Ambient Air Concentration from Groundwater - Tetrachloroethene

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
PCE	7.54E-01	353	200	122	610	2131	9.18E-05	1,524	1.56E-05	0.0037	0.481	0.0481	0.433	0.265	0.216	7.20E-02	8.20E-06	7.01E-07

Source: ASTM, 1994

Constituents	Groundwater Concentration (mg/L)	VFamb	**"Ca"** Concentration (mg/m^3)
PCE	2.60E-03	########	1.82E-09

Table E.1-32
Calculation of Ambient Air Concentration from Groundwater - Chloroform

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	122	610	2131	2.10E-04	1,524	0.000036	0.0054	0.481	0.0481	0.433	0.265	0.216	1.04E-01	1.00E-05	3.19E-07

Source: ASTM, 1994

Constituents	Groundwater Concentration (mg/L)	VFamb	**"Ca"** Concentration (mg/m^3)
Chloroform	2.40E-02	########	7.65E-09

Table E.1-33
Groundwater Inhalation Indoor Air Concentration Summary - FLFA
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	2.40E-02	4.93E-05
Tetrachloroethene	127-18-4	2.60E-03	1.23E-05

Notes:
Indoor air concentrations modeled using Johnson and Ettinger Model
Model output provided in **Appendix E.4**

Non-default model inputs (based on site-specific data):

Average soil temperature (T_s) is set at 63.5°F or 17.5°C, based on the average temperature of soil for the vicinity of FLFA.

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 2,131 cm (69.9 ft), conservatively based on the depth of groundwater measured at FLFA.

The soil type in the vadose zone was modeled as silty clay (SIC). This is based on soil type found at FLFA.

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.1-34
Groundwater Inhalation Construction Worker Trench Gas Concentration Calculations - FLFA
Radford Army Ammunition Plant, Radford, Virginia

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	2.40E+01	3.66E-03	1.04E-01	9.81E-04	4.65E-05
Tetrachloroethene	127-18-4	2.60E+00	1.84E-02	7.20E-02	3.41E-03	1.75E-05

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) =	291	Average system absolute temperature
L_d (cm) =	1,674	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 (default)
Conversion Factor (L/cm^3) =	0.001	
Conversion Factor (cm^2/m^2) =	10,000	
Conversion Factor (s/hr) =	3,600	

Table E.1-34
Groundwater Inhalation Construction Worker Trench Gas Concentration Calculations - FLFA
Radford Army Ammunition Plant, Radford, Virginia

$$C_a = C_w \times VF \times 0.001$$

C_a ($\mu g/m^3$) =	chemical-specific	Concentration in trench air
C_w ($\mu g/L$) =	chemical-specific	Maximum detected concentration in groundwater
VF (L/min^3) =	chemical-specific	Volatilization factor
Conversion Factor ($mg/\mu g$) =	0.001	

Table E.1-35
Groundwater Inhalation Shower Air Concentration Calculations - FLFA
Radford Army Ammunition Plant, Radford, Virginia

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	2.40E-02	1.19E+02	3.66E-03	1.21E+01	1.16E+03	1.14E+01	1.54E+01	2.88E-03	2.40E-03	3.77E-02
Tetrachloroethene	127-18-4	2.60E-03	1.66E+02	1.84E-02	1.03E+01	9.88E+02	1.02E+01	1.37E+01	2.81E-04	2.34E-04	3.67E-03

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 (µg/m^3-min) =	$C_{wd} \times FR/SV$	VOC generation rate
C_a (mg/m^3) =	$\left[\frac{S}{R_a \times t}\right] \times \left[D_s + \frac{e^{(-R\alpha t)}}{R_a} - \frac{e^{R_a(D_s - t)}}{R_a}\right]$	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.1-36
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, 2007	12/28/07:10/11/07
Aroclor 1260	2.0E+00	$(mg/kg\text{-}day)^{-1}$	100%	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	EPA, 2007	1/10/08:10/11/07
Benzo(a)pyrene	7.3E+00	$(mg/kg\text{-}day)^{-1}$	100%	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	12/28/07:11/1/94
Bis(2-chloroethoxy) methane	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform	N/A	N/A	N/A	N/A	N/A	B2	IRIS	1/8/08:10/19/01
p-Chloro-m-cresol	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Chlorophenyl phenyl ether	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Di-n-octyl phthalate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Nitrophenol	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TCDD TE	1.5E+05	$(mg/kg\text{-}day)^{-1}$	100%	1.5E+05	$(mg/kg\text{-}day)^{-1}$	B2	HEAST	7/97
Tetrachloroethene	5.4E-01	$(mg/kg\text{-}day)^{-1}$	100%	5.4E-01	$(mg/kg\text{-}day)^{-1}$	C	EPA, 2007	10/11/07
Inorganics								
Aluminum	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	1.5E+00	$(mg/kg\text{-}day)^{-1}$	100%	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	12/28/07:4/10/98
Barium	N/A	N/A	N/A	N/A	N/A	D	IRIS	12/28/07:3/30/98
Cadmium (food)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12/28/07:6/1/92
Chromium (III)	N/A	N/A	N/A	N/A	N/A	D	IRIS	12/28/07:9/3/98
Cobalt	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper	N/A	N/A	N/A	N/A	N/A	D	IRIS	12/28/07:8/1/91
Iron	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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	12/28/07:12/1/96
Nickel	N/A	N/A	N/A	N/A	N/A	N/A	IRIS	12/28/07:8/1/94
Perchlorate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Silver	N/A	N/A	N/A	N/A	N/A	D	IRIS	12/28/07:6/1/89
Thallium	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	N/A
ZInc	N/A	N/A	N/A	N/A	N/A	Inadequate	IRIS	12/28/07:8/3/05

(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.

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, 2007 = EPA Region III October 11, 2007 RBC table.

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.1-37
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	2E-05	mg/kg-day	100%	2.0E-05	mg/kg-day	Immune system, eyes	300	IRIS	12/28/07:11/1/96
Aroclor 1260	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
bis(chloroethoxy) methane	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	1/8/08:10/19/01
p-Chloro-m-cresol	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Chlorophenyl phenyl ether	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Di-n-octyl phthalate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Nitrophenol	Chronic	8E-03	mg/kg-day	100%	8.0E-03	mg/kg-day	N/A	N/A	VDEQ, 2007	12/28/07:5/3/07
TCDD TE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethene	Chronic	1E-02	mg/kg-day	100%	1.0E-02	mg/kg-day	Liver	1,000	IRIS	12/3/07: 3/1/88
Inorganics										
Aluminum	Chronic	1E+00	mg/kg-day	100%	1.0E+00	mg/kg-day	Developmental nervous system	N/A	EPA, 2007; PPRTV	10/11/07
Antimony	Chronic	4E-04	mg/kg-day	15%	6.0E-05	mg/kg-day	Blood Chemistry	1,000	IRIS	12/28/07:2/1/91
Arsenic	Chronic	3E-04	mg/kg-day	100%	3.0E-04	mg/kg-day	Skin, Vascular Effects	3	IRIS	12/28/07:2/1/93
Barium	Chronic	2E-01	mg/kg-day	7%	1.4E-02	mg/kg-day	Kidney	300	IRIS	12/28/07:7/11/05
Cadmium (food)	Chronic	1E-03	mg/kg-day	2.5%	2.5E-05	mg/kg-day	Kidney	10	IRIS	12/28/07:2/1/94
Cadmium (water)	Chronic	5E-04	mg/kg-day	5.0%	2.5E-05	mg/kg-day	Kidney	10	IRIS	12/28/07:2/1/94
Chromium (III)	Chronic	1.5E+00	mg/kg-day	1.3%	2.0E-02	mg/kg-day	NOAEL	1,000	IRIS	12/28/07:9/3/98
Cobalt (4)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper	Chronic	4E-02	mg/kg-day	100%	4.0E-02	mg/kg-day	GI Tract	N/A	HEAST	7/97
Iron	Chronic	7E-01	mg/kg-day	100%	7.0E-01	mg/kg-day	Blood, Liver, GI Irritation	N/A	EPA, 2007; VDEQ, 2007; PPRTV	12/28/07:10/11/07
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	2.0E-02	mg/kg-day	4%	8.0E-04	mg/kg-day	CNS	1	IRIS	12/28/07:5/1/96
Nickel	Chronic	2.0E-02	mg/kg-day	4%	8.0E-04	mg/kg-day	Kidney, Liver, Spleen	300	IRIS, VDEQ, 2007	12/28/07:12/1/96
Perchlorate	Chronic	7E-04	mg/kg-day	100%	7.0E-04	mg/kg-day	Thyroid	10	IRIS	1/8/08:2/18/05
Silver	Chronic	5.0E-03	mg/kg-day	4%	2.0E-04	mg/kg-day	Skin	3	IRIS	12/28/07:12/1/96
Thallium	Chronic	7E-05	mg/kg-day	100%	7.0E-05	mg/kg-day	Blood, Liver, Hair	N/A	EPA, 2007; VDEQ, 2007; NCEA	12/28/07:10/11/07
Vanadium	Chronic	1E-03	mg/kg-day	2.6%	2.6E-05	mg/kg-day	Kidney	N/A	EPA, 2007; VDEQ, 2007; NCEA	12/28/07:10/11/07
Zinc	Chronic	3E-01	mg/kg-day	100%	3.0E-01	mg/kg-day	Blood Chemistry	3	IRIS	12/28/07:8/3/05

(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) USEPA has retired the toxicity value for this COPC. EPA Region III October 25, 2005 RBC Table.

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, 2007 = EPA Region III October 11, 2007 RBC table.
VDEQ, 2007 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.1, Non-Cancer Toxicity Data, May 3, 2007.

Table E.1-38
Cancer Toxicity Data - Inhalation

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation CSF	
	Value	Units	Value	Units		Source	Date (1) (MM/DD/YY)
Organics							
Arclor 1254	5.40E-04	$(ug/m3)^{-1}$	2.E+00	$(mg/kg\text{-}day)^{-1}$	B2	EPA, 2007	12/28/07:10/11/07
Aroclor 1260	5.40E-04	$(ug/m3)^{-1}$	2.E+00	$(mg/kg\text{-}day)^{-1}$	B2	EPA, 2007	1/10/2008
Benzo(a)pyrene	N/A	N/A	3.1E+00	$(mg/kg\text{-}day)^{-1}$	B2	EPA, 2007; NCEA	12/28/07:10/9/02
Bis(2-chloroethoxy) methane	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform	2.30E-05	$(ug/m^3)^{-1}$	8.1E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	1/8/08:10/19/01
p-Chloro-m-cresol	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Chlorophenyl phenyl ether	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Di-n-octyl phthalate	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Nitrophenol	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TCDD TE	3.30E-11	$(ug/m^3)^{-1}$	1.50E+05	$(mg/kg\text{-}day)^{-1}$	B2	HEAST	7/97
Tetrachloroethene	5.70E-03	$(ug/m3)^{-1}$	2.00E-02	$(mg/kg\text{-}day)^{-1}$	C	EPA, 2007	10/11/2007
Inorganics							
Aluminum	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	1.5E+01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	12/28/07:4/10/98
Barium	N/A	N/A	N/A	N/A	D	IRIS	12/28/07:3/30/98
Cadmium	1.8E-03	$(ug/m^3)^{-1}$	6.3E+00	$(mg/kg\text{-}day)^{-1}$	B1	IRIS	12/28/07:6/1/92
Chromium (III)	N/A	N/A	N/A	N/A	D	IRIS	12/28/07:9/3/98
Cobalt	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper	N/A	N/A	N/A	N/A	D	IRIS	12/28/07:8/1/91
Iron	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	N/A	N/A	N/A	N/A	D	IRIS	12/28/07:12/1/96
Nickel	N/A	N/A	N/A	N/A	N/A	IRIS	12/28/07:8/1/94
Perchlorate	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Silver	N/A	N/A	N/A	N/A	N/A	N/A	12/28/07:6/1/89
Thallium	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
Zinc	N/A	N/A	N/A	N/A	Inadequate	IRIS	12/28/07:8/3/05

(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.

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, 2007 = EPA Region III October 11, 2007 RBC table.

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.1-39
Non-Cancer Toxicity Data - Inhalation

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD (1)		Primary Target Organ (s)	Combined Uncertainty/ Modifying Factors	RfC:Target Organ(s)	
		Value	Units	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	N/A	N/A	12/28/07:11/1/96
Aroclor 1260	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bis(2-chloroethoxy) methane	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform	Chronic	4.9E-02	mg/m^3	1.4E-02	mg/kg-day	N/A	1,000	EPA 2002;NCEA	1/8/08:12/1/97
p-Chloro-m-cresol	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Chlorophenyl phenyl ether	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Di-n-octyl phthalate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Nitrophenol	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TCDD TE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethene	Chronic	2.8E-01	mg/m^3	8.0E-02	mg/kg-day	CNS	N/A	EPA, 2007; VDEQ, 2007: ATSDR	10/11/07
Inorganics									
Aluminum	Chronic	3.5E-03	mg/m^3	1.0E-03	mg/kg-day	N/A	N/A	EPA, 2007; VDEQ, 2007; PPRTV	10/11/07
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Barium	Chronic	5.0E-04	mg/m3	1.4E-04	mg/kg-day	fetus	N/A	EPA, 2007; HEAST	12/28/07:7/97
Cadmium (food)	Chronic	2.0E-04	mg/m^3	5.7E-05	mg/kg-day	N/A	N/A	EPA, 2007; VDEQ, 2007; NCEA	10/11/07
Chromium (III)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	IRIS	12/28/07:9/3/98
Cobalt (3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Iron	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	Chronic	5.0E-05	mg/m^3	1.43E-05	mg/kg-day	CNS	1,000	IRIS	12/28/07:12/1/93
Nickel	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Perchlorate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Silver	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thallium	N/A	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	N/A	N/A
Zinc	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12/28/07:8/3/05

(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) USEPA has retired the toxicity value for this COPC. EPA Region III, October 25, 2005 RBC Table.

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, 2007 = EPA Region III October 11, 2007 RBC table.
VDEQ, 2007 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.1, Non-Cancer Toxicity Data, May, 3, 2007.

Table E.1-40b
Adult Lead Model - Results
Surface Soil - Former Lead Furnace Area
Maintenance Worker/Industrial Worker

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	1212	1212	1212	1212	1212	1212	1212	1212
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.11	2.09	2.16	2.29	2.00	2.18	2.07	2.11
PbB_0	Baseline PbB	ug/dL	1.53	1.45	1.78	1.70	1.98	1.53	1.39	1.40
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219	219	219	219	219
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**3.3**	**3.2**	**3.5**	**3.4**	**3.7**	**3.3**	**3.1**	**3.1**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	10.1	9.7	11.3	12.1	10.5	10.6	9.3	9.7
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**5.1%**	**4.5%**	**6.8%**	**7.9%**	**5.7%**	**5.9%**	**4.1%**	**4.5%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Table E.1-41b
Adult Lead Model - Results
Total Soil - Former Lead Furnace Area
Maintenance Worker/Industrial Worker

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	763	763	763	763	763	763	763	763
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.11	2.09	2.16	2.29	2.00	2.18	2.07	2.11
PbB_0	Baseline PbB	ug/dL	1.53	1.45	1.78	1.70	1.98	1.53	1.39	1.40
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219	219	219	219	219
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**2.6**	**2.5**	**2.9**	**2.8**	**3.1**	**2.6**	**2.5**	**2.5**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	8.1	7.7	9.2	9.8	8.7	8.5	7.4	7.7
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**2.7%**	**2.3%**	**4.0%**	**4.8%**	**3.2%**	**3.2%**	**2.0%**	**2.3%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Table E.1-42b
Adult Lead Model - Results
Total Soil - Former Lead Furnace Area
Excavation Worker

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	763	763	763	763	763	763	763	763
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.11	2.09	2.16	2.29	2.00	2.18	2.07	2.11
PbB_0	Baseline PbB	ug/dL	1.53	1.45	1.78	1.70	1.98	1.53	1.39	1.40
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219	219	219	219	219
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**3.7**	**3.6**	**4.0**	**3.9**	**4.2**	**3.7**	**3.6**	**3.6**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	11.5	11.0	12.7	13.7	11.8	12.1	10.7	11.1
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**7.2%**	**6.5%**	**9.1%**	**10.3%**	**7.9%**	**8.1%**	**6.0%**	**6.5%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

TABLE E.1-40a
RAGS D ADULT LEAD WORKSHEET
Radford Army Ammunition Plant – Former Lead Furnace Area
Calculations of Blood Lead Concentrations – Surface Soil – Maintenance and Industrial Workers

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	1,212	mg/kg	Average Detected Value	800	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	USEPA Adult Lead Model, Version dated 5/19/05
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in **Appendix E.1, Table E.1-40b**
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?	Exposure point concentration was based on the arithmetic mean of lead concentrations in surface soil; See **Appendix E.1**
What was the point of exposure and location?	Surface Soil – Former Lead Furnace Area
Where are the output values located in the risk assessment report?	Located in **Appendix E.1, TableE.1-40b**
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	GSD = 2.07 as the GSD derived from NHANES III for the South region.
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	PbB_0 = 1.39 ug/dL as the PbB_0 derived from NHANES III for the South region.
Was the default exposure frequency (EF; 219 days/year) used?	Yes. Default value was used as a conservative estimate for intermittent maintenance activities (50 days/year)
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	Yes
If non-default values were used for any of the parameters listed above, where is the rationale for the values located in the risk assessment report?	Only default parameters were used in the model.

3. Final Result

Medium	Result	Comment/RBRG [1]
Total Soil	Input value of 1,212 ppm in soil results in 4.1% of receptors for the South region having fetal blood-lead levels that exceed 10 µg/dL. This is below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	PRG not calculated.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE E.1-41a
RAGS D ADULT LEAD WORKSHEET
Radford Army Ammunition Plant – Former Lead Furnace Area
Calculations of Blood Lead Concentrations – Total Soil – Maintenance and Industrial Workers

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	763	mg/kg	Average Detected Value	800	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	USEPA Adult Lead Model, Version dated 5/19/05
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in **Appendix E.1, Table E.1-41b**
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?	Exposure point concentration was based on the arithmetic mean of lead concentrations in total soil; See **Appendix E.1**
What was the point of exposure and location?	Total Soil – Former Lead Furnace Area
Where are the output values located in the risk assessment report?	Located in **Appendix E.1, Table E.1-41b**
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	GSD = 2.07 as the GSD derived from NHANES III for the South region.
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	PbB_0 = 1.39 ug/dL as the PbB_0 derived from NHANES III for the South region.
Was the default exposure frequency (EF; 219 days/year) used?	Yes. Default value was used as a conservative estimate for intermittent maintenance activities (50 days/year)
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	Yes
If non-default values were used for any of the parameters listed above, where is the rationale for the values located in the risk assessment report?	Only default parameters were used in the model.

3. Final Result

Medium	Result	Comment/RBRG [1]
Total Soil	Input value of 763 ppm in soil results in 2.0% of receptors for the South region having fetal blood-lead levels that exceed 10 µg/dL. This is below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	PRG not calculated.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE E.1-42a
RAGS D ADULT LEAD WORKSHEET
Radford Army Ammunition Plant – Former Lead Furnace Area
Calculations of Blood Lead Concentrations – Total Soil – Excavation Worker

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	763	mg/kg	Average Detected Value	800	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	USEPA Adult Lead Model, Version dated 5/19/05
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in **Appendix E.1, Table E.1-42b**
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?	Exposure point concentration was based on the arithmetic mean of lead concentrations in surface soil; See **Appendix E.1**
What was the point of exposure and location?	Total Soil – Former Lead Furnace Area
Where are the output values located in the risk assessment report?	Located in **Appendix E.1, Table E.1-42b**
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	GSD = 2.07 as the GSD derived from NHANES III for the South region.
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	PbB_0 = 1.39 ug/dL as the PbB_0 derived from NHANES III for the South region.
Was the default exposure frequency (EF; 219 days/year) used?	Yes. Default value was used as conservative estimate for potential excavation activities (125 days/yr).
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No. A soil ingestion rate of 100 mg/day was used as recommended by EPA on the lead model web site (under Frequently Asked Questions http://www.epa.gov/superfund/health/contaminants/lead/almfaq.htm for workers exposed to high levels of soil contact.
If non-default values were used for any of the parameters listed above, where is the rationale for the values located in the risk assessment report?	Rationale provided above and in the text of the report.

3. Final Result

Medium	Result	Comment/RBRG [1]
Total Soil	Input value of 763 ppm in soil results in 6.0% of receptors for the South region having fetal blood-lead levels that exceed 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 (fetuses of exposed women) exceeding 10 ug/dL blood lead.	PRG not calculated.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE E.1-43
RAGS D IEUBK LEAD WORKSHEET
Radford Army Ammunition Plant – Former Lead Furnace Area
Child (Age 0 – 84 Months), Exposure to Total Soil

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	763	mg/kg	Average Detected Value	400	mg/kg	Recommended Soil Screening Level
Water	15	ug/L	Recommended Drinking Water Action Level	15	ug/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**, IEUBKwin OUTPUT (Attached)
What range of media concentrations were used for the model?	Total soil is the only site medium used for this model. Soil concentrations ranged from 10.8 to 25,900 mg/kg.
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 – Former Lead Furnace Area
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 drinking water at action level. Note that the maximum site groundwater concentration (3.6 µg/L) is less than the action level (15 µg/L).
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 **Appendix E.1.**

3. Final Result

Medium	Result	Comment/PRG [1]
Total Soil	Input value of 763 ppm total soil results in a child geometric mean blood lead concentration of 8.5 µg/dL and 36.4% of children above a blood lead level of 10 ug/dL. Geometric mean blood lead = 8.5 ug/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 ug/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: Tom Siard
Date: 01/10/2008
Site Name: Radford
Operable Unit: FLFA
Run Mode: Site Risk Assessment

Water Data
Recommended DW action level. Note that maximum site groundwater concentration was only 3.6 µg/L.
Soil/Dust Data
Arithmetic mean concentration of combined surface and subsurface soil.

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	5.530
1-2	5.780
2-3	6.490
3-4	6.240
4-5	6.010
5-6	6.340
6-7	7.000

****** 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: 15.000 ug Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 544.100 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	763.000	544.100
1-2	763.000	544.100
2-3	763.000	544.100
3-4	763.000	544.100
4-5	763.000	544.100
5-6	763.000	544.100
6-7	763.000	544.100

****** 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

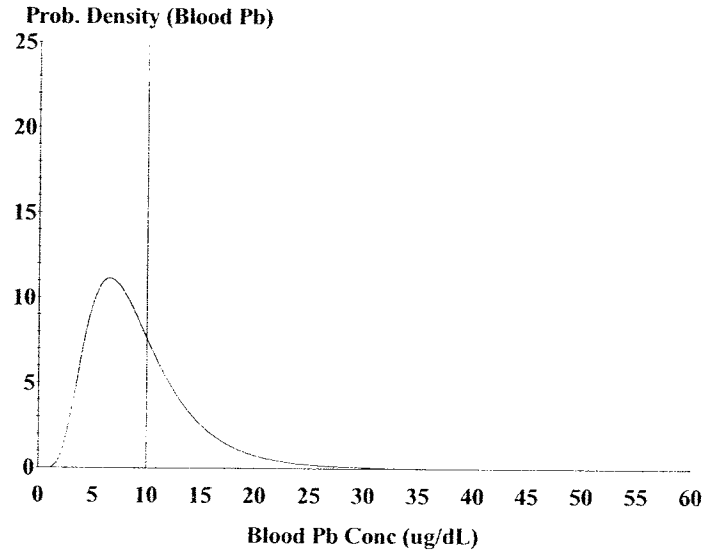
****

CALCULATED BLOOD LEAD AND LEAD UPTAKES:

****

Year	Air (ug/day)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	2.269	0.000	1.231
1-2	0.034	2.288	0.000	2.968
2-3	0.062	2.639	0.000	3.172
3-4	0.067	2.606	0.000	3.320
4-5	0.067	2.640	0.000	3.624
5-6	0.093	2.840	0.000	3.898
6-7	0.093	3.169	0.000	4.006

Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	13.446	16.966	9.0
1-2	20.601	25.891	10.5
2-3	21.168	27.042	9.9
3-4	21.734	27.725	9.5
4-5	16.939	23.270	8.1
5-6	15.546	22.377	7.0
6-7	14.837	22.105	6.3



Cutoff = 10.000 ug/dl
Geo Mean = 8.496
GSD = 1.600
% Above = 36.435
% Below = 63.565

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Site Risk Assessment
Comment = Density curve

Table E.1-44
Calculation of Cancer Risks
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current/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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	3.4E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.8E-08
				Aroclor 1260	2.19E-01	mg/kg	1.5E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-08
				Benzo(a)pyrene	2.47E-02	mg/kg	1.7E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-08
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	3.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	9.8E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	8.4E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.47E-02	mg/kg	3.8E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	2.52E-04	mg/kg	1.8E-11	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.6E-06
				Inorganics							
				Aluminum	2.28E+04	mg/kg	1.6E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	7.25E+00	mg/kg	5.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.40E+01	mg/kg	9.8E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-06
				Barium	1.88E+03	mg/kg	1.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	3.27E+00	mg/kg	2.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	1.17E+02	mg/kg	8.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.64E+01	mg/kg	1.1E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	1.06E+04	mg/kg	7.4E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.58E+04	mg/kg	2.5E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	8.97E+03	mg/kg	6.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	9.05E+02	mg/kg	6.3E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	1.06E+02	mg/kg	7.4E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	3.63E+01	mg/kg	2.5E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.62E+01	mg/kg	3.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	7.44E+03	mg/kg	5.2E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								4.2E-06
			Dermal Absorption	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	3.2E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.3E-08
				Aroclor 1260	2.19E-01	mg/kg	1.4E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-08
				Benzo(a)pyrene	2.47E-02	mg/kg	1.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-08
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	6.8E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	6.5E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	5.5E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	9.2E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.47E-02	mg/kg	2.5E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	2.52E-04	mg/kg	3.5E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.2E-07
				Inorganics							
				Aluminum	2.28E+04	mg/kg	1.1E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	7.25E+00	mg/kg	3.3E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.40E+01	mg/kg	1.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-07
				Barium	1.88E+03	mg/kg	8.7E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	3.27E+00	mg/kg	1.5E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	1.17E+02	mg/kg	5.4E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.64E+01	mg/kg	7.6E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	1.06E+04	mg/kg	4.9E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.58E+04	mg/kg	1.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	8.97E+03	mg/kg	4.1E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	9.05E+02	mg/kg	4.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	1.06E+02	mg/kg	4.9E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	3.63E+01	mg/kg	1.7E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.62E+01	mg/kg	2.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	7.44E+03	mg/kg	3.4E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								9.2E-07
		Exposure Point Total									5.1E-06
	Exposure Media Total										5.1E-06

Table E.1-44
Calculation of Cancer Risks
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current/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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	3.2E-12	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.3E-12
				Aroclor 1260	2.19E-01	mg/kg	1.4E-12	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-12
				Benzo(a)pyrene	2.47E-02	mg/kg	1.6E-13	mg/kg-day	3.1E+00	$(mg/kg\text{-}day)^{-1}$	5.0E-13
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	3.2E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	9.1E-14	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	7.8E-14	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.3E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.47E-02	mg/kg	3.5E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	2.52E-04	mg/kg	1.6E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.5E-10
				Inorganics							
				Aluminum	2.28E+04	mg/kg	1.5E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	7.25E+00	mg/kg	4.7E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.40E+01	mg/kg	9.1E-11	mg/kg-day	1.5E+01	$(mg/kg\text{-}day)^{-1}$	1.4E-09
				Barium	1.88E+03	mg/kg	1.2E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	3.27E+00	mg/kg	2.1E-11	mg/kg-day	6.3E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-10
				Chromium III	1.17E+02	mg/kg	7.6E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.64E+01	mg/kg	1.1E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	1.06E+04	mg/kg	6.9E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.58E+04	mg/kg	2.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	8.97E+03	mg/kg	5.8E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	9.05E+02	mg/kg	5.9E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	1.06E+02	mg/kg	6.9E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	3.63E+01	mg/kg	2.4E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.62E+01	mg/kg	3.0E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	7.44E+03	mg/kg	4.8E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.8E-09
		Exposure Point Total									1.8E-09
	Exposure Media Total										1.8E-09
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPC		mg/kg		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Soil Total											5.1E-06
Groundwater	Air	FLFA	**Inhalation**	**Organics**							
			(Ambient Air)	Chloroform	7.65E-09	mg/m^3	1.1E-10	mg/kg-day	8.1E-02	$(mg/kg\text{-}day)^{-1}$	8.7E-12
				Tetrachloroethene	1.82E-09	mg/m^3	2.5E-11	mg/kg-day	2.0E-02	$(mg/kg\text{-}day)^{-1}$	5.1E-13
			Exp. Route Total								9.2E-12
		Exposure Point Total									9.2E-12
	Exposure Media Total										9.2E-12
Groundwater Total											9.2E-12
										Total of Receptor Risks Across All Media	5.1E-06

N/A = Not Applicable.

Table E.1-45
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current/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
					Value	Units	Value	Units	Value	Units	Quotient
Surface Soil	Surface Soil	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	9.5E-08	mg/kg-day	2.0E-05	mg/kg-day	4.8E-03
				Aroclor 1260	2.19E-01	mg/kg	4.3E-08	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	2.47E-02	mg/kg	4.8E-09	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	4.90E-02	mg/kg	9.6E-09	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	2.7E-09	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	2.3E-09	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	3.9E-09	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.47E-02	mg/kg	1.1E-08	mg/kg-day	8.0E-03	mg/kg-day	1.3E-06
				TCDD TE	2.52E-04	mg/kg	4.9E-11	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.28E+04	mg/kg	4.5E-03	mg/kg-day	1.0E+00	mg/kg-day	4.5E-03
				Antimony	7.25E+00	mg/kg	1.4E-06	mg/kg-day	4.0E-04	mg/kg-day	3.5E-03
				Arsenic	1.40E+01	mg/kg	2.7E-06	mg/kg-day	3.0E-04	mg/kg-day	9.1E-03
				Barium	1.88E+03	mg/kg	3.7E-04	mg/kg-day	2.0E-01	mg/kg-day	1.8E-03
				Cadmium	3.27E+00	mg/kg	6.4E-07	mg/kg-day	1.0E-03	mg/kg-day	6.4E-04
				Chromium III	1.17E+02	mg/kg	2.3E-05	mg/kg-day	1.5E+00	mg/kg-day	1.5E-05
				Cobalt	1.64E+01	mg/kg	3.2E-06	mg/kg-day	N/A	mg/kg-day	---
				Copper	1.06E+04	mg/kg	2.1E-03	mg/kg-day	4.0E-02	mg/kg-day	5.2E-02
				Iron	3.58E+04	mg/kg	7.0E-03	mg/kg-day	7.0E-01	mg/kg-day	1.0E-02
				Lead	8.97E+03	mg/kg	1.8E-03	mg/kg-day	N/A	mg/kg-day	---
				Manganese	9.05E+02	mg/kg	1.8E-04	mg/kg-day	2.0E-02	mg/kg-day	8.9E-03
				Nickel	1.06E+02	mg/kg	2.1E-05	mg/kg-day	2.0E-02	mg/kg-day	1.0E-03
				Silver	3.63E+01	mg/kg	7.1E-06	mg/kg-day	5.0E-03	mg/kg-day	1.4E-03
				Vanadium	4.62E+01	mg/kg	9.0E-06	mg/kg-day	1.0E-03	mg/kg-day	9.0E-03
				Zinc	7.44E+03	mg/kg	1.5E-03	mg/kg-day	3.0E-01	mg/kg-day	4.9E-03
			Exp. Route Total								1.1E-01
			Dermal Absorption	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	8.8E-08	mg/kg-day	2.0E-05	mg/kg-day	4.4E-03
				Aroclor 1260	2.19E-01	mg/kg	4.0E-08	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	2.47E-02	mg/kg	4.1E-09	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	4.90E-02	mg/kg	6.3E-09	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.8E-09	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.5E-09	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	2.6E-09	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.47E-02	mg/kg	7.1E-09	mg/kg-day	8.0E-03	mg/kg-day	8.8E-07
				TCDD TE	2.52E-04	mg/kg	9.8E-12	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.28E+04	mg/kg	2.9E-04	mg/kg-day	1.0E+00	mg/kg-day	2.9E-04
				Antimony	7.25E+00	mg/kg	9.4E-08	mg/kg-day	6.0E-05	mg/kg-day	1.6E-03
				Arsenic	1.40E+01	mg/kg	5.4E-07	mg/kg-day	3.0E-04	mg/kg-day	1.8E-03
				Barium	1.88E+03	mg/kg	2.4E-05	mg/kg-day	1.4E-02	mg/kg-day	1.7E-03
				Cadmium	3.27E+00	mg/kg	4.2E-09	mg/kg-day	2.5E-05	mg/kg-day	1.7E-04
				Chromium III	1.17E+02	mg/kg	1.5E-06	mg/kg-day	2.0E-02	mg/kg-day	7.7E-05
				Cobalt	1.64E+01	mg/kg	2.1E-07	mg/kg-day	N/A	mg/kg-day	---
				Copper	1.06E+04	mg/kg	1.4E-04	mg/kg-day	4.0E-02	mg/kg-day	3.4E-03
				Iron	3.58E+04	mg/kg	4.6E-04	mg/kg-day	7.0E-01	mg/kg-day	6.6E-04
				Lead	8.97E+03	mg/kg	1.2E-04	mg/kg-day	N/A	mg/kg-day	---
				Manganese	9.05E+02	mg/kg	1.2E-05	mg/kg-day	8.0E-04	mg/kg-day	1.5E-02
				Nickel	1.06E+02	mg/kg	1.4E-06	mg/kg-day	8.0E-04	mg/kg-day	1.7E-03
				Silver	3.63E+01	mg/kg	4.7E-07	mg/kg-day	2.0E-04	mg/kg-day	2.3E-03
				Vanadium	4.62E+01	mg/kg	6.0E-07	mg/kg-day	2.6E-05	mg/kg-day	2.3E-02
				Zinc	7.44E+03	mg/kg	9.6E-05	mg/kg-day	3.0E-01	mg/kg-day	3.2E-04
			Exp. Route Total								5.6E-02
		Exposure Point Total									1.7E-01
	Exposure Media Total										1.7E-01

Table E.1-45
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current/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
					Value	Units	Value	Units	Value	Units	Quotient
Surface Soil	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	8.9E-12	mg/kg-day	N/A	mg/kg-day	---
				Aroclor 1260	2.19E-01	mg/kg	4.0E-12	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	2.47E-02	mg/kg	4.5E-13	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	8.9E-13	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	2.5E-13	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	2.2E-13	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	3.6E-13	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.47E-02	mg/kg	9.9E-13	mg/kg-day	N/A	mg/kg-day	---
				TCDD TE	2.52E-04	mg/kg	4.6E-15	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.28E+04	mg/kg	4.1E-07	mg/kg-day	1.0E-03	mg/kg-day	4.1E-04
				Antimony	7.25E+00	mg/kg	1.3E-10	mg/kg-day	N/A	mg/kg-day	---
				Arsenic	1.40E+01	mg/kg	2.5E-10	mg/kg-day	N/A	mg/kg-day	---
				Barium	1.88E+03	mg/kg	3.4E-08	mg/kg-day	1.4E-04	mg/kg-day	2.4E-04
				Cadmium	3.27E+00	mg/kg	5.9E-11	mg/kg-day	5.7E-05	mg/kg-day	1.0E-06
				Chromium III	1.17E+02	mg/kg	2.1E-09	mg/kg-day	N/A	mg/kg-day	---
				Cobalt	1.64E+01	mg/kg	3.0E-10	mg/kg-day	N/A	mg/kg-day	---
				Copper	1.06E+04	mg/kg	1.9E-07	mg/kg-day	N/A	mg/kg-day	---
				Iron	3.58E+04	mg/kg	6.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Lead	8.97E+03	mg/kg	1.6E-07	mg/kg-day	N/A	mg/kg-day	---
				Manganese	9.05E+02	mg/kg	1.6E-08	mg/kg-day	1.4E-05	mg/kg-day	1.1E-03
				Nickel	1.06E+02	mg/kg	1.9E-09	mg/kg-day	N/A	mg/kg-day	---
				Silver	3.63E+01	mg/kg	6.6E-10	mg/kg-day	N/A	mg/kg-day	---
				Vanadium	4.62E+01	mg/kg	8.4E-10	mg/kg-day	N/A	mg/kg-day	---
				Zinc	7.44E+03	mg/kg	1.4E-07	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								1.8E-03
		Exposure Point Total									1.8E-03
	Exposure Media Total										1.8E-03
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPCs		mg/kg		mg/kg-day		mg/kg-day	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Soil Total											1.7E-01
Groundwater	Air	FLFA	**Inhalation**	**Organics**							
			(Ambient Air)	Chloroform	7.65E-09	mg/m^3	3.0E-10	mg/kg-day	1.4E-02	mg/kg-day	2.1E-08
				Tetrachloroethene	1.82E-09	mg/m^3	7.1E-11	mg/kg-day	8.0E-02	mg/kg-day	8.9E-10
			Exp. Route Total								2.2E-08
		Exposure Point Total									2.2E-08
	Exposure Media Total										2.2E-08
Groundwater Total											2.2E-08
										Total of Receptor Hazards Across All Media	1.7E-01

N/A = Not Applicable.

Table E.1-46
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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	2.7E-08	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	5.4E-08
				Aroclor 1260	1.81E-01	mg/kg	1.3E-08	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	2.5E-08
				Benzo(a)pyrene	1.96E-02	mg/kg	1.4E-09	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	1.0E-08
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	4.4E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	9.8E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	8.4E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.4E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	3.7E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	1.2E-11	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	1.8E-06
				Inorganics							
				Aluminum	2.63E+04	mg/kg	1.8E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	4.0E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	1.2E-06	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	1.8E-06
				Barium	1.35E+03	mg/kg	9.4E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	1.6E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chromium III	9.40E+01	mg/kg	6.6E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	1.1E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Copper	7.41E+03	mg/kg	5.2E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	3.61E+04	mg/kg	2.5E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Lead	3.64E+03	mg/kg	2.5E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	5.1E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	5.8E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Silver	2.58E+01	mg/kg	1.8E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	1.0E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	3.7E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				ZInc	5.26E+03	mg/kg	3.7E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								3.7E-06
			Dermal Absorption	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	2.5E-08	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	5.0E-08
				Aroclor 1260	1.81E-01	mg/kg	1.2E-08	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	2.3E-08
				Benzo(a)pyrene	1.96E-02	mg/kg	1.2E-09	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	8.6E-09
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	2.9E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	6.5E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	5.5E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	9.2E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	2.5E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	2.4E-12	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	3.5E-07
				Inorganics							
				Aluminum	2.63E+04	mg/kg	1.2E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	2.6E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	2.4E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	3.5E-07
				Barium	1.35E+03	mg/kg	6.2E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	1.1E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chromium III	9.40E+01	mg/kg	4.3E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	7.0E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Copper	7.41E+03	mg/kg	3.4E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	3.61E+04	mg/kg	1.7E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Lead	3.64E+03	mg/kg	1.7E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	3.4E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	3.8E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Silver	2.58E+01	mg/kg	1.2E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	6.6E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	2.5E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				ZInc	5.26E+03	mg/kg	2.4E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								7.9E-07
		Exposure Point Total									4.5E-06
Exposure Media Total											4.5E-06

Table E.1-46
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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	2.5E-12	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.0E-12
				Aroclor 1260	1.81E-01	mg/kg	1.2E-12	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-12
				Benzo(a)pyrene	1.96E-02	mg/kg	1.3E-13	mg/kg-day	3.1E+00	$(mg/kg\text{-}day)^{-1}$	3.9E-13
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	4.0E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	9.1E-14	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	7.8E-14	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.3E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	3.4E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	1.1E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.7E-10
				Inorganics							
				Aluminum	2.63E+04	mg/kg	1.7E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	3.7E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	1.1E-10	mg/kg-day	1.5E+01	$(mg/kg\text{-}day)^{-1}$	1.7E-09
				Barium	1.35E+03	mg/kg	8.8E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	1.5E-11	mg/kg-day	6.3E+00	$(mg/kg\text{-}day)^{-1}$	9.6E-11
				Chromium III	9.40E+01	mg/kg	6.1E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	9.8E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	4.8E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	2.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	2.4E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	4.8E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	5.4E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	1.7E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	9.3E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	3.5E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	3.4E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.9E-09
		Exposure Point Total									1.9E-09
	Exposure Media Total										1.9E-09
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPCs		mg/kg		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											4.5E-06

Table E.1-46
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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	3.4E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.8E-08
				Aroclor 1260	2.19E-01	mg/kg	1.5E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-08
				Benzo(a)pyrene	2.47E-02	mg/kg	1.7E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-08
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	3.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	9.8E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	8.4E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.47E-02	mg/kg	3.8E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	2.52E-04	mg/kg	1.8E-11	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.6E-06
				Inorganics							
				Aluminum	2.28E+04	mg/kg	1.6E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	7.25E+00	mg/kg	5.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.40E+01	mg/kg	9.8E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-06
				Barium	1.88E+03	mg/kg	1.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	3.27E+00	mg/kg	2.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	1.17E+02	mg/kg	8.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.64E+01	mg/kg	1.1E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	1.06E+04	mg/kg	7.4E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.58E+04	mg/kg	2.5E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	8.97E+03	mg/kg	6.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	9.05E+02	mg/kg	6.3E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	1.06E+02	mg/kg	7.4E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	3.63E+01	mg/kg	2.5E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.62E+01	mg/kg	3.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	7.44E+03	mg/kg	5.2E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								4.2E-06
			Dermal Absorption	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	3.2E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.3E-08
				Aroclor 1260	2.19E-01	mg/kg	1.4E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-08
				Benzo(a)pyrene	2.47E-02	mg/kg	1.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-08
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	6.8E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	6.5E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	5.5E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	9.2E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.47E-02	mg/kg	2.5E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	2.52E-04	mg/kg	3.5E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.2E-07
				Inorganics							
				Aluminum	2.28E+04	mg/kg	1.1E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	7.25E+00	mg/kg	3.3E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.40E+01	mg/kg	1.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-07
				Barium	1.88E+03	mg/kg	8.7E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	3.27E+00	mg/kg	1.5E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	1.17E+02	mg/kg	5.4E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.64E+01	mg/kg	7.6E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	1.06E+04	mg/kg	4.9E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.58E+04	mg/kg	1.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	8.97E+03	mg/kg	4.1E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	9.05E+02	mg/kg	4.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	1.06E+02	mg/kg	4.9E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	3.63E+01	mg/kg	1.7E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.62E+01	mg/kg	2.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	7.44E+03	mg/kg	3.4E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								9.2E-07
		Exposure Point Total									5.1E-06
	Exposure Media Total										5.1E-06

Table E.1-46
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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	3.2E-12	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.3E-12
				Aroclor 1260	2.19E-01	mg/kg	1.4E-12	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-12
				Benzo(a)pyrene	2.47E-02	mg/kg	1.6E-13	mg/kg-day	3.1E+00	$(mg/kg\text{-}day)^{-1}$	5.0E-13
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	3.2E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	9.1E-14	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	7.8E-14	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.3E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.47E-02	mg/kg	3.5E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	2.52E-04	mg/kg	1.6E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.5E-10
				Inorganics							
				Aluminum	2.28E+04	mg/kg	1.5E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	7.25E+00	mg/kg	4.7E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.40E+01	mg/kg	9.1E-11	mg/kg-day	1.5E+01	$(mg/kg\text{-}day)^{-1}$	1.4E-09
				Barium	1.88E+03	mg/kg	1.2E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	3.27E+00	mg/kg	2.1E-11	mg/kg-day	6.3E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-10
				Chromium III	1.17E+02	mg/kg	7.6E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.64E+01	mg/kg	1.1E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	1.06E+04	mg/kg	6.9E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.58E+04	mg/kg	2.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	8.97E+03	mg/kg	5.8E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	9.05E+02	mg/kg	5.9E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	1.06E+02	mg/kg	6.9E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	3.63E+01	mg/kg	2.4E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.62E+01	mg/kg	3.0E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	7.44E+03	mg/kg	4.8E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.8E-09
		Exposure Point Total									1.8E-09
	Exposure Media Total										1.8E-09
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPC		mg/kg		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Soil Total											5.1E-06
Groundwater	Air	FLFA	**Inhalation** (Ambient Air)	**Organics**							
				Chloroform	7.65E-09	mg/m^3	1.1E-10	mg/kg-day	8.1E-02	$(mg/kg\text{-}day)^{-1}$	8.7E-12
				Tetrachloroethene	1.82E-09	mg/m^3	2.5E-11	mg/kg-day	2.0E-02	$(mg/kg\text{-}day)^{-1}$	5.1E-13
			Exp. Route Total								9.2E-12
		Exposure Point Total									9.2E-12
	Exposure Media Total										9.2E-12
Groundwater Total											9.2E-12
										Total of Receptor Risks Across All Media	5.1E-06

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 soil data grouping.

Table E.1-47
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
					Value	Units	Value	Units	Value	Units	Quotient
Total Soil	Total Soil	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	7.6E-08	mg/kg-day	2.0E-05	$(mg/kg-day)^{-1}$	1.5E-12
				Aroclor 1260	1.81E-01	mg/kg	3.5E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Benzo(a)pyrene	1.96E-02	mg/kg	3.8E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				bis(2-chloroethoxy)methane	6.24E-02	mg/kg	1.2E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	2.7E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	2.3E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	3.9E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	1.0E-08	mg/kg-day	8.0E-03	$(mg/kg-day)^{-1}$	8.3E-11
				TCDD TE	1.70E-04	mg/kg	3.3E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	5.1E-03	mg/kg-day	1.0E+00	mg/kg-day	5.1E-03
				Antimony	5.70E+00	mg/kg	1.1E-06	mg/kg-day	4.0E-04	mg/kg-day	2.8E-03
				Arsenic	1.71E+01	mg/kg	3.3E-06	mg/kg-day	3.0E-04	mg/kg-day	1.1E-02
				Barium	1.35E+03	mg/kg	2.6E-04	mg/kg-day	2.0E-01	mg/kg-day	1.3E-03
				Cadmium	2.36E+00	mg/kg	4.6E-07	mg/kg-day	1.0E-03	mg/kg-day	4.6E-04
				Chromium III	9.40E+01	mg/kg	1.8E-05	mg/kg-day	1.5E+00	mg/kg-day	1.2E-05
				Cobalt	1.51E+01	mg/kg	3.0E-06	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	1.5E-03	mg/kg-day	4.0E-02	mg/kg-day	3.6E-02
				Iron	3.61E+04	mg/kg	7.1E-03	mg/kg-day	7.0E-01	mg/kg-day	1.0E-02
				Lead	3.64E+03	mg/kg	7.1E-04	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	1.4E-04	mg/kg-day	2.0E-02	mg/kg-day	7.2E-03
				Nickel	8.30E+01	mg/kg	1.6E-05	mg/kg-day	2.0E-02	mg/kg-day	8.1E-04
				Silver	2.58E+01	mg/kg	5.0E-06	mg/kg-day	5.0E-03	mg/kg-day	1.0E-03
				Thallium	1.43E+01	mg/kg	2.8E-06	mg/kg-day	7.0E-05	mg/kg-day	4.0E-02
				Vanadium	5.33E+01	mg/kg	1.0E-05	mg/kg-day	1.0E-03	mg/kg-day	1.0E-02
				Zinc	5.26E+03	mg/kg	1.0E-03	mg/kg-day	3.0E-01	mg/kg-day	3.4E-03
			Exp. Route Total								1.3E-01
			Dermal Absorption	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	7.0E-08	mg/kg-day	2.0E-05	mg/kg-day	3.5E-03
				Aroclor 1260	1.81E-01	mg/kg	3.3E-08	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	3.3E-09	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	6.24E-02	mg/kg	8.1E-09	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.8E-09	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.5E-09	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	2.6E-09	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	6.9E-09	mg/kg-day	8.0E-03	mg/kg-day	8.6E-07
				TCDD TE	1.70E-04	mg/kg	6.6E-12	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	3.4E-04	mg/kg-day	1.0E+00	mg/kg-day	3.4E-04
				Antimony	5.70E+00	mg/kg	7.4E-08	mg/kg-day	6.0E-05	mg/kg-day	1.2E-03
				Arsenic	1.71E+01	mg/kg	6.6E-07	mg/kg-day	3.0E-04	mg/kg-day	2.2E-03
				Barium	1.35E+03	mg/kg	1.7E-05	mg/kg-day	1.4E-02	mg/kg-day	1.2E-03
				Cadmium	2.36E+00	mg/kg	3.0E-09	mg/kg-day	2.5E-05	mg/kg-day	1.2E-04
				Chromium III	9.40E+01	mg/kg	1.2E-06	mg/kg-day	2.0E-02	mg/kg-day	6.2E-05
				Cobalt	1.51E+01	mg/kg	2.0E-07	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	9.6E-05	mg/kg-day	4.0E-02	mg/kg-day	2.4E-03
				Iron	3.61E+04	mg/kg	4.7E-04	mg/kg-day	7.0E-01	mg/kg-day	6.7E-04
				Lead	3.64E+03	mg/kg	4.7E-05	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	9.5E-06	mg/kg-day	8.0E-04	mg/kg-day	1.2E-02
				Nickel	8.30E+01	mg/kg	1.1E-06	mg/kg-day	8.0E-04	mg/kg-day	1.3E-03
				Silver	2.58E+01	mg/kg	3.3E-07	mg/kg-day	2.0E-04	mg/kg-day	1.7E-03
				Thallium	1.43E+01	mg/kg	1.8E-07	mg/kg-day	7.0E-05	mg/kg-day	2.6E-03
				Vanadium	5.33E+01	mg/kg	6.9E-07	mg/kg-day	2.6E-05	mg/kg-day	2.6E-02
				Zinc	5.26E+03	mg/kg	6.8E-05	mg/kg-day	3.0E-01	mg/kg-day	2.3E-04
			Exp. Route Total								5.6E-02
		Exposure Point Total									1.9E-01
	Exposure Media Total										1.9E-01

Table E.1-47
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
					Value	Units	Value	Units	Value	Units	Quotient
Total Soil	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	7.0E-12	mg/kg-day	N/A	mg/kg-day	---
				Aroclor 1260	1.81E-01	mg/kg	3.3E-12	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	3.6E-13	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	1.1E-12	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	2.5E-13	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	2.5E-13	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	3.6E-13	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	9.7E-13	mg/kg-day	N/A	mg/kg-day	---
				TCDD TE	1.70E-04	mg/kg	3.1E-15	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	4.8E-07	mg/kg-day	1.0E-03	mg/kg-day	4.8E-04
				Antimony	5.70E+00	mg/kg	1.0E-10	mg/kg-day	N/A	mg/kg-day	---
				Arsenic	1.71E+01	mg/kg	3.1E-10	mg/kg-day	N/A	mg/kg-day	---
				Barium	1.35E+03	mg/kg	2.5E-08	mg/kg-day	1.4E-04	mg/kg-day	1.8E-04
				Cadmium	2.36E+00	mg/kg	4.3E-11	mg/kg-day	5.7E-05	mg/kg-day	7.5E-07
				Chromium III	9.40E+01	mg/kg	1.7E-09	mg/kg-day	N/A	mg/kg-day	---
				Cobalt	1.51E+01	mg/kg	2.7E-10	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	1.3E-07	mg/kg-day	N/A	mg/kg-day	---
				Iron	3.61E+04	mg/kg	6.6E-07	mg/kg-day	N/A	mg/kg-day	---
				Lead	3.64E+03	mg/kg	6.6E-08	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	1.3E-08	mg/kg-day	1.4E-05	mg/kg-day	9.3E-04
				Nickel	8.30E+01	mg/kg	1.5E-09	mg/kg-day	N/A	mg/kg-day	---
				Silver	2.58E+01	mg/kg	4.7E-10	mg/kg-day	N/A	mg/kg-day	---
				Thallium	1.43E+01	mg/kg	2.6E-10	mg/kg-day	N/A	mg/kg-day	---
				Vanadium	5.33E+01	mg/kg	9.7E-10	mg/kg-day	N/A	mg/kg-day	---
				Zinc	5.26E+03	mg/kg	9.6E-08	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								1.6E-03
		Exposure Point Total									1.6E-03
	Exposure Media Total										1.6E-03
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPCs		mg/kg		mg/kg-day		mg/kg-day	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											1.9E-01

Table E.1-47
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
					Value	Units	Value	Units	Value	Units	Quotient
Surface Soil	Surface Soil	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	9.5E-08	mg/kg-day	2.0E-05	mg/kg-day	4.8E-03
				Aroclor 1260	2.19E-01	mg/kg	4.3E-08	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	2.47E-02	mg/kg	4.8E-09	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	4.90E-02	mg/kg	9.6E-09	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	2.7E-09	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	2.3E-09	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	3.9E-09	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.47E-02	mg/kg	1.1E-08	mg/kg-day	8.0E-03	mg/kg-day	1.3E-06
				TCDD TE	2.52E-04	mg/kg	4.9E-11	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.28E+04	mg/kg	4.5E-03	mg/kg-day	1.0E+00	mg/kg-day	4.5E-03
				Antimony	7.25E+00	mg/kg	1.4E-06	mg/kg-day	4.0E-04	mg/kg-day	3.5E-03
				Arsenic	1.40E+01	mg/kg	2.7E-06	mg/kg-day	3.0E-04	mg/kg-day	9.1E-03
				Barium	1.88E+03	mg/kg	3.7E-04	mg/kg-day	2.0E-01	mg/kg-day	1.8E-03
				Cadmium	3.27E+00	mg/kg	6.4E-07	mg/kg-day	1.0E-03	mg/kg-day	6.4E-04
				Chromium III	1.17E+02	mg/kg	2.3E-05	mg/kg-day	1.5E+00	mg/kg-day	1.5E-05
				Cobalt	1.64E+01	mg/kg	3.2E-06	mg/kg-day	N/A	mg/kg-day	---
				Copper	1.06E+04	mg/kg	2.1E-03	mg/kg-day	4.0E-02	mg/kg-day	5.2E-02
				Iron	3.58E+04	mg/kg	7.0E-03	mg/kg-day	7.0E-01	mg/kg-day	1.0E-02
				Lead	8.97E+03	mg/kg	1.8E-03	mg/kg-day	N/A	mg/kg-day	---
				Manganese	9.05E+02	mg/kg	1.8E-04	mg/kg-day	2.0E-02	mg/kg-day	8.9E-03
				Nickel	1.06E+02	mg/kg	2.1E-05	mg/kg-day	2.0E-02	mg/kg-day	1.0E-03
				Silver	3.63E+01	mg/kg	7.1E-06	mg/kg-day	5.0E-03	mg/kg-day	1.4E-03
				Vanadium	4.62E+01	mg/kg	9.0E-06	mg/kg-day	1.0E-03	mg/kg-day	9.0E-03
				Zinc	7.44E+03	mg/kg	1.5E-03	mg/kg-day	3.0E-01	mg/kg-day	4.9E-03
			Exp. Route Total								1.1E-01
			Dermal Absorption	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	8.8E-08	mg/kg-day	2.0E-05	mg/kg-day	4.4E-03
				Aroclor 1260	2.19E-01	mg/kg	4.0E-08	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	2.47E-02	mg/kg	4.1E-09	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	4.90E-02	mg/kg	6.3E-09	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.8E-09	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.5E-09	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	2.6E-09	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.47E-02	mg/kg	7.1E-09	mg/kg-day	8.0E-03	mg/kg-day	8.8E-07
				TCDD TE	2.52E-04	mg/kg	9.8E-12	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.28E+04	mg/kg	2.9E-04	mg/kg-day	1.0E+00	mg/kg-day	2.9E-04
				Antimony	7.25E+00	mg/kg	9.4E-08	mg/kg-day	6.0E-05	mg/kg-day	1.6E-03
				Arsenic	1.40E+01	mg/kg	5.4E-07	mg/kg-day	3.0E-04	mg/kg-day	1.8E-03
				Barium	1.88E+03	mg/kg	2.4E-05	mg/kg-day	1.4E-02	mg/kg-day	1.7E-03
				Cadmium	3.27E+00	mg/kg	4.2E-09	mg/kg-day	2.5E-05	mg/kg-day	1.7E-04
				Chromium III	1.17E+02	mg/kg	1.5E-06	mg/kg-day	2.0E-02	mg/kg-day	7.7E-05
				Cobalt	1.64E+01	mg/kg	2.1E-07	mg/kg-day	N/A	mg/kg-day	---
				Copper	1.06E+04	mg/kg	1.4E-04	mg/kg-day	4.0E-02	mg/kg-day	3.4E-03
				Iron	3.58E+04	mg/kg	4.6E-04	mg/kg-day	7.0E-01	mg/kg-day	6.6E-04
				Lead	8.97E+03	mg/kg	1.2E-04	mg/kg-day	N/A	mg/kg-day	---
				Manganese	9.05E+02	mg/kg	1.2E-05	mg/kg-day	8.0E-04	mg/kg-day	1.5E-02
				Nickel	1.06E+02	mg/kg	1.4E-06	mg/kg-day	8.0E-04	mg/kg-day	1.7E-03
				Silver	3.63E+01	mg/kg	4.7E-07	mg/kg-day	2.0E-04	mg/kg-day	2.3E-03
				Vanadium	4.62E+01	mg/kg	6.0E-07	mg/kg-day	2.6E-05	mg/kg-day	2.3E-02
				Zinc	7.44E+03	mg/kg	9.6E-05	mg/kg-day	3.0E-01	mg/kg-day	3.2E-04
			Exp. Route Total								5.6E-02
		Exposure Point Total									1.7E-01
	Exposure Media Total										1.7E-01

Table E.1-47
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
					Value	Units	Value	Units	Value	Units	Quotient
Surface Soil	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	8.9E-12	mg/kg-day	N/A	mg/kg-day	---
				Aroclor 1260	2.19E-01	mg/kg	4.0E-12	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	2.47E-02	mg/kg	4.5E-13	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	8.9E-13	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	2.5E-13	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	2.2E-13	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	3.6E-13	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.47E-02	mg/kg	9.9E-13	mg/kg-day	N/A	mg/kg-day	---
				TCDD TE	2.52E-04	mg/kg	4.6E-15	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.28E+04	mg/kg	4.1E-07	mg/kg-day	1.0E-03	mg/kg-day	4.1E-04
				Antimony	7.25E+00	mg/kg	1.3E-10	mg/kg-day	N/A	mg/kg-day	---
				Arsenic	1.40E+01	mg/kg	2.5E-10	mg/kg-day	N/A	mg/kg-day	---
				Barium	1.88E+03	mg/kg	3.4E-08	mg/kg-day	1.4E-04	mg/kg-day	2.4E-04
				Cadmium	3.27E+00	mg/kg	5.9E-11	mg/kg-day	5.7E-05	mg/kg-day	1.0E-06
				Chromium III	1.17E+02	mg/kg	2.1E-09	mg/kg-day	N/A	mg/kg-day	---
				Cobalt	1.64E+01	mg/kg	3.0E-10	mg/kg-day	N/A	mg/kg-day	---
				Copper	1.06E+04	mg/kg	1.9E-07	mg/kg-day	N/A	mg/kg-day	---
				Iron	3.58E+04	mg/kg	6.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Lead	8.97E+03	mg/kg	1.6E-07	mg/kg-day	N/A	mg/kg-day	---
				Manganese	9.05E+02	mg/kg	1.6E-08	mg/kg-day	1.4E-05	mg/kg-day	1.1E-03
				Nickel	1.06E+02	mg/kg	1.9E-09	mg/kg-day	N/A	mg/kg-day	---
				Silver	3.63E+01	mg/kg	6.6E-10	mg/kg-day	N/A	mg/kg-day	---
				Vanadium	4.62E+01	mg/kg	8.4E-10	mg/kg-day	N/A	mg/kg-day	---
				Zinc	7.44E+03	mg/kg	1.4E-07	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								1.8E-03
		Exposure Point Total									1.8E-03
	Exposure Media Total										1.8E-03
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPCs		mg/kg		mg/kg-day		mg/kg-day	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Soil Total											1.7E-01
Groundwater	Air	FLFA	**Inhalation**	**Organics**							
			(Ambient Air)	Chloroform	7.65E-09	mg/m^3	3.0E-10	mg/kg-day	1.4E-02	mg/kg-day	2.1E-08
				Tetrachloroethene	1.82E-09	mg/m^3	7.1E-11	mg/kg-day	8.0E-02	mg/kg-day	8.9E-10
			Exp. Route Total								2.2E-08
		Exposure Point Total									2.2E-08
	Exposure Media Total										2.2E-08
Groundwater Total											2.2E-08
										Total of Receptor Hazards Across All Media	1.9E-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 soil data grouping.

Table E.1-48
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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	1.2E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-07
				Aroclor 1260	1.81E-01	mg/kg	5.7E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-07
				Benzo(a)pyrene	1.96E-02	mg/kg	6.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.5E-08
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	2.0E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	4.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	3.8E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	6.3E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	1.7E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	5.3E-11	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	8.0E-06
				Inorganics							
				Aluminum	2.63E+04	mg/kg	8.3E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	1.8E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	5.4E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.1E-06
				Barium	1.35E+03	mg/kg	4.2E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	7.4E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	9.40E+01	mg/kg	3.0E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	4.7E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	2.3E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	1.1E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	1.1E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	2.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	2.6E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	8.1E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	4.5E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	1.7E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	1.7E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.6E-05
			Dermal Absorption	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	1.1E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-07
				Aroclor 1260	1.81E-01	mg/kg	5.3E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-07
				Benzo(a)pyrene	1.96E-02	mg/kg	5.3E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.9E-08
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	1.3E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	2.9E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	2.5E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	4.2E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	1.1E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	1.1E-11	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.6E-06
				Inorganics							
				Aluminum	2.63E+04	mg/kg	5.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	1.2E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	1.1E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-06
				Barium	1.35E+03	mg/kg	2.8E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	4.9E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	9.40E+01	mg/kg	2.0E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	3.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	1.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	7.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	7.6E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	1.5E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	1.7E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	5.4E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	3.0E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	1.1E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	1.1E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								3.6E-06
		Exposure Point Total									2.0E-05
Exposure Media Total											2.0E-05

Table E.1-48
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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	1.1E-11	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-11
				Aroclor 1260	1.81E-01	mg/kg	5.3E-12	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-11
				Benzo(a)pyrene	1.96E-02	mg/kg	5.7E-13	mg/kg-day	3.1E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-12
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	1.8E-12	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	4.1E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	3.5E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	5.8E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	1.6E-12	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	5.0E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	7.4E-10
				Inorganics							
				Aluminum	2.63E+04	mg/kg	7.7E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	1.7E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	5.0E-10	mg/kg-day	1.5E+01	$(mg/kg\text{-}day)^{-1}$	7.5E-09
				Barium	1.35E+03	mg/kg	3.9E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	6.9E-11	mg/kg-day	6.3E+00	$(mg/kg\text{-}day)^{-1}$	4.3E-10
				Chromium III	9.40E+01	mg/kg	2.7E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	4.4E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	2.2E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	1.1E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	1.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	2.1E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	2.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	7.5E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	4.2E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	1.6E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	1.5E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								8.7E-09
		Exposure Point Total									8.7E-09
	Exposure Media Total										8.7E-09
	Air (Volatiles)	FLFA	**Inhalation**	**Organics** No COPCs		mg/kg		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											2.0E-05

Table E.1-48
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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	1.5E-07	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	3.1E-07
				Aroclor 1260	2.19E-01	mg/kg	6.9E-08	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	1.4E-07
				Benzo(a)pyrene	2.47E-02	mg/kg	7.8E-09	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	5.7E-08
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	1.5E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	4.4E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	3.8E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	6.3E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Nitrophenol	5.47E-02	mg/kg	1.7E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	2.52E-04	mg/kg	7.9E-11	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	1.2E-05
				Inorganics							
				Aluminum	2.28E+04	mg/kg	7.2E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Antimony	7.25E+00	mg/kg	2.3E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	1.40E+01	mg/kg	4.4E-06	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	6.6E-06
				Barium	1.88E+03	mg/kg	5.9E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cadmium	3.27E+00	mg/kg	1.0E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chromium III	1.17E+02	mg/kg	3.7E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	1.64E+01	mg/kg	5.2E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Copper	1.06E+04	mg/kg	3.3E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	3.58E+04	mg/kg	1.1E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Lead	8.97E+03	mg/kg	2.8E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	9.05E+02	mg/kg	2.8E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Nickel	1.06E+02	mg/kg	3.3E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Silver	3.63E+01	mg/kg	1.1E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.62E+01	mg/kg	1.5E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Zinc	7.44E+03	mg/kg	2.3E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								1.9E-05
			Dermal Absorption	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	1.4E-07	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	2.8E-07
				Aroclor 1260	2.19E-01	mg/kg	6.4E-08	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	1.3E-07
				Benzo(a)pyrene	2.47E-02	mg/kg	6.7E-09	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	4.9E-08
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	1.0E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	2.9E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	2.5E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	4.2E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Nitrophenol	5.47E-02	mg/kg	1.1E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	2.52E-04	mg/kg	1.6E-11	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	2.4E-06
				Inorganics							
				Aluminum	2.28E+04	mg/kg	4.7E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Antimony	7.25E+00	mg/kg	1.5E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	1.40E+01	mg/kg	8.7E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	1.3E-06
				Barium	1.88E+03	mg/kg	3.9E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cadmium	3.27E+00	mg/kg	6.8E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chromium III	1.17E+02	mg/kg	2.4E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	1.64E+01	mg/kg	3.4E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Copper	1.06E+04	mg/kg	2.2E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	3.58E+04	mg/kg	7.4E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Lead	8.97E+03	mg/kg	1.9E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	9.05E+02	mg/kg	1.9E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Nickel	1.06E+02	mg/kg	2.2E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Silver	3.63E+01	mg/kg	7.5E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	4.62E+01	mg/kg	9.6E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Zinc	7.44E+03	mg/kg	1.5E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								4.1E-06
		Exposure Point Total									2.3E-05
	Exposure Media Total										2.3E-05

Table E.1-48
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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	1.4E-11	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-11
				Aroclor 1260	2.19E-01	mg/kg	6.4E-12	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-11
				Benzo(a)pyrene	2.47E-02	mg/kg	7.2E-13	mg/kg-day	3.1E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-12
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	1.4E-12	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	4.1E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	3.5E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	5.8E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.47E-02	mg/kg	1.6E-12	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	2.52E-04	mg/kg	7.4E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.1E-09
				Inorganics							
				Aluminum	2.28E+04	mg/kg	6.7E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	7.25E+00	mg/kg	2.1E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.40E+01	mg/kg	4.1E-10	mg/kg-day	1.5E+01	$(mg/kg\text{-}day)^{-1}$	6.2E-09
				Barium	1.88E+03	mg/kg	5.5E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	3.27E+00	mg/kg	9.5E-11	mg/kg-day	6.3E+00	$(mg/kg\text{-}day)^{-1}$	6.0E-10
				Chromium III	1.17E+02	mg/kg	3.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.64E+01	mg/kg	4.8E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	1.06E+04	mg/kg	3.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.58E+04	mg/kg	1.0E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	8.97E+03	mg/kg	2.6E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	9.05E+02	mg/kg	2.6E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	1.06E+02	mg/kg	3.1E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	3.63E+01	mg/kg	1.1E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	4.62E+01	mg/kg	1.3E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	7.44E+03	mg/kg	2.2E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								7.9E-09
		Exposure Point Total									7.9E-09
	Exposure Media Total										7.9E-09
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPCs		mg/kg		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Soil Total											2.3E-05

Table E.1-48
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
Groundwater	Groundwater	FLFA	**Ingestion**	**Organics**							
				Chloroform	2.40E+01	µg/L	7.5E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	2.60E+00	µg/L	8.2E-06	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	4.4E-06
				TCDD TE	7.89E-07	µg/L	2.5E-12	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	3.7E-07
				Inorganics							
				Aluminum	9.32E+03	µg/L	2.9E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chromium III	4.30E+01	µg/L	1.4E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	2.69E+01	µg/L	8.5E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	1.01E+04	µg/L	3.2E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	7.83E+01	µg/L	2.5E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Perchlorate	5.40E+00	µg/L	1.7E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	2.00E+01	µg/L	6.3E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								4.8E-06
		Exposure Point Total									4.8E-06
	Exposure Media Total										4.8E-06
	Air	FLFA	**Inhalation**	**Organics**							
			(Ambient Air)	Chloroform	7.65E-09	mg/m^3	4.8E-10	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	3.9E-11
				Tetrachloroethene	1.82E-09	mg/m^3	1.1E-10	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	2.3E-12
			Exp. Route Total								4.1E-11
		Exposure Point Total									4.1E-11
	Exposure Media Total										4.1E-11
	Air	FLFA	**Inhalation**	**Organics**							
			(Indoor Air)	Chloroform	4.93E-05	mg/m^3	3.1E-06	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	2.5E-07
				Tetrachloroethene	1.23E-05	mg/m^3	7.7E-07	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	1.5E-08
			Exp. Route Total								2.7E-07
		Exposure Point Total									2.7E-07
	Exposure Media Total										2.7E-07
Groundwater Total											5.1E-06
										Total of Receptor Risks Across All Media	2.8E-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 soil data grouping.

Since indoor air represents the more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-49
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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	3.4E-07	mg/kg-day	2.0E-05	mg/kg-day	1.7E-02
				Aroclor 1260	1.81E-01	mg/kg	1.6E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	1.7E-08	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	6.24E-02	mg/kg	5.5E-08	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.2E-08	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.1E-08	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.8E-08	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	4.7E-08	mg/kg-day	8.0E-03	mg/kg-day	5.9E-06
				TCDD TE	1.70E-04	mg/kg	1.5E-10	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	2.3E-02	mg/kg-day	1.0E+00	mg/kg-day	2.3E-02
				Antimony	5.70E+00	mg/kg	5.0E-06	mg/kg-day	4.0E-04	mg/kg-day	1.3E-02
				Arsenic	1.71E+01	mg/kg	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	5.0E-02
				Barium	1.35E+03	mg/kg	1.2E-03	mg/kg-day	2.0E-01	mg/kg-day	5.9E-03
				Cadmium	2.36E+00	mg/kg	2.1E-06	mg/kg-day	1.0E-03	mg/kg-day	2.1E-03
				Chromium III	9.40E+01	mg/kg	8.3E-05	mg/kg-day	1.5E+00	mg/kg-day	5.5E-05
				Cobalt	1.51E+01	mg/kg	1.3E-05	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	6.5E-03	mg/kg-day	4.0E-02	mg/kg-day	1.6E-01
				Iron	3.61E+04	mg/kg	3.2E-02	mg/kg-day	7.0E-01	mg/kg-day	4.5E-02
				Lead	3.64E+03	mg/kg	3.2E-03	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	6.5E-04	mg/kg-day	2.0E-02	mg/kg-day	3.2E-02
				Nickel	8.30E+01	mg/kg	7.3E-05	mg/kg-day	2.0E-02	mg/kg-day	3.7E-03
				Silver	2.58E+01	mg/kg	2.3E-05	mg/kg-day	5.0E-03	mg/kg-day	4.5E-03
				Thallium	1.43E+01	mg/kg	1.3E-05	mg/kg-day	7.0E-05	mg/kg-day	1.8E-01
				Vanadium	5.33E+01	mg/kg	4.7E-05	mg/kg-day	1.0E-03	mg/kg-day	4.7E-02
				Zinc	5.26E+03	mg/kg	4.6E-03	mg/kg-day	3.0E-01	mg/kg-day	1.5E-02
			Exp. Route Total								6.0E-01
			Dermal Absorption	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	3.2E-07	mg/kg-day	2.0E-05	mg/kg-day	1.6E-02
				Aroclor 1260	1.81E-01	mg/kg	1.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	1.5E-08	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	6.24E-02	mg/kg	3.6E-08	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	8.1E-09	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	7.0E-09	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.2E-08	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	3.1E-08	mg/kg-day	8.0E-03	mg/kg-day	3.9E-06
				TCDD TE	1.70E-04	mg/kg	3.0E-11	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	1.5E-03	mg/kg-day	1.0E+00	mg/kg-day	1.5E-03
				Antimony	5.70E+00	mg/kg	3.3E-07	mg/kg-day	6.0E-05	mg/kg-day	5.5E-03
				Arsenic	1.71E+01	mg/kg	3.0E-06	mg/kg-day	3.0E-04	mg/kg-day	9.9E-03
				Barium	1.35E+03	mg/kg	7.8E-05	mg/kg-day	1.4E-02	mg/kg-day	5.6E-03
				Cadmium	2.36E+00	mg/kg	1.4E-08	mg/kg-day	2.5E-05	mg/kg-day	5.5E-04
				Chromium III	9.40E+01	mg/kg	5.5E-06	mg/kg-day	2.0E-02	mg/kg-day	2.8E-04
				Cobalt	1.51E+01	mg/kg	8.8E-07	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	4.3E-04	mg/kg-day	4.0E-02	mg/kg-day	1.1E-02
				Iron	3.61E+04	mg/kg	2.1E-03	mg/kg-day	7.0E-01	mg/kg-day	3.0E-03
				Lead	3.64E+03	mg/kg	2.1E-04	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	4.3E-05	mg/kg-day	8.0E-04	mg/kg-day	5.3E-02
				Nickel	8.30E+01	mg/kg	4.8E-06	mg/kg-day	8.0E-04	mg/kg-day	6.0E-03
				Silver	2.58E+01	mg/kg	1.5E-06	mg/kg-day	2.0E-04	mg/kg-day	7.5E-03
				Thallium	1.43E+01	mg/kg	8.3E-07	mg/kg-day	7.0E-05	mg/kg-day	1.2E-02
				Vanadium	5.33E+01	mg/kg	3.1E-06	mg/kg-day	2.6E-05	mg/kg-day	1.2E-01
				Zinc	5.26E+03	mg/kg	3.1E-04	mg/kg-day	3.0E-01	mg/kg-day	1.0E-03
			Exp. Route Total								2.5E-01
		Exposure Point Total									8.5E-01
	Exposure Media Total										8.5E-01

Table E.1-49
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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	3.2E-11	mg/kg-day	N/A	mg/kg-day	---
				Aroclor 1260	1.81E-01	mg/kg	1.5E-11	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	1.6E-12	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	5.1E-12	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.1E-12	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	9.8E-13	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.6E-12	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	4.3E-12	mg/kg-day	N/A	mg/kg-day	---
				TCDD TE	1.70E-04	mg/kg	1.4E-14	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	2.1E-06	mg/kg-day	1.0E-03	mg/kg-day	2.1E-03
				Antimony	5.70E+00	mg/kg	4.7E-10	mg/kg-day	N/A	mg/kg-day	---
				Arsenic	1.71E+01	mg/kg	1.4E-09	mg/kg-day	N/A	mg/kg-day	---
				Barium	1.35E+03	mg/kg	1.1E-07	mg/kg-day	1.4E-04	mg/kg-day	7.9E-04
				Cadmium	2.36E+00	mg/kg	1.9E-10	mg/kg-day	5.7E-05	mg/kg-day	3.4E-06
				Chromium III	9.40E+01	mg/kg	7.7E-09	mg/kg-day	N/A	mg/kg-day	---
				Cobalt	1.51E+01	mg/kg	1.2E-09	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	6.1E-07	mg/kg-day	N/A	mg/kg-day	---
				Iron	3.61E+04	mg/kg	2.9E-06	mg/kg-day	N/A	mg/kg-day	---
				Lead	3.64E+03	mg/kg	3.0E-07	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	6.0E-08	mg/kg-day	1.4E-05	mg/kg-day	4.2E-03
				Nickel	8.30E+01	mg/kg	6.8E-09	mg/kg-day	N/A	mg/kg-day	---
				Silver	2.58E+01	mg/kg	2.1E-09	mg/kg-day	N/A	mg/kg-day	---
				Thallium	1.43E+01	mg/kg	1.2E-09	mg/kg-day	N/A	mg/kg-day	---
				Vanadium	5.33E+01	mg/kg	4.4E-09	mg/kg-day	N/A	mg/kg-day	---
				Zinc	5.26E+03	mg/kg	4.3E-07	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								7.1E-03
		Exposure Point Total									7.1E-03
	Exposure Media Total										7.1E-03
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPCs		mg/kg		mg/kg-day		mg/kg-day	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											8.6E-01

Table E.1-49
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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	4.3E-07	mg/kg-day	2.0E-05	mg/kg-day	2.1E-02
				Aroclor 1260	2.19E-01	mg/kg	1.9E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	2.47E-02	mg/kg	2.2E-08	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	4.90E-02	mg/kg	4.3E-08	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.2E-08	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.1E-08	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.8E-08	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.47E-02	mg/kg	4.8E-08	mg/kg-day	8.0E-03	mg/kg-day	6.0E-06
				TCDD TE	2.52E-04	mg/kg	2.2E-10	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.28E+04	mg/kg	2.0E-02	mg/kg-day	1.0E+00	mg/kg-day	2.0E-02
				Antimony	7.25E+00	mg/kg	6.4E-06	mg/kg-day	4.0E-04	mg/kg-day	1.6E-02
				Arsenic	1.40E+01	mg/kg	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	4.1E-02
				Barium	1.88E+03	mg/kg	1.7E-03	mg/kg-day	2.0E-01	mg/kg-day	8.3E-03
				Cadmium	3.27E+00	mg/kg	2.9E-06	mg/kg-day	1.0E-03	mg/kg-day	2.9E-03
				Chromium III	1.17E+02	mg/kg	1.0E-04	mg/kg-day	1.5E+00	mg/kg-day	6.9E-05
				Cobalt	1.64E+01	mg/kg	1.4E-05	mg/kg-day	N/A	mg/kg-day	---
				Copper	1.06E+04	mg/kg	9.3E-03	mg/kg-day	4.0E-02	mg/kg-day	2.3E-01
				Iron	3.58E+04	mg/kg	3.2E-02	mg/kg-day	7.0E-01	mg/kg-day	4.5E-02
				Lead	8.97E+03	mg/kg	7.9E-03	mg/kg-day	N/A	mg/kg-day	---
				Manganese	9.05E+02	mg/kg	8.0E-04	mg/kg-day	2.0E-02	mg/kg-day	4.0E-02
				Nickel	1.06E+02	mg/kg	9.3E-05	mg/kg-day	2.0E-02	mg/kg-day	4.7E-03
				Silver	3.63E+01	mg/kg	3.2E-05	mg/kg-day	5.0E-03	mg/kg-day	6.4E-03
				Vanadium	4.62E+01	mg/kg	4.1E-05	mg/kg-day	1.0E-03	mg/kg-day	4.1E-02
				Zinc	7.44E+03	mg/kg	6.6E-03	mg/kg-day	3.0E-01	mg/kg-day	2.2E-02
			Exp. Route Total								5.0E-01
			Dermal Absorption	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	4.0E-07	mg/kg-day	2.0E-05	mg/kg-day	2.0E-02
				Aroclor 1260	2.19E-01	mg/kg	1.8E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	2.47E-02	mg/kg	1.9E-08	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	4.90E-02	mg/kg	2.8E-08	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	8.1E-09	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	7.0E-09	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.2E-08	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.47E-02	mg/kg	3.2E-08	mg/kg-day	8.0E-03	mg/kg-day	4.0E-06
				TCDD TE	2.52E-04	mg/kg	4.4E-11	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.28E+04	mg/kg	1.3E-03	mg/kg-day	1.0E+00	mg/kg-day	1.3E-03
				Antimony	7.25E+00	mg/kg	9.4E-08	mg/kg-day	6.0E-05	mg/kg-day	1.6E-03
				Arsenic	1.40E+01	mg/kg	2.4E-06	mg/kg-day	3.0E-04	mg/kg-day	8.1E-03
				Barium	1.88E+03	mg/kg	2.4E-05	mg/kg-day	1.4E-02	mg/kg-day	1.7E-03
				Cadmium	3.27E+00	mg/kg	1.9E-08	mg/kg-day	2.5E-05	mg/kg-day	7.6E-04
				Chromium III	1.17E+02	mg/kg	6.8E-06	mg/kg-day	2.0E-02	mg/kg-day	3.5E-04
				Cobalt	1.64E+01	mg/kg	9.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Copper	1.06E+04	mg/kg	6.2E-04	mg/kg-day	4.0E-02	mg/kg-day	1.5E-02
				Iron	3.58E+04	mg/kg	2.1E-03	mg/kg-day	7.0E-01	mg/kg-day	3.0E-03
				Lead	8.97E+03	mg/kg	5.2E-04	mg/kg-day	N/A	mg/kg-day	---
				Manganese	9.05E+02	mg/kg	5.3E-05	mg/kg-day	8.0E-04	mg/kg-day	6.6E-02
				Nickel	1.06E+02	mg/kg	6.2E-06	mg/kg-day	8.0E-04	mg/kg-day	7.7E-03
				Silver	3.63E+01	mg/kg	2.1E-06	mg/kg-day	2.0E-04	mg/kg-day	1.1E-02
				Vanadium	4.62E+01	mg/kg	2.7E-06	mg/kg-day	2.6E-05	mg/kg-day	1.0E-01
				Zinc	7.44E+03	mg/kg	4.3E-04	mg/kg-day	3.0E-01	mg/kg-day	1.4E-03
			Exp. Route Total								2.4E-01
		Exposure Point Total									7.4E-01
	Exposure Media Total										7.4E-01

Table E.1-49
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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	4.88E-01	mg/kg	4.0E-11	mg/kg-day	N/A	mg/kg-day	---
				Aroclor 1260	2.19E-01	mg/kg	1.8E-11	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	2.47E-02	mg/kg	2.0E-12	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy) methane	4.90E-02	mg/kg	4.0E-12	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.1E-12	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	9.8E-13	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.6E-12	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.47E-02	mg/kg	4.5E-12	mg/kg-day	N/A	mg/kg-day	---
				TCDD TE	2.52E-04	mg/kg	2.1E-14	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.28E+04	mg/kg	1.9E-06	mg/kg-day	1.0E-03	mg/kg-day	1.9E-03
				Antimony	7.25E+00	mg/kg	5.9E-10	mg/kg-day	N/A	mg/kg-day	---
				Arsenic	1.40E+01	mg/kg	1.1E-09	mg/kg-day	N/A	mg/kg-day	---
				Barium	1.88E+03	mg/kg	1.5E-07	mg/kg-day	1.4E-04	mg/kg-day	1.1E-03
				Cadmium	3.27E+00	mg/kg	2.7E-10	mg/kg-day	5.7E-05	mg/kg-day	4.7E-06
				Chromium III	1.17E+02	mg/kg	9.6E-09	mg/kg-day	N/A	mg/kg-day	---
				Cobalt	1.64E+01	mg/kg	1.3E-09	mg/kg-day	N/A	mg/kg-day	---
				Copper	1.06E+04	mg/kg	8.7E-07	mg/kg-day	N/A	mg/kg-day	---
				Iron	3.58E+04	mg/kg	2.9E-06	mg/kg-day	N/A	mg/kg-day	---
				Lead	8.97E+03	mg/kg	7.3E-07	mg/kg-day	N/A	mg/kg-day	---
				Manganese	9.05E+02	mg/kg	7.4E-08	mg/kg-day	1.4E-05	mg/kg-day	5.2E-03
				Nickel	1.06E+02	mg/kg	8.7E-09	mg/kg-day	N/A	mg/kg-day	---
				Silver	3.63E+01	mg/kg	3.0E-09	mg/kg-day	N/A	mg/kg-day	---
				Vanadium	4.62E+01	mg/kg	3.8E-09	mg/kg-day	N/A	mg/kg-day	---
				Zinc	7.44E+03	mg/kg	6.1E-07	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								8.1E-03
		Exposure Point Total									8.1E-03
	Exposure Media Total										8.1E-03
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPCs		mg/kg		mg/kg-day		mg/kg-day	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Soil Total											7.5E-01

Table E.1-49
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
Groundwater	Groundwater	FLFA	**Ingestion**	**Organics**							
				Chloroform	2.40E+01	µg/L	2.1E-04	mg/kg-day	1.0E-02	mg/kg-day	2.1E-02
				Tetrachloroethene	2.60E+00	µg/L	2.3E-05	mg/kg-day	1.0E-02	mg/kg-day	2.3E-03
				TCDD TE	7.89E-07	µg/L	6.9E-12	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	9.32E+03	µg/L	8.2E-02	mg/kg-day	1.0E+00	mg/kg-day	8.2E-02
				Chromium III	4.30E+01	µg/L	3.8E-04	mg/kg-day	1.5E+00	mg/kg-day	2.5E-04
				Cobalt	2.69E+01	µg/L	2.4E-04	mg/kg-day	N/A	mg/kg-day	---
				Iron	1.01E+04	µg/L	8.9E-02	mg/kg-day	7.0E-01	mg/kg-day	1.3E-01
				Manganese	7.83E+01	µg/L	6.9E-04	mg/kg-day	2.0E-02	mg/kg-day	3.4E-02
				Perchlorate	5.40E+00	µg/L	4.8E-05	mg/kg-day	7.0E-04	mg/kg-day	6.8E-02
				Vanadium	2.00E+01	µg/L	1.8E-04	mg/kg-day	1.0E-03	mg/kg-day	1.8E-01
			Exp. Route Total								5.1E-01
		Exposure Point Total									5.1E-01
	Exposure Media Total										5.1E-01
	Air	FLFA	**Inhalation**	**Organics**							
			(Ambient Air)	Chloroform	7.65E-09	mg/m^3	1.3E-09	mg/kg-day	1.4E-02	mg/kg-day	9.6E-08
				Tetrachloroethene	1.82E-09	mg/m^3	3.2E-10	mg/kg-day	8.0E-02	mg/kg-day	4.0E-09
			Exp. Route Total								1.0E-07
		Exposure Point Total									1.0E-07
	Exposure Media Total										1.0E-07
	Air	FLFA	**Inhalation**	**Organics**							
			(Indoor Air)	Chloroform	4.93E-05	mg/m^3	8.7E-06	mg/kg-day	1.4E-02	mg/kg-day	6.2E-04
				Tetrachloroethene	1.23E-05	mg/m^3	2.2E-06	mg/kg-day	8.0E-02	mg/kg-day	2.7E-05
			Exp. Route Total								6.5E-04
		Exposure Point Total									6.5E-04
	Exposure Media Total										6.5E-04
Groundwater Total											5.1E-01
										Total of Receptor Hazards Across All Media	1.4E+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 soil data grouping.

Since indoor air represents the more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-50
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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	8.9E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-08
				Aroclor 1260	1.81E-01	mg/kg	4.2E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.3E-09
				Benzo(a)pyrene	1.96E-02	mg/kg	4.5E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-09
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	1.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	3.2E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	2.8E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	4.6E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	1.2E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	3.9E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.9E-07
				Inorganics							
				Aluminum	2.63E+04	mg/kg	6.1E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	1.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	3.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.9E-07
				Barium	1.35E+03	mg/kg	3.1E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	5.4E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	9.40E+01	mg/kg	2.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	3.5E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	1.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	8.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	8.4E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	1.7E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	1.9E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	6.0E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	3.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	1.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	1.2E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.2E-06
			Dermal Absorption	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	3.8E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	7.5E-09
				Aroclor 1260	1.81E-01	mg/kg	1.8E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.5E-09
				Benzo(a)pyrene	1.96E-02	mg/kg	1.8E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-09
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	4.3E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	9.7E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	8.3E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.4E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	3.7E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	3.5E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.3E-08
				Inorganics							
				Aluminum	2.63E+04	mg/kg	1.8E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	3.9E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	3.5E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.3E-08
				Barium	1.35E+03	mg/kg	9.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	1.6E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	9.40E+01	mg/kg	6.5E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	1.0E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	5.1E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	2.5E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	2.5E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	5.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	5.7E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	1.8E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	9.9E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	3.7E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	3.6E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.2E-07
		Exposure Point Total									1.3E-06
	Exposure Media Total										1.3E-06

Table E.1-50
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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	4.6E-11	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	9.3E-11
				Aroclor 1260	1.81E-01	mg/kg	2.2E-11	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.3E-11
				Benzo(a)pyrene	1.96E-02	mg/kg	2.3E-12	mg/kg-day	3.1E+00	$(mg/kg\text{-}day)^{-1}$	7.3E-12
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	7.5E-12	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.7E-12	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.4E-12	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	2.4E-12	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	6.4E-12	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	2.0E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.0E-09
				Inorganics							
				Aluminum	2.63E+04	mg/kg	3.1E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	6.8E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	2.0E-09	mg/kg-day	1.5E+01	$(mg/kg\text{-}day)^{-1}$	3.1E-08
				Barium	1.35E+03	mg/kg	1.6E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	2.8E-10	mg/kg-day	6.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-09
				Chromium III	9.40E+01	mg/kg	1.1E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	1.8E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	8.9E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	4.3E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	4.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	8.8E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	9.9E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	3.1E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	1.7E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	6.4E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	6.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								3.6E-08
		Exposure Point Total									3.6E-08
	Exposure Media Total										3.6E-08
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPCs		mg/kg		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											1.4E-06
Groundwater	Air	FLFA	**Inhalation** (Trench Air)	**Organics**							
				Chloroform	4.65E-05	mg/m^3	3.2E-08	mg/kg-day	8.1E-02	$(mg/kg\text{-}day)^{-1}$	2.6E-09
				Tetrachloroethene	1.75E-05	mg/m^3	1.2E-08	mg/kg-day	2.0E-02	$(mg/kg\text{-}day)^{-1}$	2.4E-10
			Exp. Route Total								2.9E-09
		Exposure Point Total									2.9E-09
	Exposure Media Total										2.9E-09
Groundwater Total											2.9E-09
										Total of Receptor Risks Across All Media	1.4E-06

N/A = Not Applicable.

Table E.1-51
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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	6.3E-07	mg/kg-day	2.0E-05	mg/kg-day	3.1E-02
				Aroclor 1260	1.81E-01	mg/kg	2.9E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	3.2E-08	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	6.24E-02	mg/kg	1.0E-07	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	2.3E-08	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.9E-08	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	3.2E-08	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	8.6E-08	mg/kg-day	8.0E-03	mg/kg-day	1.1E-05
				TCDD TE	1.70E-04	mg/kg	2.7E-10	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	4.2E-02	mg/kg-day	1.0E+00	mg/kg-day	4.2E-02
				Antimony	5.70E+00	mg/kg	9.2E-06	mg/kg-day	4.0E-04	mg/kg-day	2.3E-02
				Arsenic	1.71E+01	mg/kg	2.8E-05	mg/kg-day	3.0E-04	mg/kg-day	9.2E-02
				Barium	1.35E+03	mg/kg	2.2E-03	mg/kg-day	2.0E-01	mg/kg-day	1.1E-02
				Cadmium	2.36E+00	mg/kg	3.8E-06	mg/kg-day	1.0E-03	mg/kg-day	3.8E-03
				Chromium III	9.40E+01	mg/kg	1.5E-04	mg/kg-day	1.5E+00	mg/kg-day	1.0E-04
				Cobalt	1.51E+01	mg/kg	2.4E-05	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	1.2E-02	mg/kg-day	4.0E-02	mg/kg-day	3.0E-01
				Iron	3.61E+04	mg/kg	5.8E-02	mg/kg-day	7.0E-01	mg/kg-day	8.3E-02
				Lead	3.64E+03	mg/kg	5.9E-03	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	1.2E-03	mg/kg-day	2.0E-02	mg/kg-day	5.9E-02
				Nickel	8.30E+01	mg/kg	1.3E-04	mg/kg-day	2.0E-02	mg/kg-day	6.7E-03
				Silver	2.58E+01	mg/kg	4.2E-05	mg/kg-day	5.0E-03	mg/kg-day	8.3E-03
				Thallium	1.43E+01	mg/kg	2.3E-05	mg/kg-day	7.0E-05	mg/kg-day	3.3E-01
				Vanadium	5.33E+01	mg/kg	8.6E-05	mg/kg-day	1.0E-03	mg/kg-day	8.6E-02
				Zinc	5.26E+03	mg/kg	8.5E-03	mg/kg-day	3.0E-01	mg/kg-day	2.8E-02
			Exp. Route Total								1.1E+00
			Dermal Absorption	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	2.6E-07	mg/kg-day	2.0E-05	mg/kg-day	1.3E-02
				Aroclor 1260	1.81E-01	mg/kg	1.2E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	1.2E-08	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	6.24E-02	mg/kg	3.0E-08	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	6.8E-09	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	5.8E-09	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	9.7E-09	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	2.6E-08	mg/kg-day	8.0E-03	mg/kg-day	3.2E-06
				TCDD TE	1.70E-04	mg/kg	2.5E-11	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	1.3E-03	mg/kg-day	1.0E+00	mg/kg-day	1.3E-03
				Antimony	5.70E+00	mg/kg	2.8E-07	mg/kg-day	6.0E-05	mg/kg-day	4.6E-03
				Arsenic	1.71E+01	mg/kg	2.5E-06	mg/kg-day	3.0E-04	mg/kg-day	8.3E-03
				Barium	1.35E+03	mg/kg	6.5E-05	mg/kg-day	1.4E-02	mg/kg-day	4.7E-03
				Cadmium	2.36E+00	mg/kg	1.1E-08	mg/kg-day	2.5E-05	mg/kg-day	4.6E-04
				Chromium III	9.40E+01	mg/kg	4.6E-06	mg/kg-day	2.0E-02	mg/kg-day	2.3E-04
				Cobalt	1.51E+01	mg/kg	7.3E-07	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	3.6E-04	mg/kg-day	4.0E-02	mg/kg-day	9.0E-03
				Iron	3.61E+04	mg/kg	1.7E-03	mg/kg-day	7.0E-01	mg/kg-day	2.5E-03
				Lead	3.64E+03	mg/kg	1.8E-04	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	3.6E-05	mg/kg-day	8.0E-04	mg/kg-day	4.4E-02
				Nickel	8.30E+01	mg/kg	4.0E-06	mg/kg-day	8.0E-04	mg/kg-day	5.0E-03
				Silver	2.58E+01	mg/kg	1.2E-06	mg/kg-day	2.0E-04	mg/kg-day	6.2E-03
				Thallium	1.43E+01	mg/kg	6.9E-07	mg/kg-day	7.0E-05	mg/kg-day	9.9E-03
				Vanadium	5.33E+01	mg/kg	2.6E-06	mg/kg-day	2.6E-05	mg/kg-day	9.9E-02
				Zinc	5.26E+03	mg/kg	2.5E-04	mg/kg-day	3.0E-01	mg/kg-day	8.5E-04
			Exp. Route Total								2.1E-01
		Exposure Point Total									1.3E+00
	Exposure Media Total										1.3E+00

Table E.1-51
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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	3.2E-09	mg/kg-day	N/A	mg/kg-day	---
				Aroclor 1260	1.81E-01	mg/kg	1.5E-09	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	1.6E-10	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	5.2E-10	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.2E-10	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.0E-10	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.7E-10	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	4.4E-10	mg/kg-day	N/A	mg/kg-day	---
				TCDD TE	1.70E-04	mg/kg	1.4E-12	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	2.2E-04	mg/kg-day	1.0E-03	mg/kg-day	2.2E-01
				Antimony	5.70E+00	mg/kg	4.8E-08	mg/kg-day	N/A	mg/kg-day	---
				Arsenic	1.71E+01	mg/kg	1.4E-07	mg/kg-day	N/A	mg/kg-day	---
				Barium	1.35E+03	mg/kg	1.1E-05	mg/kg-day	1.4E-04	mg/kg-day	8.1E-02
				Cadmium	2.36E+00	mg/kg	2.0E-08	mg/kg-day	5.7E-05	mg/kg-day	3.5E-04
				Chromium III	9.40E+01	mg/kg	7.9E-07	mg/kg-day	N/A	mg/kg-day	---
				Cobalt	1.51E+01	mg/kg	1.3E-07	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	6.2E-05	mg/kg-day	N/A	mg/kg-day	---
				Iron	3.61E+04	mg/kg	3.0E-04	mg/kg-day	N/A	mg/kg-day	---
				Lead	3.64E+03	mg/kg	3.0E-05	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	6.1E-06	mg/kg-day	1.4E-05	mg/kg-day	4.3E-01
				Nickel	8.30E+01	mg/kg	6.9E-07	mg/kg-day	N/A	mg/kg-day	---
				Silver	2.58E+01	mg/kg	2.2E-07	mg/kg-day	N/A	mg/kg-day	---
				Thallium	1.43E+01	mg/kg	1.2E-07	mg/kg-day	N/A	mg/kg-day	---
				Vanadium	5.33E+01	mg/kg	4.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Zinc	5.26E+03	mg/kg	4.4E-05	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								7.3E-01
		Exposure Point Total									7.3E-01
	Exposure Media Total										7.3E-01
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPCs		mg/kg		mg/kg-day		mg/kg-day	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											2.0E+00
Groundwater	Air	FLFA	**Inhalation** (Trench Air)	**Organics**							
				Chloroform	4.65E-05	mg/m^3	2.3E-06	mg/kg-day	1.4E-02	mg/kg-day	1.6E-04
				Tetrachloroethene	1.75E-05	mg/m^3	8.6E-07	mg/kg-day	8.0E-02	mg/kg-day	1.1E-05
			Exp. Route Total								1.7E-04
		Exposure Point Total									1.7E-04
	Exposure Media Total										1.7E-04
Groundwater Total											1.7E-04
										Total of Receptor Hazards Across All Media	2.0E+00

N/A = Not Applicable.

Table E.1-52
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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	6.1E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-06
				Aroclor 1260	1.81E-01	mg/kg	2.8E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-07
				Benzo(a)pyrene	1.96E-02	mg/kg	3.1E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-07
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	9.8E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	2.2E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.9E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	3.1E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	8.3E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	2.7E-10	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.0E-05
				Inorganics							
				Aluminum	2.63E+04	mg/kg	4.1E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	8.9E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	2.7E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.0E-05
				Barium	1.35E+03	mg/kg	2.1E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	3.7E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	9.40E+01	mg/kg	1.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	2.4E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	1.2E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	5.7E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	5.7E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	1.1E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	1.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	4.0E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	2.2E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	8.3E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	8.2E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								8.2E-05
			Dermal Absorption	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	2.7E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.4E-07
				Aroclor 1260	1.81E-01	mg/kg	1.3E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-07
				Benzo(a)pyrene	1.96E-02	mg/kg	1.3E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.2E-08
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	3.1E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	6.9E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	5.9E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	9.9E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	2.6E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	2.5E-11	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.8E-06
				Inorganics							
				Aluminum	2.63E+04	mg/kg	1.3E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	2.8E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	2.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.8E-06
				Barium	1.35E+03	mg/kg	6.7E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	1.2E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	9.40E+01	mg/kg	4.6E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	7.5E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	3.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	1.8E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	1.8E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	3.6E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	4.1E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	1.3E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	7.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	2.6E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	2.6E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								8.5E-06
		Exposure Point Total									9.1E-05
	Exposure Media Total										9.1E-05

Table E.1-52
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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	1.7E-12	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-12
				Aroclor 1260	1.81E-01	mg/kg	7.9E-13	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-12
				Benzo(a)pyrene	1.96E-02	mg/kg	8.5E-14	mg/kg-day	3.1E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-13
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	2.7E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	6.1E-14	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	5.2E-14	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	8.7E-14	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	2.3E-13	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	7.4E-16	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.1E-10
				Inorganics							
				Aluminum	2.63E+04	mg/kg	1.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	2.5E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	7.4E-11	mg/kg-day	1.5E+01	$(mg/kg\text{-}day)^{-1}$	1.1E-09
				Barium	1.35E+03	mg/kg	5.9E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	1.0E-11	mg/kg-day	6.3E+00	$(mg/kg\text{-}day)^{-1}$	6.5E-11
				Chromium III	9.40E+01	mg/kg	4.1E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	6.6E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	3.2E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	1.6E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	1.6E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	3.2E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	3.6E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	1.1E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	6.2E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	2.3E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	2.3E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.3E-09
		Exposure Point Total									1.3E-09
	Exposure Media Total										1.3E-09
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPCs		mg/kg		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											9.1E-05

Table E.1-52
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	Groundwater	FLFA	**Ingestion**	**Organics**							
				Chloroform	2.40E+01	µg/L	3.6E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	2.60E+00	µg/L	3.9E-05	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	2.1E-05
				TCDD TE	7.89E-07	µg/L	1.2E-11	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	1.8E-06
				Inorganics							
				Aluminum	9.32E+03	µg/L	1.4E-01	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chromium III	4.30E+01	µg/L	6.4E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	2.69E+01	µg/L	4.0E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	1.01E+04	µg/L	1.5E-01	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	7.83E+01	µg/L	1.2E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Perchlorate	5.40E+00	µg/L	8.0E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	2.00E+01	µg/L	3.0E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								2.3E-05
			Dermal Absorption	**Organics**							
				Chloroform	2.40E+01	µg/L	3.1E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	2.60E+00	µg/L	2.2E-05	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	1.2E-05
				TCDD TE	7.89E-07	µg/L	2.2E-10	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	3.3E-05
				Inorganics							
				Aluminum	9.32E+03	µg/L	3.4E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chromium III	4.30E+01	µg/L	1.6E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	2.69E+01	µg/L	9.8E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	1.01E+04	µg/L	3.6E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	7.83E+01	µg/L	2.8E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Perchlorate	5.40E+00	µg/L	4.2E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	2.00E+01	µg/L	7.2E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								4.5E-05
		Exposure Point Total									6.7E-05
	Exposure Media Total										6.7E-05
	Air	FLFA	**Inhalation** (Indoor Air)	**Organics**							
				Chloroform	4.93E-05	mg/m^3	1.1E-05	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	9.0E-07
				Tetrachloroethene	1.23E-05	mg/m^3	2.8E-06	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	5.5E-08
			Exp. Route Total								9.5E-07
			Inhalation (Shower Room)	**Organics**							
				Chloroform	3.77E-02	mg/m^3	1.5E-04	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	1.2E-05
				Tetrachloroethene	3.67E-03	mg/m^3	1.4E-05	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	2.9E-07
			Exp. Route Total								1.2E-05
		Exposure Point Total									1.3E-05
	Exposure Media Total										1.3E-05
	Home Grown Produce	FLFA	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											8.0E-05
										Total of Receptor Risks Across All Media	1.7E-04

N/A = Not Applicable.

Table E.1-53
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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	5.3E-07	mg/kg-day	2.0E-05	mg/kg-day	2.7E-02
				Aroclor 1260	1.81E-01	mg/kg	2.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	2.7E-08	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	6.24E-02	mg/kg	8.5E-08	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.9E-08	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.6E-08	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	2.7E-08	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	7.3E-08	mg/kg-day	8.0E-03	mg/kg-day	9.1E-06
				TCDD TE	1.70E-04	mg/kg	2.3E-10	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	3.6E-02	mg/kg-day	1.0E+00	mg/kg-day	3.6E-02
				Antimony	5.70E+00	mg/kg	7.8E-06	mg/kg-day	4.0E-04	mg/kg-day	2.0E-02
				Arsenic	1.71E+01	mg/kg	2.3E-05	mg/kg-day	3.0E-04	mg/kg-day	7.8E-02
				Barium	1.35E+03	mg/kg	1.8E-03	mg/kg-day	2.0E-01	mg/kg-day	9.2E-03
				Cadmium	2.36E+00	mg/kg	3.2E-06	mg/kg-day	1.0E-03	mg/kg-day	3.2E-03
				Chromium III	9.40E+01	mg/kg	1.3E-04	mg/kg-day	1.5E+00	mg/kg-day	8.6E-05
				Cobalt	1.51E+01	mg/kg	2.1E-05	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	1.0E-02	mg/kg-day	4.0E-02	mg/kg-day	2.5E-01
				Iron	3.61E+04	mg/kg	4.9E-02	mg/kg-day	7.0E-01	mg/kg-day	7.1E-02
				Lead	3.64E+03	mg/kg	5.0E-03	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	1.0E-03	mg/kg-day	2.0E-02	mg/kg-day	5.0E-02
				Nickel	8.30E+01	mg/kg	1.1E-04	mg/kg-day	2.0E-02	mg/kg-day	5.7E-03
				Silver	2.58E+01	mg/kg	3.5E-05	mg/kg-day	5.0E-03	mg/kg-day	7.1E-03
				Thallium	1.43E+01	mg/kg	2.0E-05	mg/kg-day	7.0E-05	mg/kg-day	2.8E-01
				Vanadium	5.33E+01	mg/kg	7.3E-05	mg/kg-day	1.0E-03	mg/kg-day	7.3E-02
				Zinc	5.26E+03	mg/kg	7.2E-03	mg/kg-day	3.0E-01	mg/kg-day	2.4E-02
			Exp. Route Total								9.4E-01
			Dermal Absorption	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	3.0E-07	mg/kg-day	2.0E-05	mg/kg-day	1.5E-02
				Aroclor 1260	1.81E-01	mg/kg	1.4E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	1.4E-08	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	6.24E-02	mg/kg	3.4E-08	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	7.7E-09	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	6.6E-09	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.1E-08	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	2.9E-08	mg/kg-day	8.0E-03	mg/kg-day	3.6E-06
				TCDD TE	1.70E-04	mg/kg	2.8E-11	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	1.4E-03	mg/kg-day	1.0E+00	mg/kg-day	1.4E-03
				Antimony	5.70E+00	mg/kg	3.1E-07	mg/kg-day	6.0E-05	mg/kg-day	5.2E-03
				Arsenic	1.71E+01	mg/kg	2.8E-06	mg/kg-day	3.0E-04	mg/kg-day	9.3E-03
				Barium	1.35E+03	mg/kg	7.4E-05	mg/kg-day	1.4E-02	mg/kg-day	5.3E-03
				Cadmium	2.36E+00	mg/kg	1.3E-08	mg/kg-day	2.5E-05	mg/kg-day	5.2E-04
				Chromium III	9.40E+01	mg/kg	5.1E-06	mg/kg-day	2.0E-02	mg/kg-day	2.6E-04
				Cobalt	1.51E+01	mg/kg	8.3E-07	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	4.1E-04	mg/kg-day	4.0E-02	mg/kg-day	1.0E-02
				Iron	3.61E+04	mg/kg	2.0E-03	mg/kg-day	7.0E-01	mg/kg-day	2.8E-03
				Lead	3.64E+03	mg/kg	2.0E-04	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	4.0E-05	mg/kg-day	8.0E-04	mg/kg-day	5.0E-02
				Nickel	8.30E+01	mg/kg	4.5E-06	mg/kg-day	8.0E-04	mg/kg-day	5.7E-03
				Silver	2.58E+01	mg/kg	1.4E-06	mg/kg-day	2.0E-04	mg/kg-day	7.1E-03
				Thallium	1.43E+01	mg/kg	7.8E-07	mg/kg-day	7.0E-05	mg/kg-day	1.1E-02
				Vanadium	5.33E+01	mg/kg	2.9E-06	mg/kg-day	2.6E-05	mg/kg-day	1.1E-01
				Zinc	5.26E+03	mg/kg	2.9E-04	mg/kg-day	3.0E-01	mg/kg-day	9.6E-04
			Exp. Route Total								2.4E-01
		Exposure Point Total									1.2E+00
	Exposure Media Total										1.2E+00

Table E.1-53
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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	2.0E-12	mg/kg-day	N/A	mg/kg-day	---
				Aroclor 1260	1.81E-01	mg/kg	9.5E-13	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	1.0E-13	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	3.3E-13	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	7.4E-14	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	6.3E-14	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	1.1E-13	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	2.8E-13	mg/kg-day	N/A	mg/kg-day	---
				TCDD TE	1.70E-04	mg/kg	9.0E-16	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	1.4E-07	mg/kg-day	1.0E-03	mg/kg-day	1.4E-04
				Antimony	5.70E+00	mg/kg	3.0E-11	mg/kg-day	N/A	mg/kg-day	---
				Arsenic	1.71E+01	mg/kg	9.0E-11	mg/kg-day	N/A	mg/kg-day	---
				Barium	1.35E+03	mg/kg	7.1E-09	mg/kg-day	1.4E-04	mg/kg-day	5.1E-05
				Cadmium	2.36E+00	mg/kg	1.2E-11	mg/kg-day	5.7E-05	mg/kg-day	2.2E-07
				Chromium III	9.40E+01	mg/kg	5.0E-10	mg/kg-day	N/A	mg/kg-day	---
				Cobalt	1.51E+01	mg/kg	8.0E-11	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	3.9E-08	mg/kg-day	N/A	mg/kg-day	---
				Iron	3.61E+04	mg/kg	1.9E-07	mg/kg-day	N/A	mg/kg-day	---
				Lead	3.64E+03	mg/kg	1.9E-08	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	3.9E-09	mg/kg-day	1.4E-05	mg/kg-day	2.7E-04
				Nickel	8.30E+01	mg/kg	4.4E-10	mg/kg-day	N/A	mg/kg-day	---
				Silver	2.58E+01	mg/kg	1.4E-10	mg/kg-day	N/A	mg/kg-day	---
				Thallium	1.43E+01	mg/kg	7.5E-11	mg/kg-day	N/A	mg/kg-day	---
				Vanadium	5.33E+01	mg/kg	2.8E-10	mg/kg-day	N/A	mg/kg-day	---
				Zinc	5.26E+03	mg/kg	2.8E-08	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								4.6E-04
		Exposure Point Total									4.6E-04
	Exposure Media Total										4.6E-04
	Air (Volatiles)	FLFA	**Inhalation**	**Organics**							
				No COPCs		mg/kg		mg/kg-day		mg/kg-day	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											1.2E+00

Table E.1-53
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	Groundwater	FLFA	**Ingestion**	**Organics**							
				Chloroform	2.40E+01	µg/L	6.6E-04	mg/kg-day	1.0E-02	mg/kg-day	6.6E-02
				Tetrachloroethene	2.60E+00	µg/L	7.1E-05	mg/kg-day	1.0E-02	mg/kg-day	7.1E-03
				TCDD TE	7.89E-07	µg/L	2.2E-11	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	9.32E+03	µg/L	2.6E-01	mg/kg-day	1.0E+00	mg/kg-day	2.6E-01
				Chromium III	4.30E+01	µg/L	1.2E-03	mg/kg-day	1.5E+00	mg/kg-day	7.9E-04
				Cobalt	2.69E+01	µg/L	7.4E-04	mg/kg-day	N/A	mg/kg-day	---
				Iron	1.01E+04	µg/L	2.8E-01	mg/kg-day	7.0E-01	mg/kg-day	4.0E-01
				Perchlorate	5.40E+00	µg/L	1.5E-04	mg/kg-day	7.0E-04	mg/kg-day	2.1E-01
				Manganese	7.83E+01	µg/L	2.1E-03	mg/kg-day	2.0E-02	mg/kg-day	1.1E-01
				Vanadium	2.00E+01	µg/L	5.5E-04	mg/kg-day	1.0E-03	mg/kg-day	5.5E-01
			Exp. Route Total								1.6E+00
			Dermal	**Organics**							
			Absorption	Chloroform	2.40E+01	µg/L	5.7E-05	mg/kg-day	1.0E-02	mg/kg-day	NV
				Tetrachloroethene	2.60E+00	µg/L	3.9E-05	mg/kg-day	1.0E-02	mg/kg-day	3.9E-03
				TCDD TE	7.89E-07	µg/L	3.9E-10	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	9.32E+03	µg/L	1.2E-03	mg/kg-day	1.0E+00	mg/kg-day	NV
				Chromium III	4.30E+01	µg/L	5.4E-06	mg/kg-day	2.0E-02	mg/kg-day	2.8E-04
				Cobalt	2.69E+01	µg/L	3.2E-06	mg/kg-day	N/A	mg/kg-day	---
				Iron	1.01E+04	µg/L	1.3E-03	mg/kg-day	7.0E-01	mg/kg-day	NV
				Manganese	7.83E+01	µg/L	9.6E-06	mg/kg-day	8.0E-04	mg/kg-day	NV
				Perchlorate	5.40E+00	µg/L	6.7E-07	mg/kg-day	7.0E-04	mg/kg-day	NV
				Vanadium	2.00E+01	µg/L	2.5E-06	mg/kg-day	2.6E-05	mg/kg-day	9.5E-02
			Exp. Route Total								9.9E-02
		Exposure Point Total									1.7E+00
	Exposure Media Total										1.7E+00
	Air	FLFA	**Inhalation**	**Organics**							
			(Indoor Air)	Chloroform	4.93E-05	mg/m^3	1.3E-05	mg/kg-day	1.4E-02	mg/kg-day	9.6E-04
				Tetrachloroethene	1.23E-05	mg/m^3	3.4E-06	mg/kg-day	8.0E-02	mg/kg-day	4.2E-05
			Exp. Route Total								1.0E-03
			Inhalation	**Organics**							
			(Shower Room)	Chloroform	3.77E-02	mg/m^3	4.3E-04	mg/kg-day	1.4E-02	mg/kg-day	3.1E-02
				Tetrachloroethene	3.67E-03	mg/m^3	4.2E-05	mg/kg-day	8.0E-02	mg/kg-day	5.2E-04
			Exp. Route Total								3.1E-02
		Exposure Point Total									3.2E-02
	Exposure Media Total										3.2E-02
	Home Grown Produce	FLFA	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											1.7E+00
										Total of Receptor Hazards Across All Media	2.9E+00

N/A = Not Applicable.
NV = No value calculated, chemical is no assessed.

Since shower room air represents the more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-54
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	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	4.3E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.5E-07
				Aroclor 1260	1.81E-01	mg/kg	2.0E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.0E-07
				Benzo(a)pyrene	1.96E-02	mg/kg	2.1E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-07
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	6.8E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.5E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.3E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	2.2E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	5.8E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	1.9E-10	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.8E-05
				Inorganics							
				Aluminum	2.63E+04	mg/kg	2.9E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	6.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	1.9E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-05
				Barium	1.35E+03	mg/kg	1.5E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	2.6E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	9.40E+01	mg/kg	1.0E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	1.7E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	8.1E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	4.0E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	4.0E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	8.0E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	9.1E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	2.8E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	1.6E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	5.8E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	5.8E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								5.7E-05
			Dermal Absorption	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	1.7E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-07
				Aroclor 1260	1.81E-01	mg/kg	7.8E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-07
				Benzo(a)pyrene	1.96E-02	mg/kg	7.8E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-08
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	1.9E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	4.3E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	3.7E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	6.1E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	1.6E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	1.6E-11	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.3E-06
				Inorganics							
				Aluminum	2.63E+04	mg/kg	8.1E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	1.7E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	1.6E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-06
				Barium	1.35E+03	mg/kg	4.1E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	7.2E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	9.40E+01	mg/kg	2.9E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	4.6E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Copper	7.41E+03	mg/kg	2.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	3.61E+04	mg/kg	1.1E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Lead	3.64E+03	mg/kg	1.1E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	2.3E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	2.5E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Silver	2.58E+01	mg/kg	7.9E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	4.4E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	1.6E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	1.6E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								5.3E-06
		Exposure Point Total									6.3E-05
	Exposure Media Total										6.3E-05

Table E.1-54
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	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	9.9E-13	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	2.0E-12
				Aroclor 1260	1.81E-01	mg/kg	4.6E-13	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	9.2E-13
				Benzo(a)pyrene	1.96E-02	mg/kg	5.0E-14	mg/kg-day	3.1E+00	$(mg/kg-day)^{-1}$	1.5E-13
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	1.6E-13	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	3.6E-14	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	3.1E-14	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	5.1E-14	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Nitrophenol	5.32E-02	mg/kg	1.4E-13	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				TCDD TE	1.70E-04	mg/kg	4.3E-16	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	6.5E-11
				Inorganics							
				Aluminum	2.63E+04	mg/kg	6.7E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Antimony	5.70E+00	mg/kg	1.4E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Arsenic	1.71E+01	mg/kg	4.3E-11	mg/kg-day	1.5E+01	$(mg/kg-day)^{-1}$	6.6E-10
				Barium	1.35E+03	mg/kg	3.4E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cadmium	2.36E+00	mg/kg	6.0E-12	mg/kg-day	6.3E+00	$(mg/kg-day)^{-1}$	3.8E-11
				Chromium III	9.40E+01	mg/kg	2.4E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	1.51E+01	mg/kg	3.8E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Copper	7.41E+03	mg/kg	1.9E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	3.61E+04	mg/kg	9.2E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Lead	3.64E+03	mg/kg	9.3E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	7.34E+02	mg/kg	1.9E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Nickel	8.30E+01	mg/kg	2.1E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Silver	2.58E+01	mg/kg	6.6E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Thallium	1.43E+01	mg/kg	3.6E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	5.33E+01	mg/kg	1.4E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Zinc	5.26E+03	mg/kg	1.3E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								7.6E-10
		Exposure Point Total									7.6E-10
	Exposure Media Total										7.6E-10
	Air (Volatiles)	FLFA	**Inhalation**	**Organics** No COPCs		mg/kg		mg/kg-day		$(mg/kg-day)^{-1}$	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											6.3E-05

Table E.1-54
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	Groundwater	FLFA	**Ingestion**	**Organics**							
				Chloroform	2.40E+01	µg/L	1.3E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	2.60E+00	µg/L	1.4E-05	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	7.7E-06
				TCDD TE	7.89E-07	µg/L	4.3E-12	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	6.5E-07
				Inorganics							
				Aluminum	9.32E+03	µg/L	5.1E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chromium III	4.30E+01	µg/L	2.4E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	2.69E+01	µg/L	1.5E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	1.01E+04	µg/L	5.5E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	7.83E+01	µg/L	4.3E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Perchlorate	5.40E+00	µg/L	3.0E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	2.00E+01	µg/L	1.1E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								8.3E-06
			Dermal	**Organics**							
			Absorption	Chloroform	2.40E+01	µg/L	1.2E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	2.60E+00	µg/L	8.3E-06	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	4.5E-06
				TCDD TE	7.89E-07	µg/L	8.3E-11	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	1.2E-05
				Inorganics							
				Aluminum	9.32E+03	µg/L	3.4E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chromium III	4.30E+01	µg/L	1.6E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	2.69E+01	µg/L	9.8E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	1.01E+04	µg/L	3.6E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	7.83E+01	µg/L	2.8E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Perchlorate	5.40E+00	µg/L	2.0E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	2.00E+01	µg/L	7.2E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								1.7E-05
		Exposure Point Total									2.5E-05
	Exposure Media Tota										2.5E-05
	Air	FLFA	**Inhalation**	**Organics**							
			(Indoor Air)	Chloroform	4.93E-05	mg/m^3	6.5E-06	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	5.3E-07
				Tetrachloroethene	1.23E-05	mg/m^3	1.6E-06	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	3.2E-08
			Exp. Route Total								5.6E-07
		Exposure Point Total									5.6E-07
	Exposure Media Tota										5.6E-07
	Home Grown Produce	FLFA	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Tota										0.0E+00
Groundwater Total											2.6E-05
										Total of Receptor Risks Across All Media	8.9E-05

N/A = Not Applicable.

Table E.1-55
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
					Value	Units	Value	Units	Value	Units	Quotient
Total Soil	Total Soil	FLFA	**Ingestion**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	5.0E-06	mg/kg-day	2.0E-05	mg/kg-day	2.5E-01
				Aroclor 1260	1.81E-01	mg/kg	2.3E-06	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	2.5E-07	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	6.24E-02	mg/kg	8.0E-07	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	1.8E-07	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	1.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	2.6E-07	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	6.8E-07	mg/kg-day	8.0E-03	mg/kg-day	8.5E-05
				TCDD TE	1.70E-04	mg/kg	2.2E-09	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	3.4E-01	mg/kg-day	1.0E+00	mg/kg-day	3.4E-01
				Antimony	5.70E+00	mg/kg	7.3E-05	mg/kg-day	4.0E-04	mg/kg-day	1.8E-01
				Arsenic	1.71E+01	mg/kg	2.2E-04	mg/kg-day	3.0E-04	mg/kg-day	7.3E-01
				Barium	1.35E+03	mg/kg	1.7E-02	mg/kg-day	2.0E-01	mg/kg-day	8.6E-02
				Cadmium	2.36E+00	mg/kg	3.0E-05	mg/kg-day	1.0E-03	mg/kg-day	3.0E-02
				Chromium III	9.40E+01	mg/kg	1.2E-03	mg/kg-day	1.5E+00	mg/kg-day	8.0E-04
				Cobalt	1.51E+01	mg/kg	1.9E-04	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	9.5E-02	mg/kg-day	4.0E-02	mg/kg-day	2.4E+00
				Iron	3.61E+04	mg/kg	4.6E-01	mg/kg-day	7.0E-01	mg/kg-day	6.6E-01
				Lead	3.64E+03	mg/kg	4.7E-02	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	9.4E-03	mg/kg-day	2.0E-02	mg/kg-day	4.7E-01
				Nickel	8.30E+01	mg/kg	1.1E-03	mg/kg-day	2.0E-02	mg/kg-day	5.3E-02
				Silver	2.58E+01	mg/kg	3.3E-04	mg/kg-day	5.0E-03	mg/kg-day	6.6E-02
				Thallium	1.43E+01	mg/kg	1.8E-04	mg/kg-day	7.0E-05	mg/kg-day	2.6E+00
				Vanadium	5.33E+01	mg/kg	6.8E-04	mg/kg-day	1.0E-03	mg/kg-day	6.8E-01
				Zinc	5.26E+03	mg/kg	6.7E-02	mg/kg-day	3.0E-01	mg/kg-day	2.2E-01
			Exp. Route Total								8.7E+00
			Dermal Absorption	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	1.9E-06	mg/kg-day	2.0E-05	mg/kg-day	9.7E-02
				Aroclor 1260	1.81E-01	mg/kg	9.1E-07	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	9.1E-08	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy)methane	6.24E-02	mg/kg	2.2E-07	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	5.0E-08	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	4.3E-08	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	7.2E-08	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	1.9E-07	mg/kg-day	8.0E-03	mg/kg-day	2.4E-05
				TCDD TE	1.70E-04	mg/kg	1.8E-10	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	9.4E-03	mg/kg-day	1.0E+00	mg/kg-day	9.4E-03
				Antimony	5.70E+00	mg/kg	2.0E-06	mg/kg-day	6.0E-05	mg/kg-day	3.4E-02
				Arsenic	1.71E+01	mg/kg	1.8E-05	mg/kg-day	3.0E-04	mg/kg-day	6.1E-02
				Barium	1.35E+03	mg/kg	4.8E-04	mg/kg-day	1.4E-02	mg/kg-day	3.5E-02
				Cadmium	2.36E+00	mg/kg	8.4E-08	mg/kg-day	2.5E-05	mg/kg-day	3.4E-03
				Chromium III	9.40E+01	mg/kg	3.4E-05	mg/kg-day	2.0E-02	mg/kg-day	1.7E-03
				Cobalt	1.51E+01	mg/kg	5.4E-06	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	2.7E-03	mg/kg-day	4.0E-02	mg/kg-day	6.6E-02
				Iron	3.61E+04	mg/kg	1.3E-02	mg/kg-day	7.0E-01	mg/kg-day	1.8E-02
				Lead	3.64E+03	mg/kg	1.3E-03	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	2.6E-04	mg/kg-day	8.0E-04	mg/kg-day	3.3E-01
				Nickel	8.30E+01	mg/kg	3.0E-05	mg/kg-day	8.0E-04	mg/kg-day	3.7E-02
				Silver	2.58E+01	mg/kg	9.2E-06	mg/kg-day	2.0E-04	mg/kg-day	4.6E-02
				Thallium	1.43E+01	mg/kg	5.1E-06	mg/kg-day	7.0E-05	mg/kg-day	7.3E-02
				Vanadium	5.33E+01	mg/kg	1.9E-05	mg/kg-day	2.6E-05	mg/kg-day	7.3E-01
				Zinc	5.26E+03	mg/kg	1.9E-03	mg/kg-day	3.0E-01	mg/kg-day	6.3E-03
			Exp. Route Total								1.6E+00
		Exposure Point Total									1.0E+01
	Exposure Media Total										1.0E+01

Table E.1-55
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
					Value	Units	Value	Units	Value	Units	Quotient
Total Soil	Air (Particulates)	FLFA	**Inhalation**	**Organics**							
				Aroclor 1254	3.88E-01	mg/kg	1.2E-11	mg/kg-day	N/A	mg/kg-day	---
				Aroclor 1260	1.81E-01	mg/kg	5.4E-12	mg/kg-day	N/A	mg/kg-day	---
				Benzo(a)pyrene	1.96E-02	mg/kg	5.8E-13	mg/kg-day	N/A	mg/kg-day	---
				bis(2-chloroethoxy) methane	6.24E-02	mg/kg	1.9E-12	mg/kg-day	N/A	mg/kg-day	---
				p-Chloro-m-cresol	1.40E-02	mg/kg	4.2E-13	mg/kg-day	N/A	mg/kg-day	---
				4-Chlorophenyl phenyl ether	1.20E-02	mg/kg	3.6E-13	mg/kg-day	N/A	mg/kg-day	---
				Di-n-octyl phthalate	2.00E-02	mg/kg	5.9E-13	mg/kg-day	N/A	mg/kg-day	---
				2-Nitrophenol	5.32E-02	mg/kg	1.6E-12	mg/kg-day	N/A	mg/kg-day	---
				TCDD TE	1.70E-04	mg/kg	5.0E-15	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	2.63E+04	mg/kg	7.8E-07	mg/kg-day	1.0E-03	mg/kg-day	7.8E-04
				Antimony	5.70E+00	mg/kg	1.7E-10	mg/kg-day	N/A	mg/kg-day	---
				Arsenic	1.71E+01	mg/kg	5.1E-10	mg/kg-day	N/A	mg/kg-day	---
				Barium	1.35E+03	mg/kg	4.0E-08	mg/kg-day	1.4E-04	mg/kg-day	2.9E-04
				Cadmium	2.36E+00	mg/kg	7.0E-11	mg/kg-day	5.7E-05	mg/kg-day	1.2E-06
				Chromium III	9.40E+01	mg/kg	2.8E-09	mg/kg-day	N/A	mg/kg-day	---
				Cobalt	1.51E+01	mg/kg	4.5E-10	mg/kg-day	N/A	mg/kg-day	---
				Copper	7.41E+03	mg/kg	2.2E-07	mg/kg-day	N/A	mg/kg-day	---
				Iron	3.61E+04	mg/kg	1.1E-06	mg/kg-day	N/A	mg/kg-day	---
				Lead	3.64E+03	mg/kg	1.1E-07	mg/kg-day	N/A	mg/kg-day	---
				Manganese	7.34E+02	mg/kg	2.2E-08	mg/kg-day	1.4E-05	mg/kg-day	1.5E-03
				Nickel	8.30E+01	mg/kg	2.5E-09	mg/kg-day	N/A	mg/kg-day	---
				Silver	2.58E+01	mg/kg	7.7E-10	mg/kg-day	N/A	mg/kg-day	---
				Thallium	1.43E+01	mg/kg	4.2E-10	mg/kg-day	N/A	mg/kg-day	---
				Vanadium	5.33E+01	mg/kg	1.6E-09	mg/kg-day	N/A	mg/kg-day	---
				Zinc	5.26E+03	mg/kg	1.6E-07	mg/kg-day	N/A	mg/kg-day	---
			Exp. Route Total								2.6E-03
		Exposure Point Total									2.6E-03
	Exposure Media Total										2.6E-03
	Air (Volatiles)	FLFA	**Inhalation**	**Organics** No COPCs		mg/kg		mg/kg-day		mg/kg-day	0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											1.0E+01

Table E.1-55
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
					Value	Units	Value	Units	Value	Units	Quotient
Groundwater	Groundwater	FLFA	**Ingestion**	**Organics**							
				Chloroform	2.40E+01	µg/L	1.5E-03	mg/kg-day	1.0E-02	mg/kg-day	1.5E-01
				Tetrachloroethene	2.60E+00	µg/L	1.7E-04	mg/kg-day	1.0E-02	mg/kg-day	1.7E-02
				TCDD TE	7.89E-07	µg/L	5.0E-11	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	9.32E+03	µg/L	6.0E-01	mg/kg-day	1.0E+00	mg/kg-day	6.0E-01
				Chromium III	4.30E+01	µg/L	2.7E-03	mg/kg-day	1.5E+00	mg/kg-day	1.8E-03
				Cobalt	2.69E+01	µg/L	1.7E-03	mg/kg-day	N/A	mg/kg-day	---
				Iron	1.01E+04	µg/L	6.5E-01	mg/kg-day	7.0E-01	mg/kg-day	9.2E-01
				Manganese	7.83E+01	µg/L	5.0E-03	mg/kg-day	2.0E-02	mg/kg-day	2.5E-01
				Perchlorate	5.40E+00	µg/L	3.5E-04	mg/kg-day	7.0E-04	mg/kg-day	4.9E-01
				Vanadium	2.00E+01	µg/L	1.3E-03	mg/kg-day	1.0E-03	mg/kg-day	1.3E+00
			Exp. Route Total								3.7E+00
			Dermal	**Organics**							
			Absorption	Chloroform	2.40E+01	µg/L	1.4E-04	mg/kg-day	1.0E-02	mg/kg-day	NV
				Tetrachloroethene	2.60E+00	µg/L	9.7E-05	mg/kg-day	1.0E-02	mg/kg-day	9.7E-03
				TCDD TE	7.89E-07	µg/L	9.7E-10	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	9.32E+03	µg/L	3.9E-03	mg/kg-day	1.0E+00	mg/kg-day	NV
				Chromium III	4.30E+01	µg/L	1.8E-05	mg/kg-day	2.0E-02	mg/kg-day	9.3E-04
				Cobalt	2.69E+01	µg/L	1.1E-05	mg/kg-day	N/A	mg/kg-day	---
				Iron	1.01E+04	µg/L	4.2E-03	mg/kg-day	7.0E-01	mg/kg-day	NV
				Manganese	7.83E+01	µg/L	3.3E-05	mg/kg-day	8.0E-04	mg/kg-day	NV
				Perchlorate	5.40E+00	µg/L	2.3E-06	mg/kg-day	7.0E-04	mg/kg-day	NV
				Vanadium	2.00E+01	µg/L	8.4E-06	mg/kg-day	2.6E-05	mg/kg-day	3.2E-01
			Exp. Route Total								3.4E-01
		Exposure Point Total									4.0E+00
	Exposure Media Total										4.0E+00
	Air	FLFA	**Inhalation**	**Organics**							
			(Indoor Air)	Chloroform	4.93E-05	mg/m^3	7.6E-05	mg/kg-day	1.4E-02	mg/kg-day	5.4E-03
				Tetrachloroethene	1.23E-05	mg/m^3	1.9E-05	mg/kg-day	8.0E-02	mg/kg-day	2.4E-04
			Exp. Route Total								5.6E-03
		Exposure Point Total									5.6E-03
	Exposure Media Total										5.6E-03
	Home Grown Produce	FLFA	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											4.1E+00
										Total of Receptor Hazards Across All Media	1.4E+01

N/A = Not Applicable.
NV = No value calculated, chemical is not assessed.

Table E.1-56
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	FLFA	**Ingestion**	**Organics**							
				Chloroform	2.40E+01	µg/L	3.6E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	2.60E+00	µg/L	3.9E-05	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	2.1E-05
				TCDD TE	7.89E-07	µg/L	1.2E-11	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	1.8E-06
				Inorganics							
				Aluminum	9.32E+03	µg/L	1.4E-01	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chromium III	4.30E+01	µg/L	6.4E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	2.69E+01	µg/L	4.0E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	1.01E+04	µg/L	1.5E-01	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	7.83E+01	µg/L	1.2E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Perchlorate	5.40E+00	µg/L	8.0E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	2.00E+01	µg/L	3.0E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								2.3E-05
			Dermal Absorption	**Organics**							
				Chloroform	2.40E+01	µg/L	3.1E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	2.60E+00	µg/L	2.2E-05	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	1.2E-05
				TCDD TE	7.89E-07	µg/L	2.2E-10	mg/kg-day	1.5E+05	$(mg/kg-day)^{-1}$	3.3E-05
				Inorganics							
				Aluminum	9.32E+03	µg/L	7.3E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chromium III	4.30E+01	µg/L	3.4E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Cobalt	2.69E+01	µg/L	2.1E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Iron	1.01E+04	µg/L	7.9E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Manganese	7.83E+01	µg/L	6.1E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Perchlorate	5.40E+00	µg/L	4.2E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Vanadium	2.00E+01	µg/L	1.6E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
			Exp. Route Total								4.5E-05
		Exposure Point Total									6.7E-05
	Exposure Media Total										6.7E-05
	Air	FLFA	**Inhalation** (Indoor Air)	**Organics**							
				Chloroform	4.93E-05	mg/m^3	1.1E-05	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	9.0E-07
				Tetrachloroethene	1.23E-05	mg/m^3	2.8E-06	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	5.5E-08
			Exp. Route Total								9.5E-07
			Inhalation (Shower Room)	**Organics**							
				Chloroform	3.77E-02	mg/m^3	1.5E-04	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	1.2E-05
				Tetrachloroethene	3.67E-03	mg/m^3	1.4E-05	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	2.9E-07
			Exp. Route Total								1.2E-05
		Exposure Point Total									1.3E-05
	Exposure Media Total										1.3E-05
	Home Grown Produce	FLFA	**Ingestion**	**Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											8.0E-05
										Total of Receptor Risks Across All Media	8.0E-05

N/A = Not Applicable.

Table E.1-57
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	FLFA	**Ingestion**	**Organics**							
				Chloroform	2.40E+01	µg/L	6.6E-04	mg/kg-day	1.0E-02	mg/kg-day	6.6E-02
				Tetrachloroethene	2.60E+00	µg/L	7.1E-05	mg/kg-day	1.0E-02	mg/kg-day	7.1E-03
				TCDD TE	7.89E-07	µg/L	2.2E-11	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	9.32E+03	µg/L	2.6E-01	mg/kg-day	1.0E+00	mg/kg-day	2.6E-01
				Chromium III	4.30E+01	µg/L	1.2E-03	mg/kg-day	1.5E+00	mg/kg-day	7.9E-04
				Cobalt	2.69E+01	µg/L	7.4E-04	mg/kg-day	N/A	mg/kg-day	---
				Iron	1.01E+04	µg/L	2.8E-01	mg/kg-day	7.0E-01	mg/kg-day	4.0E-01
				Perchlorate	5.40E+00	µg/L	1.5E-04	mg/kg-day	7.0E-04	mg/kg-day	2.1E-01
				Manganese	7.83E+01	µg/L	2.1E-03	mg/kg-day	2.0E-02	mg/kg-day	1.1E-01
				Vanadium	2.00E+01	µg/L	5.5E-04	mg/kg-day	1.0E-03	mg/kg-day	5.5E-01
			Exp. Route Total								1.6E+00
			Dermal	**Organics**							
			Absorption	Chloroform	2.40E+01	µg/L	5.7E-05	mg/kg-day	1.0E-02	mg/kg-day	NV
				Tetrachloroethene	2.60E+00	µg/L	3.9E-05	mg/kg-day	1.0E-02	mg/kg-day	3.9E-03
				TCDD TE	7.89E-07	µg/L	3.9E-10	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	9.32E+03	µg/L	1.2E-03	mg/kg-day	1.0E+00	mg/kg-day	NV
				Chromium III	4.30E+01	µg/L	5.4E-06	mg/kg-day	2.0E-02	mg/kg-day	2.8E-04
				Cobalt	2.69E+01	µg/L	3.2E-06	mg/kg-day	N/A	mg/kg-day	---
				Iron	1.01E+04	µg/L	1.3E-03	mg/kg-day	7.0E-01	mg/kg-day	NV
				Manganese	7.83E+01	µg/L	9.6E-06	mg/kg-day	8.0E-04	mg/kg-day	NV
				Perchlorate	5.40E+00	µg/L	6.7E-07	mg/kg-day	7.0E-04	mg/kg-day	NV
				Vanadium	2.00E+01	µg/L	2.5E-06	mg/kg-day	2.6E-05	mg/kg-day	9.5E-02
			Exp. Route Total								9.9E-02
		Exposure Point Total									1.7E+00
	Exposure Media Total										1.7E+00
	Air	FLFA	**Inhalation**	**Organics**							
			(Indoor Air)	Chloroform	4.93E-05	mg/m³	1.3E-05	mg/kg-day	1.4E-02	mg/kg-day	9.6E-04
				Tetrachloroethene	1.23E-05	mg/m³	3.4E-06	mg/kg-day	8.0E-02	mg/kg-day	4.2E-05
			Exp. Route Total								1.0E-03
			Inhalation	**Organics**							
			(Shower Room)	Chloroform	3.77E-02	mg/m³	4.3E-04	mg/kg-day	1.4E-02	mg/kg-day	3.1E-02
				Tetrachloroethene	3.67E-03	mg/m³	4.2E-05	mg/kg-day	8.0E-02	mg/kg-day	5.2E-04
			Exp. Route Total								3.1E-02
		Exposure Point Total									3.2E-02
	Exposure Media Total										3.2E-02
	Home Grown Produce	FLFA	**Ingestion**	**Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											1.7E+00
										Total of Receptor Hazards Across All Media	1.7E+00

N/A = Not Applicable.
NV = No value calculated, chemical is not assessed.

Table E.1-58
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	FLFA	**Ingestion**	**Organics**							
				Chloroform	2.40E+01	µg/L	1.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	2.60E+00	µg/L	1.4E-05	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	7.7E-06
				TCDD TE	7.89E-07	µg/L	4.3E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	6.5E-07
				Inorganics							
				Aluminum	9.32E+03	µg/L	5.1E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	4.30E+01	µg/L	2.4E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	2.69E+01	µg/L	1.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	1.01E+04	µg/L	5.5E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.83E+01	µg/L	4.3E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Perchlorate	5.40E+00	µg/L	3.0E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	2.00E+01	µg/L	1.1E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								8.3E-06
			Dermal Absorption	**Organics**							
				Chloroform	2.40E+01	µg/L	1.2E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	2.60E+00	µg/L	8.3E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	4.5E-06
				TCDD TE	7.89E-07	µg/L	8.3E-11	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.2E-05
				Inorganics							
				Aluminum	9.32E+03	µg/L	3.4E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chromium III	4.30E+01	µg/L	1.6E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Cobalt	2.69E+01	µg/L	9.8E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Iron	1.01E+04	µg/L	3.6E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Manganese	7.83E+01	µg/L	2.8E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Perchlorate	5.40E+00	µg/L	2.0E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Vanadium	2.00E+01	µg/L	7.2E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
			Exp. Route Total								1.7E-05
		Exposure Point Total									2.5E-05
	Exposure Media Total										2.5E-05
	Air	FLFA	**Inhalation** (Indoor Air)	**Organics**							
				Chloroform	4.93E-05	mg/m^3	6.5E-06	mg/kg-day	8.1E-02	$(mg/kg\text{-}day)^{-1}$	5.3E-07
				Tetrachloroethene	1.23E-05	mg/m^3	1.6E-06	mg/kg-day	2.0E-02	$(mg/kg\text{-}day)^{-1}$	3.2E-08
			Exp. Route Total								5.6E-07
		Exposure Point Total									5.6E-07
	Exposure Media Total										5.6E-07
	Home Grown Produce	FLFA	**Ingestion**	**Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											2.6E-05
										Total of Receptor Risks Across All Media	2.6E-05

N/A = Not Applicable.

Table E.1-59
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	FLFA	**Ingestion**	**Organics**							
				Chloroform	2.40E+01	µg/L	1.5E-03	mg/kg-day	1.0E-02	mg/kg-day	1.5E-01
				Tetrachloroethene	2.60E+00	µg/L	1.7E-04	mg/kg-day	1.0E-02	mg/kg-day	1.7E-02
				TCDD TE	7.89E-07	µg/L	5.0E-11	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	9.32E+03	µg/L	6.0E-01	mg/kg-day	1.0E+00	mg/kg-day	6.0E-01
				Chromium III	4.30E+01	µg/L	2.7E-03	mg/kg-day	1.5E+00	mg/kg-day	1.8E-03
				Cobalt	2.69E+01	µg/L	1.7E-03	mg/kg-day	N/A	mg/kg-day	---
				Iron	1.01E+04	µg/L	6.5E-01	mg/kg-day	7.0E-01	mg/kg-day	9.2E-01
				Manganese	7.83E+01	µg/L	5.0E-03	mg/kg-day	2.0E-02	mg/kg-day	2.5E-01
				Perchlorate	5.40E+00	µg/L	3.5E-04	mg/kg-day	7.0E-04	mg/kg-day	4.9E-01
				Vanadium	2.00E+01	µg/L	1.3E-03	mg/kg-day	1.0E-03	mg/kg-day	1.3E+00
			Exp. Route Total								3.7E+00
			Dermal	**Organics**							
			Absorption	Chloroform	2.40E+01	µg/L	1.4E-04	mg/kg-day	1.0E-02	mg/kg-day	NV
				Tetrachloroethene	2.60E+00	µg/L	9.7E-05	mg/kg-day	1.0E-02	mg/kg-day	9.7E-03
				TCDD TE	7.89E-07	µg/L	9.7E-10	mg/kg-day	N/A	mg/kg-day	---
				Inorganics							
				Aluminum	9.32E+03	µg/l	3.9E-03	mg/kg-day	1.0E+00	mg/kg-day	NV
				Chromium III	4.30E+01	µg/l	1.8E-05	mg/kg-day	2.0E-02	mg/kg-day	9.3E-04
				Cobalt	2.69E+01	µg/l	1.1E-05	mg/kg-day	N/A	mg/kg-day	---
				Iron	1.01E+04	µg/l	4.2E-03	mg/kg-day	7.0E-01	mg/kg-day	NV
				Manganese	7.83E+01	µg/l	3.3E-05	mg/kg-day	8.0E-04	mg/kg-day	NV
				Perchlorate	5.40E+00	µg/l	2.3E-06	mg/kg-day	7.0E-04	mg/kg-day	NV
				Vanadium	2.00E+01	µg/l	8.4E-06	mg/kg-day	2.6E-05	mg/kg-day	3.2E-01
			Exp. Route Total								3.4E-01
		Exposure Point Total									4.0E+00
	Exposure Media Total										4.0E+00
	Air	FLFA	**Inhalation**	**Organics**							
			(Indoor Air)	Chloroform	4.93E-05	mg/m^3	7.6E-05	mg/kg-day	1.4E-02	mg/kg-day	5.4E-03
				Tetrachloroethene	1.23E-05	mg/m^3	1.9E-05	mg/kg-day	8.0E-02	mg/kg-day	2.4E-04
			Exp. Route Total								5.6E-03
		Exposure Point Total									5.6E-03
	Exposure Media Total										5.6E-03
	Home Grown Produce	FLFA	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											4.1E+00
										Total of Receptor Hazards Across All Media	4.1E+00

N/A = Not Applicable.
NV = No value calculated, chemical is not assessed.

Table E.1-60
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	FLFA										
			Aroclor 1254	6.8E-08		6.3E-08	1.3E-07	Immune System, Eyes	4.8E-03		4.4E-03	9.2E-03
			Aroclor 1260	3.1E-08		2.8E-08	5.9E-08	N/A	---		---	---
			Benzo(a)pyrene	1.3E-08		1.1E-08	2.3E-08	N/A	---		---	---
			bis(2-chloroethoxy) methane	---		---	---	N/A	---		---	---
			p-Chloro-m-cresol	---		---	---	N/A	---		---	---
			4-Chlorophenyl phenyl ether	---		---	---	N/A	---		---	---
			Di-n-octyl phthalate	---		---	---	N/A	---		---	--
			2-Nitrophenol	---		---	---	N/A	1.3E-06		8.8E-07	2.2E-06
			TCDD TE	2.6E-06		5.2E-07	3.2E-06	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	4.5E-03		2.9E-04	4.8E-03
			Antimony	---		---	---	Blood Chemistry	3.5E-03		1.6E-03	5.1E-03
			Arsenic	1.5E-06		2.9E-07	1.8E-06	Skin, Vascular Effects	9.1E-03		1.8E-03	1.1E-02
			Barium	---		---	---	Kidney	1.8E-03		1.7E-03	3.6E-03
			Cadmium	---		---	---	Kidney	6.4E-04		1.7E-04	8.1E-04
			Chromium III	---		---	---	NOAEL	1.5E-05		7.7E-05	9.3E-05
			Cobalt	---		---	---	N/A	---		---	---
			Copper	---		---	---	Gi Tract	5.2E-02		3.4E-03	5.5E-02
			Iron	---		---	---	Blood, Liver, GI Irritation	1.0E-02		6.6E-04	1.1E-02
			Lead	---		---	---	N/A	---		---	---
			Manganese	---		---	---	CNS	8.9E-03		1.5E-02	2.3E-02
			Nickel	---		---	---	Kidney, Liver, Spleen	1.0E-03		1.7E-03	2.7E-03
			Silver	---		---	---	Skin	1.4E-03		2.3E-03	3.8E-03
			Vanadium	---		---	---	Kidney	9.0E-03		2.3E-02	3.2E-02
			Zinc	---		---	---	Blood Chemistry	4.9E-03		3.2E-04	5.2E-03
			Chemical Total	4.2E-06		9.2E-07	5.1E-06		0.11		0.056	0.17
		Exposure Point Total					5.1E-06					0.17
	Exposure Media Total						5.1E-06					0.17

Table E.1-60
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
	Air (Particulates and Volatiles)	FLFA										
			Aroclor 1254		6.3E-12		6.3E-12	N/A		---		---
			Aroclor 1260		2.8E-12		2.8E-12	N/A		---		---
			Benzo(a)pyrene		5.0E-13		5.0E-13	N/A		---		---
			bis(2-chloroethoxy) methane		---		---	N/A		---		---
			p-Chloro-m-cresol		---		---	N/A		---		---
			4-Chlorophenyl phenyl ether		---		---	N/A		---		---
			Di-n-octyl phthalate		---		---	N/A		---		---
			2-Nitrophenol		---		---	N/A		---		---
			TCDD TE		2.5E-10		2.5E-10	N/A		---		---
			Aluminum		---		---	N/A		4.1E-04		4.1E-04
			Antimony		---		---	N/A		---		---
			Arsenic		1.4E-09		1.4E-09	N/A		---		---
			Barium		---		---	Fetus		2.4E-04		2.4E-04
			Cadmium		1.3E-10		1.3E-10	N/A		1.0E-06		1.0E-06
			Chromium III		---		---	N/A		---		---
			Cobalt		---		---	N/A		---		---
			Copper		---		---	N/A		---		---
			Iron		---		---	N/A		---		---
			Lead		---		---	N/A		---		---
			Manganese		---		---	CNS		1.1E-03		1.1E-03
			Nickel		---		---	N/A		---		---
			Silver		---		---	N/A		---		---
			Vanadium		---		---	N/A		---		---
			Zinc		---		---	N/A		---		---
			Chemical Total		1.8E-09		1.8E-09			0.0018		0.0018
		Exposure Point Total					1.8E-09					0.0018
	Exposure Media Total						1.8E-09					0.0018
Surface Soil Total							5.1E-06					0.17

Table E.1-60
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
Groundwater	Air (Ambient Air)	FLFA	Chloroform		8.7E-12		8.7E-12	N/A		2.1E-08		2.1.E-08
			Tetrachloroethene		5.1E-13		5.1E-13	CNS		8.9E-10		8.9.E-10
			Chemical Total		9.2E-12		9.2E-12			2.2E-08		2.2.E-08
		Exposure Point Total					9.2E-12					2.2.E-08
	Exposure Media Total						9.2E-12					2.2.E-08
Groundwater Total							9.2E-12					
Receptor Total							5.1E-06					0.17

5.1E-06	Total Hazard Across All Media = 0.17

(a) Chromium RfD is based on NOAEL; no target organ is identified.

CNS = Central Nervous System.
GI = Gastrointestinal
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.

Total Immune System HI Across All Media =	0.0092
Total Eyes HI Across All Media =	0.0092
Total CNS HI Across All Media =	0.029
Total Blood HI Across All Media =	0.021
Total Skin HI Across All Media =	0.015
Total Vascular Effects HI Across All Media =	0.011
Total Kidney HI Across All Media =	0.039
Total NOAEL HI Across All Media =	0.000093
Total GI Irritation HI Across All Media =	0.066
Total Liver HI Across All Media =	0.013
Total Spleen HI Across All Media =	0.0027
Total Fetus HI Across All Media =	0.00024

Table E.1-61
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	FLFA										
			Aroclor 1254	6.8E-08		6.3E-07	1.3E-07	Immune System, Eyes	4.8E-03		4.4E-03	9.2E-03
			Aroclor 1260	3.1E-08		2.8E-08	5.9E-08	N/A	---		---	---
			Benzo(a)pyrene	1.3E-08		1.1E-08	2.3E-08	N/A	---		---	---
			bis(2-chloroethoxy) methane	---		---	---	N/A	---		---	---
			p-Chloro-m-cresol	---		---	---	N/A	---		---	---
			4-Chlorophenyl phenyl ether	---		---	---	N/A	---		---	---
			Di-n-octyl phthalate	---		---	---	N/A	---		---	--
			2-Nitrophenol	---		---	---	N/A	1.3E-06		8.8E-07	2.2E-06
			TCDD TE	2.6E-06		5.2E-07	3.2E-06	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	4.5E-03		2.9E-04	4.8E-03
			Antimony	---		---	---	Blood Chemistry	3.5E-03		1.6E-03	5.1E-03
			Arsenic	1.5E-06		2.9E-07	1.8E-06	Skin, Vascular Effects	9.1E-03		1.8E-03	1.1E-02
			Barium	---		---	---	Kidney	1.8E-03		1.7E-03	3.6E-03
			Cadmium	---		---	---	Kidney	6.4E-04		1.7E-04	8.1E-04
			Chromium III	---		---	---	NOAEL	1.5E-05		7.7E-05	9.3E-05
			Cobalt	---		---	---	N/A	---		---	---
			Copper	---		---	---	Gi Tract	5.2E-02		3.4E-03	5.5E-02
			Iron	---		---	---	Blood, Liver, GI Irritation	1.0E-02		6.6E-04	1.1E-02
			Lead	---		---	---	N/A	---		---	---
			Manganese	---		---	---	CNS	8.9E-03		1.5E-02	2.3E-02
			Nickel	---		---	---	Kidney, Liver, Spleen	1.0E-03		1.7E-03	2.7E-03
			Silver	---		---	---	Skin	1.4E-03		2.3E-03	3.8E-03
			Vanadium	---		---	---	Kidney	9.0E-03		2.3E-02	3.2E-02
			Zinc	---		---	---	Blood Chemistry	4.9E-03		3.2E-04	5.2E-03
			Chemical Total	4.2E-06		9.2E-07	5.1E-06		0.11		0.056	0.17
		Exposure Point Total					5.1E-06					0.17
	Exposure Media Total						5.1E-06					0.17

Table E.1-61
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	Air (Particulates and Volatiles)	FLFA										
			Aroclor 1254		6.3E-12		6.3E-12	N/A		---		---
			Aroclor 1260		2.8E-12		2.8E-12	N/A		---		---
			Benzo(a)pyrene		5.0E-13		5.0E-13	N/A		---		---
			bis(2-chloroethoxy) methane		---		---	N/A		---		---
			p-Chloro-m-cresol		---		---	N/A		---		---
			4-Chlorophenyl phenyl ether		---		---	N/A		---		---
			Di-n-octyl phthalate		---		---	N/A		---		---
			2-Nitrophenol		---		---	N/A		---		---
			TCDD TE		2.5E-10		2.5E-10	N/A		---		---
			Aluminum		---		---	N/A		4.1E-04		4.1E-04
			Antimony		---		---	N/A		---		---
			Arsenic		1.4E-09		1.4E-09	N/A		---		---
			Barium		---		---	Fetus		2.4E-04		2.4E-04
			Cadmium		1.3E-10		1.3E-10	N/A		1.0E-06		1.0E-06
			Chromium III		---		---	N/A		---		---
			Cobalt		---		---	N/A		---		---
			Copper		---		---	N/A		---		---
			Iron		---		---	N/A		---		---
			Lead		---		---	N/A		---		---
			Manganese		---		---	CNS		1.1E-03		1.1E-03
			Nickel		---		---	N/A		---		---
			Silver		---		---	N/A		---		---
			Vanadium		---		---	N/A		---		---
			Zinc		---		---	N/A		---		---
			Chemical Total		1.8E-09		1.8E-09			0.0018		0.0018
		Exposure Point Total					1.8E-09					0.0018
	Exposure Media Total						1.8E-09					0.0018
Surface Soil Total							5.1E-06					0.17

Table E.1-61
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	FLFA										
			Aroclor 1254	5.4E-08		5.0E-08	1.0E-07	Immune System, Eyes	1.5E-12		3.5E-03	3.5E-03
			Aroclor 1260	2.5E-08		2.3E-08	4.9E-08	N/A	---		---	---
			Benzo(a)pyrene	1.0E-08		8.6E-09	1.9E-08	N/A	---		---	---
			bis(2-chloroethoxy) methane	---		---	---	N/A	---		---	---
			p-Chloro-m-cresol	---		---	---	N/A	---		---	---
			4-Chlorophenyl phenyl ether	---		---		N/A	---		---	---
			Di-n-octyl phthalate	---		---	---	N/A	---		---	---
			2-Nitrophenol	---		---	---	N/A	8.3E-11		8.6E-07	8.6E-07
			TCDD TE	1.8E-06		3.5E-07	2.1E-06	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	5.1E-03		3.4E-04	5.5E-03
			Antimony	---		---	---	Blood Chemistry	2.8E-03		1.2E-03	4.0E-03
			Arsenic	1.8E-06		3.5E-07	2.1E-06	Skin, Vascular Effects	1.1E-02		2.2E-03	1.3E-02
			Barium	---		---	---	Kidney	1.3E-03		1.2E-03	2.6E-03
			Cadmium	---		---	---	Kidney	4.6E-04		1.2E-04	5.8E-04
			Chromium III	---		---	---	NOAEL	1.2E-05		6.2E-05	7.5E-05
			Cobalt	---		---	---	N/A	---		---	---
			Copper	---		---	---	Gi Tract	3.6E-02		2.4E-03	3.9E-02
			Iron	---		---	---	Blood, Liver, GI Irritation	1.0E-02		6.7E-04	1.1E-02
			Lead	---		---	---	N/A	---		---	---
			Manganese	---		---	---	CNS	7.2E-03		1.2E-02	1.9E-02
			Nickel	---		---	---	Kidney, Liver, Spleen	8.1E-04		1.3E-03	2.2E-03
			Silver	---		---	---	Skin	1.0E-03		1.7E-03	2.7E-03
			Thallium	---		---	---	Blood, Liver, Hair	4.0E-02		2.6E-03	4.3E-02
			Vanadium	---		---	---	Kidney	1.0E-02		2.6E-02	3.7E-02
			ZInc	---		---	---	Blood Chemistry	3.4E-03		2.3E-04	3.7E-03
			Chemical Total	3.7E-06		7.9E-07	4.5E-06		0.13		0.056	0.19
		Exposure Point Total					4.5E-06					0.19
	Exposure Media Total						4.5E-06					0.19

Table E.1-61
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	Air (Particulates and Volatiles)	FLFA	Aroclor 1254		5.0E-12		5.0E-12	N/A		---		---
			Aroclor 1260		2.3E-12		2.3E-12	N/A		---		---
			Benzo(a)pyrene		3.9E-13		3.9E-13	N/A		---		---
			bis(2-chloroethoxy) methane		---		---	N/A		---		---
			p-Chloro-m-cresol		---		---	N/A		---		---
			4-Chlorophenyl phenyl ether		---		---	N/A		---		---
			Di-n-octyl phthalate		---		---	N/A		---		---
			2-Nitrophenol		---		---	N/A		---		---
			TCDD TE		1.7E-10		1.7E-10	N/A		---		---
			Aluminum		---		---	N/A		4.8E-04		4.8E-04
			Antimony		---		---	N/A		---		---
			Arsenic		1.7E-09		1.7E-09	N/A		---		---
			Barium		---		---	Fetus		1.8E-04		1.8E-04
			Cadmium		9.6E-11		9.6E-11	N/A		7.5E-07		7.5E-07
			Chromium III		---		---	N/A		---		---
			Cobalt		---		---	N/A		---		---
			Copper		---		---	N/A		---		---
			Iron		---		---	N/A		---		---
			Lead		---		---	N/A		---		---
			Manganese		---		---	CNS		9.3E-04		9.3E-04
			Nickel		---		---	N/A		---		---
			Silver		---		---	N/A		---		---
			Thallium		---		---	N/A		---		---
			Vanadium		---		---	N/A		---		---
			ZInc		---		---	N/A		---		---
			Chemical Total		1.9E-09		1.9E-09			0.0016		0.0016
		Exposure Point Total					1.9E-09					0.0016
	Exposure Media Total						1.9E-09					0.0016
Total Soil Total							4.5E-06					0.19

Table E.1-61
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
Groundwater	Air (Ambient Air)	FLFA	Chloroform		8.7E-12		8.7E-12	N/A		2.1E-08		2.1E-08
			Tetrachloroethene		5.1E-13		5.1E-13	CNS		8.9E-10		8.9.E-10
			Chemical Total		9.2E-12		9.2E-12			2.2E-08		2.2.E-08
		Exposure Point Total					9.2E-12					2.2.E-08
	Exposure Media Total						9.2E-12					2.2.E-08
Groundwater Total							9.2E-12					2.2E-08
Receptor Total[b]							5.1E-06					0.19

Total Risk Across All Media[b] = 5.1E-06

Total Hazard Across All Media[c] = 0.19

(a) Chromium RfD is based on NOAEL; no target organ is identified.
(b) Since surface soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this soil data grouping.
(c) 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 Immune System HI Across All Media =	0.0035
Total Eyes HI Across All Media =	0.0035
Total CNS HI Across All Media =	0.025
Total Blood HI Across All Media =	0.061
Total Skin HI Across All Media =	0.016
Total Vascular Effects HI Across All Media =	0.013
Total Kidney HI Across All Media =	0.042
Total NOAEL HI Across All Media =	0.000075
Total GI Irritation HI Across All Media =	0.049
Total Liver HI Across All Media =	0.056
Total Spleen HI Across All Media =	0.0022
Total Hair HI Across All Media =	0.043
Total Fetus HI Across All Media =	0.00018

Table E.1-62
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	FLFA										
			Aroclor 1254	3.1E-07		2.8E-07	5.9E-07	Immune System, Eyes	2.1E-02		2.0E-02	4.1E-02
			Aroclor 1260	1.4E-07		1.3E-07	2.7E-07	N/A	---		---	---
			Benzo(a)pyrene	5.7E-08		4.9E-08	1.1E-07	N/A	---		---	---
			bis(2-chloroethoxy) methane	---		---	---	N/A	---		---	---
			p-Chloro-m-cresol	---		---	---	N/A	---		---	---
			4-Chlorophenyl phenyl ether	---		---	---	N/A	---		---	---
			Di-n-octyl phthalate	---		---	---	N/A	---		---	---
			2-Nitrophenol	---		---	---	N/A	6.0E-06		4.0E-06	1.0E-05
			TCDD TE	1.2E-05		2.4E-06	1.4E-05	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	2.0E-02		1.3E-03	2.1E-02
			Antimony	---		---	---	Blood Chemistry	1.6E-02		1.6E-03	1.8E-02
			Arsenic	6.6E-06		1.3E-06	7.9E-06	Skin, Vascular Effects	4.1E-02		8.1E-03	4.9E-02
			Barium	---		---	---	Kidney	8.3E-03		1.7E-03	1.0E-02
			Cadmium	---		---	---	Kidney	2.9E-03		7.6E-04	3.6E-03
			Chromium III	---		---	---	NOAEL	6.9E-05		3.5E-04	4.2E-04
			Cobalt	---		---	---	N/A	---		---	---
			Copper	---		---	---	Gi Tract	2.3E-01		1.5E-02	2.5E-01
			Iron	---		---	---	Blood, Liver, GI Irritation	4.5E-02		3.0E-03	4.8E-02
			Lead	---		---	---	N/A	---		---	---
			Manganese	---		---	---	CNS	4.0E-02		6.6E-02	1.1E-01
			Nickel	---		---	---	Kidney, Liver, Spleen	4.7E-03		7.7E-03	1.2E-02
			Silver	---		---	---	Skin	6.4E-03		1.1E-02	1.7E-02
			Vanadium	---		---	---	Kidney	4.1E-02		1.0E-01	1.4E-01
			Zinc	---		---	---	Blood Chemistry	2.2E-02		1.4E-03	2.3E-02
			Chemical Total	1.9E-05		4.1E-06	2.3E-05		0.50		0.24	0.74
		Exposure Point Total					2.3E-05					0.74
	Exposure Media Total						2.3E-05					0.74

Table E.1-62
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	Air (Particulates and Volatiles)	FLFA										
			Aroclor 1254		2.8E-11		2.8E-11	N/A		---		---
			Aroclor 1260		1.3E-11		1.3E-11	N/A		---		---
			Benzo(a)pyrene		2.2E-12		2.2E-12	N/A		---		---
			bis(2-chloroethoxy) methane		---		---	N/A		---		---
			p-Chloro-m-cresol		---		---	N/A		---		---
			4-Chlorophenyl phenyl ether		---		---	N/A		---		---
			Di-n-octyl phthalate		---		---	N/A		---		---
			2-Nitrophenol		---		---	N/A		---		---
			TCDD TE		1.1E-09		1.1E-09	N/A		---		---
			Aluminum		---		---	N/A		1.9E-03		1.9E-03
			Antimony		---		---	N/A		---		---
			Arsenic		6.2E-09		6.2E-09	N/A		---		---
			Barium		---		---	Fetus		1.1E-03		1.1E-03
			Cadmium		6.0E-10		6.0E-10	N/A		4.7E-06		4.7E-06
			Chromium III		---		---	N/A		---		---
			Cobalt		---		---	N/A		---		---
			Copper		---		---	N/A		---		---
			Iron		---		---	N/A		---		---
			Lead		---		---	N/A		---		---
			Manganese		---		---	CNS		5.2E-03		5.2E-03
			Nickel		---		---	N/A		---		---
			Silver		---		---	N/A		---		---
			Vanadium		---		---	N/A		---		---
			Zinc		---		---	N/A		---		---
			Chemical Total		7.9E-09		7.9E-09			0.0081		0.0081
		Exposure Point Total					7.9E-09					0.0081
	Exposure Media Total						7.9E-09					0.0081
Surface Soil Total							2.3E-05					0.75

Table E.1-62
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	FLFA										
			Aroclor 1254	2.4E-07		2.3E-07	4.7E-07	Immune System, Eyes	1.7E-02		1.6E-02	3.3E-02
			Aroclor 1260	1.1E-07		1.1E-07	2.2E-07	N/A	---		---	---
			Benzo(a)pyrene	4.5E-08		3.9E-08	8.4E-08	N/A	---		---	---
			bis(2-chloroethoxy) methane	---		---	---	N/A	---		---	---
			p-Chloro-m-cresol	---		---	---	N/A	---		---	---
			4-Chlorophenyl phenyl ether	---		---		N/A	---		---	---
			Di-n-octyl phthalate	---		---	---	N/A	---		---	---
			2-Nitrophenol	---		---	---	N/A	5.9E-06		3.9E-06	9.7E-06
			TCDD TE	8.0E-06		1.6E-06	9.6E-06	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	2.3E-02		1.5E-03	2.5E-02
			Antimony	---		---	---	Blood Chemistry	1.3E-02		5.5E-03	1.8E-02
			Arsenic	8.1E-06		1.6E-06	9.7E-06	Skin, Vascular Effects	5.0E-02		9.9E-03	6.0E-02
			Barium	---		---	---	Kidney	5.9E-03		5.6E-03	1.2E-02
			Cadmium	---		---	---	Kidney	2.1E-03		5.5E-04	2.6E-03
			Chromium III	---		---	---	NOAEL	5.5E-05		2.8E-04	3.4E-04
			Cobalt	---		---	---	N/A	---		---	---
			Copper	---		---	---	Gi Tract	1.6E-01		1.1E-02	1.7E-01
			Iron	---		---	---	Blood, Liver, GI Irritation	4.5E-02		3.0E-03	4.8E-02
			Lead	---		---	---	N/A	---		---	---
			Manganese	---		---	---	CNS	3.2E-02		5.3E-02	8.6E-02
			Nickel	---		---	---	Kidney, Liver, Spleen	3.7E-03		6.0E-03	9.7E-03
			Silver	---		---	---	Skin	4.5E-03		7.5E-03	1.2E-02
			Thallium	---		---	---	Blood, Liver, Hair	1.8E-01		1.2E-02	1.9E-01
			Vanadium	---		---	---	Kidney	4.7E-02		1.2E-01	1.7E-01
			ZInc	---		---	---	Blood Chemistry	1.5E-02		1.0E-03	1.6E-02
			Chemical Total	1.6E-05		3.6E-06	2.0E-05		0.60		0.25	0.85
		Exposure Point Total					2.0E-05					0.85
	Exposure Media Total						2.0E-05					0.85

Table E.1-62
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	Air (Particulates and Volatiles)	FLFA	Aroclor 1254		2.3E-11		2.3E-11	N/A		---		---
			Aroclor 1260		1.1E-11		1.1E-11	N/A		---		---
			Benzo(a)pyrene		1.8E-12		1.8E-12	N/A		---		---
			bis(2-chloroethoxy) methane		---		---	N/A		---		---
			p-Chloro-m-cresol		---		---	N/A		---		---
			4-Chlorophenyl phenyl ether		---		---	N/A		---		---
			Di-n-octyl phthalate		---		---	N/A		---		---
			2-Nitrophenol		---		---	N/A		---		---
			TCDD TE		7.4E-10		7.4E-10	N/A		---		---
			Aluminum		---		---	N/A		2.1E-03		2.1E-03
			Antimony		---		---	N/A		---		---
			Arsenic		7.5E-09		7.5E-09	N/A		---		---
			Barium		---		---	Fetus		7.9E-04		7.9E-04
			Cadmium		4.3E-10		4.3E-10	N/A		3.4E-06		3.4E-06
			Chromium III		---		---	N/A		---		---
			Cobalt		---		---	N/A		---		---
			Copper		---		---	N/A		---		---
			Iron		---		---	N/A		---		---
			Lead		---		---	N/A		---		---
			Manganese		---		---	CNS		4.2E-03		4.2E-03
			Nickel		---		---	N/A		---		---
			Silver		---		---	N/A		---		---
			Thallium		---		---	N/A		---		---
			Vanadium		---		---	N/A		---		---
			ZInc		---		---	N/A		---		---
			Chemical Total		8.7E-09		8.7E-09			0.0071		0.0071
		Exposure Point Total					8.7E-09					0.0071
	Exposure Media Total						8.7E-09					0.0071
Total Soil Total							2.0E-05					0.86

Table E.1-62
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
Groundwater	Groundwater	FLFA										
			Chloroform	---			---	N/A	2.1E-02			2.1E-02
			Tetrachloroethene	4.4E-06			4.4E-06	CNS	2.3E-03			2.3E-03
			TCDD TE	3.7E-07			3.7E-07	N/A	---			---
			Aluminum	---			---	Developmental nervous system	8.2E-02			8.2E-02
			Chromium III	---			---	NOAEL	2.5E-04			2.5E-04
			Cobalt	---			---	N/A	---			---
			Iron	---			---	Blood, Liver, GI Irritation	1.3E-01			1.3E-01
			Manganese	---			---	CNS	3.4E-02			3.4E-02
			Perchlorate	---			---	Thyroid	6.8E-02			6.8E-02
			Vanadium	---			---	Kidney	1.8E-01			1.8E-01
			Chemical Total	4.8E-06			4.8E-06		0.51			0.5
		Exposure Point Total					4.8E-06					0.5
	Exposure Media Total						4.8E-06					0.5
	Air (Ambient Air)	FLFA										
			Chloroform		3.9E-11		3.9E-11	N/A		9.6E-08		9.6E-08
			Tetrachloroethene		2.3E-12		2.3E-12	CNS		4.0E-09		4.0.E-09
			Chemical Total		4.1E-11		4.1E-11			1.0E-07		1.0.E-07
		Exposure Point Total					4.1E-11					1.0.E-07
	Air (Indoor Air)	FLFA										
			Chloroform		2.5E-07		2.5E-07	N/A		6.2E-04		6.2E-04
			Tetrachloroethene		1.5E-08		1.5E-08	CNS		2.7E-05		2.7.E-05
			Chemical Total		2.7E-07		2.7E-07			6.5E-04		6.5.E-04
		Exposure Point Total					2.7E-07					6.5.E-04
	Exposure Media Total						2.7E-07					6.5.E-04
Groundwater Total							5.1E-06					0.5
Receptor Total[b]							2.8E-05					1.4

Total Risk Across All Media[b] = 2.8E-05

Total Hazard Across All Media[c] = 1.4

(a) Chromium RfD is based on NOAEL; no target organ is identified.
(b) Since surface 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 more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.
(c) 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 more highly contaminated portion of groundwater, 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 Immune System HI Across All Media =	0.033
Total Eyes HI Across All Media =	0.033
Total CNS HI Across All Media =	0.23
Total Blood HI Across All Media =	0.40
Total Skin HI Across All Media =	0.072
Total Vascular Effects HI Across All Media =	0.060
Total Kidney HI Across All Media =	0.37
Total NOAEL HI Across All Media =	0.00059
Total GI Irritation HI Across All Media =	0.35
Total Liver HI Across All Media =	0.38
Total Spleen HI Across All Media =	0.0097
Total Hair HI Across All Media =	0.19
Total Fetus HI Across All Media =	0.00079
Total Thyroid HI Across All Media =	0.068

Table E.1-63
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	FLFA										
			Aroclor 1254	1.8E-08		7.5E-09	2.5E-08	Immune System, Eyes	3.1E-02		1.3E-02	4.4E-02
			Aroclor 1260	8.3E-09		3.5E-09	1.2E-08	N/A	---		---	---
			Benzo(a)pyrene	3.3E-09		1.3E-09	4.6E-09	N/A	---		---	---
			bis(2-chloroethoxy) methane	---		---	---	N/A	---		---	---
			p-Chloro-m-cresol	---		---	---	N/A	---		---	---
			4-Chlorophenyl phenyl ether	---		---		N/A	---		---	---
			Di-n-octyl phthalate	---		---	---	N/A	---		---	---
			2-Nitrophenol	---		---	---	N/A	1.1E-05		3.2E-06	1.4E-05
			TCDD TE	5.9E-07		5.3E-08	6.4E-07	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	4.2E-02		1.3E-03	4.4E-02
			Antimony	---		---	---	Blood Chemistry	2.3E-02		4.6E-03	2.8E-02
			Arsenic	5.9E-07		5.3E-08	6.4E-07	Skin, Vascular Effects	9.2E-02		8.3E-03	1.0E-01
			Barium	---		---	---	Kidney	1.1E-02		4.7E-03	1.6E-02
			Cadmium	---		---	---	Kidney	3.8E-03		4.6E-04	4.3E-03
			Chromium III	---		---	---	NOAEL	1.0E-04		2.3E-04	3.3E-04
			Cobalt	---		---	---	N/A	---		---	---
			Copper	---		---	---	Gi Tract	3.0E-01		9.0E-03	3.1E-01
			Iron	---		---	---	Blood, Liver, GI Irritation	8.3E-02		2.5E-03	8.6E-02
			Lead	---		---	---	N/A	---		---	---
			Manganese	---		---	---	CNS	5.9E-02		4.4E-02	1.0E-01
			Nickel	---		---	---	Kidney, Liver, Spleen	6.7E-03		5.0E-03	1.2E-02
			Silver	---		---	---	Skin	8.3E-03		6.2E-03	1.5E-02
			Thallium	---		---	---	Blood, Liver, Hair	3.3E-01		9.9E-03	3.4E-01
			Vanadium	---		---	---	Kidney	8.6E-02		9.9E-02	1.9E-01
			Zinc	---		---	---	Blood Chemistry	2.8E-02		8.5E-04	2.9E-02
			Chemical Total	1.2E-06		1.2E-07	1.3E-06		1.1		0.21	1.3
		Exposure Point Total					1.3E-06					1.3
	Exposure Media Total						1.3E-06					1.3

Table E.1-63
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	Air (Particulates and Volatiles)	FLFA	Aroclor 1254		9.3E-11		9.3E-11	N/A		---		---
			Aroclor 1260		4.3E-11		4.3E-11	N/A		---		---
			Benzo(a)pyrene		7.3E-12		7.3E-12	N/A		---		---
			bis(2-chloroethoxy) methane		---		---	N/A		---		---
			p-Chloro-m-cresol		---		---	N/A		---		---
			4-Chlorophenyl phenyl ether		---		---	N/A		---		---
			Di-n-octyl phthalate		---		---	N/A		---		---
			2-Nitrophenol		---		---	N/A		---		---
			TCDD TE		3.0E-09		3.0E-09	N/A		---		---
			Aluminum		---		---	N/A		2.2E-01		2.2E-01
			Antimony		---		---	N/A		---		---
			Arsenic		3.1E-08		3.1E-08	N/A		---		---
			Barium		---		---	Fetus		8.1E-02		8.1E-02
			Cadmium		1.8E-09		1.8E-09	N/A		3.5E-04		3.5E-04
			Chromium III		---		---	N/A		---		---
			Cobalt		---		---	N/A		---		---
			Copper		---		---	N/A		---		---
			Iron		---		---	N/A		---		---
			Lead		---		---	N/A		---		---
			Manganese		---		---	CNS		4.3E-01		4.3E-01
			Nickel		---		---	N/A		---		---
			Silver		---		---	N/A		---		---
			Thallium		---		---	N/A		---		---
			Vanadium		---		---	N/A		---		---
			Zinc		---		---	N/A		---		---
			Chemical Total		3.6E-08		3.6E-08			0.73		0.73
		Exposure Point Total					3.6E-08					0.73
	Exposure Media Total						3.6E-08					0.73
Total Soil Total							1.4E-06					2.0

Table E.1-63
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
Groundwater	Air (Trench Air)	FLFA	Chloroform		2.6E-09		2.6E-09	N/A		1.6E-04		1.6.E-04
			Tetrachloroethene		2.4E-10		2.4E-10	CNS		1.1E-05		1.1.E-05
			Chemical Total		2.9E-09		2.9E-09			1.7E-04		1.7.E-04
		Exposure Point Total					2.9E-09					1.7.E-04
	Exposure Media Total						2.9E-09					1.7.E-04
Groundwater Total							2.9E-09					1.7E-04
Receptor Total							1.4E-06					2.0

Total Risk Across All Media = 1.4E-06

Total Hazard Across All Media = 2.0

(a) Chromium RfD is based on NOAEL; no target organ is identified.

CNS = Central nervous system.
GI = Gastrointestinal.
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.

Total Immune System HI Across All Media =	0.044
Total Eyes HI Across All Media =	0.044
Total CNS HI Across All Media =	0.58
Total Blood HI Across All Media =	0.48
Total Skin HI Across All Media =	0.11
Total Vascular Effects HI Across All Media =	0.10
Total Kidney HI Across All Media =	0.22
Total NOAEL HI Across All Media =	0.00033
Total GI Irritation HI Across All Media =	0.39
Total Liver HI Across All Media =	0.44
Total Spleen HI Across All Media =	0.012
Total Hair HI Across All Media =	0.34
Total Fetus HI Across All Media =	0.081

Table E.1-64
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	FLFA										
			Aroclor 1254	1.2E-06		5.4E-07	1.8E-06	Immune System, Eyes	2.7E-02		1.5E-02	4.1E-02
			Aroclor 1260	5.7E-07		2.5E-07	8.2E-07	N/A	---		---	---
			Benzo(a)pyrene	2.2E-07		9.2E-08	3.2E-07	N/A	---		---	---
			bis(2-chloroethoxy) methane	---		---	---	N/A	---		---	---
			p-Chloro-m-cresol	---		---	---	N/A	---		---	---
			4-Chlorophenyl phenyl ether	---		---		N/A	---		---	---
			Di-n-octyl phthalate	---		---	---	N/A	---		---	---
			2-Nitrophenol	---		---	---	N/A	9.1E-06		3.6E-06	1.3E-05
			TCDD TE	4.0E-05		3.8E-06	4.4E-05	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	3.6E-02		1.4E-03	3.7E-02
			Antimony	---		---	---	Blood Chemistry	2.0E-02		5.2E-03	2.5E-02
			Arsenic	4.0E-05		3.8E-06	4.4E-05	Skin, Vascular Effects	7.8E-02		9.3E-03	8.7E-02
			Barium	---		---	---	Kidney	9.2E-03		5.3E-03	1.5E-02
			Cadmium	---		---	---	Kidney	3.2E-03		5.2E-04	3.7E-03
			Chromium III	---		---	---	NOAEL	8.6E-05		2.6E-04	3.5E-04
			Cobalt	---		---	---	N/A	---		---	---
			Copper	---		---	---	Gi Tract	2.5E-01		1.0E-02	2.6E-01
			Iron	---		---	---	Blood, Liver, GI Irritation	7.1E-02		2.8E-03	7.3E-02
			Lead	---		---	---	N/A	---		---	---
			Manganese	---		---	---	CNS	5.0E-02		5.0E-02	1.0E-01
			Nickel	---		---	---	Kidney, Liver, Spleen	5.7E-03		5.7E-03	1.1E-02
			Silver	---		---	---	Skin	7.1E-03		7.1E-03	1.4E-02
			Thallium	---		---	---	Blood, Liver, Hair	2.8E-01		1.1E-02	2.9E-01
			Vanadium	---		---	---	Kidney	7.3E-02		1.1E-01	1.9E-01
			Zinc	---		---	---	Blood Chemistry	2.4E-02		9.6E-04	2.5E-02
			Chemical Total	8.2E-05		8.5E-06	9.1E-05		0.94		0.24	1.2
		Exposure Point Total					9.1E-05					1.2
	Exposure Media Total						9.1E-05					1.2

Table E.1-64
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	Air (Particulates and Volatiles)	FLFA	Aroclor 1254		3.4E-12		3.4E-12	N/A		---		---
			Aroclor 1260		1.6E-12		1.6E-12	N/A		---		---
			Benzo(a)pyrene		2.6E-13		2.6E-13	N/A		---		---
			bis(2-chloroethoxy) methane		---		---	N/A		---		---
			p-Chloro-m-cresol		---		---	N/A		---		---
			4-Chlorophenyl phenyl ether		---		---	N/A		---		---
			Di-n-octyl phthalate		---		---	N/A		---		---
			2-Nitrophenol		---		---	N/A		---		---
			TCDD TE		1.1E-10		1.1E-10	N/A		---		---
			Aluminum		---		---	N/A		1.4E-04		1.4E-04
			Antimony		---		---	N/A		---		---
			Arsenic		1.1E-09		1.1E-09	N/A		---		---
			Barium		---		---	Fetus		5.1E-05		5.1E-05
			Cadmium		6.5E-11		6.5E-11	N/A		2.2E-07		2.2E-07
			Chromium III		---		---	N/A		---		---
			Cobalt		---		---	N/A		---		---
			Copper		---		---	N/A		---		---
			Iron		---		---	N/A		---		---
			Lead		---		---	N/A		---		---
			Manganese		---		---	CNS		2.7E-04		2.7E-04
			Nickel		---		---	N/A		---		---
			Silver		---		---	N/A		---		---
			Thallium		---		---	N/A		---		---
			Vanadium		---		---	N/A		---		---
			Zinc		---		---	N/A		---		---
			Chemical Total		1.3E-09		1.3E-09			0.00046		0.00046
		Exposure Point Total					1.3E-09					0.00046
	Exposure Media Total						1.3E-09					0.00046
Total Soil Total							9.1E-05					1.2

Table E.1-64
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	FLFA										
			Chloroform	---		---	---	N/A	6.6E-02		NV	6.6E-02
			Tetrachloroethene	2.1E-05		1.2E-05	3.3E-05	CNS	7.1E-03		3.9E-03	1.1E-02
			TCDD TE	1.8E-06		3.3E-05	3.5E-05	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	2.6E-01		NV	2.6E-01
			Chromium III	---		---	---	NOAEL	7.9E-04		2.8E-04	1.1E-03
			Cobalt	---		---	---	N/A	---		---	---
			Iron	---		---	---	Blood, Liver, GI Irritation	4.0E-01		NV	4.0E-01
			Manganese	---		---	---	CNS	2.1E-01		NV	2.1E-01
			Perchlorate	---		---	---	Thyroid	1.1E-01		NV	1.1E-01
			Vanadium	---		---	---	Kidney	5.5E-01		9.5E-02	6.4E-01
			Chemical Total	2.3E-05		4.5E-05	6.7E-05		1.6		0.10	1.7
		Exposure Point Total					6.7E-05					1.7
	Exposure Media Total						6.7E-05					1.7
	Air (Indoor Air)	FLFA										
			Chloroform		9.0E-07		9.0E-07	N/A		9.6E-04		9.6.E-04
			Tetrachloroethene		5.5E-08		5.5E-08	CNS		4.2E-05		4.2.E-05
			Chemical Total		9.5E-07		9.5E-07			0.0010		0.0010
		Exposure Point Total					9.5E-07					0.0010
	Exposure Media Total						9.5E-07					0.0010
	Air (Shower Room)	FLFA										
			Chloroform		1.2E-05		1.2E-05	N/A		3.1E-02		3.1E-02
			Tetrachloroethene		2.9E-07		2.9E-07	CNS		5.2E-04		5.2E-04
			Chemical Total		1.2E-05		1.2E-05			0.03		0.03
		Exposure Point Total					1.2E-05					0.03
	Exposure Media Total						1.2E-05					0.03
Groundwater Total							8.0E-05					1.7
Receptor Total							1.7E-04					2.9

Total Risk Across All Media = 1.7E-04

Total Hazard Across All Media = 2.9

(a) Chromium RfD is based on NOAEL; no target organ is identified.
NV = No value calculated, chemical is not assessed.

CNS = Central nervous system.
GI = Gastrointestinal.
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.

Total Immune System HI Across All Media =	0.041
Total Eyes HI Across All Media =	0.041
Total CNS HI Across All Media =	0.62
Total Blood HI Across All Media =	0.81
Total Skin HI Across All Media =	0.102
Total Vascular Effects HI Across All Media =	0.087
Total Kidney HI Across All Media =	0.86
Total NOAEL HI Across All Media =	0.00035
Total GI Irritation HI Across All Media =	0.73
Total Liver HI Across All Media =	0.77
Total Spleen HI Across All Media =	0.011
Total Hair HI Across All Media =	0.29
Total Fetus HI Across All Media =	0.000051
Total Thyroid HI Across All Media =	0.11

Table E.1-65
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	FLFA										
			Aroclor 1254	8.5E-07		3.3E-07	1.2E-06	Immune System, Eyes	2.5E-01		9.7E-02	3.5E-01
			Aroclor 1260	4.0E-07		1.6E-07	5.5E-07	N/A	---		---	---
			Benzo(a)pyrene	1.6E-07		5.7E-08	2.1E-07	N/A	---		---	---
			bis(2-chloroethoxy) methane	---		---	---	N/A	---		---	---
			p-Chloro-m-cresol	---		---	---	N/A	---		---	---
			4-Chlorophenyl phenyl ether	---		---	---	N/A	---		---	---
			Di-n-octyl phthalate	---		---	---	N/A	---		---	---
			2-Nitrophenol	---		---	---	N/A	8.5E-05		2.4E-05	1.1E-04
			TCDD TE	2.8E-05		2.3E-06	3.0E-05	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	3.4E-01		9.4E-03	3.5E-01
			Antimony	---		---	---	Blood Chemistry	1.8E-01		3.4E-02	2.2E-01
			Arsenic	2.8E-05		2.4E-06	3.0E-05	Skin, Vascular Effects	7.3E-01		6.1E-02	7.9E-01
			Barium	---		---	---	Kidney	8.6E-02		3.5E-02	1.2E-01
			Cadmium	---		---	---	Kidney	3.0E-02		3.4E-03	3.4E-02
			Chromium III	---		---	---	NOAEL	8.0E-04		1.7E-03	2.5E-03
			Cobalt	---		---	---	N/A	---		---	---
			Copper	---		---	---	GI Tract	2.4E+00		6.6E-02	2.4E+00
			Iron	---		---	---	Blood, Liver, GI Irritation	6.6E-01		1.8E-02	6.8E-01
			Lead	---		---	---	N/A	---		---	---
			Manganese	---		---	---	CNS	4.7E-01		3.3E-01	8.0E-01
			Nickel	---		---	---	Kidney, Liver, Spleen	5.3E-02		3.7E-02	9.0E-02
			Silver	---		---	---	Skin	6.6E-02		4.6E-02	1.1E-01
			Thallium	---		---	---	Blood, Liver, Hair	2.6E+00		7.3E-02	2.7E+00
			Vanadium	---		---	---	Kidney	6.8E-01		7.3E-01	1.4E+00
			Zinc	---		---	---	Blood Chemistry	2.2E-01		6.3E-03	2.3E-01
			Chemical Total	5.7E-05		5.3E-06	6.3E-05		8.7		1.6	10
		Exposure Point Total					6.3E-05					10
	Exposure Media Total						6.3E-05					10

Table E.1-65
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	Air (Particulates and Volatiles)	FLFA	Aroclor 1254		2.0E-12		2.0E-12	N/A		---		---
			Aroclor 1260		9.2E-13		9.2E-13	N/A		---		---
			Benzo(a)pyrene		1.5E-13		1.5E-13	N/A		---		---
			bis(2-chloroethoxy) methane		---		---	N/A		---		---
			p-Chloro-m-cresol		---		---	N/A		---		---
			4-Chlorophenyl phenyl ether		---		---	N/A		---		---
			Di-n-octyl phthalate		---		---	N/A		---		---
			2-Nitrophenol		---		---	N/A		---		---
			TCDD TE		6.5E-11		6.5E-11	N/A		---		---
			Aluminum		---		---	N/A		7.8E-04		7.8E-04
			Antimony		---		---	N/A		---		---
			Arsenic		6.6E-10		6.6E-10	N/A		---		---
			Barium		---		---	Fetus		2.9E-04		2.9E-04
			Cadmium		3.8E-11		3.8E-11	N/A		1.2E-06		1.2E-06
			Chromium III		---		---	N/A		---		---
			Cobalt		---		---	N/A		---		---
			Copper		---		---	N/A		---		---
			Iron		---		---	N/A		---		---
			Lead		---		---	N/A		---		---
			Manganese		---		---	CNS		1.5E-03		1.5E-03
			Nickel		---		---	N/A		---		---
			Silver		---		---	N/A		---		---
			Thallium		---		---	N/A		---		---
			Vanadium		---		---	N/A		---		---
			Zinc		---		---	N/A		---		---
			Chemical Total		7.6E-10		7.6E-10			0.0026		0.0026
		Exposure Point Total					7.6E-10					0.0026
	Exposure Media Total						7.6E-10					0.0026
Total Soil Total							6.3E-05					10

Table E.1-65
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	FLFA										
			Chloroform	---		---	---	N/A	1.5E-01		NV	1.5E-01
			Tetrachloroethene	7.7E-06		4.5E-06	1.2E-05	CNS	1.7E-02		9.7E-03	2.6E-02
			TCDD TE	6.5E-07		1.2E-05	1.3E-05	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	6.0E-01		NV	6.0E-01
			Chromium III	---		---	---	NOAEL	1.8E-03		9.3E-04	2.8E-03
			Cobalt	---		---	---	N/A	---		---	---
			Iron	---		---	---	Blood, Liver, GI Irritation	9.2E-01		NV	9.2E-01
			Manganese	---		---	---	CNS	2.5E-01		NV	2.5E-01
			Perchlorate	---		---	---	Thyroid	4.9E-01		NV	4.9E-01
			Vanadium	---		---	---	Kidney	1.3E+00		3.2E-01	1.6E+00
			Chemical Total	8.3E-06		1.7E-05	2.5E-05		3.7		0.34	4.0
		Exposure Point Total					2.5E-05					4.0
	Exposure Media Total						2.5E-05					4.0
	Air (Indoor Air)	FLFA										
			Chloroform		5.3E-07		5.3E-07	N/A		5.4E-03		5.4.E-03
			Tetrachloroethene		3.2E-08		3.2E-08	CNS		2.4E-04		2.4.E-04
			Chemical Total		5.6E-07		5.6E-07			0.0056		0.0056
		Exposure Point Total					5.6E-07					0.0056
	Exposure Media Total						5.6E-07					0.0056
Groundwater Total							2.6E-05					4.1
Receptor Total							8.9E-05					14

Total Risk Across All Media = 8.9E-05

Total Hazard Across All Media = 14

(a) Chromium RfD is based on NOAEL; no target organ is identified.
NV = No value calculated, chemical is not assessed.

CNS = Central nervous system.
GI = Gastrointestinal.
NOAEL = No Observable Adverse Effects Level.
N/A = Not Available.

Total Immune System HI Across All Media =	0.35
Total Eyes HI Across All Media =	0.35
Total CNS HI Across All Media =	2.0
Total Blood HI Across All Media =	4.7
Total Skin HI Across All Media =	0.902
Total Vascular Effects HI Across All Media =	0.79
Total Kidney HI Across All Media =	3.26
Total NOAEL HI Across All Media =	0.0053
Total GI Irritation HI Across All Media =	4.0
Total Liver HI Across All Media =	4.4
Total Spleen HI Across All Media =	0.090
Total Hair HI Across All Media =	2.7
Total Fetus HI Across All Media =	0.00029
Total Thyroid HI Across All Media =	0.49

Table E.1-66
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	FLFA										
			Chloroform	---		---	---	N/A	6.6E-02		NV	6.6E-02
			Tetrachloroethene	2.1E-05		1.2E-05	3.3E-05	CNS	7.1E-03		3.9E-03	1.1E-02
			TCDD TE	1.8E-06		3.3E-05	3.5E-05	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	2.6E-01		NV	2.6E-01
			Chromium III	---		---	---	NOAEL	7.9E-04		2.8E-04	1.1E-03
			Cobalt	---		---	---	N/A	---		---	---
			Iron	---		---	---	Blood, Liver, GI Irritation	4.0E-01		NV	4.0E-01
			Manganese	---		---	---	CNS	2.1E-01		NV	2.1E-01
			Perchlorate	---		---	---	Thyroid	1.1E-01		NV	1.1E-01
			Vanadium	---		---	---	Kidney	5.5E-01		9.5E-02	6.4E-01
			Chemical Total	2.3E-05		4.5E-05	6.7E-05		1.6		0.10	1.7
		Exposure Point Total					6.7E-05					1.7
	Exposure Media Total						6.7E-05					1.7
	Air (Indoor Air)	FLFA										
			Chloroform		9.0E-07		9.0E-07	N/A		9.6E-04		9.6E-04
			Tetrachloroethene		5.5E-08		5.5E-08	CNS		4.2E-05		4.2.E-05
			Chemical Total		9.5E-07		9.5E-07			0.0010		0.0010
		Exposure Point Total					9.5E-07					0.0010
	Exposure Media Total						9.5E-07					0.0010
	Air (Shower Room)	FLFA										
			Chlororform		1.2E-05		1.2E-05	N/A		3.1E-02		3.1E-02
			Tetrachloroethene		2.9E-07		2.9E-07	CNS		5.2E-04		5.2.E-04
			Chemical Total		1.2E-05		1.2E-05			0.03		0.03
		Exposure Point Total					1.2E-05					0.03
	Exposure Media Total						1.2E-05					0.03
Groundwater Total							8.0E-05					1.7
Receptor Total							8.0E-05					1.7

Total Risk Across All Media = 8.0E-05

Total Hazard Across All Media = 1.7

NV = No value calculated, chemical is not assessed.
CNS = Central nervous system.
NOAEL = No Observable Adverse Effects Level.
GI = Gastrointestinal
N/A = Not Available.

Total CNS HI Across All Media = 0.48
Total NOAEL HI Across All Media = 0.00106
Total Blood HI Across All Media = 0.40
Total Liver HI Across All Media = 0.40
Total GI Irritation HI Across All Media = 0.40
Total Thyroid HI Across All Media = 0.11
Total Kidney HI Across All Media = 0.64

Table E.1-67
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	FLFA										
			Chloroform	---		---	---	N/A	1.5E-01		NV	1.5E-01
			Tetrachloroethene	7.7E-06		4.5E-06	1.2E-05	CNS	1.7E-02		9.7E-03	2.6E-02
			TCDD TE	6.5E-07		1.2E-05	1.3E-05	N/A	---		---	---
			Aluminum	---		---	---	Developmental nervous system	6.0E-01		NV	6.0E-01
			Chromium III	---		---	---	NOAEL	1.8E-03		9.3E-04	2.8E-03
			Cobalt	---		---	---	N/A	---		---	---
			Iron	---		---	---	Blood, Liver, GI Irritation	9.2E-01		NV	9.2E-01
			Manganese	---		---	---	CNS	2.5E-01		NV	2.5E-01
			Perchlorate	---		---	---	Thyroid	4.9E-01		NV	4.9E-01
			Vanadium	---		---	---	Kidney	1.3E+00		3.2E-01	1.6E+00
			Chemical Total	8.3E-06		1.7E-05	2.5E-05		3.7		0.34	4.0
		Exposure Point Total					2.5E-05					4.0
	Exposure Media Total						2.5E-05					4.0
	Air (Indoor Air)	FLFA										
			Chloroform		5.3E-07		5.3E-07	N/A		5.4E-03		5.4E-03
			Tetrachloroethene		3.2E-08		3.2E-08	CNS		2.4E-04		2.4.E-04
			Chemical Total		5.6E-07		5.6E-07			5.6E-03		5.6E-03
		Exposure Point Total					5.6E-07					5.6.E-03
	Exposure Media Total						5.6E-07					5.6.E-03
Groundwater Total							2.6E-05					4.1
Receptor Total							2.6E-05					4.1

Total Risk Across All Media = 2.6E-05

Total Hazard Across All Media = 4.1

NV = No value calculated, chemical is not assessed.
CNS = Central nervous system.
NOAEL = No Observable Adverse Effects Level.
GI = Gastrointestinal
N/A = Not Available.

Total CNS HI Across All Media =	0.87
Total NOAEL HI Across All Media =	0.00276
Total Blood HI Across All Media =	0.92
Total Liver HI Across All Media =	0.92
Total GI Irritation HI Across All Media =	0.92
Total Thyroid HI Across All Media =	0.49
Total Kidney HI Across All Media =	1.60

Table E.1-68
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	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	FLFA	TCDD TE	2.6E-06		5.2E-07		3.2E-06					
			Arsenic	1.5E-06		2.9E-07		1.8E-06					
			Chemical Total	4.1E-06		8.1E-07		4.9E-06					<1
		Exposure Point Total						4.9E-06					<1
	Exposure Media Total							4.9E-06					<1
	Air (Particulates and Volatiles)	FLFA											
			Chemical Total					<1.0E-06					<1
		Exposure Point Total						<1.0E-06					<1
	Exposure Media Total							<1.0E-06					<1
Soil Total								4.9E-06					<1
Groundwater	Air (Ambient Air)	FLFA											
			Chemical Total					<1.0E-06					<1
		Exposure Point Total						<1.0E-06					<1
	Exposure Media Total							<1.0E-06					<1
Groundwater Total													
Receptor Total								4.9E-06					<1

Total Risk Across All Media = 4.9E-06

Total Hazard Across All Media = <1

Table E.1-69
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	FLFA	TCDD TE	2.6E-06		5.2E-07	3.2E-06					
			Arsenic	1.5E-06		2.9E-07	1.8E-06					
			Chemical Total	4.1E-06		8.1E-07	4.9E-06					<1
		Exposure Point Total					4.9E-06					<1
	Exposure Media Total						4.9E-06					<1
	Air (Particulates and Volatiles)	FLFA										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Soil Total							4.9E-06					<1
Total Soil	Total Soil	FLFA	TCDD TE	1.8E-06		3.5E-07	2.1E-06					
			Arsenic	1.8E-06		3.5E-07	2.1E-06					
			Chemical Total	3.6E-06		7.1E-07	4.3E-06					<1
		Exposure Point Total					4.3E-06					<1
	Exposure Media Total						4.3E-06					<1
	Air (Particulates and Volatiles)	FLFA										
			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							4.3E-06					<1
Groundwater	Air (Ambient Air)	FLFA										
			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]							4.9E-06					<1

Total Risk Across All Media [a] = 4.9E-06

Total Hazard Across All Media = <1

(a) Since surface soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this soil data grouping.

Table E.1-70
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	FLFA	TCDD TE	1.2E-05		2.4E-06	1.4E-05					
			Arsenic	6.6E-06		1.3E-06	7.9E-06					
			Chemical Total	1.8E-05		3.7E-06	2.2E-05					<1
		Exposure Point Total					2.2E-05					<1
	Exposure Media Total						2.2E-05					<1
	Air (Particulates and Volatiles)	FLFA										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Surface Soil Total							2.2E-05					<1
Total Soil	Total Soil	FLFA	TCDD TE	8.0E-06		1.6E-06	9.6E-06					
			Arsenic	8.1E-06		1.6E-06	9.7E-06					
			Chemical Total	1.6E-05		3.2E-06	1.9E-05					<1
		Exposure Point Total					1.9E-05					<1
	Exposure Media Total						1.9E-05					<1
	Air (Particulates and Volatiles)	FLFA										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Total Soil Total							1.9E-05					<1

Table E.1-70
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
Groundwater	Groundwater	FLFA	Tetrachloroethene	4.4E-06			4.4E-06					
			Chemical Total	4.4E-06			4.4E-06					
		Exposure Point Total					4.4E-06					<1
	Exposure Media Total						4.4E-06					<1
	Air (Ambient Air)	FLFA										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Air (Indoor Air)	FLFA										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							4.4E-06					<1
Receptor Total[a]							2.7E-05					1.4 (b)

Total Risk Across All Media[a] = 2.7E-05

Total Hazard Across All Media = 1.4 (b)

(a) Since surface soil represents the more highly contaminated portion of soil, total risk and hazard estimates are conservatively based on this soil data grouping.

(b) No chemical or target organ HI is equal to or greater than 1.

Table E.1-71
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	FLFA										
			Chemical Total				<1.0E-06					1.3 (b)
		Exposure Point Total					<1.0E-06					1.3 (b)
	Exposure Media Total						<1.0E-06					1.3 (b)
	Air (Particulates and Volatiles)	FLFA										
			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					2.0 (b)
Groundwater	Air (Trench Air)	FLFA										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total												<1
Receptor Total							1.3 (a)					2.0 (b)

Total Risk Across All Media = 1.3 (a)

Total Hazard Across All Media = 2.0 (b)

(a) No chemical risk is equal to or greater than 1.0E-06.
(b) No chemical or target organ HI is equal to or greater than 1.

Table E.1-72
Risk Assessment Summary
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 51	Aroclor 1254	1.2E-06		5.4E-07	1.8E-06					
			TCDD TE	4.0E-05		3.8E-06	4.4E-05					
			Arsenic	4.0E-05		3.8E-06	4.4E-05					
			Chemical Total	8.1E-05		8.1E-06	8.9E-05					1.2 (a)
		Exposure Point Total					8.9E-05					1.2 (a)
	Exposure Media Total						8.9E-05					1.2 (a)
	Air (Particulates and Volatiles)	FLFA										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Total Soil Total							8.9E-05					1.2 (a)
Groundwater	Groundwater	FLFA	Tetrachloroethene	2.1E-05		1.2E-05	3.3E-05					
			TCDD TE	1.8E-06		3.3E-05	3.5E-05					
			Chemical Total	2.3E-05		4.5E-05	6.7E-05					1.7 (a)
		Exposure Point Total					6.7E-05					1.7 (a)
	Exposure Media Total						6.7E-05					1.7 (a)
	Air (Indoor Air)	FLFA										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Air (Shower Room)	FLFA	Chloroform		1.2E-05		1.2E-05					
			Chemical Total		1.2E-05		1.2E-05					<1
		Exposure Point Total					1.2E-05					<1
	Exposure Media Total						1.2E-05					<1
Groundwater Total							7.9E-05					1.7 (a)
Receptor Total							1.7E-04					2.9 (a)

Total Risk Across All Media = 1.7E-04

Total Hazard Across All Media = 2.9 (a)

(a) No chemical or target organ HI is equal to or greater than 1.

Table E.1-73
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	FLFA										
			Aroclor 1254	8.5E-07		3.3E-07	1.2E-06		---		---	---
			TCDD TE	2.8E-05		2.3E-06	3.0E-05		---		---	---
			Arsenic	2.8E-05		2.4E-06	3.0E-05		---		---	---
			Copper	---		---	---	GI Tract	2.4E+00		6.6E-02	2.4E+00
			Thallium	---		---	---	Blood, Liver, Hair	2.6E+00		7.3E-02	2.7E+00
			Vanadium	---		---	---	Kidney	6.8E-01		7.3E-01	1.4E+00
			Chemical Total	5.7E-05		5.0E-06	6.2E-05		5.7		0.9	6.5
		Exposure Point Total					6.2E-05					6.5
	Exposure Media Total						6.2E-05					6.5
	Air (Particulates and Volatiles)	FLFA										
			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-05					6.5
Groundwater	Groundwater	FLFA										
			Tetrachloroethene	7.7E-06		4.5E-06	1.2E-05		---		---	---
			TCDD TE	6.5E-07		1.2E-05	1.3E-05		---		---	---
			Vanadium	---		---	---	Kidney	1.3E+00		3.2E-01	1.6
			Chemical Total	8.3E-06		1.7E-05	2.5E-05		1.3		0.32	1.6
		Exposure Point Total					2.5E-05					1.6
	Exposure Media Total						2.5E-05					1.6
	Air (Indoor Air)	FLFA										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							2.5E-05					1.6
Receptor Total							8.7E-05					8.1

Total Risk Across All Media = 8.7E-05

Total Hazard Across All Media = 8.1

GI = Gastrointestinal

Total GI Tract HI Across All Media = 2.4
Total Blood HI Across All Media = 2.7
Total Liver HI Across All Media = 2.7
Total Hair HI Across All Media = 2.7
Total Kidney HI Across All Media = 3.0

Table E.1-74
Risk Assessment Summary
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	FLFA										
			Tetrachloroethene	2.1E-05		1.2E-05	3.3E-05					
			TCDD TE	1.8E-06		3.3E-05	3.5E-05					
			Chemical Total	2.3E-05		4.5E-05	6.7E-05					
		Exposure Point Total					6.7E-05					1.7 (a)
	Exposure Media Total						6.7E-05					1.7 (a)
	Air (Indoor Air)	FLFA										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Air (Shower Room)	FLFA										
			Chloroform		1.2E-05		1.2E-05					
			Chemical Total				1.2E-05					<1
		Exposure Point Total					1.2E-05					<1
	Exposure Media Total						1.2E-05					<1
Groundwater Total							7.9E-05					1.7 (a)
Receptor Total							7.9E-05					1.7 (a)

Total Risk Across All Media = 7.9E-05

Total Hazard Across All Media = 1.7 (a)

(a) No chemical or target organ HI is equal to or greater than 1.

Table E.1-75
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	FLFA										
			Tetrachloroethene	7.7E-06		4.5E-06	1.2E-05		---		---	---
			TCDD TE	6.5E-07		1.2E-05	1.3E-05		---		---	---
			Vanadium	---		---	---	Kidney	1.3E+00		3.2E-01	1.6E+00
			Chemical Total	8.3E-06		1.7E-05	2.5E-05		1.3		0.32	1.6
		Exposure Point Total					2.5E-05					1.6
	Exposure Media Total						2.5E-05					1.6
	Air (Indoor Air)	FLFA										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							2.5E-05					<1
Receptor Total							2.5E-05					<1

Total Risk Across All Media = 2.5E-05

Total Hazard Across All Media = 1.6

Total Kidney HI Across All Media = 1.6

Appendix E-2

Calculations for 2,3,7,8-TCDD Equivalents

Calculations for 2,3,7,8-TCDD Equivalents

Sample		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)	
17MW02	TCDD-TE	4.26E-06	NG/L			GW	4.26E-12	mg/L		mg/L
17PZ01	TCDD-TE	3.06E-06	NG/L			GW	3.06E-12	mg/L		mg/L
LFMW01	TCDD-TE	2.06E-05	NG/L			GW	2.06E-11	mg/L		mg/L
LFSB12B	TCDD-TE	1.06E-02	ng/kg			SB	1.06E-08	mg/kg		mg/kg
LFSB12C	TCDD-TE	9.23E-03	ng/kg			SB	9.23E-09	mg/kg		mg/kg
LFSB13A	TCDD-TE	1.50E-02	ng/kg			SB	1.50E-08	mg/kg		mg/kg
LFSB14A	TCDD-TE	2.73E-02	ng/kg			SB	2.73E-08	mg/kg		mg/kg
LFSB14B	TCDD-TE	1.92E-02	ng/kg			SB	1.92E-08	mg/kg		mg/kg
LFSB15B	TCDD-TE	2.19E-01	ng/kg			SB	2.19E-07	mg/kg		mg/kg
LFSB15C	TCDD-TE	1.72E-02	ng/kg			SB	1.72E-08	mg/kg		mg/kg
LFSB12A	TCDD-TE	3.93E-01	ng/kg	3.93E-01	ng/kg	SS	3.93E-07	mg/kg	3.93E-07	mg/kg
LFSB15A	TCDD-TE	2.19E+00	ng/kg	2.19E+00	ng/kg	SS	2.19E-06	mg/kg	2.19E-06	mg/kg
LFSB16A	TCDD-TE	4.40E-01	ng/kg	4.40E-01	ng/kg	SS	4.40E-07	mg/kg	4.40E-07	mg/kg
LFSB17A	TCDD-TE	4.26E-01	ng/kg	4.26E-01	ng/kg	SS	4.26E-07	mg/kg	4.26E-07	mg/kg
LFSS01	TCDD-TE	2.09E-01	ng/kg	2.09E-01	ng/kg	SS	2.09E-07	mg/kg	2.09E-07	mg/kg
LFSS02	TCDD-TE	7.39E-01	ng/kg	7.39E-01	ng/kg	SS	7.39E-07	mg/kg	7.39E-07	mg/kg
LFSS03	TCDD-TE	3.94E-01	ng/kg	3.94E-01	ng/kg	SS	3.94E-07	mg/kg	3.94E-07	mg/kg
LFSS04	TCDD-TE	3.45E+00	ng/kg	3.45E+00	ng/kg	SS	3.45E-06	mg/kg	3.45E-06	mg/kg
LFSS05	TCDD-TE	1.58E+00	ng/kg	1.58E+00	ng/kg	SS	1.58E-06	mg/kg	1.58E-06	mg/kg
LFSS06	TCDD-TE	8.01E-01	ng/kg	8.01E-01	ng/kg	SS	8.01E-07	mg/kg	8.01E-07	mg/kg
LFSS07	TCDD-TE	1.41E+00	ng/kg	1.41E+00	ng/kg	SS	1.41E-06	mg/kg	1.41E-06	mg/kg
LFSS08	TCDD-TE	4.32E-01	ng/kg	4.32E-01	ng/kg	SS	4.32E-07	mg/kg	4.32E-07	mg/kg
LFSS09	TCDD-TE	2.18E+00	ng/kg	2.18E+00	ng/kg	SS	2.18E-06	mg/kg	2.18E-06	mg/kg
LFSS10	TCDD-TE	2.31E+00	ng/kg	2.31E+00	ng/kg	SS	2.31E-06	mg/kg	2.31E-06	mg/kg
LFSS11	TCDD-TE	2.23E+00	ng/kg	2.23E+00	ng/kg	SS	2.23E-06	mg/kg	2.23E-06	mg/kg
LFSS12	TCDD-TE	3.90E-01	ng/kg	3.90E-01	ng/kg	SS	3.90E-07	mg/kg	3.90E-07	mg/kg
LFSS13	TCDD-TE	2.03E+00	ng/kg	2.03E+00	ng/kg	SS	2.03E-06	mg/kg	2.03E-06	mg/kg
LFSS14	TCDD-TE	1.28E+00	ng/kg	1.28E+00	ng/kg	SS	1.28E-06	mg/kg	1.28E-06	mg/kg
LFSS15	TCDD-TE	1.03E+00	ng/kg	1.03E+00	ng/kg	SS	1.03E-06	mg/kg	1.03E-06	mg/kg
LFSS16	TCDD-TE	5.34E-01	ng/kg	5.34E-01	ng/kg	SS	5.34E-07	mg/kg	5.34E-07	mg/kg
LFSS17	TCDD-TE	1.13E+00	ng/kg	1.13E+00	ng/kg	SS	1.13E-06	mg/kg	1.13E-06	mg/kg
LFSS18	TCDD-TE	1.32E+00	ng/kg	1.32E+00	ng/kg	SS	1.32E-06	mg/kg	1.32E-06	mg/kg
LFSS19	TCDD-TE	2.13E+00	ng/kg	2.13E+00	ng/kg	SS	2.13E-06	mg/kg	2.13E-06	mg/kg
LFSS20	TCDD-TE	4.34E+01	ng/kg	4.34E+01	ng/kg	SS	4.34E-05	mg/kg	4.34E-05	mg/kg
LFSS21	TCDD-TE	1.96E+00	ng/kg	1.96E+00	ng/kg	SS	1.96E-06	mg/kg	1.96E-06	mg/kg

Appendix E-3

Exposure Point Concentrations – ProUCL 4.0 Output

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

1,2,4-Trichlorobenzene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	6
		Percent Non-Detects	66.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.012	Minimum Detected	-4.423
Maximum Detected	0.0545	Maximum Detected	-2.91
Mean of Detected	0.0325	Mean of Detected	-3.602
SD of Detected	0.0213	SD of Detected	0.765
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.996	Shapiro Wilk Test Statistic	0.979
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0725	Mean	-2.79
SD	0.0325	SD	0.723
95% DL/2 (t) UCL	0.0926	95% H-Stat (DL/2) UCL	0.159
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.602
		SD in Log Scale	0.658
		Mean in Original Scale	0.0326
		SD in Original Scale	0.0195
		95% Percentile Bootstrap UCL	0.0431

95% BCA Bootstrap UCL	0.0434

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	0.254
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
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0325
SD	0.0174
SE of Mean	0.0123
95% KM (t) UCL	0.0554
95% KM (z) UCL	0.0527
95% KM (jackknife) UCL	0.0589
95% KM (bootstrap t) UCL	0.0733
95% KM (BCA) UCL	0.0545
95% KM (Percentile Bootstrap) UCL	0.0545
95% KM (Chebyshev) UCL	0.0861
97.5% KM (Chebyshev) UCL	0.109
99% KM (Chebyshev) UCL	0.155

Potential UCLs to Use

95% KM (t) UCL	0.0554
95% KM (Percentile Bootstrap) UCL	0.0545

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

1,2-Dichlorobenzene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	2
Number of Unique Samples	2	Number of Non-Detect Data	7
		Percent Non-Detects	77.78%

Raw Statistics

Minimum Detected	0.03
Maximum Detected	0.051
Mean of Detected	0.0405
SD of Detected	0.0148
Minimum Non-Detect	0.17
Maximum Non-Detect	0.2

Log-transformed Statistics

Minimum Detected	-3.507
Maximum Detected	-2.976
Mean of Detected	-3.241
SD of Detected	0.375
Minimum Non-Detect	-1.772
Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	1	Shapiro Wilk Test Statistic	1
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0807	Mean	-2.577
SD	0.0243	SD	0.405
95% DL/2 (t) UCL	0.0957	95% H-Stat (DL/2) UCL	0.112
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	0.359	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0405
5% K-S Critical Value	N/A	SD	0.0105
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0105
		95% KM (t) UCL	0.06
Assuming Gamma Distribution		95% KM (z) UCL	0.0578
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0665
Minimum	N/A	95% KM (bootstrap t) UCL	1.8E+308
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.0863
SD	N/A	97.5% KM (Chebyshev) UCL	0.106
k star	N/A	99% KM (Chebyshev) UCL	0.145
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	

AppChi2	N/A	95% KM (t) UCL	0.06
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

1,3-Dichlorobenzene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	6
		Percent Non-Detects	66.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.012	Minimum Detected	-4.423
Maximum Detected	0.051	Maximum Detected	-2.976
Mean of Detected	0.0317	Mean of Detected	-3.614
SD of Detected	0.0195	SD of Detected	0.739
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	1	Shapiro Wilk Test Statistic	0.96
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0722	Mean	-2.794
SD	0.0326	SD	0.721
95% DL/2 (t) UCL	0.0924	95% H-Stat (DL/2) UCL	0.158
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.614
		SD in Log Scale	0.631
		Mean in Original Scale	0.0318
		SD in Original Scale	0.0182
		95% Percentile Bootstrap UCL	0.0412
		95% BCA Bootstrap UCL	0.0409

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	0.275	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0317
5% K-S Critical Value	N/A	SD	0.0159
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0113
		95% KM (t) UCL	0.0526
Assuming Gamma Distribution		95% KM (z) UCL	0.0502
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0558
Minimum	N/A	95% KM (bootstrap t) UCL	0.0585
Maximum	N/A	95% KM (BCA) UCL	0.051
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.051
Median	N/A	95% KM (Chebyshev) UCL	0.0807
SD	N/A	97.5% KM (Chebyshev) UCL	0.102
k star	N/A	99% KM (Chebyshev) UCL	0.144
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.0526
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	0.051
95% Adjusted Gamma UCL	N/A		

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

1,4-Dichlorobenzene (mg/kg)

General Statistics			
Number of Valid Samples	9	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	6
		Percent Non-Detects	66.67%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.013	Minimum Detected	-4.343
Maximum Detected	0.0525	Maximum Detected	-2.947
Mean of Detected	0.0332	Mean of Detected	-3.557
SD of Detected	0.0198	SD of Detected	0.714
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9

For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.999	Shapiro Wilk Test Statistic	0.955
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0727	Mean	-2.775
SD	0.0319	SD	0.69
95% DL/2 (t) UCL	0.0925	95% H-Stat (DL/2) UCL	0.151
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.557
		SD in Log Scale	0.609
		Mean in Original Scale	0.0333
		SD in Original Scale	0.0184
		95% Percentile Bootstrap UCL	0.043
		95% BCA Bootstrap UCL	0.0434
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	0.281	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0332
5% K-S Critical Value	N/A	SD	0.0161
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0114
		95% KM (t) UCL	0.0544
Assuming Gamma Distribution		95% KM (z) UCL	0.0519
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0577
Minimum	N/A	95% KM (bootstrap t) UCL	0.0656
Maximum	N/A	95% KM (BCA) UCL	0.0525
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.0525
Median	N/A	95% KM (Chebyshev) UCL	0.0829
SD	N/A	97.5% KM (Chebyshev) UCL	0.104
k star	N/A	99% KM (Chebyshev) UCL	0.147
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	95% KM (t) UCL	0.0544

95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	0.0525
95% Adjusted Gamma UCL	N/A		

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

2,4-Dichlorophenol (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	2
Number of Unique Samples	2	Number of Non-Detect Data	7
		Percent Non-Detects	77.78%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.022	Minimum Detected	-3.817
Maximum Detected	0.0469	Maximum Detected	-3.061
Mean of Detected	0.0344	Mean of Detected	-3.439
SD of Detected	0.0176	SD of Detected	0.535
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	1	Shapiro Wilk Test Statistic	1
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0793	Mean	-2.621
SD	0.027	SD	0.506
95% DL/2 (t) UCL	0.0961	95% H-Stat (DL/2) UCL	0.125
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	0.359	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0344
5% K-S Critical Value	N/A	SD	0.0124
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0124
		95% KM (t) UCL	0.0575
Assuming Gamma Distribution		95% KM (z) UCL	0.0549
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0652
Minimum	N/A	95% KM (bootstrap t) UCL	1.8E+308
Maximum	N/A	95% KM (BCA) UCL	0.0469
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.0469
Median	N/A	95% KM (Chebyshev) UCL	0.0886
SD	N/A	97.5% KM (Chebyshev) UCL	0.112
k star	N/A	99% KM (Chebyshev) UCL	0.158
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.0575
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	0.0469
95% Adjusted Gamma UCL	N/A		

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

2,4-Dinitrotoluene (mg/kg)

General Statistics			
Number of Valid Samples	9	Number of Detected Data	2
Number of Unique Samples	2	Number of Non-Detect Data	7
		Percent Non-Detects	77.78%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.081	Minimum Detected	-2.513
Maximum Detected	0.12	Maximum Detected	-2.12
Mean of Detected	0.101	Mean of Detected	-2.317
SD of Detected	0.0276	SD of Detected	0.278
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	0.4	Maximum Non-Detect	-0.916

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0

Observations < Largest ND are treated as NDs

Single DL Non-Detect Percentage 100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	1
5% Shapiro Wilk Critical Value	N/A

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.111
SD	0.0351
95% DL/2 (t) UCL	0.132
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	1
5% Shapiro Wilk Critical Value	N/A

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-2.235
SD	0.258
95% H-Stat (DL/2) UCL	0.132
Log ROS Method	
Mean in Log Scale	N/A
SD in Log Scale	N/A
Mean in Original Scale	N/A
SD in Original Scale	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A

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	0.359
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
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.101
SD	0.0195
SE of Mean	0.0195
95% KM (t) UCL	0.137
95% KM (z) UCL	0.133
95% KM (jackknife) UCL	0.149
95% KM (bootstrap t) UCL	1.8E+308
95% KM (BCA) UCL	0.12
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	0.185
97.5% KM (Chebyshev) UCL	0.222
99% KM (Chebyshev) UCL	0.295

Potential UCLs to Use

95% KM (t) UCL	0.137
95% KM (% Bootstrap) UCL	N/A

95% Adjusted Gamma UCL	N/A

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

2-Chloronaphthalene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	6
		Percent Non-Detects	66.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.008	Minimum Detected	-4.828
Maximum Detected	0.048	Maximum Detected	-3.037
Mean of Detected	0.0253	Mean of Detected	-3.926
SD of Detected	0.0205	SD of Detected	0.896
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.949	Shapiro Wilk Test Statistic	1
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0701	Mean	-2.898
SD	0.0357	SD	0.894
95% DL/2 (t) UCL	0.0922	95% H-Stat (DL/2) UCL	0.217
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.926
		SD in Log Scale	0.776
		Mean in Original Scale	0.0254
		SD in Original Scale	0.0179
		95% Percentile Bootstrap UCL	0.0344
		95% BCA Bootstrap UCL	0.0348

Gamma Distribution Test with Detected Values Only	Data Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	0.252
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
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0253
SD	0.0168
SE of Mean	0.0119
95% KM (t) UCL	0.0474
95% KM (z) UCL	0.0448
95% KM (jackknife) UCL	0.0508
95% KM (bootstrap t) UCL	0.082
95% KM (BCA) UCL	N/A
95% KM (Percentile Bootstrap) UCL	0.048
95% KM (Chebyshev) UCL	0.077
97.5% KM (Chebyshev) UCL	0.0993
99% KM (Chebyshev) UCL	0.143

Potential UCLs to Use

95% KM (t) UCL	0.0474
95% KM (Percentile Bootstrap) UCL	0.048

2-Chlorophenol (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	6
		Percent Non-Detects	66.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0082	Minimum Detected	-4.804
Maximum Detected	0.049	Maximum Detected	-3.016
Mean of Detected	0.0274	Mean of Detected	-3.836
SD of Detected	0.0205	SD of Detected	0.903
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.99
5% Shapiro Wilk Critical Value	0.767

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.0708
SD	0.0347
95% DL/2 (t) UCL	0.0923
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.98
5% Shapiro Wilk Critical Value	0.767

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-2.868
SD	0.858
95% H-Stat (DL/2) UCL	0.203
Log ROS Method	
Mean in Log Scale	-3.836
SD in Log Scale	0.777
Mean in Original Scale	0.0276
SD in Original Scale	0.019
95% Percentile Bootstrap UCL	0.0376
95% BCA Bootstrap UCL	0.038

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	0.251
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
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0274
SD	0.0167
SE of Mean	0.0118
95% KM (t) UCL	0.0494
95% KM (z) UCL	0.0469
95% KM (jackknife) UCL	0.0528
95% KM (bootstrap t) UCL	0.0697
95% KM (BCA) UCL	N/A
95% KM (Percentile Bootstrap) UCL	0.049
95% KM (Chebyshev) UCL	0.079
97.5% KM (Chebyshev) UCL	0.101
99% KM (Chebyshev) UCL	0.145

Potential UCLs to Use

95% KM (t) UCL	0.0494
95% KM (Percentile Bootstrap) UCL	0.049

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

2-Methylnaphthalene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	7
Number of Unique Samples	7	Number of Non-Detect Data	2
		Percent Non-Detects	22.22%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0042	Minimum Detected	-5.473
Maximum Detected	0.062	Maximum Detected	-2.781
Mean of Detected	0.0236	Mean of Detected	-4.137
SD of Detected	0.022	SD of Detected	0.969
Minimum Non-Detect	0.2	Minimum Non-Detect	-1.609
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.831	Shapiro Wilk Test Statistic	0.946
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0406	Mean	-3.729
SD	0.0387	SD	1.165
95% DL/2 (t) UCL	0.0646	95% H-Stat (DL/2) UCL	0.217
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.137
		SD in Log Scale	0.878
		Mean in Original Scale	0.0224
		SD in Original Scale	0.0197
		95% Percentile Bootstrap UCL	0.0331
		95% BCA Bootstrap UCL	0.0344

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.91	Data appear Normal at 5% Significance Level	
Theta Star	0.0259		
nu star	12.74		
A-D Test Statistic	0.376	Nonparametric Statistics	

5% A-D Critical Value	0.722	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.722	Mean	0.0236
5% K-S Critical Value	0.317	SD	0.0204
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00833
		95% KM (t) UCL	0.0391
Assuming Gamma Distribution		95% KM (z) UCL	0.0373
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0394
Minimum	0.0042	95% KM (bootstrap t) UCL	0.0628
Maximum	0.062	95% KM (BCA) UCL	0.0371
Mean	0.0235	95% KM (Percentile Bootstrap) UCL	0.038
Median	0.012	95% KM (Chebyshev) UCL	0.0599
SD	0.0201	97.5% KM (Chebyshev) UCL	0.0756
k star	1.144	99% KM (Chebyshev) UCL	0.107
Theta star	0.0205		
Nu star	20.59	**Potential UCLs to Use**	
AppChi2	11.29	95% KM (t) UCL	0.0391
95% Gamma Approximate UCL	0.0429	95% KM (Percentile Bootstrap) UCL	0.038
95% Adjusted Gamma UCL	0.049		

Note: DL/2 is not a recommended method.

2-Nitrophenol (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	6
		Percent Non-Detects	66.67%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.011	Minimum Detected	-4.51
Maximum Detected	0.055	Maximum Detected	-2.9
Mean of Detected	0.0307	Mean of Detected	-3.687
SD of Detected	0.0224	SD of Detected	0.805
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Test Statistic	0.998
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.0719
SD	0.0335
95% DL/2 (t) UCL	0.0927
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-2.818
SD	0.769
95% H-Stat (DL/2) UCL	0.172
Log ROS Method	
Mean in Log Scale	-3.687
SD in Log Scale	0.697
Mean in Original Scale	0.0307
SD in Original Scale	0.0197
95% Percentile Bootstrap UCL	0.0408
95% BCA Bootstrap UCL	0.0422

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	0.247
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
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0307
SD	0.0183
SE of Mean	0.0129
95% KM (t) UCL	0.0547
95% KM (z) UCL	0.0519
95% KM (jackknife) UCL	0.0584
95% KM (bootstrap t) UCL	0.0855
95% KM (BCA) UCL	0.055
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	0.087
97.5% KM (Chebyshev) UCL	0.111
99% KM (Chebyshev) UCL	0.159

Potential UCLs to Use

95% KM (t) UCL	0.0547
95% KM (Percentile Bootstrap) UCL	N/A

Note: DL/2 is not a recommended method.

Acenaphthylene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	5
Number of Unique Samples	5	Number of Non-Detect Data	4
		Percent Non-Detects	44.44%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.000855	Minimum Detected	-7.064
Maximum Detected	0.013	Maximum Detected	-4.343
Mean of Detected	0.00375	Mean of Detected	-6.179
SD of Detected	0.00522	SD of Detected	1.108
Minimum Non-Detect	0.0018	Minimum Non-Detect	-6.32
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.654	Shapiro Wilk Test Statistic	0.829
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0344	Mean	-4.992
SD	0.0469	SD	2.156
95% DL/2 (t) UCL	0.0635	95% H-Stat (DL/2) UCL	4.939
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.293
		SD in Log Scale	0.845
		Mean in Original Scale	0.00286
		SD in Original Scale	0.00387
		95% Percentile Bootstrap UCL	0.00523
		95% BCA Bootstrap UCL	0.00639

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.523	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	0.00717		
nu star	5.234		
A-D Test Statistic	0.695	**Nonparametric Statistics**	

5% A-D Critical Value	0.692
K-S Test Statistic	0.692
5% K-S Critical Value	0.365

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000855
Maximum	0.013
Mean	0.00385
Median	0.00145
SD	0.00422
k star	0.898
Theta star	0.00428
Nu star	16.17
AppChi2	8.079
95% Gamma Approximate UCL	0.0077
95% Adjusted Gamma UCL	0.009

Kaplan-Meier (KM) Method	
Mean	0.0033
SD	0.00438
SE of Mean	0.002
95% KM (t) UCL	0.00702
95% KM (z) UCL	0.00659
95% KM (jackknife) UCL	0.00706
95% KM (bootstrap t) UCL	0.0662
95% KM (BCA) UCL	0.00728
95% KM (Percentile Bootstrap) UCL	0.00666
95% KM (Chebyshev) UCL	0.012
97.5% KM (Chebyshev) UCL	0.0158
99% KM (Chebyshev) UCL	0.0232

Potential UCLs to Use

95% KM (BCA) UCL	0.00728

Note: DL/2 is not a recommended method.

Aluminum (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Unique Samples	26

Raw Statistics

Minimum	9770
Maximum	47800
Mean	20179
Median	18500
SD	8046
Coefficient of Variation	0.399
Skewness	2.013

Log-transformed Statistics

Minimum of Log Data	9.187
Maximum of Log Data	10.77
Mean of log Data	9.851
SD of log Data	0.343

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.81
Shapiro Wilk Critical Value	0.923

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.944
Shapiro Wilk Critical Value	0.923

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	22820

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	23366

Assuming Lognormal Distribution

95% H-UCL	22774
95% Chebyshev (MVUE) UCL	25976
97.5% Chebyshev (MVUE) UCL	28525

95% Modified-t UCL	22920	99% Chebyshev (MVUE) UCL	33531

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.454	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	2707		
nu star	402.5		
Approximate Chi Square Value (.05)	357	Nonparametric Statistics	
Adjusted Level of Significance	0.0401	95% CLT UCL	22726
Adjusted Chi Square Value	354.3	95% Jackknife UCL	22820
		95% Standard Bootstrap UCL	22727
Anderson-Darling Test Statistic	0.84	95% Bootstrap-t UCL	24082
Anderson-Darling 5% Critical Value	0.745	95% Hall's Bootstrap UCL	30316
Kolmogorov-Smirnov Test Statistic	0.156	95% Percentile Bootstrap UCL	22930
Kolmogorov-Smirnov 5% Critical Value	0.168	95% BCA Bootstrap UCL	23186
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	26928
		97.5% Chebyshev(Mean, Sd) UCL	29849
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	35586
95% Approximate Gamma UCL	22751		
95% Adjusted Gamma UCL	22926		
Potential UCL to Use		Use 95% Approximate Gamma UCL	22751

Anthracene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	5
Number of Unique Samples	5	Number of Non-Detect Data	4
		Percent Non-Detects	44.44%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0019	Minimum Detected	-6.266
Maximum Detected	0.0056	Maximum Detected	-5.185
Mean of Detected	0.00349	Mean of Detected	-5.738
SD of Detected	0.00153	SD of Detected	0.454
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	0.21	Maximum Non-Detect	-1.561

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Test Statistic	0.947

5% Shapiro Wilk Critical Value	0.762

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.0458
SD	0.0504
95% DL/2 (t) UCL	0.077
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	2.683
Theta Star	0.0013
nu star	26.83
A-D Test Statistic	0.257
5% A-D Critical Value	0.68
K-S Test Statistic	0.68
5% K-S Critical Value	0.358

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.0019
Maximum	0.0056
Mean	0.00354
Median	0.00365
SD	0.00117
k star	6.599
Theta star	0.000537
Nu star	118.8
AppChi2	94.62
95% Gamma Approximate UCL	0.00445
95% Adjusted Gamma UCL	0.00467

Note: DL/2 is not a recommended method.

5% Shapiro Wilk Critical Value	0.762

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-4.218
SD	1.832
95% H-Stat (DL/2) UCL	2.607
Log ROS Method	
Mean in Log Scale	-5.738
SD in Log Scale	0.346
Mean in Original Scale	0.00339
SD in Original Scale	0.00117
95% Percentile Bootstrap UCL	0.00404
95% BCA Bootstrap UCL	0.00408

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.00349
SD	0.00137
SE of Mean	0.0006853
95% KM (t) UCL	0.00476
95% KM (z) UCL	0.00462
95% KM (jackknife) UCL	0.00483
95% KM (bootstrap t) UCL	0.0053
95% KM (BCA) UCL	0.0045
95% KM (Percentile Bootstrap) UCL	0.00461
95% KM (Chebyshev) UCL	0.00648
97.5% KM (Chebyshev) UCL	0.00777
99% KM (Chebyshev) UCL	0.0103

Potential UCLs to Use

95% KM (t) UCL	0.00476
95% KM (Percentile Bootstrap) UCL	0.00461

Antimony (mg/kg)

General Statistics

Number of Valid Samples	26	Number of Detected Data	7
Number of Unique Samples	7	Number of Non-Detect Data	19
		Percent Non-Detects	73.08%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.43	Minimum Detected	-0.844
Maximum Detected	47.6	Maximum Detected	3.863
Mean of Detected	12.35	Mean of Detected	1.368
SD of Detected	17.58	SD of Detected	1.827
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	3.8	Maximum Non-Detect	1.335

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	22
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	84.62%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.749	Shapiro Wilk Test Statistic	0.933
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.696	Mean	-0.234
SD	10.14	SD	1.408
95% DL/2 (t) UCL	7.095	95% H-Stat (DL/2) UCL	2.478
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.506
		SD in Log Scale	2.104
		Mean in Original Scale	3.397
		SD in Original Scale	10.24
		95% Percentile Bootstrap UCL	7.014
		95% BCA Bootstrap UCL	8.856

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.408	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	30.27		
nu star	5.71		
A-D Test Statistic	0.308	**Nonparametric Statistics**	

5% A-D Critical Value	0.749	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.749	Mean	3.646
5% K-S Critical Value	0.326	SD	9.959
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2.11
		95% KM (t) UCL	7.25
Assuming Gamma Distribution		95% KM (z) UCL	7.117
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	7.033
Minimum	0.43	95% KM (bootstrap t) UCL	19.73
Maximum	47.6	95% KM (BCA) UCL	8.787
Mean	12.58	95% KM (Percentile Bootstrap) UCL	7.751
Median	12.65	95% KM (Chebyshev) UCL	12.84
SD	8.629	97.5% KM (Chebyshev) UCL	16.82
k star	1.587	99% KM (Chebyshev) UCL	24.64
Theta star	7.925		
Nu star	82.54	**Potential UCLs to Use**	
AppChi2	62.61	95% KM (t) UCL	7.25
95% Gamma Approximate UCL	16.59		
95% Adjusted Gamma UCL	16.9		

Note: DL/2 is not a recommended method.

Aroclor 1254 (mg/kg)

General Statistics

Number of Valid Samples	23	Number of Detected Data	22
Number of Unique Samples	22	Number of Non-Detect Data	1
		Percent Non-Detects	4.35%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0135	Minimum Detected	-4.305
Maximum Detected	1.58	Maximum Detected	0.457
Mean of Detected	0.201	Mean of Detected	-2.252
SD of Detected	0.328	SD of Detected	1.103
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	0.18	Maximum Non-Detect	-1.715

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.509	Shapiro Wilk Test Statistic	0.979
5% Shapiro Wilk Critical Value	0.911	5% Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	

Mean	0.196
SD	0.321
95% DL/2 (t) UCL	0.311
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Mean	-2.259
SD	1.078
95% H-Stat (DL/2) UCL	0.34
Log ROS Method	
Mean in Log Scale	-2.271
SD in Log Scale	1.081
Mean in Original Scale	0.195
SD in Original Scale	0.321
95% Percentile Bootstrap UCL	0.321
95% BCA Bootstrap UCL	0.391

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.811
Theta Star	0.247
nu star	35.7
A-D Test Statistic	0.766
5% A-D Critical Value	0.775
K-S Test Statistic	0.775
5% K-S Critical Value	0.191

Data appear Gamma Distributed at 5% Significance Level

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.0135
Maximum	1.58
Mean	0.196
Median	0.111
SD	0.321
k star	0.838
Theta star	0.234
Nu star	38.53
AppChi2	25.32
95% Gamma Approximate UCL	0.299
95% Adjusted Gamma UCL	0.308

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.195
SD	0.314
SE of Mean	0.0671
95% KM (t) UCL	0.311
95% KM (z) UCL	0.306
95% KM (jackknife) UCL	0.311
95% KM (bootstrap t) UCL	0.501
95% KM (BCA) UCL	0.309
95% KM (Percentile Bootstrap) UCL	0.314
95% KM (Chebyshev) UCL	0.488
97.5% KM (Chebyshev) UCL	0.615
99% KM (Chebyshev) UCL	0.863

Potential UCLs to Use

95% KM (Chebyshev) UCL	0.488

Note: DL/2 is not a recommended method.

Aroclor 1260 (mg/kg)

General Statistics

Number of Valid Samples	23	Number of Detected Data	8
Number of Unique Samples	8	Number of Non-Detect Data	15
		Percent Non-Detects	65.22%

Raw Statistics	
Minimum Detected	0.0373
Maximum Detected	1.09
Mean of Detected	0.219
SD of Detected	0.355
Minimum Non-Detect	0.018
Maximum Non-Detect	0.095

Log-transformed Statistics	
Minimum Detected	-3.289
Maximum Detected	0.0862
Mean of Detected	-2.171
SD of Detected	1.049
Minimum Non-Detect	-4.017
Maximum Non-Detect	-2.354

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

Number treated as Non-Detect	19
Number treated as Detected	4
Single DL Non-Detect Percentage	82.61%

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.541
5% Shapiro Wilk Critical Value	0.818

Data not Normal at 5% Significance Level

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.859
5% Shapiro Wilk Critical Value	0.818

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method

Mean	0.0877
SD	0.223
95% DL/2 (t) UCL	0.168

Maximum Likelihood Estimate(MLE) Method N/A

MLE yields a negative mean

Assuming Lognormal Distribution

DL/2 Substitution Method

Mean	-3.478
SD	1.216
95% H-Stat (DL/2) UCL	0.0622

Log ROS Method

Mean in Log Scale	-4.128
SD in Log Scale	1.632
Mean in Original Scale	0.0802
SD in Original Scale	0.226
95% Percentile Bootstrap UCL	0.171
95% BCA Bootstrap UCL	0.222

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.645
Theta Star	0.339
nu star	10.31
A-D Test Statistic	0.981
5% A-D Critical Value	0.739
K-S Test Statistic	0.739
5% K-S Critical Value	0.303

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	0.101
SD	0.214
SE of Mean	0.0477
95% KM (t) UCL	0.183
95% KM (z) UCL	0.179

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.0373
Maximum	1.09
Mean	0.203
Median	0.179
SD	0.211
k star	1.622
Theta star	0.125
Nu star	74.6
AppChi2	55.71
95% Gamma Approximate UCL	0.272
95% Adjusted Gamma UCL	0.278

95% KM (jackknife) UCL	0.171
95% KM (bootstrap t) UCL	0.527
95% KM (BCA) UCL	0.219
95% KM (Percentile Bootstrap) UCL	0.193
95% KM (Chebyshev) UCL	0.309
97.5% KM (Chebyshev) UCL	0.399
99% KM (Chebyshev) UCL	0.576
Potential UCLs to Use	
95% KM (BCA) UCL	0.219

Note: DL/2 is not a recommended method.

Arsenic (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Unique Samples	26

Raw Statistics		**Log-transformed Statistics**	
Minimum	1.79	Minimum of Log Data	0.582
Maximum	68.9	Maximum of Log Data	4.233
Mean	9.933	Mean of log Data	1.797
Median	5.3	SD of log Data	0.913
SD	13.9		
Coefficient of Variation	1.399		
Skewness	3.336		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.576	Shapiro Wilk Test Statistic	0.931
Shapiro Wilk Critical Value	0.923	Shapiro Wilk Critical Value	0.923
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	14.49	95% H-UCL	14
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	16.67
95% Adjusted-CLT UCL	16.17	97.5% Chebyshev (MVUE) UCL	20.01
95% Modified-t UCL	14.78	99% Chebyshev (MVUE) UCL	26.56

Gamma Distribution Test		**Data Distribution**
k star (bias corrected)	1.039	**Data appear Lognormal at 5% Significance Level**
Theta Star	9.562	
nu star	56.09	

Approximate Chi Square Value (.05)	39.88
Adjusted Level of Significance	0.0401
Adjusted Chi Square Value	39.01
Anderson-Darling Test Statistic	1.503
Anderson-Darling 5% Critical Value	0.77
Kolmogorov-Smirnov Test Statistic	0.237
Kolmogorov-Smirnov 5% Critical Value	0.173

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	13.97
95% Adjusted Gamma UCL	14.28

Nonparametric Statistics

95% CLT UCL	14.33
95% Jackknife UCL	14.49
95% Standard Bootstrap UCL	14.09
95% Bootstrap-t UCL	20.18
95% Hall's Bootstrap UCL	30.67
95% Percentile Bootstrap UCL	14.6
95% BCA Bootstrap UCL	16.53
95% Chebyshev(Mean, Sd) UCL	21.59
97.5% Chebyshev(Mean, Sd) UCL	26.63
99% Chebyshev(Mean, Sd) UCL	36.54

Potential UCL to Use

Use 95% H-UCL 14

Barium (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Unique Samples	27

Raw Statistics

Minimum	25.3
Maximum	2630
Mean	411.8
Median	75.5
SD	765
Coefficient of Variation	1.858
Skewness	2.328

Log-transformed Statistics

Minimum of Log Data	3.231
Maximum of Log Data	7.875
Mean of log Data	4.928
SD of log Data	1.306

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.523
Shapiro Wilk Critical Value	0.923

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	662.9

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	724.5
95% Modified-t UCL	673.9

Gamma Distribution Test

k star (bias corrected)	0.531

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.756
Shapiro Wilk Critical Value	0.923

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	679.2
95% Chebyshev (MVUE) UCL	713.2
97.5% Chebyshev (MVUE) UCL	889
99% Chebyshev (MVUE) UCL	1234

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Theta Star	775.3
nu star	28.68
Approximate Chi Square Value (.05)	17.46
Adjusted Level of Significance	0.0401
Adjusted Chi Square Value	16.9
Anderson-Darling Test Statistic	4.192
Anderson-Darling 5% Critical Value	0.801
Kolmogorov-Smirnov Test Statistic	0.375
Kolmogorov-Smirnov 5% Critical Value	0.177

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	676.5
95% Adjusted Gamma UCL	698.9

Nonparametric Statistics

95% CLT UCL	654
95% Jackknife UCL	662.9
95% Standard Bootstrap UCL	648.6
95% Bootstrap-t UCL	771.7
95% Hall's Bootstrap UCL	612.5
95% Percentile Bootstrap UCL	659.9
95% BCA Bootstrap UCL	731.8
95% Chebyshev(Mean, Sd) UCL	1054
97.5% Chebyshev(Mean, Sd) UCL	1331
99% Chebyshev(Mean, Sd) UCL	1877

Potential UCL to Use

Use 99% Chebyshev (Mean, Sd) UCL 1877

Benzo(a)anthracene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	8
Number of Unique Samples	8	Number of Non-Detect Data	1
		Percent Non-Detects	11.11%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0079	Minimum Detected	-4.841
Maximum Detected	0.028	Maximum Detected	-3.576
Mean of Detected	0.0155	Mean of Detected	-4.253
SD of Detected	0.00711	SD of Detected	0.436
Minimum Non-Detect	0.21	Minimum Non-Detect	-1.561
Maximum Non-Detect	0.21	Maximum Non-Detect	-1.561

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.891	Shapiro Wilk Test Statistic	0.956
5% Shapiro Wilk Critical Value	0.818	5% 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**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0254	Mean	-4.031
SD	0.0306	SD	0.781

95% DL/2 (t) UCL	0.0444
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

95% H-Stat (DL/2) UCL	0.0525
Log ROS Method	
Mean in Log Scale	-4.253
SD in Log Scale	0.408
Mean in Original Scale	0.0153
SD in Original Scale	0.00666
95% Percentile Bootstrap UCL	0.0189
95% BCA Bootstrap UCL	0.0199

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	3.831
Theta Star	0.00404
nu star	61.3
A-D Test Statistic	0.309
5% A-D Critical Value	0.718
K-S Test Statistic	0.718
5% K-S Critical Value	0.295

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.0079
Maximum	0.028
Mean	0.0156
Median	0.014
SD	0.00665
k star	4.549
Theta star	0.00343
Nu star	81.88
AppChi2	62.03
95% Gamma Approximate UCL	0.0206
95% Adjusted Gamma UCL	0.0219

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0155
SD	0.00665
SE of Mean	0.00251
95% KM (t) UCL	0.0202
95% KM (z) UCL	0.0196
95% KM (jackknife) UCL	0.0202
95% KM (bootstrap t) UCL	0.0246
95% KM (BCA) UCL	0.0195
95% KM (Percentile Bootstrap) UCL	0.0194
95% KM (Chebyshev) UCL	0.0264
97.5% KM (Chebyshev) UCL	0.0312
99% KM (Chebyshev) UCL	0.0405

Potential UCLs to Use

95% KM (t) UCL	0.0202
95% KM (Percentile Bootstrap) UCL	0.0194

Benzo(a)pyrene (mg/kg)

General Statistics

Number of Valid Samples	9
Number of Unique Samples	6
Number of Detected Data	6
Number of Non-Detect Data	3
Percent Non-Detects	33.33%

Raw Statistics	
Minimum Detected	0.0097
Maximum Detected	0.028
Mean of Detected	0.0187
SD of Detected	0.0079
Minimum Non-Detect	0.2
Maximum Non-Detect	0.21

Log-transformed Statistics	
Minimum Detected	-4.636
Maximum Detected	-3.576
Mean of Detected	-4.061
SD of Detected	0.454
Minimum Non-Detect	-1.609
Maximum Non-Detect	-1.561

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

Number treated as Non-Detect	9
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	0.897
5% Shapiro Wilk Critical Value	0.788

Data appear Normal at 5% Significance Level

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.897
5% Shapiro Wilk Critical Value	0.788

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method

Mean	0.0464
SD	0.042
95% DL/2 (t) UCL	0.0724

Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Assuming Lognormal Distribution

DL/2 Substitution Method

Mean	-3.47
SD	0.958
95% H-Stat (DL/2) UCL	0.146

Log ROS Method

Mean in Log Scale	-4.061
SD in Log Scale	0.379
Mean in Original Scale	0.0183
SD in Original Scale	0.00663
95% Percentile Bootstrap UCL	0.0218
95% BCA Bootstrap UCL	0.0216

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	3.237
Theta Star	0.00578
nu star	38.84
A-D Test Statistic	0.375
5% A-D Critical Value	0.698
K-S Test Statistic	0.698
5% K-S Critical Value	0.333

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	0.0187
SD	0.00721
SE of Mean	0.00323
95% KM (t) UCL	0.0247
95% KM (z) UCL	0.024
95% KM (jackknife) UCL	0.0249

Minimum	0.0097	95% KM (bootstrap t) UCL	0.0254
Maximum	0.028	95% KM (BCA) UCL	0.0236
Mean	0.0189	95% KM (Percentile Bootstrap) UCL	0.0237
Median	0.0196	95% KM (Chebyshev) UCL	0.0328
SD	0.00664	97.5% KM (Chebyshev) UCL	0.0388
k star	5.649	99% KM (Chebyshev) UCL	0.0508
Theta star	0.00335		
Nu star	101.7	**Potential UCLs to Use**	
AppChi2	79.41	95% KM (t) UCL	0.0247
95% Gamma Approximate UCL	0.0242	95% KM (Percentile Bootstrap) UCL	0.0237
95% Adjusted Gamma UCL	0.0256		

Note: DL/2 is not a recommended method.

Benzo(b)fluoranthene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	6
Number of Unique Samples	6	Number of Non-Detect Data	3
		Percent Non-Detects	33.33%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.018	Minimum Detected	-4.017
Maximum Detected	0.067	Maximum Detected	-2.703
Mean of Detected	0.0339	Mean of Detected	-3.496
SD of Detected	0.0188	SD of Detected	0.5
Minimum Non-Detect	0.2	Minimum Non-Detect	-1.609
Maximum Non-Detect	0.21	Maximum Non-Detect	-1.561

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.837	Shapiro Wilk Test Statistic	0.913
5% Shapiro Wilk Critical Value	0.788	5% 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**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0565	Mean	-3.093
SD	0.037	SD	0.723
95% DL/2 (t) UCL	0.0795	95% H-Stat (DL/2) UCL	0.117

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.496
		SD in Log Scale	0.417
		Mean in Original Scale	0.033
		SD in Original Scale	0.0155
		95% Percentile Bootstrap UCL	0.0416
		95% BCA Bootstrap UCL	0.0441

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.425	**Data appear Normal at 5% Significance Level**	
Theta Star	0.014		
nu star	29.1		
A-D Test Statistic	0.427	**Nonparametric Statistics**	
5% A-D Critical Value	0.699	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.699	Mean	0.0339
5% K-S Critical Value	0.333	SD	0.0172
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00769
		95% KM (t) UCL	0.0482
Assuming Gamma Distribution		95% KM (z) UCL	0.0466
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0487
Minimum	0.018	95% KM (bootstrap t) UCL	0.089
Maximum	0.067	95% KM (BCA) UCL	0.046
Mean	0.0343	95% KM (Percentile Bootstrap) UCL	0.0463
Median	0.027	95% KM (Chebyshev) UCL	0.0675
SD	0.0157	97.5% KM (Chebyshev) UCL	0.082
k star	4.171	99% KM (Chebyshev) UCL	0.11
Theta star	0.00823		
Nu star	75.08	**Potential UCLs to Use**	
AppChi2	56.12	95% KM (t) UCL	0.0482
95% Gamma Approximate UCL	0.0459	95% KM (Percentile Bootstrap) UCL	0.0463
95% Adjusted Gamma UCL	0.0489		

Note: DL/2 is not a recommended method.

Benzo(g,h,i)perylene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	6
Number of Unique Samples	5	Number of Non-Detect Data	3
		Percent Non-Detects	33.33%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0048	Minimum Detected	-5.339
Maximum Detected	0.025	Maximum Detected	-3.689

Mean of Detected	0.0126	Mean of Detected	-4.55
SD of Detected	0.00783	SD of Detected	0.655
Minimum Non-Detect	0.2	Minimum Non-Detect	-1.609
Maximum Non-Detect	0.21	Maximum Non-Detect	-1.561

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.893	Shapiro Wilk Test Statistic	0.919
5% Shapiro Wilk Critical Value	0.788	5% 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**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0423	Mean	-3.795
SD	0.045	SD	1.245
95% DL/2 (t) UCL	0.0702	95% H-Stat (DL/2) UCL	0.27
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.55
		SD in Log Scale	0.548
		Mean in Original Scale	0.0121
		SD in Original Scale	0.00653
		95% Percentile Bootstrap UCL	0.0156
		95% BCA Bootstrap UCL	0.0161

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.635	**Data appear Normal at 5% Significance Level**	
Theta Star	0.00769		
nu star	19.62		
A-D Test Statistic	0.371	**Nonparametric Statistics**	
5% A-D Critical Value	0.701	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.701	Mean	0.0126
5% K-S Critical Value	0.335	SD	0.00715
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0032
		95% KM (t) UCL	0.0185
Assuming Gamma Distribution		95% KM (z) UCL	0.0178
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0187
Minimum	0.0048	95% KM (bootstrap t) UCL	0.0202
Maximum	0.025	95% KM (BCA) UCL	0.018
Mean	0.0127	95% KM (Percentile Bootstrap) UCL	0.0177

Median	0.0131	95% KM (Chebyshev) UCL	0.0265
SD	0.00658	97.5% KM (Chebyshev) UCL	0.0325
k star	2.755	99% KM (Chebyshev) UCL	0.0444
Theta star	0.0046		
Nu star	49.6	**Potential UCLs to Use**	
AppChi2	34.43	95% KM (t) UCL	0.0185
95% Gamma Approximate UCL	0.0183	95% KM (Percentile Bootstrap) UCL	0.0177
95% Adjusted Gamma UCL	0.0198		

Note: DL/2 is not a recommended method.

Benzo(k)fluoranthene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	6
Number of Unique Samples	6	Number of Non-Detect Data	3
		Percent Non-Detects	33.33%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0059	Minimum Detected	-5.133
Maximum Detected	0.0185	Maximum Detected	-3.99
Mean of Detected	0.0105	Mean of Detected	-4.646
SD of Detected	0.00507	SD of Detected	0.453
Minimum Non-Detect	0.2	Minimum Non-Detect	-1.609
Maximum Non-Detect	0.21	Maximum Non-Detect	-1.561

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.853	Shapiro Wilk Test Statistic	0.902
5% Shapiro Wilk Critical Value	0.788	5% 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**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0409	Mean	-3.859
SD	0.0458	SD	1.233
95% DL/2 (t) UCL	0.0693	95% H-Stat (DL/2) UCL	0.243
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.646
		SD in Log Scale	0.378

Mean in Original Scale	0.0103
SD in Original Scale	0.00419
95% Percentile Bootstrap UCL	0.0125
95% BCA Bootstrap UCL	0.0131

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	2.982
Theta Star	0.00352
nu star	35.78
A-D Test Statistic	0.449
5% A-D Critical Value	0.698
K-S Test Statistic	0.698
5% K-S Critical Value	0.333

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.0059
Maximum	0.0185
Mean	0.0106
Median	0.0091
SD	0.00422
k star	5.182
Theta star	0.00205
Nu star	93.28
AppChi2	72
95% Gamma Approximate UCL	0.0138
95% Adjusted Gamma UCL	0.0146

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0105
SD	0.00463
SE of Mean	0.00207
95% KM (t) UCL	0.0143
95% KM (z) UCL	0.0139
95% KM (jackknife) UCL	0.0145
95% KM (bootstrap t) UCL	0.0225
95% KM (BCA) UCL	0.0141
95% KM (Percentile Bootstrap) UCL	0.0138
95% KM (Chebyshev) UCL	0.0195
97.5% KM (Chebyshev) UCL	0.0234
99% KM (Chebyshev) UCL	0.0311

Potential UCLs to Use

95% KM (t) UCL	0.0143
95% KM (Percentile Bootstrap) UCL	0.0138

Beryllium (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Detected Data	9
Number of Unique Samples	9	Number of Non-Detect Data	18
		Percent Non-Detects	66.67%

Raw Statistics

Minimum Detected	0.4
Maximum Detected	1.72
Mean of Detected	1.011
SD of Detected	0.41
Minimum Non-Detect	0.64

Log-transformed Statistics

Minimum Detected	-0.916
Maximum Detected	0.542
Mean of Detected	-0.0729
SD of Detected	0.452
Minimum Non-Detect	-0.446

Maximum Non-Detect	1.7	Maximum Non-Detect	0.531
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.30%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.987	Shapiro Wilk Test Statistic	0.965
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.726	Mean	-0.421
SD	0.344	SD	0.456
95% DL/2 (t) UCL	0.839	95% H-Stat (DL/2) UCL	0.72
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.38
		SD in Log Scale	0.369
		Mean in Original Scale	0.735
		SD in Original Scale	0.318
		95% Percentile Bootstrap UCL	0.84
		95% BCA Bootstrap UCL	0.845
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.177	**Data appear Normal at 5% Significance Level**	
Theta Star	0.242		
nu star	75.18		
A-D Test Statistic	0.163	**Nonparametric Statistics**	
5% A-D Critical Value	0.723	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.723	Mean	0.749
5% K-S Critical Value	0.28	SD	0.355
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0941
		95% KM (t) UCL	0.909
Assuming Gamma Distribution		95% KM (z) UCL	0.903
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.935
Minimum	0.4	95% KM (bootstrap t) UCL	0.919
Maximum	1.72	95% KM (BCA) UCL	0.996
Mean	1.069	95% KM (Percentile Bootstrap) UCL	0.967
Median	1.028	95% KM (Chebyshev) UCL	1.159
SD	0.268	97.5% KM (Chebyshev) UCL	1.336
k star	12.57	99% KM (Chebyshev) UCL	1.685

Theta star	0.085		
Nu star	679	**Potential UCLs to Use**	
AppChi2	619.5	95% KM (t) UCL	0.909
95% Gamma Approximate UCL	1.172	95% KM (Percentile Bootstrap) UCL	0.967
95% Adjusted Gamma UCL	1.179		

Note: DL/2 is not a recommended method.

bis(2-Chloroethoxy)methane (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	2
Number of Unique Samples	2	Number of Non-Detect Data	7
		Percent Non-Detects	77.78%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.013	Minimum Detected	-4.343
Maximum Detected	0.049	Maximum Detected	-3.016
Mean of Detected	0.031	Mean of Detected	-3.679
SD of Detected	0.0255	SD of Detected	0.938
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	1	Shapiro Wilk Test Statistic	1
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0786	Mean	-2.674
SD	0.0292	SD	0.663
95% DL/2 (t) UCL	0.0966	95% H-Stat (DL/2) UCL	0.157
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A

95% BCA Bootstrap UCL	N/A

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	0.359
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
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.031
SD	0.018
SE of Mean	0.018
95% KM (t) UCL	0.0645
95% KM (z) UCL	0.0606
95% KM (jackknife) UCL	0.0756
95% KM (bootstrap t) UCL	0.058
95% KM (BCA) UCL	0.049
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	0.109
97.5% KM (Chebyshev) UCL	0.143
99% KM (Chebyshev) UCL	0.21

Potential UCLs to Use

95% KM (t) UCL	0.0645
95% KM (% Bootstrap) UCL	N/A

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

Bis(2-chloroisopropyl)ether (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	6
		Percent Non-Detects	66.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0088	Minimum Detected	-4.733
Maximum Detected	0.0495	Maximum Detected	-3.006
Mean of Detected	0.0264	Mean of Detected	-3.867
SD of Detected	0.0209	SD of Detected	0.864
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.949	Shapiro Wilk Test Statistic	1
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0705	Mean	-2.878
SD	0.0352	SD	0.861
95% DL/2 (t) UCL	0.0923	95% H-Stat (DL/2) UCL	0.202
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.867
		SD in Log Scale	0.748
		Mean in Original Scale	0.0264
		SD in Original Scale	0.0181
		95% Percentile Bootstrap UCL	0.0355
		95% BCA Bootstrap UCL	0.0369
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	0.253	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0264
5% K-S Critical Value	N/A	SD	0.0171
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0121
		95% KM (t) UCL	0.0489
Assuming Gamma Distribution		95% KM (z) UCL	0.0463
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0523
Minimum	N/A	95% KM (bootstrap t) UCL	0.0841
Maximum	N/A	95% KM (BCA) UCL	0.0495
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.0495
Median	N/A	95% KM (Chebyshev) UCL	0.079
SD	N/A	97.5% KM (Chebyshev) UCL	0.102
k star	N/A	99% KM (Chebyshev) UCL	0.146
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	

AppChi2	N/A	95% KM (t) UCL	0.0489
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	0.0495
95% Adjusted Gamma UCL	N/A		

Note: DL/2 is not a recommended method.

Cadmium (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Detected Data	11
Number of Unique Samples	11	Number of Non-Detect Data	16
		Percent Non-Detects	59.26%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.072	Minimum Detected	-2.631
Maximum Detected	19.8	Maximum Detected	2.986
Mean of Detected	4.264	Mean of Detected	-0.119
SD of Detected	6.16	SD of Detected	2.164
Minimum Non-Detect	0.056	Minimum Non-Detect	-2.882
Maximum Non-Detect	1.5	Maximum Non-Detect	0.405

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	22
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	81.48%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.741	Shapiro Wilk Test Statistic	0.849
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.949	Mean	-0.942
SD	4.297	SD	1.76
95% DL/2 (t) UCL	3.359	95% H-Stat (DL/2) UCL	2.241
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.996
		SD in Log Scale	2.24
		Mean in Original Scale	1.773
		SD in Original Scale	4.362
		95% Percentile Bootstrap UCL	3.245
		95% BCA Bootstrap UCL	3.773

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.364
Theta Star	11.73
nu star	7.998
A-D Test Statistic	0.769
5% A-D Critical Value	0.797
K-S Test Statistic	0.797
5% K-S Critical Value	0.272

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.072
Maximum	19.8
Mean	3.962
Median	3.644
SD	3.92
k star	0.812
Theta star	4.883
Nu star	43.82
AppChi2	29.64
95% Gamma Approximate UCL	5.858
95% Adjusted Gamma UCL	6.009

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.804
SD	4.268
SE of Mean	0.862
95% KM (t) UCL	3.274
95% KM (z) UCL	3.222
95% KM (jackknife) UCL	3.223
95% KM (bootstrap t) UCL	4.854
95% KM (BCA) UCL	3.388
95% KM (Percentile Bootstrap) UCL	3.185
95% KM (Chebyshev) UCL	5.56
97.5% KM (Chebyshev) UCL	7.186
99% KM (Chebyshev) UCL	10.38

Potential UCLs to Use

95% KM (t) UCL	3.274

Calcium (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Unique Samples	27

Raw Statistics

Minimum	1280
Maximum	55700
Mean	11182
Median	6850
SD	12778
Coefficient of Variation	1.143
Skewness	2.289

Log-transformed Statistics

Minimum of Log Data	7.155
Maximum of Log Data	10.93
Mean of log Data	8.791
SD of log Data	1.07

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.729
Shapiro Wilk Critical Value	0.923

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.954
Shapiro Wilk Critical Value	0.923

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	15377

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	16385
95% Modified-t UCL	15557

Gamma Distribution Test

k star (bias corrected)	0.983
Theta Star	11372
nu star	53.1
Approximate Chi Square Value (.05)	37.36
Adjusted Level of Significance	0.0401
Adjusted Chi Square Value	36.51
Anderson-Darling Test Statistic	0.513
Anderson-Darling 5% Critical Value	0.772
Kolmogorov-Smirnov Test Statistic	0.106
Kolmogorov-Smirnov 5% Critical Value	0.173

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	15894
95% Adjusted Gamma UCL	16261

Potential UCL to Use

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	19990
95% Chebyshev (MVUE) UCL	23037
97.5% Chebyshev (MVUE) UCL	28116
99% Chebyshev (MVUE) UCL	38093

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	15227
95% Jackknife UCL	15377
95% Standard Bootstrap UCL	15098
95% Bootstrap-t UCL	18329
95% Hall's Bootstrap UCL	34570
95% Percentile Bootstrap UCL	15344
95% BCA Bootstrap UCL	16187
95% Chebyshev(Mean, Sd) UCL	21901
97.5% Chebyshev(Mean, Sd) UCL	26539
99% Chebyshev(Mean, Sd) UCL	35650

Use 95% Approximate Gamma UCL 15894

Chromium (mg/kg)

General Statistics

Number of Valid Samples	27
Number of Unique Samples	24

Raw Statistics

Minimum	13.1
Maximum	299
Mean	57.09
Median	32.5
SD	71.29
Coefficient of Variation	1.249
Skewness	2.923

Log-transformed Statistics

Minimum of Log Data	2.573
Maximum of Log Data	5.7
Mean of log Data	3.686
SD of log Data	0.725

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.511
Shapiro Wilk Critical Value	0.923

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.805
Shapiro Wilk Critical Value	0.923

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	80.49

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	87.9
95% Modified-t UCL	81.78

Assuming Lognormal Distribution

95% H-UCL	70.57
95% Chebyshev (MVUE) UCL	85.04
97.5% Chebyshev (MVUE) UCL	99.65
99% Chebyshev (MVUE) UCL	128.4

Gamma Distribution Test

k star (bias corrected)	1.394
Theta Star	40.96
nu star	75.27
Approximate Chi Square Value (.05)	56.29
Adjusted Level of Significance	0.0401
Adjusted Chi Square Value	55.24
Anderson-Darling Test Statistic	3.361
Anderson-Darling 5% Critical Value	0.763
Kolmogorov-Smirnov Test Statistic	0.306
Kolmogorov-Smirnov 5% Critical Value	0.171

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	76.34
95% Adjusted Gamma UCL	77.79

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	79.66
95% Jackknife UCL	80.49
95% Standard Bootstrap UCL	78.91
95% Bootstrap-t UCL	121.4
95% Hall's Bootstrap UCL	138.8
95% Percentile Bootstrap UCL	81.38
95% BCA Bootstrap UCL	89.53
95% Chebyshev(Mean, Sd) UCL	116.9
97.5% Chebyshev(Mean, Sd) UCL	142.8
99% Chebyshev(Mean, Sd) UCL	193.6

Potential UCL to Use

Use 95% Chebyshev (Mean, Sd) UCL 116.9

Chrysene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	6
Number of Unique Samples	6	Number of Non-Detect Data	3
		Percent Non-Detects	33.33%

Raw Statistics

Minimum Detected	0.012
Maximum Detected	0.037
Mean of Detected	0.0218
SD of Detected	0.00979

Log-transformed Statistics

Minimum Detected	-4.423
Maximum Detected	-3.297
Mean of Detected	-3.905
SD of Detected	0.438

Minimum Non-Detect	0.2	Minimum Non-Detect	-1.609
Maximum Non-Detect	0.21	Maximum Non-Detect	-1.561
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.914	Shapiro Wilk Test Statistic	0.953
5% Shapiro Wilk Critical Value	0.788	5% 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**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0484	Mean	-3.366
SD	0.0407	SD	0.881
95% DL/2 (t) UCL	0.0737	95% H-Stat (DL/2) UCL	0.131
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.905
		SD in Log Scale	0.367
		Mean in Original Scale	0.0214
		SD in Original Scale	0.00814
		95% Percentile Bootstrap UCL	0.026
		95% BCA Bootstrap UCL	0.0264

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.273	**Data appear Normal at 5% Significance Level**	
Theta Star	0.00667		
nu star	39.28		
A-D Test Statistic	0.267	**Nonparametric Statistics**	
5% A-D Critical Value	0.698	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.698	Mean	0.0218
5% K-S Critical Value	0.333	SD	0.00893
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.004
		95% KM (t) UCL	0.0293
Assuming Gamma Distribution		95% KM (z) UCL	0.0284
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0295
Minimum	0.012	95% KM (bootstrap t) UCL	0.0365
Maximum	0.037	95% KM (BCA) UCL	0.0282
Mean	0.0221	95% KM (Percentile Bootstrap) UCL	0.0284
Median	0.021	95% KM (Chebyshev) UCL	0.0392
SD	0.00819	97.5% KM (Chebyshev) UCL	0.0468

k star	5.685
Theta star	0.00389
Nu star	102.3
AppChi2	79.99
95% Gamma Approximate UCL	0.0283
95% Adjusted Gamma UCL	0.0298

99% KM (Chebyshev) UCL	0.0616

Potential UCLs to Use

95% KM (t) UCL	0.0293
95% KM (Percentile Bootstrap) UCL	0.0284

Note: DL/2 is not a recommended method.

Cobalt (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Unique Samples	26

Raw Statistics

Minimum	3.7
Maximum	47
Mean	13.54
Median	11.2
SD	8.862
Coefficient of Variation	0.654
Skewness	2.311

Log-transformed Statistics

Minimum of Log Data	1.308
Maximum of Log Data	3.85
Mean of log Data	2.453
SD of log Data	0.542

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.777
Shapiro Wilk Critical Value	0.923

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.972
Shapiro Wilk Critical Value	0.923

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	16.45

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	17.16
95% Modified-t UCL	16.58

Assuming Lognormal Distribution

95% H-UCL	16.62
95% Chebyshev (MVUE) UCL	19.75
97.5% Chebyshev (MVUE) UCL	22.51
99% Chebyshev (MVUE) UCL	27.93

Gamma Distribution Test

k star (bias corrected)	3.065
Theta Star	4.419
nu star	165.5
Approximate Chi Square Value (.05)	136.8
Adjusted Level of Significance	0.0401
Adjusted Chi Square Value	135.1
Anderson-Darling Test Statistic	0.67
Anderson-Darling 5% Critical Value	0.751

Data Distribution

Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	16.35
95% Jackknife UCL	16.45
95% Standard Bootstrap UCL	16.32
95% Bootstrap-t UCL	17.95
95% Hall's Bootstrap UCL	20.57

Kolmogorov-Smirnov Test Statistic	0.175
Kolmogorov-Smirnov 5% Critical Value	0.169

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	16.39
95% Adjusted Gamma UCL	16.59

Potential UCL to Use

95% Percentile Bootstrap UCL	16.53
95% BCA Bootstrap UCL	17.46
95% Chebyshev(Mean, Sd) UCL	20.98
97.5% Chebyshev(Mean, Sd) UCL	24.19
99% Chebyshev(Mean, Sd) UCL	30.51

Use 95% Approximate Gamma UCL 16.39

Copper (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Unique Samples	26

Raw Statistics

Minimum	10.8
Maximum	23800
Mean	1546
Median	64.2
SD	4728
Coefficient of Variation	3.058
Skewness	4.393

Log-transformed Statistics

Minimum of Log Data	2.38
Maximum of Log Data	10.08
Mean of log Data	4.981
SD of log Data	1.962

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.366
Shapiro Wilk Critical Value	0.923

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	3098

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	3865
95% Modified-t UCL	3226

Gamma Distribution Test

k star (bias corrected)	0.285
Theta Star	5422
nu star	15.4
Approximate Chi Square Value (.05)	7.539
Adjusted Level of Significance	0.0401
Adjusted Chi Square Value	7.188

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.854
Shapiro Wilk Critical Value	0.923

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	4443
95% Chebyshev (MVUE) UCL	2640
97.5% Chebyshev (MVUE) UCL	3421
99% Chebyshev (MVUE) UCL	4955

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	3043
95% Jackknife UCL	3098
95% Standard Bootstrap UCL	2990

Anderson-Darling Test Statistic	3.581	95% Bootstrap-t UCL	8405
Anderson-Darling 5% Critical Value	0.856	95% Hall's Bootstrap UCL	8337
Kolmogorov-Smirnov Test Statistic	0.331	95% Percentile Bootstrap UCL	3205
Kolmogorov-Smirnov 5% Critical Value	0.183	95% BCA Bootstrap UCL	4299
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5512
		97.5% Chebyshev(Mean, Sd) UCL	7228
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	10600
95% Approximate Gamma UCL	3158		
95% Adjusted Gamma UCL	3312		
Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	10600

Dibenz(a,h)Anthracene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	6
		Percent Non-Detects	66.67%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0026	Minimum Detected	-5.952
Maximum Detected	0.0035	Maximum Detected	-5.655
Mean of Detected	0.00293	Mean of Detected	-5.841
SD of Detected	0.0004933	SD of Detected	0.162
Minimum Non-Detect	0.0017	Minimum Non-Detect	-6.377
Maximum Non-Detect	0.21	Maximum Non-Detect	-1.561

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.832	Shapiro Wilk Test Statistic	0.843
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0451	Mean	-4.541
SD	0.0511	SD	2.163
95% DL/2 (t) UCL	0.0767	95% H-Stat (DL/2) UCL	10.09
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	

MLE method failed to converge properly

Mean in Log Scale	-6.029
SD in Log Scale	0.212
Mean in Original Scale	0.00246
SD in Original Scale	0.0005285
95% Percentile Bootstrap UCL	0.00274
95% BCA Bootstrap UCL	0.00277

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	0.479
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
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	0.0028
SD	0.0003521
SE of Mean	0.0001929
95% KM (t) UCL	0.00316
95% KM (z) UCL	0.00312
95% KM (jackknife) UCL	0.00313
95% KM (bootstrap t) UCL	0.00471
95% KM (BCA) UCL	0.0035
95% KM (Percentile Bootstrap) UCL	0.0035
95% KM (Chebyshev) UCL	0.00364
97.5% KM (Chebyshev) UCL	0.004
99% KM (Chebyshev) UCL	0.00472

Potential UCLs to Use

95% KM (t) UCL	0.00316
95% KM (Percentile Bootstrap) UCL	0.0035

Note: DL/2 is not a recommended method.

Dibenzofuran (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	6
		Percent Non-Detects	66.67%

Raw Statistics

Minimum Detected	0.013
Maximum Detected	0.0462
Mean of Detected	0.0244

Log-transformed Statistics

Minimum Detected	-4.343
Maximum Detected	-3.075
Mean of Detected	-3.895

SD of Detected	0.0189	SD of Detected	0.712
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.773	Shapiro Wilk Test Statistic	0.794
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0704	Mean	-2.881
SD	0.0362	SD	0.842
95% DL/2 (t) UCL	0.0928	95% H-Stat (DL/2) UCL	0.192
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.895
		SD in Log Scale	0.518
		Mean in Original Scale	0.023
		SD in Original Scale	0.0126
		95% Percentile Bootstrap UCL	0.0297
		95% BCA Bootstrap UCL	0.0307

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	0.563	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0244
5% K-S Critical Value	N/A	SD	0.0154
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0109
		95% KM (t) UCL	0.0447
Assuming Gamma Distribution		95% KM (z) UCL	0.0423
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0478
Minimum	N/A	95% KM (bootstrap t) UCL	0.511
Maximum	N/A	95% KM (BCA) UCL	0.0462
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.0462
Median	N/A	95% KM (Chebyshev) UCL	0.0719

SD	N/A	97.5% KM (Chebyshev) UCL	0.0925
k star	N/A	99% KM (Chebyshev) UCL	0.133
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	95% KM (t) UCL	0.0447
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	0.0462
95% Adjusted Gamma UCL	N/A		

Note: DL/2 is not a recommended method.

Fluoranthene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	6
Number of Unique Samples	5	Number of Non-Detect Data	3
		Percent Non-Detects	33.33%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.018	Minimum Detected	-4.017
Maximum Detected	0.0535	Maximum Detected	-2.928
Mean of Detected	0.0281	Mean of Detected	-3.654
SD of Detected	0.0137	SD of Detected	0.423
Minimum Non-Detect	0.2	Minimum Non-Detect	-1.609
Maximum Non-Detect	0.21	Maximum Non-Detect	-1.561

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.804	Shapiro Wilk Test Statistic	0.877
5% Shapiro Wilk Critical Value	0.788	5% 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**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0526	Mean	-3.198
SD	0.0384	SD	0.762
95% DL/2 (t) UCL	0.0764	95% H-Stat (DL/2) UCL	0.115
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.654
		SD in Log Scale	0.352
		Mean in Original Scale	0.0275

SD in Original Scale	0.0112
95% Percentile Bootstrap UCL	0.0338
95% BCA Bootstrap UCL	0.0363

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	3.249
Theta Star	0.00864
nu star	38.99
A-D Test Statistic	0.468
5% A-D Critical Value	0.698
K-S Test Statistic	0.698
5% K-S Critical Value	0.333

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.018
Maximum	0.0535
Mean	0.0284
Median	0.025
SD	0.0113
k star	5.682
Theta star	0.005
Nu star	102.3
AppChi2	79.94
95% Gamma Approximate UCL	0.0364
95% Adjusted Gamma UCL	0.0384

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0281
SD	0.0125
SE of Mean	0.00558
95% KM (t) UCL	0.0385
95% KM (z) UCL	0.0373
95% KM (jackknife) UCL	0.0388
95% KM (bootstrap t) UCL	0.0608
95% KM (BCA) UCL	0.0378
95% KM (Percentile Bootstrap) UCL	0.0376
95% KM (Chebyshev) UCL	0.0524
97.5% KM (Chebyshev) UCL	0.0629
99% KM (Chebyshev) UCL	0.0836

Potential UCLs to Use

95% KM (t) UCL	0.0385
95% KM (Percentile Bootstrap) UCL	0.0376

Fluorene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	6
Number of Unique Samples	6	Number of Non-Detect Data	3
		Percent Non-Detects	33.33%

Raw Statistics

Minimum Detected	0.0012
Maximum Detected	0.009
Mean of Detected	0.00342
SD of Detected	0.00297
Minimum Non-Detect	0.18
Maximum Non-Detect	0.2

Log-transformed Statistics

Minimum Detected	-6.725
Maximum Detected	-4.711
Mean of Detected	-5.942
SD of Detected	0.761
Minimum Non-Detect	-1.715
Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.795
5% Shapiro Wilk Critical Value	0.788

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.0345
SD	0.0468
95% DL/2 (t) UCL	0.0635
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.933
5% Shapiro Wilk Critical Value	0.788

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-4.741
SD	1.9
95% H-Stat (DL/2) UCL	2.256
Log ROS Method	
Mean in Log Scale	-5.942
SD in Log Scale	0.636
Mean in Original Scale	0.0032
SD in Original Scale	0.00243
95% Percentile Bootstrap UCL	0.00452
95% BCA Bootstrap UCL	0.00494

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.138
Theta Star	0.003
nu star	13.65
A-D Test Statistic	0.376
5% A-D Critical Value	0.704
K-S Test Statistic	0.704
5% K-S Critical Value	0.336

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.0012
Maximum	0.009
Mean	0.00342
Median	0.0026
SD	0.00248
k star	1.824
Theta star	0.00188

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.00342
SD	0.00271
SE of Mean	0.00121
95% KM (t) UCL	0.00567
95% KM (z) UCL	0.00541
95% KM (jackknife) UCL	0.00574
95% KM (bootstrap t) UCL	0.0114
95% KM (BCA) UCL	0.00548
95% KM (Percentile Bootstrap) UCL	0.00556
95% KM (Chebyshev) UCL	0.0087
97.5% KM (Chebyshev) UCL	0.011
99% KM (Chebyshev) UCL	0.0155

Nu star	32.83	**Potential UCLs to Use**	
AppChi2	20.73	95% KM (t) UCL	0.00567
95% Gamma Approximate UCL	0.00542	95% KM (Percentile Bootstrap) UCL	0.00556
95% Adjusted Gamma UCL	0.006		

Note: DL/2 is not a recommended method.

Hexachlorobutadiene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	6
		Percent Non-Detects	66.67%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.01	Minimum Detected	-4.605
Maximum Detected	0.052	Maximum Detected	-2.957
Mean of Detected	0.0307	Mean of Detected	-3.689
SD of Detected	0.021	SD of Detected	0.839
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.999	Shapiro Wilk Test Statistic	0.964
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0719	Mean	-2.819
SD	0.0333	SD	0.779
95% DL/2 (t) UCL	0.0925	95% H-Stat (DL/2) UCL	0.176
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.689
		SD in Log Scale	0.718
		Mean in Original Scale	0.0309
		SD in Original Scale	0.0197
		95% Percentile Bootstrap UCL	0.0412
		95% BCA Bootstrap UCL	0.0412

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	0.266
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
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0307
SD	0.0172
SE of Mean	0.0121
95% KM (t) UCL	0.0532
95% KM (z) UCL	0.0506
95% KM (jackknife) UCL	0.0567
95% KM (bootstrap t) UCL	0.0687
95% KM (BCA) UCL	0.052
95% KM (Percentile Bootstrap) UCL	0.052
95% KM (Chebyshev) UCL	0.0835
97.5% KM (Chebyshev) UCL	0.106
99% KM (Chebyshev) UCL	0.151

Potential UCLs to Use

95% KM (t) UCL	0.0532
95% KM (Percentile Bootstrap) UCL	0.052

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

Indeno(1,2,3-cd)pyrene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	6
Number of Unique Samples	6	Number of Non-Detect Data	3
		Percent Non-Detects	33.33%

Raw Statistics

Minimum Detected	0.0063
Maximum Detected	0.026
Mean of Detected	0.0139
SD of Detected	0.00783
Minimum Non-Detect	0.2
Maximum Non-Detect	0.21

Log-transformed Statistics

Minimum Detected	-5.067
Maximum Detected	-3.65
Mean of Detected	-4.417
SD of Detected	0.579
Minimum Non-Detect	-1.609
Maximum Non-Detect	-1.561

Note: Data have multiple DLs - Use of KM Method is recommended

Number treated as Non-Detect 9

For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.911	Shapiro Wilk Test Statistic	0.928
5% Shapiro Wilk Critical Value	0.788	5% 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**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0431	Mean	-3.707
SD	0.0444	SD	1.16
95% DL/2 (t) UCL	0.0706	95% H-Stat (DL/2) UCL	0.217
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.417
		SD in Log Scale	0.484
		Mean in Original Scale	0.0134
		SD in Original Scale	0.00653
		95% Percentile Bootstrap UCL	0.0169
		95% BCA Bootstrap UCL	0.0172

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.01	**Data appear Normal at 5% Significance Level**	
Theta Star	0.00689		
nu star	24.12		
A-D Test Statistic	0.297	**Nonparametric Statistics**	
5% A-D Critical Value	0.7	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.7	Mean	0.0139
5% K-S Critical Value	0.334	SD	0.00715
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0032
		95% KM (t) UCL	0.0198
Assuming Gamma Distribution		95% KM (z) UCL	0.0191
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.02
Minimum	0.0063	95% KM (bootstrap t) UCL	0.023
Maximum	0.026	95% KM (BCA) UCL	0.0193
Mean	0.014	95% KM (Percentile Bootstrap) UCL	0.0189
Median	0.0145	95% KM (Chebyshev) UCL	0.0278
SD	0.00658	97.5% KM (Chebyshev) UCL	0.0338
k star	3.419	99% KM (Chebyshev) UCL	0.0457
Theta star	0.0041		
Nu star	61.54	**Potential UCLs to Use**	
AppChi2	44.49	95% KM (t) UCL	0.0198

95% Gamma Approximate UCL	0.0194	95% KM (Percentile Bootstrap) UCL	0.0189
95% Adjusted Gamma UCL	0.0208		

Note: DL/2 is not a recommended method.

Iron (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Unique Samples	26

Raw Statistics

Minimum	14100
Maximum	99900
Mean	29765
Median	25000
SD	17492
Coefficient of Variation	0.588
Skewness	2.884

Log-transformed Statistics

Minimum of Log Data	9.554
Maximum of Log Data	11.51
Mean of log Data	10.2
SD of log Data	0.423

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.673
Shapiro Wilk Critical Value	0.923

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.886
Shapiro Wilk Critical Value	0.923

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	35507

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	37299
95% Modified-t UCL	35818

Assuming Lognormal Distribution

95% H-UCL	34304
95% Chebyshev (MVUE) UCL	39901
97.5% Chebyshev (MVUE) UCL	44523
99% Chebyshev (MVUE) UCL	53603

Gamma Distribution Test

k star (bias corrected)	4.425
Theta Star	6727
nu star	238.9
Approximate Chi Square Value (.05)	204.2
Adjusted Level of Significance	0.0401
Adjusted Chi Square Value	202.1
Anderson-Darling Test Statistic	1.649
Anderson-Darling 5% Critical Value	0.747
Kolmogorov-Smirnov Test Statistic	0.244
Kolmogorov-Smirnov 5% Critical Value	0.169

Data not Gamma Distributed at 5% Significance Level

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	35302
95% Jackknife UCL	35507
95% Standard Bootstrap UCL	35267
95% Bootstrap-t UCL	41101
95% Hall's Bootstrap UCL	60416
95% Percentile Bootstrap UCL	35424
95% BCA Bootstrap UCL	37070
95% Chebyshev(Mean, Sd) UCL	44439
97.5% Chebyshev(Mean, Sd) UCL	50788

Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL 63260
95% Approximate Gamma UCL 34836	
95% Adjusted Gamma UCL 35190	
Potential UCL to Use	Use 95% Student's-t UCL 35507
	or 95% Modified-t UCL 35818

Isophorone (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	6
		Percent Non-Detects	66.67%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0074	Minimum Detected	-4.906
Maximum Detected	0.0464	Maximum Detected	-3.072
Mean of Detected	0.0213	Mean of Detected	-4.194
SD of Detected	0.0218	SD of Detected	0.984
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.8	Shapiro Wilk Test Statistic	0.869
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0688	Mean	-2.987
SD	0.0378	SD	1.033
95% DL/2 (t) UCL	0.0922	95% H-Stat (DL/2) UCL	0.295
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.194
		SD in Log Scale	0.814
		Mean in Original Scale	0.0202
		SD in Original Scale	0.0159
		95% Percentile Bootstrap UCL	0.0282

95% BCA Bootstrap UCL	0.0287

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	0.472
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
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	0.0213
SD	0.0178
SE of Mean	0.0126
95% KM (t) UCL	0.0446
95% KM (z) UCL	0.0419
95% KM (jackknife) UCL	0.0482
95% KM (bootstrap t) UCL	0.277
95% KM (BCA) UCL	0.0464
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	0.0761
97.5% KM (Chebyshev) UCL	0.0998
99% KM (Chebyshev) UCL	0.146

Potential UCLs to Use

95% KM (t) UCL	0.0446
95% KM (Percentile Bootstrap) UCL	N/A

Lead (mg/kg)

General Statistics

Number of Valid Samples	33	Number of Unique Samples	32

Raw Statistics

Minimum	18.3
Maximum	25850
Mean	1212
Median	128
SD	4481
Coefficient of Variation	3.698
Skewness	5.521

Log-transformed Statistics

Minimum of Log Data	2.907
Maximum of Log Data	10.16
Mean of log Data	5.231
SD of log Data	1.625

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.272
Shapiro Wilk Critical Value	0.931

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.914
Shapiro Wilk Critical Value	0.931

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	2533

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	3296
95% Modified-t UCL	2658

Assuming Lognormal Distribution

95% H-UCL	1774
95% Chebyshev (MVUE) UCL	1679
97.5% Chebyshev (MVUE) UCL	2127
99% Chebyshev (MVUE) UCL	3006

Gamma Distribution Test

k star (bias corrected)	0.346
Theta Star	3501
nu star	22.84
Approximate Chi Square Value (.05)	12.97
Adjusted Level of Significance	0.0419
Adjusted Chi Square Value	12.59
Anderson-Darling Test Statistic	3.795
Anderson-Darling 5% Critical Value	0.842
Kolmogorov-Smirnov Test Statistic	0.3
Kolmogorov-Smirnov 5% Critical Value	0.165

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	2133
95% Adjusted Gamma UCL	2198

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	2495
95% Jackknife UCL	2533
95% Standard Bootstrap UCL	2468
95% Bootstrap-t UCL	9012
95% Hall's Bootstrap UCL	7048
95% Percentile Bootstrap UCL	2729
95% BCA Bootstrap UCL	3655
95% Chebyshev(Mean, Sd) UCL	4612
97.5% Chebyshev(Mean, Sd) UCL	6083
99% Chebyshev(Mean, Sd) UCL	8973

Potential UCL to Use

Use 99% Chebyshev (Mean, Sd) UCL 8973

Magnesium (mg/kg)

General Statistics

Number of Valid Samples	27
Number of Unique Samples	26

Raw Statistics

Minimum	1070
Maximum	60400
Mean	11885
Median	7510
SD	13642
Coefficient of Variation	1.148

Log-transformed Statistics

Minimum of Log Data	6.975
Maximum of Log Data	11.01
Mean of log Data	8.928
SD of log Data	0.965

Skewness 2.558

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic 0.68

Shapiro Wilk Critical Value 0.923

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic 0.977

Shapiro Wilk Critical Value 0.923

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL 16363

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL 17585

95% Modified-t UCL 16578

Assuming Lognormal Distribution

95% H-UCL 19037

95% Chebyshev (MVUE) UCL 22478

97.5% Chebyshev (MVUE) UCL 27133

99% Chebyshev (MVUE) UCL 36275

Gamma Distribution Test

k star (bias corrected) 1.126

Theta Star 10553

nu star 60.81

Approximate Chi Square Value (.05) 43.88

Adjusted Level of Significance 0.0401

Adjusted Chi Square Value 42.96

Anderson-Darling Test Statistic 0.663

Anderson-Darling 5% Critical Value 0.768

Kolmogorov-Smirnov Test Statistic 0.155

Kolmogorov-Smirnov 5% Critical Value 0.172

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL 16472

95% Adjusted Gamma UCL 16825

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

95% CLT UCL 16203

95% Jackknife UCL 16363

95% Standard Bootstrap UCL 16117

95% Bootstrap-t UCL 20306

95% Hall's Bootstrap UCL 38941

95% Percentile Bootstrap UCL 16332

95% BCA Bootstrap UCL 17503

95% Chebyshev(Mean, Sd) UCL 23329

97.5% Chebyshev(Mean, Sd) UCL 28280

99% Chebyshev(Mean, Sd) UCL 38007

Potential UCL to Use

Use 95% Approximate Gamma UCL 16472

Manganese (mg/kg)

General Statistics

Number of Valid Samples 27

Number of Unique Samples 27

Raw Statistics

Minimum 137

Maximum 2230

Mean 711.4

Median 548

Log-transformed Statistics

Minimum of Log Data 4.92

Maximum of Log Data 7.71

Mean of log Data 6.324

SD of log Data 0.701

SD	556.4
Coefficient of Variation	0.782
Skewness	1.715

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.787
Shapiro Wilk Critical Value	0.923

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.976
Shapiro Wilk Critical Value	0.923

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	894

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	925.3
95% Modified-t UCL	899.9

Assuming Lognormal Distribution

95% H-UCL	957.2
95% Chebyshev (MVUE) UCL	1153
97.5% Chebyshev (MVUE) UCL	1347
99% Chebyshev (MVUE) UCL	1727

Gamma Distribution Test

k star (bias corrected)	1.986
Theta Star	358.3
nu star	107.2
Approximate Chi Square Value (.05)	84.32
Adjusted Level of Significance	0.0401
Adjusted Chi Square Value	83.03
Anderson-Darling Test Statistic	0.562
Anderson-Darling 5% Critical Value	0.756
Kolmogorov-Smirnov Test Statistic	0.127
Kolmogorov-Smirnov 5% Critical Value	0.17

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	904.6
95% Adjusted Gamma UCL	918.7

Nonparametric Statistics

95% CLT UCL	887.5
95% Jackknife UCL	894
95% Standard Bootstrap UCL	886.5
95% Bootstrap-t UCL	967.6
95% Hall's Bootstrap UCL	929.2
95% Percentile Bootstrap UCL	887.4
95% BCA Bootstrap UCL	934.5
95% Chebyshev(Mean, Sd) UCL	1178
97.5% Chebyshev(Mean, Sd) UCL	1380
99% Chebyshev(Mean, Sd) UCL	1777

Potential UCL to Use

Use 95% Approximate Gamma UCL 904.6

Mercury (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Detected Data	26
Number of Unique Samples	22	Number of Non-Detect Data	1
		Percent Non-Detects	3.70%

Raw Statistics

Log-transformed Statistics

Minimum Detected	0.03	Minimum Detected	-3.507
Maximum Detected	2.2	Maximum Detected	0.788
Mean of Detected	0.334	Mean of Detected	-1.946
SD of Detected	0.581	SD of Detected	1.178
Minimum Non-Detect	0.0605	Minimum Non-Detect	-2.805
Maximum Non-Detect	0.0605	Maximum Non-Detect	-2.805

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.533	Shapiro Wilk Test Statistic	0.888
5% Shapiro Wilk Critical Value	0.92	5% Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.322	Mean	-2.003
SD	0.573	SD	1.193
95% DL/2 (t) UCL	0.51	95% H-Stat (DL/2) UCL	0.442
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.172	Mean in Log Scale	-1.994
SD	0.71	SD in Log Scale	1.182
95% MLE (t) UCL	0.405	Mean in Original Scale	0.323
95% MLE (Tiku) UCL	0.414	SD in Original Scale	0.572
		95% Percentile Bootstrap UCL	0.509
		95% BCA Bootstrap UCL	0.574

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.654	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.51		
nu star	34.03		
A-D Test Statistic	2.421	**Nonparametric Statistics**	
5% A-D Critical Value	0.788	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.788	Mean	0.323
5% K-S Critical Value	0.179	SD	0.562
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.11
		95% KM (t) UCL	0.511
Assuming Gamma Distribution		95% KM (z) UCL	0.504
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.511
Minimum	0	95% KM (bootstrap t) UCL	0.744
Maximum	2.2	95% KM (BCA) UCL	0.538
Mean	0.321	95% KM (Percentile Bootstrap) UCL	0.51
Median	0.12	95% KM (Chebyshev) UCL	0.803

SD	0.573	97.5% KM (Chebyshev) UCL	1.011
k star	0.408	99% KM (Chebyshev) UCL	1.42
Theta star	0.787		
Nu star	22.05	**Potential UCLs to Use**	
AppChi2	12.38	97.5% KM (Chebyshev) UCL	1.011
95% Gamma Approximate UCL	0.573		
95% Adjusted Gamma UCL	0.595		

Note: DL/2 is not a recommended method.

Naphthalene (mg/kg)

General Statistics

Number of Valid Samples	7	Number of Detected Data	5
Number of Unique Samples	5	Number of Non-Detect Data	2
		Percent Non-Detects	28.57%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0074	Minimum Detected	-4.906
Maximum Detected	0.034	Maximum Detected	-3.381
Mean of Detected	0.0199	Mean of Detected	-4.051
SD of Detected	0.0105	SD of Detected	0.608
Minimum Non-Detect	0.2	Minimum Non-Detect	-1.609
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.965	Shapiro Wilk Test Statistic	0.944
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0428	Mean	-3.552
SD	0.04	SD	0.987
95% DL/2 (t) UCL	0.0722	95% H-Stat (DL/2) UCL	0.204
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.051
		SD in Log Scale	0.534
		Mean in Original Scale	0.0195
		SD in Original Scale	0.00926
		95% Percentile Bootstrap UCL	0.0247
		95% BCA Bootstrap UCL	0.0247

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.697
Theta Star	0.0117
nu star	16.97
A-D Test Statistic	0.262
5% A-D Critical Value	0.681
K-S Test Statistic	0.681
5% K-S Critical Value	0.359

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.0074
Maximum	0.034
Mean	0.02
Median	0.022
SD	0.0093
k star	2.785
Theta star	0.00717
Nu star	39
AppChi2	25.69
95% Gamma Approximate UCL	0.0303
95% Adjusted Gamma UCL	0.0347

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0199
SD	0.00937
SE of Mean	0.00468
95% KM (t) UCL	0.029
95% KM (z) UCL	0.0276
95% KM (jackknife) UCL	0.0293
95% KM (bootstrap t) UCL	0.0303
95% KM (BCA) UCL	0.0263
95% KM (Percentile Bootstrap) UCL	0.0267
95% KM (Chebyshev) UCL	0.0403
97.5% KM (Chebyshev) UCL	0.0491
99% KM (Chebyshev) UCL	0.0665

Potential UCLs to Use

95% KM (t) UCL	0.029
95% KM (Percentile Bootstrap) UCL	0.0267

Nickel (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Unique Samples	27

Raw Statistics

Minimum	7.5
Maximum	404
Mean	40.82
Median	19.3
SD	77.38
Coefficient of Variation	1.896
Skewness	4.33

Log-transformed Statistics

Minimum of Log Data	2.015
Maximum of Log Data	6.001
Mean of log Data	3.108
SD of log Data	0.901

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.418

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.858

Shapiro Wilk Critical Value	0.923

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	66.22

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	78.57
95% Modified-t UCL	68.28

Gamma Distribution Test

k star (bias corrected)	0.882
Theta Star	46.28
nu star	47.63
Approximate Chi Square Value (.05)	32.79
Adjusted Level of Significance	0.0401
Adjusted Chi Square Value	32
Anderson-Darling Test Statistic	2.844
Anderson-Darling 5% Critical Value	0.775
Kolmogorov-Smirnov Test Statistic	0.281
Kolmogorov-Smirnov 5% Critical Value	0.173

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	59.29
95% Adjusted Gamma UCL	60.75

Potential UCL to Use

Shapiro Wilk Critical Value	0.923

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	50.96
95% Chebyshev (MVUE) UCL	60.76
97.5% Chebyshev (MVUE) UCL	72.82
99% Chebyshev (MVUE) UCL	96.5

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	65.31
95% Jackknife UCL	66.22
95% Standard Bootstrap UCL	64.96
95% Bootstrap-t UCL	118.9
95% Hall's Bootstrap UCL	140.3
95% Percentile Bootstrap UCL	68.42
95% BCA Bootstrap UCL	85
95% Chebyshev(Mean, Sd) UCL	105.7
97.5% Chebyshev(Mean, Sd) UCL	133.8
99% Chebyshev(Mean, Sd) UCL	189

Use 95% Chebyshev (Mean, Sd) UCL 105.7

Phenanthrene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	6
Number of Unique Samples	6	Number of Non-Detect Data	3
		Percent Non-Detects	33.33%

Raw Statistics

Minimum Detected	0.014
Maximum Detected	0.055
Mean of Detected	0.0273
SD of Detected	0.0146
Minimum Non-Detect	0.2
Maximum Non-Detect	0.21

Log-transformed Statistics

Minimum Detected	-4.269
Maximum Detected	-2.9
Mean of Detected	-3.701
SD of Detected	0.476
Minimum Non-Detect	-1.609
Maximum Non-Detect	-1.561

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.831	Shapiro Wilk Test Statistic	0.945
5% Shapiro Wilk Critical Value	0.788	5% 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**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0521	Mean	-3.229
SD	0.039	SD	0.801
95% DL/2 (t) UCL	0.0763	95% H-Stat (DL/2) UCL	0.123
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.701
		SD in Log Scale	0.397
		Mean in Original Scale	0.0266
		SD in Original Scale	0.012
		95% Percentile Bootstrap UCL	0.0339
		95% BCA Bootstrap UCL	0.0358

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.669	**Data appear Normal at 5% Significance Level**	
Theta Star	0.0102		
nu star	32.03		
A-D Test Statistic	0.348	**Nonparametric Statistics**	
5% A-D Critical Value	0.698	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.698	Mean	0.0273
5% K-S Critical Value	0.333	SD	0.0133
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00597
		95% KM (t) UCL	0.0384
Assuming Gamma Distribution		95% KM (z) UCL	0.0372
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0388
Minimum	0.014	95% KM (bootstrap t) UCL	0.0489
Maximum	0.055	95% KM (BCA) UCL	0.0374
Mean	0.0277	95% KM (Percentile Bootstrap) UCL	0.0376
Median	0.027	95% KM (Chebyshev) UCL	0.0534
SD	0.0121	97.5% KM (Chebyshev) UCL	0.0646
k star	4.619	99% KM (Chebyshev) UCL	0.0867
Theta star	0.00599		
Nu star	83.14	**Potential UCLs to Use**	

AppChi2	63.12	95% KM (t) UCL	0.0384
95% Gamma Approximate UCL	0.0364	95% KM (Percentile Bootstrap) UCL	0.0376
95% Adjusted Gamma UCL	0.0387		

Note: DL/2 is not a recommended method.

Potassium (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Unique Samples	25

Raw Statistics

Minimum	712
Maximum	7870
Mean	2336
Median	2030
SD	1493
Coefficient of Variation	0.639
Skewness	2.271

Log-transformed Statistics

Minimum of Log Data	6.568
Maximum of Log Data	8.971
Mean of log Data	7.604
SD of log Data	0.546

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.789
Shapiro Wilk Critical Value	0.923

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.976
Shapiro Wilk Critical Value	0.923

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	2826

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	2942
95% Modified-t UCL	2847

Assuming Lognormal Distribution

95% H-UCL	2885
95% Chebyshev (MVUE) UCL	3430
97.5% Chebyshev (MVUE) UCL	3912
99% Chebyshev (MVUE) UCL	4860

Gamma Distribution Test

k star (bias corrected)	3.097
Theta Star	754.1
nu star	167.2
Approximate Chi Square Value (.05)	138.3
Adjusted Level of Significance	0.0401
Adjusted Chi Square Value	136.7
Anderson-Darling Test Statistic	0.443
Anderson-Darling 5% Critical Value	0.75
Kolmogorov-Smirnov Test Statistic	0.143
Kolmogorov-Smirnov 5% Critical Value	0.169

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	2808
95% Jackknife UCL	2826
95% Standard Bootstrap UCL	2781
95% Bootstrap-t UCL	3116
95% Hall's Bootstrap UCL	5166
95% Percentile Bootstrap UCL	2860
95% BCA Bootstrap UCL	2902
95% Chebyshev(Mean, Sd) UCL	3588

97.5% Chebyshev(Mean, Sd) UCL 4130

Assuming Gamma Distribution

99% Chebyshev(Mean, Sd) UCL 5195

95% Approximate Gamma UCL 2824

95% Adjusted Gamma UCL 2858

Potential UCL to Use

Use 95% Approximate Gamma UCL 2824

Pyrene (mg/kg)

General Statistics

Number of Valid Samples	9	Number of Detected Data	6
Number of Unique Samples	6	Number of Non-Detect Data	3
		Percent Non-Detects	33.33%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.019	Minimum Detected	-3.963
Maximum Detected	0.0505	Maximum Detected	-2.986
Mean of Detected	0.0306	Mean of Detected	-3.546
SD of Detected	0.0119	SD of Detected	0.37
Minimum Non-Detect	0.2	Minimum Non-Detect	-1.609
Maximum Non-Detect	0.21	Maximum Non-Detect	-1.561

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.904	Shapiro Wilk Test Statistic	0.942
5% Shapiro Wilk Critical Value	0.788	5% 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**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0543	Mean	-3.126
SD	0.0368	SD	0.695
95% DL/2 (t) UCL	0.0771	95% H-Stat (DL/2) UCL	0.107
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.546
		SD in Log Scale	0.31
		Mean in Original Scale	0.0301
		SD in Original Scale	0.00986
		95% Percentile Bootstrap UCL	0.0357

95% BCA Bootstrap UCL	0.0368

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	4.441
Theta Star	0.00689
nu star	53.29
A-D Test Statistic	0.306
5% A-D Critical Value	0.698
K-S Test Statistic	0.698
5% K-S Critical Value	0.333

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.019
Maximum	0.0505
Mean	0.0309
Median	0.032
SD	0.0099
k star	7.799
Theta star	0.00397
Nu star	140.4
AppChi2	114
95% Gamma Approximate UCL	0.0381
95% Adjusted Gamma UCL	0.0399

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0306
SD	0.0108
SE of Mean	0.00485
95% KM (t) UCL	0.0396
95% KM (z) UCL	0.0386
95% KM (jackknife) UCL	0.0399
95% KM (bootstrap t) UCL	0.0457
95% KM (BCA) UCL	0.0382
95% KM (Percentile Bootstrap) UCL	0.0383
95% KM (Chebyshev) UCL	0.0517
97.5% KM (Chebyshev) UCL	0.0609
99% KM (Chebyshev) UCL	0.0788

Potential UCLs to Use

95% KM (t) UCL	0.0396
95% KM (Percentile Bootstrap) UCL	0.0383

Selenium (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Detected Data	16
Number of Unique Samples	15	Number of Non-Detect Data	11
		Percent Non-Detects	40.74%

Raw Statistics

Minimum Detected	0.34
Maximum Detected	1.3
Mean of Detected	0.7
SD of Detected	0.306
Minimum Non-Detect	0.25
Maximum Non-Detect	1.27

Log-transformed Statistics

Minimum Detected	-1.079
Maximum Detected	0.262
Mean of Detected	-0.439
SD of Detected	0.418
Minimum Non-Detect	-1.386
Maximum Non-Detect	0.239

Note: Data have multiple DLs - Use of KM Method is recommended

Number treated as Non-Detect 25

For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.59%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.887	Shapiro Wilk Test Statistic	0.953
5% Shapiro Wilk Critical Value	0.887	5% Shapiro Wilk Critical Value	0.887
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.613	Mean	-0.602
SD	0.279	SD	0.524
95% DL/2 (t) UCL	0.704	95% H-Stat (DL/2) UCL	0.645
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.577
		SD in Log Scale	0.403
		Mean in Original Scale	0.609
		SD in Original Scale	0.268
		95% Percentile Bootstrap UCL	0.698
		95% BCA Bootstrap UCL	0.709
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	5.04	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.139		
nu star	161.3		
A-D Test Statistic	0.362	**Nonparametric Statistics**	
5% A-D Critical Value	0.741	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.741	Mean	0.626
5% K-S Critical Value	0.216	SD	0.272
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.06
		95% KM (t) UCL	0.728
Assuming Gamma Distribution		95% KM (z) UCL	0.725
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.727
Minimum	0.295	95% KM (bootstrap t) UCL	0.746
Maximum	1.3	95% KM (BCA) UCL	0.736
Mean	0.688	95% KM (Percentile Bootstrap) UCL	0.728
Median	0.749	95% KM (Chebyshev) UCL	0.888
SD	0.261	97.5% KM (Chebyshev) UCL	1.001
k star	6.327	99% KM (Chebyshev) UCL	1.223
Theta star	0.109		
Nu star	341.7	**Potential UCLs to Use**	
AppChi2	299.8	95% KM (t) UCL	0.728

95% Gamma Approximate UCL	0.784
95% Adjusted Gamma UCL	0.791

Note: DL/2 is not a recommended method.

Silver (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Detected Data	19
Number of Unique Samples	18	Number of Non-Detect Data	8
		Percent Non-Detects	29.63%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.11	Minimum Detected	-2.207
Maximum Detected	65.2	Maximum Detected	4.177
Mean of Detected	9.481	Mean of Detected	0.48
SD of Detected	17.65	SD of Detected	2.037
Minimum Non-Detect	0.075	Minimum Non-Detect	-2.59
Maximum Non-Detect	1.27	Maximum Non-Detect	0.239

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	19
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	70.37%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.605	Shapiro Wilk Test Statistic	0.909
5% Shapiro Wilk Critical Value	0.901	5% Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.82	Mean	0.0675
SD	15.27	SD	1.882
95% DL/2 (t) UCL	11.83	95% H-Stat (DL/2) UCL	9.06
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.0875
		SD in Log Scale	2.016
		Mean in Original Scale	6.767
		SD in Original Scale	15.29
		95% Percentile Bootstrap UCL	11.8
		95% BCA Bootstrap UCL	13.64

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.351
Theta Star	26.98
nu star	13.35
A-D Test Statistic	1.236
5% A-D Critical Value	0.828
K-S Test Statistic	0.828
5% K-S Critical Value	0.213

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.11
Maximum	65.2
Mean	9.763
Median	6.2
SD	14.69
k star	0.476
Theta star	20.49
Nu star	25.73
AppChi2	15.17
95% Gamma Approximate UCL	16.56
95% Adjusted Gamma UCL	17.14

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	6.777
SD	15
SE of Mean	2.966
95% KM (t) UCL	11.84
95% KM (z) UCL	11.66
95% KM (jackknife) UCL	11.79
95% KM (bootstrap t) UCL	17.71
95% KM (BCA) UCL	12.33
95% KM (Percentile Bootstrap) UCL	11.63
95% KM (Chebyshev) UCL	19.71
97.5% KM (Chebyshev) UCL	25.3
99% KM (Chebyshev) UCL	36.29

Potential UCLs to Use

99% KM (Chebyshev) UCL	36.29

Sodium (mg/kg)

General Statistics

Number of Valid Samples	23	Number of Unique Samples	23

Raw Statistics

Minimum	39.5
Maximum	3165
Mean	577.5
Median	357
SD	761.1
Coefficient of Variation	1.318
Skewness	2.616

Log-transformed Statistics

Minimum of Log Data	3.676
Maximum of Log Data	8.06
Mean of log Data	5.719
SD of log Data	1.21

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.634
Shapiro Wilk Critical Value	0.914

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.916
Shapiro Wilk Critical Value	0.914

Data not Normal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	850

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	931
95% Modified-t UCL	864.4

Assuming Lognormal Distribution

95% H-UCL	1313
95% Chebyshev (MVUE) UCL	1377
97.5% Chebyshev (MVUE) UCL	1712
99% Chebyshev (MVUE) UCL	2370

Gamma Distribution Test

k star (bias corrected)	0.822
Theta Star	702.2
nu star	37.83
Approximate Chi Square Value (.05)	24.75
Adjusted Level of Significance	0.0389
Adjusted Chi Square Value	23.98
Anderson-Darling Test Statistic	0.941
Anderson-Darling 5% Critical Value	0.774
Kolmogorov-Smirnov Test Statistic	0.176
Kolmogorov-Smirnov 5% Critical Value	0.187

Data follow Appr. Gamma Distribution at 5% Significance Level

Data Distribution

Data Follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	882.8
95% Adjusted Gamma UCL	911

Nonparametric Statistics

95% CLT UCL	838.5
95% Jackknife UCL	850
95% Standard Bootstrap UCL	827.3
95% Bootstrap-t UCL	1231
95% Hall's Bootstrap UCL	2216
95% Percentile Bootstrap UCL	855.7
95% BCA Bootstrap UCL	943.1
95% Chebyshev(Mean, Sd) UCL	1269
97.5% Chebyshev(Mean, Sd) UCL	1569
99% Chebyshev(Mean, Sd) UCL	2156

Potential UCL to Use

Use 95% Approximate Gamma UCL 882.8

Thallium (mg/kg)

General Statistics

Number of Valid Samples	20	Number of Detected Data	9
Number of Unique Samples	8	Number of Non-Detect Data	11
		Percent Non-Detects	55.00%

Raw Statistics

Minimum Detected	0.099
Maximum Detected	0.316
Mean of Detected	0.185
SD of Detected	0.0695
Minimum Non-Detect	0.6
Maximum Non-Detect	1.62

Log-transformed Statistics

Minimum Detected	-2.313
Maximum Detected	-1.154
Mean of Detected	-1.748
SD of Detected	0.368
Minimum Non-Detect	-0.511
Maximum Non-Detect	0.482

Note: Data have multiple DLs - Use of KM Method is recommended

Number treated as Non-Detect 20

For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.94	Shapiro Wilk Test Statistic	0.98
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.286	Mean	-1.36
SD	0.149	SD	0.478
95% DL/2 (t) UCL	0.344	95% H-Stat (DL/2) UCL	0.358
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.748
		SD in Log Scale	0.28
		Mean in Original Scale	0.181
		SD in Original Scale	0.052
		95% Percentile Bootstrap UCL	0.199
		95% BCA Bootstrap UCL	0.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	5.678	**Data appear Normal at 5% Significance Level**	
Theta Star	0.0326		
nu star	102.2		
A-D Test Statistic	0.204	**Nonparametric Statistics**	
5% A-D Critical Value	0.722	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.722	Mean	0.185
5% K-S Critical Value	0.279	SD	0.0655
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0232
		95% KM (t) UCL	0.225
Assuming Gamma Distribution		95% KM (z) UCL	0.223
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.226
Minimum	0.099	95% KM (bootstrap t) UCL	0.244
Maximum	0.316	95% KM (BCA) UCL	0.222
Mean	0.189	95% KM (Percentile Bootstrap) UCL	0.227
Median	0.193	95% KM (Chebyshev) UCL	0.286
SD	0.052	97.5% KM (Chebyshev) UCL	0.33
k star	11.84	99% KM (Chebyshev) UCL	0.415
Theta star	0.016		
Nu star	473.6	**Potential UCLs to Use**	
AppChi2	424.2	95% KM (t) UCL	0.225

95% Gamma Approximate UCL	0.211	95% KM (Percentile Bootstrap) UCL	0.227
95% Adjusted Gamma UCL	0.213		

Note: DL/2 is not a recommended method.

Vanadium (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Unique Samples	26

Raw Statistics

Minimum	21.6
Maximum	75.6
Mean	42.88
Median	44.6
SD	10.06
Coefficient of Variation	0.235
Skewness	0.882

Log-transformed Statistics

Minimum of Log Data	3.073
Maximum of Log Data	4.325
Mean of log Data	3.732
SD of log Data	0.237

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.927
Shapiro Wilk Critical Value	0.923

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.949
Shapiro Wilk Critical Value	0.923

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	46.18

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	46.41
95% Modified-t UCL	46.24

Assuming Lognormal Distribution

95% H-UCL	46.65
95% Chebyshev (MVUE) UCL	51.53
97.5% Chebyshev (MVUE) UCL	55.26
99% Chebyshev (MVUE) UCL	62.6

Gamma Distribution Test

k star (bias corrected)	16.99
Theta Star	2.524
nu star	917.4
Approximate Chi Square Value (.05)	848.1
Adjusted Level of Significance	0.0401
Adjusted Chi Square Value	843.9
Anderson-Darling Test Statistic	0.538
Anderson-Darling 5% Critical Value	0.744
Kolmogorov-Smirnov Test Statistic	0.124
Kolmogorov-Smirnov 5% Critical Value	0.168

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	46.06
95% Jackknife UCL	46.18
95% Standard Bootstrap UCL	46
95% Bootstrap-t UCL	46.5
95% Hall's Bootstrap UCL	47.41
95% Percentile Bootstrap UCL	46
95% BCA Bootstrap UCL	46.32
95% Chebyshev(Mean, Sd) UCL	51.32
97.5% Chebyshev(Mean, Sd) UCL	54.97

Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	62.14
95% Approximate Gamma UCL	46.38		
95% Adjusted Gamma UCL	46.61		
Potential UCL to Use		Use 95% Student's-t UCL	46.18

Zinc (mg/kg)

General Statistics

Number of Valid Samples	27	Number of Unique Samples	27

Raw Statistics		**Log-transformed Statistics**	
Minimum	26	Minimum of Log Data	3.258
Maximum	15235	Maximum of Log Data	9.631
Mean	1370	Mean of log Data	5.568
Median	145	SD of log Data	1.691
SD	3171		
Coefficient of Variation	2.314		
Skewness	3.598		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.478	Shapiro Wilk Test Statistic	0.867
Shapiro Wilk Critical Value	0.923	Shapiro Wilk Critical Value	0.923
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	2411	95% H-UCL	3448
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2749
95% Adjusted-CLT UCL	2826	97.5% Chebyshev (MVUE) UCL	3516
95% Modified-t UCL	2482	99% Chebyshev (MVUE) UCL	5022
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.378	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	3621		
nu star	20.43		
Approximate Chi Square Value (.05)	11.17	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0401	95% CLT UCL	2374
Adjusted Chi Square Value	10.73	95% Jackknife UCL	2411
		95% Standard Bootstrap UCL	2343
Anderson-Darling Test Statistic	3.076	95% Bootstrap-t UCL	3857
Anderson-Darling 5% Critical Value	0.831	95% Hall's Bootstrap UCL	5685
Kolmogorov-Smirnov Test Statistic	0.328	95% Percentile Bootstrap UCL	2482
Kolmogorov-Smirnov 5% Critical Value	0.18	95% BCA Bootstrap UCL	2996

Data not Gamma Distributed at 5% Significance Level

95% Chebyshev(Mean, Sd) UCL 4030

97.5% Chebyshev(Mean, Sd) UCL 5181

99% Chebyshev(Mean, Sd) UCL 7442

Assuming Gamma Distribution

95% Approximate Gamma UCL 2506

95% Adjusted Gamma UCL 2609

Potential UCL to Use

Use 99% Chebyshev (Mean, Sd) UCL 7442

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

2-Nitrophenol (mg/kg)

General Statistics

Number of Valid Samples	17	Number of Detected Data	3
Number of Unique Samples	3	Number of Non-Detect Data	14
		Percent Non-Detects	82.35%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.011	Minimum Detected	-4.51
Maximum Detected	0.055	Maximum Detected	-2.9
Mean of Detected	0.0307	Mean of Detected	-3.687
SD of Detected	0.0224	SD of Detected	0.805
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.24	Maximum Non-Detect	-1.427

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	17
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Test Statistic	0.998
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0886	Mean	-2.542
SD	0.0303	SD	0.623
95% DL/2 (t) UCL	0.101	95% H-Stat (DL/2) UCL	0.134
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.687
		SD in Log Scale	0.69
		Mean in Original Scale	0.031
		SD in Original Scale	0.0206
		95% Percentile Bootstrap UCL	0.0394

95% BCA Bootstrap UCL	0.0404

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	0.247
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
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0307
SD	0.0183
SE of Mean	0.0129
95% KM (t) UCL	0.0532
95% KM (z) UCL	0.0519
95% KM (jackknife) UCL	0.0575
95% KM (bootstrap t) UCL	0.0787
95% KM (BCA) UCL	N/A
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	0.087
97.5% KM (Chebyshev) UCL	0.111
99% KM (Chebyshev) UCL	0.159

Potential UCLs to Use

95% KM (t) UCL	0.0532
95% KM (Percentile Bootstrap) UCL	N/A

Acenaphthylene (mg/kg)

General Statistics

Number of Valid Samples	17	Number of Detected Data	7
Number of Unique Samples	7	Number of Non-Detect Data	10
		Percent Non-Detects	58.82%

Raw Statistics

Minimum Detected	0.000855
Maximum Detected	0.013
Mean of Detected	0.00303
SD of Detected	0.00443
Minimum Non-Detect	0.0018
Maximum Non-Detect	0.22

Log-transformed Statistics

Minimum Detected	-7.064
Maximum Detected	-4.343
Mean of Detected	-6.333
SD of Detected	0.949
Minimum Non-Detect	-6.32
Maximum Non-Detect	-1.514

Note: Data have multiple DLs - Use of KM Method is recommended

Number treated as Non-Detect 17

For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.559	Shapiro Wilk Test Statistic	0.766
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0251	Mean	-5.577
SD	0.043	SD	1.975
95% DL/2 (t) UCL	0.0434	95% H-Stat (DL/2) UCL	0.231
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.518
		SD in Log Scale	0.639
		Mean in Original Scale	0.00204
		SD in Original Scale	0.00286
		95% Percentile Bootstrap UCL	0.00338
		95% BCA Bootstrap UCL	0.00411
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.707	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.00429		
nu star	9.904		
A-D Test Statistic	1.104	**Nonparametric Statistics**	
5% A-D Critical Value	0.727	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.727	Mean	0.00215
5% K-S Critical Value	0.319	SD	0.00316
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0009495
		95% KM (t) UCL	0.00381
Assuming Gamma Distribution		95% KM (z) UCL	0.00372
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.00377
Minimum	0.000855	95% KM (bootstrap t) UCL	0.0136
Maximum	0.013	95% KM (BCA) UCL	0.00406
Mean	0.00303	95% KM (Percentile Bootstrap) UCL	0.00385
Median	0.00302	95% KM (Chebyshev) UCL	0.00629
SD	0.00271	97.5% KM (Chebyshev) UCL	0.00808
k star	2.037	99% KM (Chebyshev) UCL	0.0116
Theta star	0.00149		
Nu star	69.25	**Potential UCLs to Use**	
AppChi2	51.09	95% KM (t) UCL	0.00381

95% Gamma Approximate UCL	0.00411	95% KM (% Bootstrap) UCL	0.00385
95% Adjusted Gamma UCL	0.00425		

Note: DL/2 is not a recommended method.

Aluminum (mg/kg)

General Statistics

Number of Valid Samples	38	Number of Unique Samples	36

Raw Statistics		Log-transformed Statistics	
Minimum	9770	Minimum of Log Data	9.187
Maximum	47900	Maximum of Log Data	10.78
Mean	23419	Mean of log Data	9.984
Median	20150	SD of log Data	0.392
SD	9836		
Coefficient of Variation	0.42		
Skewness	1.112		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.878	Shapiro Wilk Test Statistic	0.957
Shapiro Wilk Critical Value	0.938	Shapiro Wilk Critical Value	0.938
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	26111	95% H-UCL	26348
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	30023
95% Adjusted-CLT UCL	26351	97.5% Chebyshev (MVUE) UCL	32907
95% Modified-t UCL	26159	99% Chebyshev (MVUE) UCL	38572

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.127	**Data appear Lognormal at 5% Significance Level**	
Theta Star	3822		
nu star	465.7		
Approximate Chi Square Value (.05)	416.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0434	95% CLT UCL	26044
Adjusted Chi Square Value	414.7	95% Jackknife UCL	26111
		95% Standard Bootstrap UCL	25959
Anderson-Darling Test Statistic	0.887	95% Bootstrap-t UCL	26536
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL	26469
Kolmogorov-Smirnov Test Statistic	0.147	95% Percentile Bootstrap UCL	25946
Kolmogorov-Smirnov 5% Critical Value	0.143	95% BCA Bootstrap UCL	26191
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	30374
		97.5% Chebyshev(Mean, Sd) UCL	33384

Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL 39296
95% Approximate Gamma UCL 26175	
95% Adjusted Gamma UCL 26296	
Potential UCL to Use	Use 95% Student's-t UCL 26111
	or 95% Modified-t UCL 26159
	or 95% H-UCL 26348

Antimony (mg/kg)

General Statistics

Number of Valid Samples	34	Number of Detected Data	7
Number of Unique Samples	7	Number of Non-Detect Data	27
		Percent Non-Detects	79.41%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.43	Minimum Detected	-0.844
Maximum Detected	47.6	Maximum Detected	3.863
Mean of Detected	12.35	Mean of Detected	1.368
SD of Detected	17.58	SD of Detected	1.827
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	7.14	Maximum Non-Detect	1.966

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	32
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.12%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.749	Shapiro Wilk Test Statistic	0.933
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.188	Mean	-0.237
SD	8.913	SD	1.356
95% DL/2 (t) UCL	5.775	95% H-Stat (DL/2) UCL	3.874
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.648
		SD in Log Scale	1.885
		Mean in Original Scale	2.639
		SD in Original Scale	9.02

95% Percentile Bootstrap UCL	5.627
95% BCA Bootstrap UCL	7.068

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.408
Theta Star	30.27
nu star	5.71
A-D Test Statistic	0.308
5% A-D Critical Value	0.749
K-S Test Statistic	0.749
5% K-S Critical Value	0.326

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.43
Maximum	47.6
Mean	12.53
Median	12.65
SD	7.527
k star	2.079
Theta star	6.025
Nu star	141.4
AppChi2	114.9
95% Gamma Approximate UCL	15.41
95% Adjusted Gamma UCL	15.57

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	2.93
SD	8.816
SE of Mean	1.635
95% KM (t) UCL	5.697
95% KM (z) UCL	5.62
95% KM (jackknife) UCL	5.514
95% KM (bootstrap t) UCL	14.42
95% KM (BCA) UCL	8.432
95% KM (Percentile Bootstrap) UCL	6.694
95% KM (Chebyshev) UCL	10.06
97.5% KM (Chebyshev) UCL	13.14
99% KM (Chebyshev) UCL	19.2

Potential UCLs to Use

95% KM (t) UCL	5.697

Note: DL/2 is not a recommended method.

Aroclor 1254 (mg/kg)

General Statistics

Number of Valid Samples	30	Number of Detected Data	22
Number of Unique Samples	22	Number of Non-Detect Data	8
		Percent Non-Detects	26.67%

Raw Statistics

Minimum Detected	0.0135
Maximum Detected	1.58
Mean of Detected	0.201
SD of Detected	0.328
Minimum Non-Detect	0.039
Maximum Non-Detect	0.18

Log-transformed Statistics

Minimum Detected	-4.305
Maximum Detected	0.457
Mean of Detected	-2.252
SD of Detected	1.103
Minimum Non-Detect	-3.244
Maximum Non-Detect	-1.715

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	80.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.509	Shapiro Wilk Test Statistic	0.979
5% Shapiro Wilk Critical Value	0.911	5% Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.155	Mean	-2.63
SD	0.29	SD	1.161
95% DL/2 (t) UCL	0.245	95% H-Stat (DL/2) UCL	0.178
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.61
		SD in Log Scale	1.123
		Mean in Original Scale	0.155
		SD in Original Scale	0.29
		95% Percentile Bootstrap UCL	0.25
		95% BCA Bootstrap UCL	0.31

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.811	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.247		
nu star	35.7		
A-D Test Statistic	0.766	**Nonparametric Statistics**	
5% A-D Critical Value	0.775	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.775	Mean	0.156
5% K-S Critical Value	0.191	SD	0.284
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0532
		95% KM (t) UCL	0.246
Assuming Gamma Distribution		95% KM (z) UCL	0.243
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.246
Minimum	0	95% KM (bootstrap t) UCL	0.399
Maximum	1.58	95% KM (BCA) UCL	0.259
Mean	0.159	95% KM (Percentile Bootstrap) UCL	0.253
Median	0.0656	95% KM (Chebyshev) UCL	0.388
SD	0.289	97.5% KM (Chebyshev) UCL	0.488
k star	0.465	99% KM (Chebyshev) UCL	0.685
Theta star	0.342		
Nu star	27.88	**Potential UCLs to Use**	

AppChi2	16.83	95% KM (Chebyshev) UCL	0.388
95% Gamma Approximate UCL	0.263		
95% Adjusted Gamma UCL	0.271		

Note: DL/2 is not a recommended method.

Aroclor 1260 (mg/kg)

General Statistics

Number of Valid Samples	30	Number of Detected Data	8
Number of Unique Samples	8	Number of Non-Detect Data	22
		Percent Non-Detects	73.33%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0373	Minimum Detected	-3.289
Maximum Detected	1.09	Maximum Detected	0.0862
Mean of Detected	0.219	Mean of Detected	-2.171
SD of Detected	0.355	SD of Detected	1.049
Minimum Non-Detect	0.018	Minimum Non-Detect	-4.017
Maximum Non-Detect	0.095	Maximum Non-Detect	-2.354

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	86.67%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.541	Shapiro Wilk Test Statistic	0.859
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0723	Mean	-3.564
SD	0.196	SD	1.071
95% DL/2 (t) UCL	0.133	95% H-Stat (DL/2) UCL	0.0585
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.66
		SD in Log Scale	1.664
		Mean in Original Scale	0.0614
		SD in Original Scale	0.199
		95% Percentile Bootstrap UCL	0.132
		95% BCA Bootstrap UCL	0.181

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.645
Theta Star	0.339
nu star	10.31
A-D Test Statistic	0.981
5% A-D Critical Value	0.739
K-S Test Statistic	0.739
5% K-S Critical Value	0.303

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.0373
Maximum	1.09
Mean	0.202
Median	0.19
SD	0.183
k star	2.176
Theta star	0.0928
Nu star	130.6
AppChi2	105.2
95% Gamma Approximate UCL	0.251
95% Adjusted Gamma UCL	0.254

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0859
SD	0.189
SE of Mean	0.037
95% KM (t) UCL	0.149
95% KM (z) UCL	0.147
95% KM (jackknife) UCL	0.137
95% KM (bootstrap t) UCL	0.391
95% KM (BCA) UCL	0.181
95% KM (Percentile Bootstrap) UCL	0.162
95% KM (Chebyshev) UCL	0.247
97.5% KM (Chebyshev) UCL	0.317
99% KM (Chebyshev) UCL	0.454

Potential UCLs to Use

95% KM (BCA) UCL	0.181

Arsenic (mg/kg)

General Statistics

Number of Valid Samples	36	Number of Unique Samples	35

Raw Statistics

Minimum	1.39
Maximum	68.9
Mean	8.111
Median	4.055
SD	12.41
Coefficient of Variation	1.53
Skewness	3.824

Log-transformed Statistics

Minimum of Log Data	0.329
Maximum of Log Data	4.233
Mean of log Data	1.572
SD of log Data	0.904

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.529
Shapiro Wilk Critical Value	0.935

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.922
Shapiro Wilk Critical Value	0.935

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	11.6

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	12.92
95% Modified-t UCL	11.82

Gamma Distribution Test

k star (bias corrected)	1.023
Theta Star	7.929
nu star	73.65
Approximate Chi Square Value (.05)	54.89
Adjusted Level of Significance	0.0428
Adjusted Chi Square Value	54.15
Anderson-Darling Test Statistic	2.279
Anderson-Darling 5% Critical Value	0.774
Kolmogorov-Smirnov Test Statistic	0.22
Kolmogorov-Smirnov 5% Critical Value	0.151

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	10.88
95% Adjusted Gamma UCL	11.03

Potential UCL to Use

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	10.28
95% Chebyshev (MVUE) UCL	12.45
97.5% Chebyshev (MVUE) UCL	14.75
99% Chebyshev (MVUE) UCL	19.28

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	11.51
95% Jackknife UCL	11.6
95% Standard Bootstrap UCL	11.55
95% Bootstrap-t UCL	15.67
95% Hall's Bootstrap UCL	23.76
95% Percentile Bootstrap UCL	11.88
95% BCA Bootstrap UCL	13.87
95% Chebyshev(Mean, Sd) UCL	17.12
97.5% Chebyshev(Mean, Sd) UCL	21.02
99% Chebyshev(Mean, Sd) UCL	28.69

Use 95% Chebyshev (Mean, Sd) UCL 17.12

Barium (mg/kg)

General Statistics

Number of Valid Samples	39	Number of Unique Samples	39

Raw Statistics

Minimum	25.3
Maximum	2630
Mean	308.8
Median	73.8
SD	652
Coefficient of Variation	2.111
Skewness	2.97

Log-transformed Statistics

Minimum of Log Data	3.231
Maximum of Log Data	7.875
Mean of log Data	4.738
SD of log Data	1.128

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.437	Shapiro Wilk Test Statistic	0.701
Shapiro Wilk Critical Value	0.939	Shapiro Wilk Critical Value	0.939
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	484.8	95% H-UCL	342.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	408.7
95% Adjusted-CLT UCL	533.6	97.5% Chebyshev (MVUE) UCL	494.5
95% Modified-t UCL	493.1	99% Chebyshev (MVUE) UCL	663.2
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.588	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	525.2		
nu star	45.86		
Approximate Chi Square Value (.05)	31.32	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0437	95% CLT UCL	480.5
Adjusted Chi Square Value	30.85	95% Jackknife UCL	484.8
		95% Standard Bootstrap UCL	482.5
Anderson-Darling Test Statistic	7.385	95% Bootstrap-t UCL	630.4
Anderson-Darling 5% Critical Value	0.802	95% Hall's Bootstrap UCL	577.1
Kolmogorov-Smirnov Test Statistic	0.413	95% Percentile Bootstrap UCL	492
Kolmogorov-Smirnov 5% Critical Value	0.148	95% BCA Bootstrap UCL	540
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	763.9
		97.5% Chebyshev(Mean, Sd) UCL	960.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1348
95% Approximate Gamma UCL	452.1		
95% Adjusted Gamma UCL	459.1		
Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	1348

Benzo(a)pyrene (mg/kg)

General Statistics

Number of Valid Samples	17	Number of Detected Data	6
Number of Unique Samples	6	Number of Non-Detect Data	11
		Percent Non-Detects	64.71%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0097	Minimum Detected	-4.636
Maximum Detected	0.028	Maximum Detected	-3.576
Mean of Detected	0.0187	Mean of Detected	-4.061
SD of Detected	0.0079	SD of Detected	0.454

Minimum Non-Detect	0.002	Minimum Non-Detect	-6.215
Maximum Non-Detect	0.22	Maximum Non-Detect	-1.514
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	17
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.897	Shapiro Wilk Test Statistic	0.897
5% Shapiro Wilk Critical Value	0.788	5% 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**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0315	Mean	-4.778
SD	0.0424	SD	1.916
95% DL/2 (t) UCL	0.0494	95% H-Stat (DL/2) UCL	0.407
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.797
		SD in Log Scale	0.696
		Mean in Original Scale	0.0105
		SD in Original Scale	0.00794
		95% Percentile Bootstrap UCL	0.0137
		95% BCA Bootstrap UCL	0.0145

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.237	**Data appear Normal at 5% Significance Level**	
Theta Star	0.00578		
nu star	38.84		
A-D Test Statistic	0.375	**Nonparametric Statistics**	
5% A-D Critical Value	0.698	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.698	Mean	0.0139
5% K-S Critical Value	0.333	SD	0.00664
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00202
		95% KM (t) UCL	0.0174
Assuming Gamma Distribution		95% KM (z) UCL	0.0172
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0169
Minimum	0.0097	95% KM (bootstrap t) UCL	0.018
Maximum	0.028	95% KM (BCA) UCL	0.0236
Mean	0.0196	95% KM (Percentile Bootstrap) UCL	0.0196
Median	0.02	95% KM (Chebyshev) UCL	0.0227
SD	0.00487	97.5% KM (Chebyshev) UCL	0.0265

k star	12.28	99% KM (Chebyshev) UCL	0.0339
Theta star	0.00159		
Nu star	417.6	**Potential UCLs to Use**	
AppChi2	371.2	95% KM (t) UCL	0.0174
95% Gamma Approximate UCL	0.022	95% KM (Percentile Bootstrap) UCL	0.0196
95% Adjusted Gamma UCL	0.0223		

Note: DL/2 is not a recommended method.

bis(2-Chloroethoxy)methane (mg/kg)

General Statistics

Number of Valid Samples	17	Number of Detected Data	2
Number of Unique Samples	2	Number of Non-Detect Data	15
		Percent Non-Detects	88.24%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.013	Minimum Detected	-4.343
Maximum Detected	0.049	Maximum Detected	-3.016
Mean of Detected	0.031	Mean of Detected	-3.679
SD of Detected	0.0255	SD of Detected	0.938
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.24	Maximum Non-Detect	-1.427

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	17
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	1	Shapiro Wilk Test Statistic	1
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0922	Mean	-2.466
SD	0.0258	SD	0.523
95% DL/2 (t) UCL	0.103	95% H-Stat (DL/2) UCL	0.127
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A

95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A

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	0.359
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
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.031
SD	0.018
SE of Mean	0.018
95% KM (t) UCL	0.0624
95% KM (z) UCL	0.0606
95% KM (jackknife) UCL	0.0741
95% KM (bootstrap t) UCL	1.8E+308
95% KM (BCA) UCL	0.049
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	0.109
97.5% KM (Chebyshev) UCL	0.143
99% KM (Chebyshev) UCL	0.21

Potential UCLs to Use

95% KM (t) UCL	0.0624
95% KM (% Bootstrap) UCL	N/A

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

Cadmium (mg/kg)

General Statistics

Number of Valid Samples	38	Number of Detected Data	11
Number of Unique Samples	11	Number of Non-Detect Data	27
		Percent Non-Detects	71.05%

Raw Statistics

Minimum Detected	0.072
Maximum Detected	19.8
Mean of Detected	4.264
SD of Detected	6.16
Minimum Non-Detect	0.056
Maximum Non-Detect	1.5

Log-transformed Statistics

Minimum Detected	-2.631
Maximum Detected	2.986
Mean of Detected	-0.119
SD of Detected	2.164
Minimum Non-Detect	-2.882
Maximum Non-Detect	0.405

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

Number treated as Non-Detect	33
Number treated as Detected	5
Single DL Non-Detect Percentage	86.84%

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.741
5% Shapiro Wilk Critical Value	0.85

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	1.433
SD	3.695
95% DL/2 (t) UCL	2.444
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.849
5% Shapiro Wilk Critical Value	0.85

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-1.288
SD	1.637
95% H-Stat (DL/2) UCL	2.492
Log ROS Method	
Mean in Log Scale	-2.646
SD in Log Scale	2.189
Mean in Original Scale	1.266
SD in Original Scale	3.744
95% Percentile Bootstrap UCL	2.331
95% BCA Bootstrap UCL	2.937

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.364
Theta Star	11.73
nu star	7.998
A-D Test Statistic	0.769
5% A-D Critical Value	0.797
K-S Test Statistic	0.797
5% K-S Critical Value	0.272

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0
Maximum	19.8
Mean	4.056
Median	4.193
SD	3.53
k star	0.389
Theta star	10.42

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.306
SD	3.682
SE of Mean	0.627
95% KM (t) UCL	2.363
95% KM (z) UCL	2.336
95% KM (jackknife) UCL	2.315
95% KM (bootstrap t) UCL	3.285
95% KM (BCA) UCL	2.559
95% KM (Percentile Bootstrap) UCL	2.453
95% KM (Chebyshev) UCL	4.037
97.5% KM (Chebyshev) UCL	5.218
99% KM (Chebyshev) UCL	7.54

Nu star	29.59
AppChi2	18.17
95% Gamma Approximate UCL	6.604
95% Adjusted Gamma UCL	6.742

Potential UCLs to Use

95% KM (t) UCL	2.363

Note: DL/2 is not a recommended method.

Chromium (mg/kg)

General Statistics

Number of Valid Samples	39	Number of Unique Samples	35

Raw Statistics

Minimum	13.1
Maximum	299
Mean	52.43
Median	35.1
SD	59.57
Coefficient of Variation	1.136
Skewness	3.584

Log-transformed Statistics

Minimum of Log Data	2.573
Maximum of Log Data	5.7
Mean of log Data	3.696
SD of log Data	0.611

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.474
Shapiro Wilk Critical Value	0.939

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.821
Shapiro Wilk Critical Value	0.939

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	68.51

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	73.97
95% Modified-t UCL	69.43

Assuming Lognormal Distribution

95% H-UCL	59.11
95% Chebyshev (MVUE) UCL	70.24
97.5% Chebyshev (MVUE) UCL	79.75
99% Chebyshev (MVUE) UCL	98.44

Gamma Distribution Test

k star (bias corrected)	1.905
Theta Star	27.53
nu star	148.6
Approximate Chi Square Value (.05)	121.4
Adjusted Level of Significance	0.0437
Adjusted Chi Square Value	120.4
Anderson-Darling Test Statistic	4.178
Anderson-Darling 5% Critical Value	0.759
Kolmogorov-Smirnov Test Statistic	0.265
Kolmogorov-Smirnov 5% Critical Value	0.143

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	68.12
95% Jackknife UCL	68.51
95% Standard Bootstrap UCL	67.75
95% Bootstrap-t UCL	99.54
95% Hall's Bootstrap UCL	126.1
95% Percentile Bootstrap UCL	69.14
95% BCA Bootstrap UCL	77.18

Data not Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL 94.01
	97.5% Chebyshev(Mean, Sd) UCL 112
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL 147.3
95% Approximate Gamma UCL 64.17	
95% Adjusted Gamma UCL 64.68	
Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL 94.01

Cobalt (mg/kg)

General Statistics

Number of Valid Samples 39	Number of Unique Samples 37

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.7	Minimum of Log Data	1.308
Maximum	47	Maximum of Log Data	3.85
Mean	12.94	Mean of log Data	2.439
Median	10.6	SD of log Data	0.475
SD	7.669		
Coefficient of Variation	0.593		
Skewness	2.62		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.761	Shapiro Wilk Test Statistic	0.966
Shapiro Wilk Critical Value	0.939	Shapiro Wilk Critical Value	0.939
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	15.01	95% H-UCL	14.84
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	17.21
95% Adjusted-CLT UCL	15.51	97.5% Chebyshev (MVUE) UCL	19.12
95% Modified-t UCL	15.09	99% Chebyshev (MVUE) UCL	22.88

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.962	**Data appear Lognormal at 5% Significance Level**	
Theta Star	3.265		
nu star	309.1		
Approximate Chi Square Value (.05)	269.3	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0437	95% CLT UCL	14.96
Adjusted Chi Square Value	267.9	95% Jackknife UCL	15.01
		95% Standard Bootstrap UCL	14.92
Anderson-Darling Test Statistic	1.064	95% Bootstrap-t UCL	15.85
Anderson-Darling 5% Critical Value	0.752	95% Hall's Bootstrap UCL	17.18

Kolmogorov-Smirnov Test Statistic	0.165
Kolmogorov-Smirnov 5% Critical Value	0.142

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	14.85
95% Adjusted Gamma UCL	14.93

95% Percentile Bootstrap UCL	14.96
95% BCA Bootstrap UCL	15.38
95% Chebyshev(Mean, Sd) UCL	18.29
97.5% Chebyshev(Mean, Sd) UCL	20.61
99% Chebyshev(Mean, Sd) UCL	25.16

Potential UCL to Use

Use 95% Student's-t UCL	15.01
or 95% Modified-t UCL	15.09
or 95% H-UCL	14.84

Copper (mg/kg)

General Statistics

Number of Valid Samples	39	Number of Unique Samples	38

Raw Statistics

Minimum	10.8
Maximum	23800
Mean	1079
Median	39.3
SD	3975
Coefficient of Variation	3.685
Skewness	5.292

Log-transformed Statistics

Minimum of Log Data	2.38
Maximum of Log Data	10.08
Mean of log Data	4.449
SD of log Data	1.819

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.304
Shapiro Wilk Critical Value	0.939

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	2152

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	2702
95% Modified-t UCL	2242

Gamma Distribution Test

k star (bias corrected)	0.272
Theta Star	3969
nu star	21.2
Approximate Chi Square Value (.05)	11.74
Adjusted Level of Significance	0.0437

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.787
Shapiro Wilk Critical Value	0.939

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	1235
95% Chebyshev (MVUE) UCL	1109
97.5% Chebyshev (MVUE) UCL	1414
99% Chebyshev (MVUE) UCL	2012

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	2126

Adjusted Chi Square Value	11.46
Anderson-Darling Test Statistic	6.8
Anderson-Darling 5% Critical Value	0.868
Kolmogorov-Smirnov Test Statistic	0.351
Kolmogorov-Smirnov 5% Critical Value	0.154

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	1948
95% Adjusted Gamma UCL	1995

Potential UCL to Use

95% Jackknife UCL	2152
95% Standard Bootstrap UCL	2124
95% Bootstrap-t UCL	6034
95% Hall's Bootstrap UCL	5700
95% Percentile Bootstrap UCL	2268
95% BCA Bootstrap UCL	2983
95% Chebyshev(Mean, Sd) UCL	3853
97.5% Chebyshev(Mean, Sd) UCL	5054
99% Chebyshev(Mean, Sd) UCL	7412

Use 99% Chebyshev (Mean, Sd) UCL 7412

Iron (mg/kg)

General Statistics

Number of Valid Samples	39	Number of Unique Samples	37

Raw Statistics

Minimum	14100
Maximum	99900
Mean	31724
Median	26200
SD	15583
Coefficient of Variation	0.491
Skewness	2.476

Log-transformed Statistics

Minimum of Log Data	9.554
Maximum of Log Data	11.51
Mean of log Data	10.28
SD of log Data	0.399

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.785
Shapiro Wilk Critical Value	0.939

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	35931

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	36886
95% Modified-t UCL	36096

Gamma Distribution Test

k star (bias corrected)	5.518
Theta Star	5749
nu star	430.4

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.957
Shapiro Wilk Critical Value	0.939

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	35489
95% Chebyshev (MVUE) UCL	40462
97.5% Chebyshev (MVUE) UCL	44365
99% Chebyshev (MVUE) UCL	52032

Data Distribution

Data appear Lognormal at 5% Significance Level

Approximate Chi Square Value (.05)	383.3
Adjusted Level of Significance	0.0437
Adjusted Chi Square Value	381.6
Anderson-Darling Test Statistic	0.901
Anderson-Darling 5% Critical Value	0.751
Kolmogorov-Smirnov Test Statistic	0.152
Kolmogorov-Smirnov 5% Critical Value	0.142

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	35622
95% Adjusted Gamma UCL	35785

Potential UCL to Use

Nonparametric Statistics

95% CLT UCL	35829
95% Jackknife UCL	35931
95% Standard Bootstrap UCL	35720
95% Bootstrap-t UCL	37710
95% Hall's Bootstrap UCL	40306
95% Percentile Bootstrap UCL	36077
95% BCA Bootstrap UCL	37500
95% Chebyshev(Mean, Sd) UCL	42601
97.5% Chebyshev(Mean, Sd) UCL	47307
99% Chebyshev(Mean, Sd) UCL	56552

Use 95% Student's-t UCL	35931
or 95% Modified-t UCL	36096
or 95% H-UCL	35489

Lead (mg/kg)

General Statistics

Number of Valid Samples	56	Number of Detected Data	55
Number of Unique Samples	53	Number of Non-Detect Data	1
		Percent Non-Detects	1.79%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	10.8	Minimum Detected	2.38
Maximum Detected	25850	Maximum Detected	10.16
Mean of Detected	762.9	Mean of Detected	4.475
SD of Detected	3496	SD of Detected	1.747
Minimum Non-Detect	10.5	Minimum Non-Detect	2.351
Maximum Non-Detect	10.5	Maximum Non-Detect	2.351

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.415	Lilliefors Test Statistic	0.118
5% Lilliefors Critical Value	0.119	5% Lilliefors Critical Value	0.119
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	749.4	Mean	4.425
SD	3465	SD	1.772

95% DL/2 (t) UCL	1524
95% H-Stat (DL/2) UCL	861.6

Maximum Likelihood Estimate(MLE) Method	
Mean	704.3
SD	3470
95% MLE (t) UCL	1480
95% MLE (Tiku) UCL	1387

Log ROS Method	
Mean in Log Scale	4.396
SD in Log Scale	1.831
Mean in Original Scale	749.3
SD in Original Scale	3465
95% Percentile Bootstrap UCL	1658
95% BCA Bootstrap UCL	2220

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.311
Theta Star	2452
nu star	34.22
A-D Test Statistic	5.963
5% A-D Critical Value	0.859
K-S Test Statistic	0.859
5% K-S Critical Value	0.13

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0
Maximum	25850
Mean	749.3
Median	73.45
SD	3465
k star	0.268
Theta star	2798
Nu star	30
AppChi2	18.49
95% Gamma Approximate UCL	1216
95% Adjusted Gamma UCL	1232

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	749.5
SD	3434
SE of Mean	463.2
95% KM (t) UCL	1524
95% KM (z) UCL	1511
95% KM (jackknife) UCL	1524
95% KM (bootstrap t) UCL	5048
95% KM (BCA) UCL	1715
95% KM (Percentile Bootstrap) UCL	1636
95% KM (Chebyshev) UCL	2768
97.5% KM (Chebyshev) UCL	3642
99% KM (Chebyshev) UCL	5358

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	3642

Manganese (mg/kg)

General Statistics

Number of Valid Samples	39
Number of Unique Samples	39

Raw Statistics

Minimum	137
Maximum	2230

Log-transformed Statistics

Minimum of Log Data	4.92
Maximum of Log Data	7.71

Mean	610.1
Median	453
SD	489.8
Coefficient of Variation	0.803
Skewness	2.204

Mean of log Data	6.193
SD of log Data	0.638

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.726
Shapiro Wilk Critical Value	0.939

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.963
Shapiro Wilk Critical Value	0.939

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	742.4

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	768.7
95% Modified-t UCL	747

Assuming Lognormal Distribution

95% H-UCL	738.7
95% Chebyshev (MVUE) UCL	881.2
97.5% Chebyshev (MVUE) UCL	1005
99% Chebyshev (MVUE) UCL	1247

Gamma Distribution Test

k star (bias corrected)	2.248
Theta Star	271.4
nu star	175.4
Approximate Chi Square Value (.05)	145.7
Adjusted Level of Significance	0.0437
Adjusted Chi Square Value	144.7
Anderson-Darling Test Statistic	1.134
Anderson-Darling 5% Critical Value	0.757
Kolmogorov-Smirnov Test Statistic	0.14
Kolmogorov-Smirnov 5% Critical Value	0.143

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	734.2
95% Adjusted Gamma UCL	739.6

Data Distribution

Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	739.2
95% Jackknife UCL	742.4
95% Standard Bootstrap UCL	740.3
95% Bootstrap-t UCL	793.2
95% Hall's Bootstrap UCL	764.6
95% Percentile Bootstrap UCL	743.5
95% BCA Bootstrap UCL	755.8
95% Chebyshev(Mean, Sd) UCL	952
97.5% Chebyshev(Mean, Sd) UCL	1100
99% Chebyshev(Mean, Sd) UCL	1391

Potential UCL to Use

Use 95% Approximate Gamma UCL 734.2

Nickel (mg/kg)

General Statistics

Number of Valid Samples	39

Number of Unique Samples	38

Raw Statistics

Minimum	7.5
Maximum	404
Mean	38.14
Median	22.4
SD	64.29
Coefficient of Variation	1.685
Skewness	5.172

Log-transformed Statistics

Minimum of Log Data	2.015
Maximum of Log Data	6.001
Mean of log Data	3.211
SD of log Data	0.773

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.402
Shapiro Wilk Critical Value	0.939

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.911
Shapiro Wilk Critical Value	0.939

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	55.5

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	64.19
95% Modified-t UCL	56.92

Assuming Lognormal Distribution

95% H-UCL	43.71
95% Chebyshev (MVUE) UCL	52.85
97.5% Chebyshev (MVUE) UCL	61.39
99% Chebyshev (MVUE) UCL	78.17

Gamma Distribution Test

k star (bias corrected)	1.219
Theta Star	31.28
nu star	95.11
Approximate Chi Square Value (.05)	73.62
Adjusted Level of Significance	0.0437
Adjusted Chi Square Value	72.87
Anderson-Darling Test Statistic	2.784
Anderson-Darling 5% Critical Value	0.771
Kolmogorov-Smirnov Test Statistic	0.224
Kolmogorov-Smirnov 5% Critical Value	0.145

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	49.28
95% Adjusted Gamma UCL	49.79

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	55.08
95% Jackknife UCL	55.5
95% Standard Bootstrap UCL	54.79
95% Bootstrap-t UCL	91.6
95% Hall's Bootstrap UCL	112.6
95% Percentile Bootstrap UCL	56.89
95% BCA Bootstrap UCL	70.72
95% Chebyshev(Mean, Sd) UCL	83.01
97.5% Chebyshev(Mean, Sd) UCL	102.4
99% Chebyshev(Mean, Sd) UCL	140.6

Potential UCL to Use

Use 95% Chebyshev (Mean, Sd) UCL 83.01

Silver (mg/kg)

General Statistics

Number of Valid Samples	39	Number of Detected Data	22
Number of Unique Samples	21	Number of Non-Detect Data	17
		Percent Non-Detects	43.59%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.11	Minimum Detected	-2.207
Maximum Detected	65.2	Maximum Detected	4.177
Mean of Detected	8.32	Mean of Detected	0.41
SD of Detected	16.61	SD of Detected	1.894
Minimum Non-Detect	0.075	Minimum Non-Detect	-2.59
Maximum Non-Detect	1.44	Maximum Non-Detect	0.365

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	31
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	79.49%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.562	Shapiro Wilk Test Statistic	0.917
5% Shapiro Wilk Critical Value	0.911	5% Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.927	Mean	-0.0973
SD	12.95	SD	1.591
95% DL/2 (t) UCL	8.424	95% H-Stat (DL/2) UCL	7.198
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.274
		SD in Log Scale	1.711
		Mean in Original Scale	4.86
		SD in Original Scale	12.98
		95% Percentile Bootstrap UCL	8.705
		95% BCA Bootstrap UCL	10.24

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.365	**Data appear Lognormal at 5% Significance Level**	
Theta Star	22.82		
nu star	16.04		

A-D Test Statistic	1.661
5% A-D Critical Value	0.829
K-S Test Statistic	0.829
5% K-S Critical Value	0.199

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	0.11
Maximum	65.2
Mean	8.496
Median	8.663
SD	12.35
k star	0.604
Theta star	14.08
Nu star	47.08
AppChi2	32.33
95% Gamma Approximate UCL	12.37
95% Adjusted Gamma UCL	12.56

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	4.883
SD	12.8
SE of Mean	2.099
95% KM (t) UCL	8.421
95% KM (z) UCL	8.335
95% KM (jackknife) UCL	8.382
95% KM (bootstrap t) UCL	14.16
95% KM (BCA) UCL	8.664
95% KM (Percentile Bootstrap) UCL	8.666
95% KM (Chebyshev) UCL	14.03
97.5% KM (Chebyshev) UCL	17.99
99% KM (Chebyshev) UCL	25.76

Potential UCLs to Use

99% KM (Chebyshev) UCL	25.76

Note: DL/2 is not a recommended method.

Thallium (mg/kg)

General Statistics

Number of Valid Samples	32	Number of Detected Data	21
Number of Unique Samples	18	Number of Non-Detect Data	11
		Percent Non-Detects	34.38%

Raw Statistics

Minimum Detected	0.099
Maximum Detected	26.9
Mean of Detected	3.773
SD of Detected	7.924
Minimum Non-Detect	0.6
Maximum Non-Detect	1.62

Log-transformed Statistics

Minimum Detected	-2.313
Maximum Detected	3.292
Mean of Detected	-0.718
SD of Detected	1.826
Minimum Non-Detect	-0.511
Maximum Non-Detect	0.482

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	28
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.50%

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.524
5% Shapiro Wilk Critical Value	0.908

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.661
5% Shapiro Wilk Critical Value	0.908

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	2.603
SD	6.574
95% DL/2 (t) UCL	4.573
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.316
Theta Star	11.94
nu star	13.27
A-D Test Statistic	4.288
5% A-D Critical Value	0.839
K-S Test Statistic	0.839
5% K-S Critical Value	0.205

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.099
Maximum	26.9
Mean	3.868
Median	0.328
SD	6.379
k star	0.451
Theta star	8.573
Nu star	28.88
AppChi2	17.61
95% Gamma Approximate UCL	6.343
95% Adjusted Gamma UCL	6.517

Note: DL/2 is not a recommended method.

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-0.829
SD	1.483
95% H-Stat (DL/2) UCL	2.949
Log ROS Method	
Mean in Log Scale	-0.877
SD in Log Scale	1.524
Mean in Original Scale	2.6
SD in Original Scale	6.575
95% Percentile Bootstrap UCL	4.578
95% BCA Bootstrap UCL	5.077

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	2.552
SD	6.488
SE of Mean	1.175
95% KM (t) UCL	4.544
95% KM (z) UCL	4.485
95% KM (jackknife) UCL	4.527
95% KM (bootstrap t) UCL	5.591
95% KM (BCA) UCL	4.619
95% KM (Percentile Bootstrap) UCL	4.557
95% KM (Chebyshev) UCL	7.675
97.5% KM (Chebyshev) UCL	9.891
99% KM (Chebyshev) UCL	14.25

Potential UCLs to Use

99% KM (Chebyshev) UCL	14.25

Vanadium (mg/kg)

General Statistics

Number of Valid Samples	39	Number of Unique Samples	38

Raw Statistics

Minimum	21.6
Maximum	90.5
Mean	49.14
Median	45.3
SD	14.84
Coefficient of Variation	0.302
Skewness	0.926

Log-transformed Statistics

Minimum of Log Data	3.073
Maximum of Log Data	4.505
Mean of log Data	3.852
SD of log Data	0.295

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.933
Shapiro Wilk Critical Value	0.939

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.978
Shapiro Wilk Critical Value	0.939

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	53.15

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	53.43
95% Modified-t UCL	53.21

Assuming Lognormal Distribution

95% H-UCL	53.56
95% Chebyshev (MVUE) UCL	59.42
97.5% Chebyshev (MVUE) UCL	63.87
99% Chebyshev (MVUE) UCL	72.62

Gamma Distribution Test

k star (bias corrected)	11.05
Theta Star	4.446
nu star	862.1
Approximate Chi Square Value (.05)	794.9
Adjusted Level of Significance	0.0437
Adjusted Chi Square Value	792.4
Anderson-Darling Test Statistic	0.569
Anderson-Darling 5% Critical Value	0.748
Kolmogorov-Smirnov Test Statistic	0.123
Kolmogorov-Smirnov 5% Critical Value	0.141

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	53.29
95% Adjusted Gamma UCL	53.46

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	53.05
95% Jackknife UCL	53.15
95% Standard Bootstrap UCL	52.94
95% Bootstrap-t UCL	53.54
95% Hall's Bootstrap UCL	53.62
95% Percentile Bootstrap UCL	52.98
95% BCA Bootstrap UCL	53.4
95% Chebyshev(Mean, Sd) UCL	59.5
97.5% Chebyshev(Mean, Sd) UCL	63.99
99% Chebyshev(Mean, Sd) UCL	72.79

Potential UCL to Use

Use 95% Approximate Gamma UCL 53.29

Zinc (mg/kg)

General Statistics

Number of Valid Samples	39	Number of Unique Samples	39

Raw Statistics

Minimum	26
Maximum	15235
Mean	968.7
Median	115
SD	2693
Coefficient of Variation	2.78
Skewness	4.359

Log-transformed Statistics

Minimum of Log Data	3.258
Maximum of Log Data	9.631
Mean of log Data	5.125
SD of log Data	1.561

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.399
Shapiro Wilk Critical Value	0.939

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.803
Shapiro Wilk Critical Value	0.939

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	1696

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	2000
95% Modified-t UCL	1746

Assuming Lognormal Distribution

95% H-UCL	1242
95% Chebyshev (MVUE) UCL	1298
97.5% Chebyshev (MVUE) UCL	1628
99% Chebyshev (MVUE) UCL	2277

Gamma Distribution Test

k star (bias corrected)	0.367
Theta Star	2639
nu star	28.63
Approximate Chi Square Value (.05)	17.42
Adjusted Level of Significance	0.0437
Adjusted Chi Square Value	17.08
Anderson-Darling Test Statistic	5.966
Anderson-Darling 5% Critical Value	0.84
Kolmogorov-Smirnov Test Statistic	0.333
Kolmogorov-Smirnov 5% Critical Value	0.152

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	1592
95% Adjusted Gamma UCL	1624

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	1678
95% Jackknife UCL	1696
95% Standard Bootstrap UCL	1666
95% Bootstrap-t UCL	2680
95% Hall's Bootstrap UCL	3924
95% Percentile Bootstrap UCL	1756
95% BCA Bootstrap UCL	2056
95% Chebyshev(Mean, Sd) UCL	2848
97.5% Chebyshev(Mean, Sd) UCL	3662
99% Chebyshev(Mean, Sd) UCL	5259

Potential UCL to Use	Use 99% Chebyshev (Mean, Sd) UCL 5259

General UCL Statistics for Full Data Sets

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TCDD-TE_TS (ng/kg)

General Statistics

Number of Valid Samples	32	Number of Unique Samples	32

Raw Statistics		Log-transformed Statistics	
Minimum	0.00923	Minimum of Log Data	-4.685
Maximum	43.35	Maximum of Log Data	3.769
Mean	2.333	Mean of log Data	-0.712
Median	0.77	SD of log Data	1.964
SD	7.539		
Coefficient of Variation	3.232		
Skewness	5.528		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.273	Shapiro Wilk Test Statistic	0.889
Shapiro Wilk Critical Value	0.93	Shapiro Wilk Critical Value	0.93
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4.593	95% H-UCL	12.62
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	8.824
95% Adjusted-CLT UCL	5.917	97.5% Chebyshev (MVUE) UCL	11.39
95% Modified-t UCL	4.81	99% Chebyshev (MVUE) UCL	16.43

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.4	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	5.825		
nu star	25.63		
Approximate Chi Square Value (.05)	15.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0416	95% CLT UCL	4.525
Adjusted Chi Square Value	14.66	95% Jackknife UCL	4.593
		95% Standard Bootstrap UCL	4.552
Anderson-Darling Test Statistic	1.729	95% Bootstrap-t UCL	16.2
Anderson-Darling 5% Critical Value	0.828	95% Hall's Bootstrap UCL	14.03
Kolmogorov-Smirnov Test Statistic	0.242	95% Percentile Bootstrap UCL	4.966

Kolmogorov-Smirnov 5% Critical Value	0.166

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	3.961
95% Adjusted Gamma UCL	4.078

95% BCA Bootstrap UCL	6.555
95% Chebyshev(Mean, Sd) UCL	8.142
97.5% Chebyshev(Mean, Sd) UCL	10.66
99% Chebyshev(Mean, Sd) UCL	15.59

Potential UCL to Use

Use 99% Chebyshev (Mean, Sd) UCL 15.59

TCDD-TE_SS (ng/kg)

General Statistics

Number of Valid Samples	25	Number of Unique Samples	25

Raw Statistics

Minimum	0.209
Maximum	43.35
Mean	2.973
Median	1.281
SD	8.454
Coefficient of Variation	2.843
Skewness	4.92

Log-transformed Statistics

Minimum of Log Data	-1.566
Maximum of Log Data	3.769
Mean of log Data	0.151
SD of log Data	1.07

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.286
Shapiro Wilk Critical Value	0.918

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.872
Shapiro Wilk Critical Value	0.918

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	5.866

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	7.532
95% Modified-t UCL	6.143

Assuming Lognormal Distribution

95% H-UCL	3.636
95% Chebyshev (MVUE) UCL	4.132
97.5% Chebyshev (MVUE) UCL	5.057
99% Chebyshev (MVUE) UCL	6.875

Gamma Distribution Test

k star (bias corrected)	0.599
Theta Star	4.961
nu star	29.97
Approximate Chi Square Value (.05)	18.47
Adjusted Level of Significance	0.0395
Adjusted Chi Square Value	17.85
Anderson-Darling Test Statistic	2.943

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	5.755
95% Jackknife UCL	5.866
95% Standard Bootstrap UCL	5.728
95% Bootstrap-t UCL	24.29

Anderson-Darling 5% Critical Value	0.793
Kolmogorov-Smirnov Test Statistic	0.33
Kolmogorov-Smirnov 5% Critical Value	0.183
Data not Gamma Distributed at 5% Significance Level	

Assuming Gamma Distribution	
95% Approximate Gamma UCL	4.825
95% Adjusted Gamma UCL	4.992

95% Hall's Bootstrap UCL	18.87
95% Percentile Bootstrap UCL	6.268
95% BCA Bootstrap UCL	8.136
95% Chebyshev(Mean, Sd) UCL	10.34
97.5% Chebyshev(Mean, Sd) UCL	13.53
99% Chebyshev(Mean, Sd) UCL	19.8

Potential UCL to Use	
Use 99% Chebyshev (Mean, Sd) UCL	19.8

Appendix E-4

Johnson & Ettinger Model – Input and Output

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	2.40E+01	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	2131	SIC	17.5	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)
1931	0.265	0.284	1.50E-09	0.844	1.27E-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	7,476	2.64E-03	1.11E-01	1.78E-04	5.40E-03	5.54E-05	5.09E-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)
1931	200	2.66E+03	0.10	8.33E+01	5.40E-03	4.00E+02	3.73E+167	1.86E-05	4.93E-02	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)
4.7E-07	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	2.60E+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	2131	SIC	17.5	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)
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)
1931	0.265	0.284	1.50E-09	0.844	1.27E-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	9,477	1.21E-02	5.09E-01	1.78E-04	3.74E-03	2.68E-05	2.53E-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)
1931	200	1.32E+03	0.10	8.33E+01	3.74E-03	4.00E+02	1.34E+242	9.26E-06	1.23E-02	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:

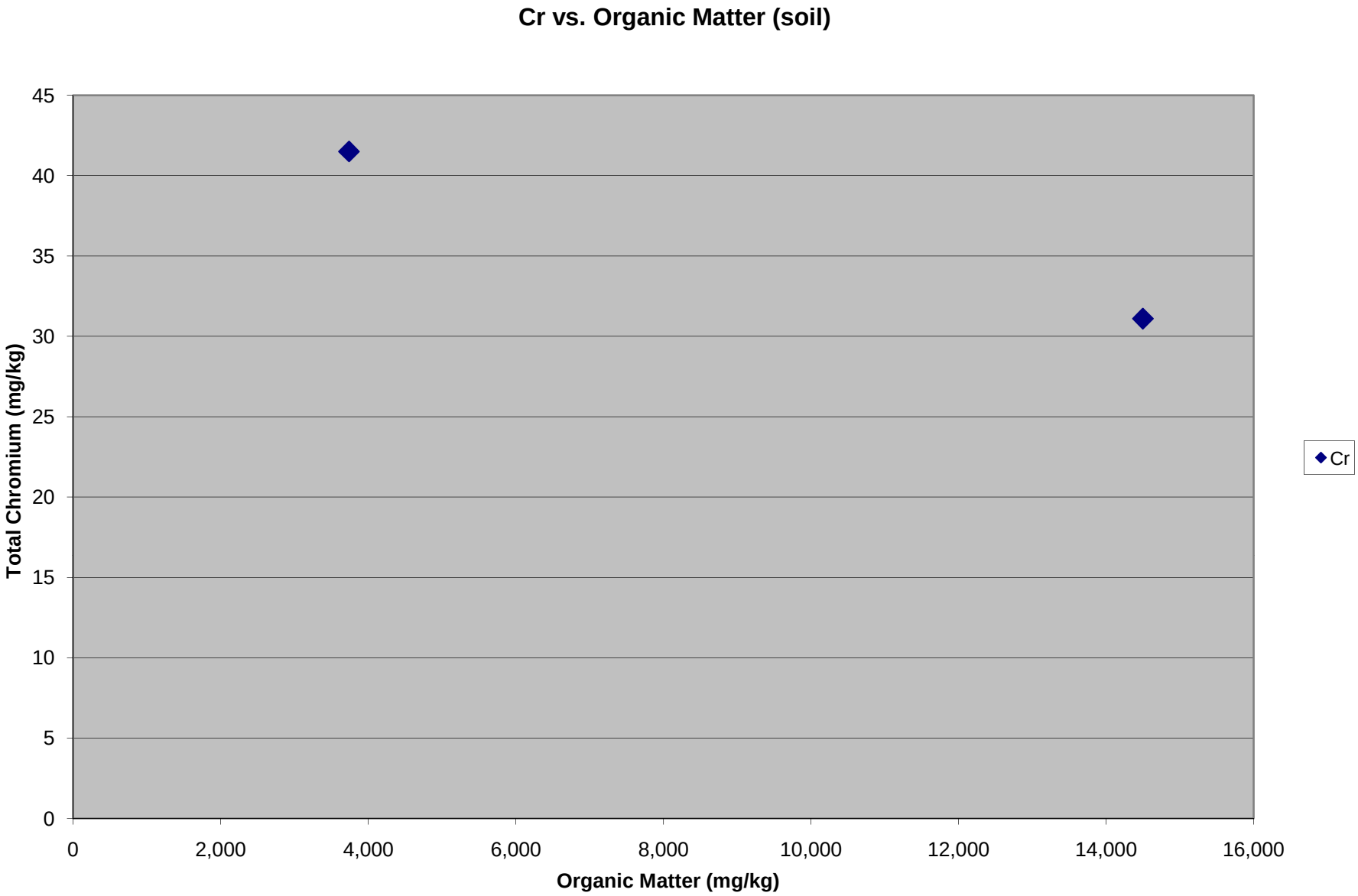
Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
3.0E-08	2.0E-05

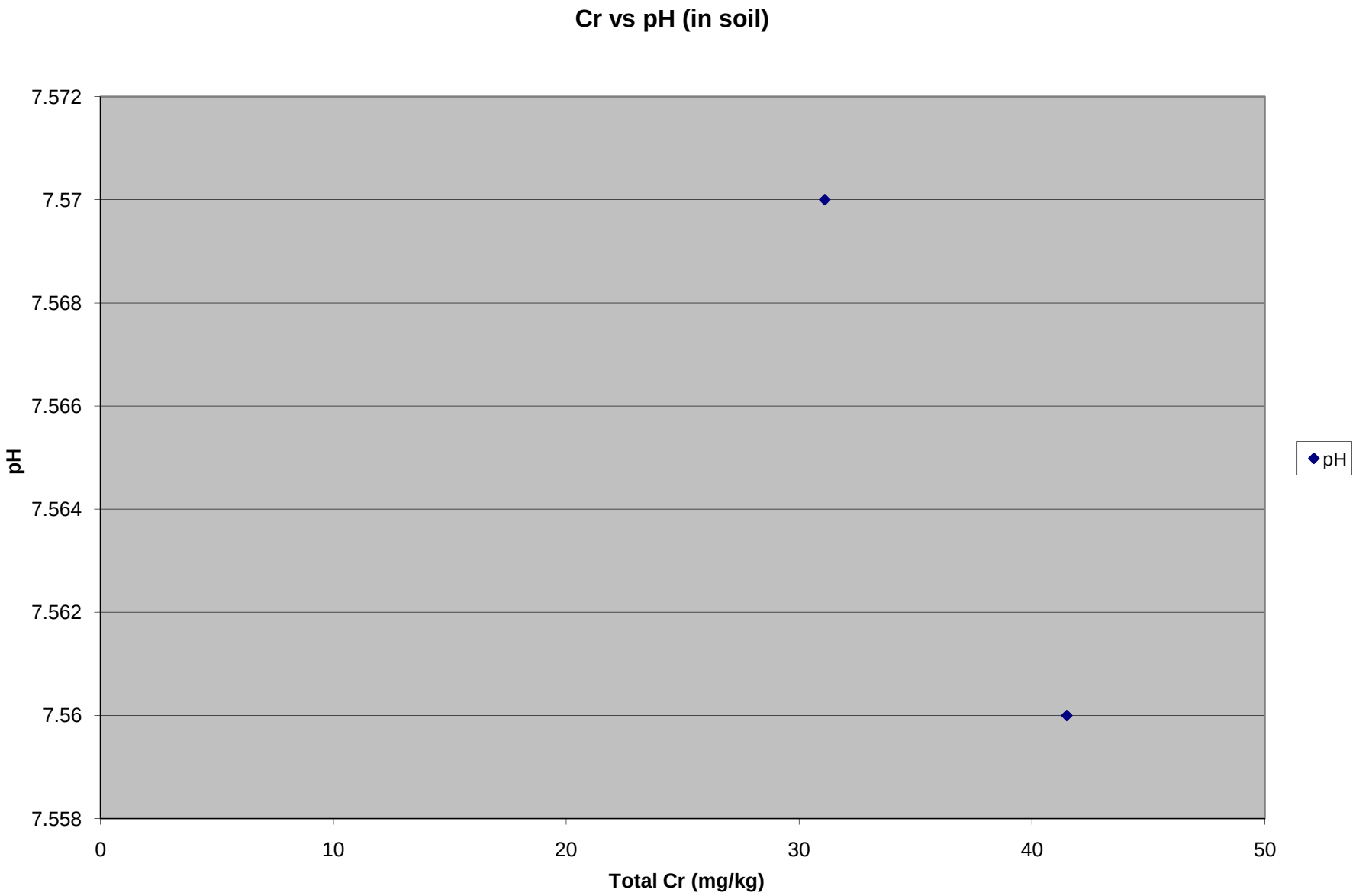
MESSAGE SUMMARY BELOW:

END

Appendix E-5

Chromium Concentration Plots


Cr vs. Organic Matter (soil)
Total Chromium (mg/kg)
45
40
35
30
25
20
15
10
5
0
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
Organic Matter (mg/kg)
Cr


Cr vs pH (in soil)
7.572
7.57
7.568
7.566
7.564
7.562
7.56
7.558
pH
0
10
20
30
40
50
Total Cr (mg/kg)
pH

Appendix E-6

Background Comparisons – ProUCL 4.0 Output

Goodness-of-Fit Test Statistics for Data Sets with Non-Detects

User Selected Options

From File	H:\Risk DB\Radford\SWMU 51\SWMU_51_revised_Nov 2007\Data\Bkgrd SS.wst
Full Precision	OFF
Confidence Coefficient	0.95

Aluminum

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Aluminum Data	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 C.V.
Statistics (Full: no NDs)	4.541	4.078	1828	8.91	0.477	0.0535

Normal Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Antimony

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Antimony Data	14	0	14	0	14	100.00%

Insufficient detected observations for valid results

Arsenic

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Arsenic Data	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 C.V.
Statistics (Full: no NDs)	3.494	3.143	1.068	1.167	0.532	0.456

Normal Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Barium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Barium Data	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	0	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Beryllium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Beryllium Data	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	0.0033
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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Cadmium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Cadmium Data	28	0	28	2	26	92.86%

Insufficient detected observations for valid results

Calcium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Calcium Data	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	0	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Chromium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Chromium Data	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 C.V.
Statistics (Full: no NDs)	4.111	3.695	5.13	2.922	0.529	0.181

Normal Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Cobalt

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Cobalt Data	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Copper

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Copper Data	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	N/A
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	0	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Iron

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Iron Data	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 C.V.
Statistics (Full: no NDs)	3.411	3.069	5895	9.755	0.57	0.0584

Normal Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Lead

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Lead Data	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 C.V.
Statistics (Full: no NDs)	1.456	1.324	18.52	2.913	0.702	0.241

Normal Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Magnesium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Magnesium Data	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	0	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Manganese

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Manganese Data	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 C.V.
Statistics (Full: no NDs)	1.442	1.311	482.6	6.16	0.971	0.158

Normal Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Mercury

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Mercury Data	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	0	1.2	0.05	0	0.227
Statistics (Lognormal ROS Estimated Data)	28	0	1.2	0.0503	2.3931E-5	0.227

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Nickel

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Nickel Data	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 C.V.

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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Potassium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Potassium Data	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Selenium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs

Selenium Data	28	0	28	2	26	92.86%

Insufficient detected observations for valid results

Thallium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Thallium Data	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 C.V.
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	0.0093	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.229	0.457	-1.992

Normal Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Vanadium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Vanadium Data	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 C.V.
Statistics (Full: no NDs)	4.392	3.946	7.716	3.405	0.497	0.146

Normal Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Zinc

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Zinc Data	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 C.V.
Statistics (Full: no NDs)	1.826	1.654	22.56	3.421	0.761	0.223

Normal Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Goodness-of-Fit Test Statistics for Data Sets with Non-Detects

User Selected Options

From File	H:\Risk DB\Radford\SWMU 51\SWMU_51_revised_Nov 2007\Data\Bkgrd TS.wst
Full Precision	OFF
Confidence Coefficient	0.95

Aluminum

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Aluminum Data	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 C.V.
Statistics (Full: no NDs)	2.787	2.689	5097	9.371	0.618	0.0659

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.15	0.0997	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0626	0.0997	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Antimony

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Antimony Data	38	0	38	0	38	100.00%

Insufficient detected observations for valid results

Arsenic

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Arsenic Data	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	0	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Barium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Barium Data	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	0	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Beryllium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Beryllium Data	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	0.0026
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	0	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Cadmium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Cadmium Data	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	0.0086
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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Calcium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Calcium Data	79	0	79	63	16	20.25%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	16	4.6	6.7	5.563	5.4	0.796
Statistics (Detects Only)	63	116	25700	1392	717	3322
Statistics (All: NDs treated as DL value)	79	4.6	25700	1111	534	3014
Statistics (All: NDs treated as DL/2 value)	79	2.3	25700	1111	534	3014
Statistics (Normal ROS Estimated Data)	79	-3726	25700	537.2	534	3423
Statistics (Gamma ROS Estimated Data)	79	0	25700	1110	534	3014
Statistics (Lognormal ROS Estimated Data)	79	60.37	25700	1129	534	3007

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	0.899	0.873	1548	6.588	0.949	0.144
Statistics (NDs = DL)	0.456	0.447	2437	5.599	2.149	0.384
Statistics (NDs = DL/2)	0.42	0.413	2643	5.459	2.409	0.441
Statistics (Gamma ROS Estimates)	0.131	0.135	8441	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	6.173	1.189	0.193

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.359	0.112	Data Not Normal
Lilliefors (NDs = DL)	0.357	0.0997	Data Not Normal
Lilliefors (NDs = DL/2)	0.357	0.0997	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.289	0.0997	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	4.055	0.785	
Kolmogorov-Smirnov (Detects Only)	0.223	0.116	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	2.78	0.829	
Kolmogorov-Smirnov (NDs = DL)	0.146	0.107	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	3.129	0.837	
Kolmogorov-Smirnov (NDs = DL/2)	0.149	0.107	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	17.18	0.972	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.418	0.114	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.108	0.112	Data Appear Lognormal
Lilliefors (NDs = DL)	0.224	0.0997	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.251	0.0997	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0933	0.0997	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Chromium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Chromium Data	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 C.V.
Statistics (Full: no NDs)	4.546	4.382	5.91	3.177	0.501	0.158

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0734	0.0997	Data Appear Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.122	0.0997	Data Not Lognormal

Note: DL/2 is not a recommended method.

Cobalt

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Cobalt Data	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	0	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Copper

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Copper Data	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	N/A
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	0	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Iron

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Iron Data	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 C.V.
Statistics (Full: no NDs)	4.607	4.441	5852	10.09	0.508	0.0503

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0648	0.0997	Data Appear Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.115	0.0997	Data Not Lognormal

Note: DL/2 is not a recommended method.

Lead

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Lead Data	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 C.V.
Statistics (Full: no NDs)	1.186	1.149	18.59	2.615	0.783	0.299

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.344	0.0997	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.147	0.0997	Data Not Lognormal

Note: DL/2 is not a recommended method.

Magnesium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Magnesium Data	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	-1911	58100	4438	1080	13862
Statistics (Gamma ROS Estimated Data)	79	0	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Manganese

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Manganese Data	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 C.V.
Statistics (Full: no NDs)	1.121	1.087	420.6	5.647	1.118	0.198

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.165	0.0997	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.093	0.0997	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Mercury

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Mercury Data	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	7.9520E-4	1.2	0.0541	0.0171	0.141

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Nickel

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Nickel Data	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	0	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Potassium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Potassium Data	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	0	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 C.V.

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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Selenium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Selenium Data	79	0	79	2	77	97.47%

Insufficient detected observations for valid results

Silver

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Silver Data	79	0	79	1	78	98.73%

Insufficient detected observations for valid results

Sodium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Sodium Data	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Thallium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Thallium Data	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 C.V.
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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	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: DL/2 is not a recommended method.

Vanadium

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Vanadium Data	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 C.V.
Statistics (Full: no NDs)	4.973	4.792	9.218	3.721	0.477	0.128

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0967	0.0997	Data Appear Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.0843	0.0997	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Zinc

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Zinc Data	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 C.V.
Statistics (Full: no NDs)	1.083	1.05	50.74	3.478	0.93	0.267

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Full: no NDs)	0.291	0.0997	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	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

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)

		Lilliefors (Full: no NDs)		0.0696	0.0997	Data Appear Lognormal					
Note: DL/2 is not a recommended method.											

Goodness-of-Fit Test Statistics for Full Data Sets without Non-Detects

User Selected Options

From File: H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\SS Metals

Full Precision: OFF

Confidence Coefficient: 0.95

Aluminum (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	26
Minimum	9770
Maximum	47800
Mean of Raw Data	20179
Standard Deviation of Raw Data	8046
Kstar	7.454
Mean of Log Transformed Data	9.851
Standard Deviation of Log Transformed Data	0.343

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.81
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.211
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	0.84
A-D Critical (0.95) Value	0.745
K-S Test Statistic	0.156
K-S Critical(0.95) Value	0.168

Data follow Appr. Gamma Distribution at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.944
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.134
Lilliefors Critical (0.95) Value	0.171

Data appear Lognormal at (0.05) Significance Level

Arsenic (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	26
Minimum	1.79
Maximum	68.9
Mean of Raw Data	9.933

Standard Deviation of Raw Data	13.9
Kstar	1.039
Mean of Log Transformed Data	1.797
Standard Deviation of Log Transformed Data	0.913

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.576
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.316
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	1.503
A-D Critical (0.95) Value	0.77
K-S Test Statistic	0.237
K-S Critical(0.95) Value	0.173

Data not Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.931
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.158
Lilliefors Critical (0.95) Value	0.171

Data appear Lognormal at (0.05) Significance Level

Barium (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	27
Minimum	25.3
Maximum	2630
Mean of Raw Data	411.8
Standard Deviation of Raw Data	765
Kstar	0.531
Mean of Log Transformed Data	4.928
Standard Deviation of Log Transformed Data	1.306

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.523
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.393
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	4.192
A-D Critical (0.95) Value	0.801
K-S Test Statistic	0.375
K-S Critical(0.95) Value	0.177

Data not Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.756
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.331
Lilliefors Critical (0.95) Value	0.171

Data not Lognormal at (0.05) Significance Level

Calcium (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	27
Minimum	1280
Maximum	55700
Mean of Raw Data	11182
Standard Deviation of Raw Data	12778
Kstar	0.983
Mean of Log Transformed Data	8.791
Standard Deviation of Log Transformed Data	1.07

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.729
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.219
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	0.513
A-D Critical (0.95) Value	0.772
K-S Test Statistic	0.106
K-S Critical(0.95) Value	0.173

Data appear Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.954
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.119
Lilliefors Critical (0.95) Value	0.171

Data appear Lognormal at (0.05) Significance Level

Chromium (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	24
Minimum	13.1
Maximum	299
Mean of Raw Data	57.09
Standard Deviation of Raw Data	71.29
Kstar	1.394
Mean of Log Transformed Data	3.686
Standard Deviation of Log Transformed Data	0.725

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.511
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.378
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	3.361
A-D Critical (0.95) Value	0.763
K-S Test Statistic	0.306
K-S Critical(0.95) Value	0.171

Data not Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.805
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.265
Lilliefors Critical (0.95) Value	0.171

Data not Lognormal at (0.05) Significance Level

Cobalt (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	26
Minimum	3.7
Maximum	47
Mean of Raw Data	13.54
Standard Deviation of Raw Data	8.862
Kstar	3.065
Mean of Log Transformed Data	2.453
Standard Deviation of Log Transformed Data	0.542

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.777

Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.239
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	0.67
A-D Critical (0.95) Value	0.751
K-S Test Statistic	0.175
K-S Critical(0.95) Value	0.169

Data follow Appr. Gamma Distribution at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.972
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.136
Lilliefors Critical (0.95) Value	0.171

Data appear Lognormal at (0.05) Significance Level

Copper (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	26
Minimum	10.8
Maximum	23800
Mean of Raw Data	1546
Standard Deviation of Raw Data	4728
Kstar	0.285
Mean of Log Transformed Data	4.981
Standard Deviation of Log Transformed Data	1.962

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.366
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.383
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	3.581
A-D Critical (0.95) Value	0.856
K-S Test Statistic	0.331
K-S Critical(0.95) Value	0.183

Data not Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.854
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.211
Lilliefors Critical (0.95) Value	0.171

Data not Lognormal at (0.05) Significance Level

Iron (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	26
Minimum	14100
Maximum	99900
Mean of Raw Data	29765
Standard Deviation of Raw Data	17492
Kstar	4.425
Mean of Log Transformed Data	10.2
Standard Deviation of Log Transformed Data	0.423

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.673
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.278
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	1.649
A-D Critical (0.95) Value	0.747
K-S Test Statistic	0.244
K-S Critical(0.95) Value	0.169

Data not Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.886
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.215
Lilliefors Critical (0.95) Value	0.171

Data not Lognormal at (0.05) Significance Level

Lead (mg/kg)

Raw Statistics

Number of Valid Samples	33
Number of Unique Samples	32
Minimum	18.3
Maximum	25850
Mean of Raw Data	1212
Standard Deviation of Raw Data	4481

Kstar	0.346
Mean of Log Transformed Data	5.231
Standard Deviation of Log Transformed Data	1.625

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.272
Shapiro Wilk Critical (0.95) Value	0.931
Lilliefors Test Statistic	0.399
Lilliefors Critical (0.95) Value	0.154

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	3.795
A-D Critical (0.95) Value	0.842
K-S Test Statistic	0.3
K-S Critical(0.95) Value	0.165

Data not Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.914
Shapiro Wilk Critical (0.95) Value	0.931
Lilliefors Test Statistic	0.164
Lilliefors Critical (0.95) Value	0.154

Data not Lognormal at (0.05) Significance Level

Magnesium (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	26
Minimum	1070
Maximum	60400
Mean of Raw Data	11885
Standard Deviation of Raw Data	13642
Kstar	1.126
Mean of Log Transformed Data	8.928
Standard Deviation of Log Transformed Data	0.965

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.68
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.245
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	0.663

A-D Critical (0.95) Value	0.768
K-S Test Statistic	0.155
K-S Critical(0.95) Value	0.172

Data appear Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.977
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.113
Lilliefors Critical (0.95) Value	0.171

Data appear Lognormal at (0.05) Significance Level

Manganese (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	27
Minimum	137
Maximum	2230
Mean of Raw Data	711.4
Standard Deviation of Raw Data	556.4
Kstar	1.986
Mean of Log Transformed Data	6.324
Standard Deviation of Log Transformed Data	0.701

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.787
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.214
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	0.562
A-D Critical (0.95) Value	0.756
K-S Test Statistic	0.127
K-S Critical(0.95) Value	0.17

Data appear Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.976
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.0959
Lilliefors Critical (0.95) Value	0.171

Data appear Lognormal at (0.05) Significance Level

Nickel (mg/kg)

Raw Statistics	
Number of Valid Samples	27
Number of Unique Samples	27
Minimum	7.5
Maximum	404
Mean of Raw Data	40.82
Standard Deviation of Raw Data	77.38
Kstar	0.882
Mean of Log Transformed Data	3.108
Standard Deviation of Log Transformed Data	0.901

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.418
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.345
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	2.844
A-D Critical (0.95) Value	0.775
K-S Test Statistic	0.281
K-S Critical(0.95) Value	0.173

Data not Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.858
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.212
Lilliefors Critical (0.95) Value	0.171

Data not Lognormal at (0.05) Significance Level

Potassium (mg/kg)

Raw Statistics	
Number of Valid Samples	27
Number of Unique Samples	25
Minimum	712
Maximum	7870
Mean of Raw Data	2336
Standard Deviation of Raw Data	1493
Kstar	3.097
Mean of Log Transformed Data	7.604
Standard Deviation of Log Transformed Data	0.546

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.789
Shapiro Wilk Critical (0.95) Value	0.923

Lilliefors Test Statistic	0.221
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	0.443
A-D Critical (0.95) Value	0.75
K-S Test Statistic	0.143
K-S Critical(0.95) Value	0.169

Data appear Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.976
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.108
Lilliefors Critical (0.95) Value	0.171

Data appear Lognormal at (0.05) Significance Level

Sodium (mg/kg)

Raw Statistics

Number of Valid Samples	23
Number of Unique Samples	23
Minimum	39.5
Maximum	3165
Mean of Raw Data	577.5
Standard Deviation of Raw Data	761.1
Kstar	0.822
Mean of Log Transformed Data	5.719
Standard Deviation of Log Transformed Data	1.21

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.634
Shapiro Wilk Critical (0.95) Value	0.914
Lilliefors Test Statistic	0.309
Lilliefors Critical (0.95) Value	0.185

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	0.941
A-D Critical (0.95) Value	0.774
K-S Test Statistic	0.176
K-S Critical(0.95) Value	0.187

Data follow Appr. Gamma Distribution at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.916

Shapiro Wilk Critical (0.95) Value	0.914
Lilliefors Test Statistic	0.238
Lilliefors Critical (0.95) Value	0.185

Data appear Lognormal at (0.05) Significance Level

Vanadium (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	26
Minimum	21.6
Maximum	75.6
Mean of Raw Data	42.88
Standard Deviation of Raw Data	10.06
Kstar	16.99
Mean of Log Transformed Data	3.732
Standard Deviation of Log Transformed Data	0.237

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.927
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.123
Lilliefors Critical (0.95) Value	0.171

Data appear Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	0.538
A-D Critical (0.95) Value	0.744
K-S Test Statistic	0.124
K-S Critical(0.95) Value	0.168

Data appear Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.949
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.14
Lilliefors Critical (0.95) Value	0.171

Data appear Lognormal at (0.05) Significance Level

Zinc (mg/kg)

Raw Statistics

Number of Valid Samples	27
Number of Unique Samples	27
Minimum	26
Maximum	15235
Mean of Raw Data	1370
Standard Deviation of Raw Data	3171
Kstar	0.378

Mean of Log Transformed Data	5.568
Standard Deviation of Log Transformed Data	1.691

Normal Distribution Test Results

Shapiro Wilk Test Statistic	0.478
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.402
Lilliefors Critical (0.95) Value	0.171

Data not Normal at (0.05) Significance Level

Gamma Distribution Test Results

A-D Test Statistic	3.076
A-D Critical (0.95) Value	0.831
K-S Test Statistic	0.328
K-S Critical(0.95) Value	0.18

Data not Gamma Distributed at (0.05) Significance Level

Lognormal Distribution Test Results

Shapiro Wilk Test Statistic	0.867
Shapiro Wilk Critical (0.95) Value	0.923
Lilliefors Test Statistic	0.204
Lilliefors Critical (0.95) Value	0.171

Data not Lognormal at (0.05) Significance Level

Goodness-of-Fit Test Statistics for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\SS Metals
Full Precision	OFF
Confidence Coefficient	0.95

Antimony (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Antimony (mg/kg) Data	26	0	26	7	19	73.08%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	19	0.34	3.8	1.019	0.89	0.738
Statistics (Detects Only)	7	0.43	47.6	12.35	5.3	17.58
Statistics (All: NDs treated as DL value)	26	0.34	47.6	4.069	0.915	10.04
Statistics (All: NDs treated as DL/2 value)	26	0.17	47.6	3.696	0.468	10.14
Statistics (Normal ROS Estimated Data)	26	-30.55	47.6	-10.27	-17.14	17.28
Statistics (Gamma ROS Estimated Data)	26	0.43	47.6	12.58	12.65	8.629
Statistics (Lognormal ROS Estimated Data)	26	0.0169	47.6	3.397	0.0927	10.24

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	0.547	0.51	22.57	1.368	1.827	1.335
Statistics (NDs = DL)	0.553	0.515	7.359	0.272	1.207	4.438
Statistics (NDs = DL/2)	0.423	0.4	8.739	-0.234	1.408	-6.005
Statistics (Gamma ROS Estimates)	1.765	1.587	7.126	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-1.506	2.104	-1.397

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.749	0.803	Data Not Normal
Lilliefors (Detects Only)	0.336	0.335	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.399	0.92	Data Not Normal
Lilliefors (NDs = DL)	0.4	0.174	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.386	0.92	Data Not Normal
Lilliefors (NDs = DL/2)	0.416	0.174	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.816	0.92	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.245	0.174	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.308	0.749	
Kolmogorov-Smirnov (Detects Only)	0.184	0.326	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	3.825	0.803	
Kolmogorov-Smirnov (NDs = DL)	0.349	0.181	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	4.479	0.825	
Kolmogorov-Smirnov (NDs = DL/2)	0.39	0.183	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	3.668	0.759	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.363	0.174	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.933	0.803	Data Appear Lognormal
Lilliefors (Detects Only)	0.164	0.335	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.809	0.92	Data Not Lognormal
Lilliefors (NDs = DL)	0.248	0.174	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.766	0.92	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.304	0.174	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.838	0.92	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.25	0.174	Data Not Lognormal

Note: DL/2 is not a recommended method.

Beryllium (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Beryllium (mg/kg) Data	27	0	27	9	18	66.67%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	18	0.64	1.7	1.167	1.25	0.384
Statistics (Detects Only)	9	0.4	1.72	1.011	1.01	0.41
Statistics (All: NDs treated as DL value)	27	0.4	1.72	1.115	1.06	0.392
Statistics (All: NDs treated as DL/2 value)	27	0.32	1.72	0.726	0.7	0.344
Statistics (Normal ROS Estimated Data)	27	0.316	1.72	0.732	0.626	0.335
Statistics (Gamma ROS Estimated Data)	27	0.4	1.72	1.069	1.028	0.268
Statistics (Lognormal ROS Estimated Data)	27	0.4	1.72	0.735	0.608	0.318

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	6.154	5.495	0.164	-0.0729	0.452	-6.203
Statistics (NDs = DL)	7.552	6.737	0.148	0.0412	0.389	9.451
Statistics (NDs = DL/2)	5.131	4.585	0.141	-0.421	0.456	-1.082
Statistics (Gamma ROS Estimates)	14.12	12.57	0.0757	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.38	0.369	-0.971

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.987	0.829	Data Appear Normal
Lilliefors (Detects Only)	0.119	0.295	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.937	0.923	Data Appear Normal
Lilliefors (NDs = DL)	0.133	0.171	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.901	0.923	Data Not Normal
Lilliefors (NDs = DL/2)	0.155	0.171	Data Appear Normal
Shapiro-Wilks (Normal ROS Estimates)	0.878	0.923	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.181	0.171	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.163	0.723	
Kolmogorov-Smirnov (Detects Only)	0.156	0.28	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.607	0.745	

Kolmogorov-Smirnov (NDs = DL)	0.146	0.168	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.41	0.747	
Kolmogorov-Smirnov (NDs = DL/2)	0.118	0.169	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.719	0.744	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.174	0.168	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.965	0.829	Data Appear Lognormal
Lilliefors (Detects Only)	0.182	0.295	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.93	0.923	Data Appear Lognormal
Lilliefors (NDs = DL)	0.144	0.171	Data Appear Lognormal
Shapiro-Wilks (NDs = DL/2)	0.957	0.923	Data Appear Lognormal
Lilliefors (NDs = DL/2)	0.121	0.171	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.92	0.923	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.181	0.171	Data Not Lognormal

Note: DL/2 is not a recommended method.

Cadmium (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Cadmium (mg/kg) Data	27	0	27	11	16	59.26%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	16	0.056	1.5	0.713	0.795	0.523
Statistics (Detects Only)	11	0.072	19.8	4.264	0.45	6.16
Statistics (All: NDs treated as DL value)	27	0.056	19.8	2.16	0.59	4.232
Statistics (All: NDs treated as DL/2 value)	27	0.028	19.8	1.949	0.45	4.297
Statistics (Normal ROS Estimated Data)	27	-8.848	19.8	-0.406	-2.339	5.875
Statistics (Gamma ROS Estimated Data)	27	0.072	19.8	3.962	3.644	3.92
Statistics (Lognormal ROS Estimated Data)	27	0.0045	19.8	1.773	0.0625	4.362

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	0.417	0.395	10.24	-0.119	2.164	-18.16
Statistics (NDs = DL)	0.49	0.46	4.409	-0.531	1.654	-3.116
Statistics (NDs = DL/2)	0.408	0.387	4.779	-0.942	1.76	-1.869
Statistics (Gamma ROS Estimates)	0.885	0.812	4.476	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-1.996	2.24	-1.122

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.741	0.85	Data Not Normal
Lilliefors (Detects Only)	0.278	0.267	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.54	0.923	Data Not Normal
Lilliefors (NDs = DL)	0.377	0.171	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.5	0.923	Data Not Normal
Lilliefors (NDs = DL/2)	0.425	0.171	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.861	0.923	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.22	0.171	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.769	0.797	
Kolmogorov-Smirnov (Detects Only)	0.253	0.272	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.366	0.81	
Kolmogorov-Smirnov (NDs = DL)	0.217	0.178	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.183	0.828	
Kolmogorov-Smirnov (NDs = DL/2)	0.308	0.18	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	1.795	0.778	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.276	0.174	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.849	0.85	Data Not Lognormal
Lilliefors (Detects Only)	0.236	0.267	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.937	0.923	Data Appear Lognormal
Lilliefors (NDs = DL)	0.149	0.171	Data Appear Lognormal
Shapiro-Wilks (NDs = DL/2)	0.931	0.923	Data Appear Lognormal
Lilliefors (NDs = DL/2)	0.17	0.171	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.887	0.923	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.206	0.171	Data Not Lognormal

Note: DL/2 is not a recommended method.

Mercury (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Mercury (mg/kg) Data	27	0	27	26	1	3.70%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Detects Only)	26	0.03	2.2	0.334	0.12	0.581
Statistics (All: NDs treated as DL value)	27	0.03	2.2	0.324	0.12	0.572
Statistics (All: NDs treated as DL/2 value)	27	0.03	2.2	0.322	0.12	0.573
Statistics (Normal ROS Estimated Data)	27	-0.152	2.2	0.316	0.12	0.577
Statistics (Gamma ROS Estimated Data)	27	0	2.2	0.321	0.12	0.573
Statistics (Lognormal ROS Estimated Data)	27	0.03	2.2	0.323	0.12	0.572

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	0.711	0.657	0.469	-1.946	1.178	-0.605
Statistics (NDs = DL)	0.71	0.656	0.456	-1.978	1.167	-0.59
Statistics (NDs = DL/2)	0.694	0.642	0.465	-2.003	1.193	-0.596
Statistics (Gamma ROS Estimates)	0.432	0.408	0.745	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-1.994	1.182	-0.593

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.533	0.92	Data Not Normal
Lilliefors (Detects Only)	0.392	0.174	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.525	0.923	Data Not Normal
Lilliefors (NDs = DL)	0.394	0.171	Data Not Normal

Shapiro-Wilks (NDs = DL/2)	0.527	0.923	Data Not Normal
Lilliefors (NDs = DL/2)	0.393	0.171	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.558	0.923	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.387	0.171	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	2.421	0.788	
Kolmogorov-Smirnov (Detects Only)	0.288	0.179	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	2.585	0.788	
Kolmogorov-Smirnov (NDs = DL)	0.287	0.175	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.463	0.789	
Kolmogorov-Smirnov (NDs = DL/2)	0.282	0.176	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	2.075	0.823	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.242	0.18	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.888	0.92	Data Not Lognormal
Lilliefors (Detects Only)	0.192	0.174	Data Not Lognormal
Shapiro-Wilks (NDs = DL)	0.884	0.923	Data Not Lognormal
Lilliefors (NDs = DL)	0.191	0.171	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.89	0.923	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.184	0.171	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.884	0.923	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.186	0.171	Data Not Lognormal

Note: DL/2 is not a recommended method.

Selenium (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Selenium (mg/kg) Data	27	0	27	16	11	40.74%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	11	0.25	1.27	0.97	1.075	0.36
Statistics (Detects Only)	16	0.34	1.3	0.7	0.645	0.306
Statistics (All: NDs treated as DL value)	27	0.25	1.3	0.81	0.79	0.349
Statistics (All: NDs treated as DL/2 value)	27	0.125	1.3	0.613	0.545	0.279
Statistics (Normal ROS Estimated Data)	27	0.0424	1.3	0.601	0.56	0.294
Statistics (Gamma ROS Estimated Data)	27	0.295	1.3	0.688	0.749	0.261
Statistics (Lognormal ROS Estimated Data)	27	0.26	1.3	0.609	0.531	0.268

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	6.152	5.493	0.114	-0.439	0.418	-0.951
Statistics (NDs = DL)	4.708	4.209	0.172	-0.32	0.506	-1.582
Statistics (NDs = DL/2)	4.595	4.109	0.133	-0.602	0.524	-0.87
Statistics (Gamma ROS Estimates)	7.09	6.327	0.097	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.577	0.403	-0.699

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.887	0.887	Data Not Normal
Lilliefors (Detects Only)	0.163	0.222	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.919	0.923	Data Not Normal
Lilliefors (NDs = DL)	0.17	0.171	Data Appear Normal
Shapiro-Wilks (NDs = DL/2)	0.892	0.923	Data Not Normal
Lilliefors (NDs = DL/2)	0.172	0.171	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.9	0.923	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.185	0.171	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.362	0.741	
Kolmogorov-Smirnov (Detects Only)	0.137	0.216	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.771	0.748	
Kolmogorov-Smirnov (NDs = DL)	0.193	0.169	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.942	0.748	
Kolmogorov-Smirnov (NDs = DL/2)	0.196	0.169	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.734	0.746	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.157	0.168	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.953	0.887	Data Appear Lognormal
Lilliefors (Detects Only)	0.117	0.222	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.904	0.923	Data Not Lognormal
Lilliefors (NDs = DL)	0.193	0.171	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.869	0.923	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.231	0.171	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.943	0.923	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.185	0.171	Data Not Lognormal

Note: DL/2 is not a recommended method.

Silver (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Silver (mg/kg) Data	27	0	27	19	8	29.63%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	8	0.075	1.27	1	1.083	0.385
Statistics (Detects Only)	19	0.11	65.2	9.481	0.62	17.65
Statistics (All: NDs treated as DL value)	27	0.075	65.2	6.968	1.04	15.21
Statistics (All: NDs treated as DL/2 value)	27	0.0375	65.2	6.82	0.6	15.27
Statistics (Normal ROS Estimated Data)	27	-23.55	65.2	5.672	0.39	16.41
Statistics (Gamma ROS Estimated Data)	27	0.11	65.2	9.763	6.2	14.69
Statistics (Lognormal ROS Estimated Data)	27	0.0118	65.2	6.767	0.39	15.29

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	0.376	0.359	25.24	0.48	2.037	4.247

Statistics (NDs = DL)	0.395	0.376	17.63	0.273	1.796	6.582
Statistics (NDs = DL/2)	0.361	0.346	18.88	0.0675	1.882	27.86
Statistics (Gamma ROS Estimates)	0.508	0.476	19.21	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.0875	2.016	-23.03

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.605	0.901	Data Not Normal
Lilliefors (Detects Only)	0.322	0.203	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.511	0.923	Data Not Normal
Lilliefors (NDs = DL)	0.356	0.171	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.505	0.923	Data Not Normal
Lilliefors (NDs = DL/2)	0.354	0.171	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.635	0.923	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.318	0.171	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	1.236	0.828	
Kolmogorov-Smirnov (Detects Only)	0.259	0.213	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	2.201	0.831	
Kolmogorov-Smirnov (NDs = DL)	0.313	0.18	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.856	0.839	
Kolmogorov-Smirnov (NDs = DL/2)	0.34	0.181	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.981	0.807	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.175	0.178	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.909	0.901	Data Appear Lognormal
Lilliefors (Detects Only)	0.207	0.203	Data Not Lognormal
Shapiro-Wilks (NDs = DL)	0.936	0.923	Data Appear Lognormal
Lilliefors (NDs = DL)	0.211	0.171	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.894	0.923	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.276	0.171	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.892	0.923	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.243	0.171	Data Not Lognormal

Note: DL/2 is not a recommended method.

Thallium (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Thallium (mg/kg) Data	20	0	20	9	11	55.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	11	0.6	1.62	0.738	0.66	0.294
Statistics (Detects Only)	9	0.099	0.316	0.185	0.16	0.0695
Statistics (All: NDs treated as DL value)	20	0.099	1.62	0.489	0.61	0.357
Statistics (All: NDs treated as DL/2 value)	20	0.099	0.81	0.286	0.31	0.149

Statistics (Normal ROS Estimated Data)	20	0.099	0.316	0.185	0.185	0.0524
Statistics (Gamma ROS Estimated Data)	20	0.099	0.316	0.189	0.193	0.052
Statistics (Lognormal ROS Estimated Data)	20	0.099	0.316	0.181	0.174	0.052

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	8.406	7.178	0.022	-1.748	0.368	-0.211
Statistics (NDs = DL)	2.047	1.774	0.239	-0.979	0.78	-0.797
Statistics (NDs = DL/2)	4.753	4.074	0.0602	-1.36	0.478	-0.351
Statistics (Gamma ROS Estimates)	13.89	11.84	0.0136	--	--	--
Statistics (Lognormal ROS Estlmates)	--	--	--	-1.748	0.28	-0.16

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.94	0.829	Data Appear Normal
Lilliefors (Detects Only)	0.196	0.295	Data Appear Normal
Shapiro-Wilks (NDs = DL)	0.791	0.905	Data Not Normal
Lilliefors (NDs = DL)	0.227	0.198	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.746	0.905	Data Not Normal
Lilliefors (NDs = DL/2)	0.284	0.198	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.952	0.905	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.147	0.198	Data Appear Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.204	0.722	
Kolmogorov-Smirnov (Detects Only)	0.171	0.279	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.159	0.752	
Kolmogorov-Smirnov (NDs = DL)	0.253	0.196	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.056	0.745	
Kolmogorov-Smirnov (NDs = DL/2)	0.223	0.195	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.285	0.741	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.147	0.194	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.98	0.829	Data Appear Lognormal
Lilliefors (Detects Only)	0.146	0.295	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.885	0.905	Data Not Lognormal
Lilliefors (NDs = DL)	0.276	0.198	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.895	0.905	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.228	0.198	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.986	0.905	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.104	0.198	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Goodness-of-Fit Test Statistics for Data Sets with Non-Detects

User Selected Options

From File: H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\TS Metals

Full Precision: OFF

Confidence Coefficient: 0.95

Aluminum (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Aluminum (mg/kg) Data	38	0	38	38	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	38	9770	47900	23419	20150	9836

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Full: no NDs)	6.633	6.127	3531	9.984	0.392	0.0393

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.878	0.938	Data Not Normal
Lilliefors (Full: no NDs)	0.195	0.144	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.887	0.75	
Kolmogorov-Smirnov (Full: no NDs)	0.147	0.143	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.957	0.938	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.12	0.144	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Antimony (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Antimony (mg/kg) Data	34	0	34	7	27	79.41%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	27	0.34	7.14	1.627	0.88	2.085
Statistics (Detects Only)	7	0.43	47.6	12.35	5.3	17.58
Statistics (All: NDs treated as DL value)	34	0.34	47.6	3.834	0.89	8.886
Statistics (All: NDs treated as DL/2 value)	34	0.17	47.6	3.188	0.455	8.913
Statistics (Normal ROS Estimated Data)	34	-30.28	47.6	-11.75	-17.27	15.63
Statistics (Gamma ROS Estimated Data)	34	0.43	47.6	12.53	12.65	7.527
Statistics (Lognormal ROS Estimated Data)	34	0.0189	47.6	2.639	0.0964	9.02

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.

Statistics (Detects Only)	0.547	0.518	22.57	1.368	1.827	1.335
Statistics (NDs = DL)	0.599	0.566	6.396	0.313	1.203	3.843
Statistics (NDs = DL/2)	0.461	0.44	6.921	-0.237	1.356	-5.709
Statistics (Gamma ROS Estimates)	2.259	2.079	5.545	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-1.648	1.885	-1.144

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.749	0.803	Data Not Normal
Lilliefors (Detects Only)	0.336	0.335	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.419	0.933	Data Not Normal
Lilliefors (NDs = DL)	0.358	0.152	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.37	0.933	Data Not Normal
Lilliefors (NDs = DL/2)	0.367	0.152	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.783	0.933	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.263	0.152	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.308	0.749	
Kolmogorov-Smirnov (Detects Only)	0.184	0.326	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	4.144	0.802	
Kolmogorov-Smirnov (NDs = DL)	0.32	0.158	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	4.961	0.82	
Kolmogorov-Smirnov (NDs = DL/2)	0.354	0.16	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	5.71	0.758	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.363	0.153	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.933	0.803	Data Appear Lognormal
Lilliefors (Detects Only)	0.164	0.335	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.826	0.933	Data Not Lognormal
Lilliefors (NDs = DL)	0.228	0.152	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.798	0.933	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.27	0.152	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.804	0.933	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.267	0.152	Data Not Lognormal

Note: DL/2 is not a recommended method.

Arsenic (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Arsenic (mg/kg) Data	36	0	36	36	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	36	1.39	68.9	8.111	4.055	12.41

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.

Statistics (Full: no NDs)	1.096	1.023	7.402	1.572	0.904	0.575

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.529	0.935	Data Not Normal
Lilliefors (Full: no NDs)	0.332	0.148	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	2.279	0.774	
Kolmogorov-Smirnov (Full: no NDs)	0.22	0.151	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.922	0.935	Data Not Lognormal
Lilliefors (Full: no NDs)	0.128	0.148	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Barium (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Barium (mg/kg) Data	39	0	39	39	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	39	25.3	2630	308.8	73.8	652

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Full: no NDs)	0.618	0.588	499.3	4.738	1.128	0.238

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.437	0.939	Data Not Normal
Lilliefors (Full: no NDs)	0.439	0.142	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	7.385	0.802	
Kolmogorov-Smirnov (Full: no NDs)	0.413	0.148	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.701	0.939	Data Not Lognormal
Lilliefors (Full: no NDs)	0.327	0.142	Data Not Lognormal

Note: DL/2 is not a recommended method.

Cadmium (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Cadmium (mg/kg) Data	38	0	38	11	27	71.05%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	27	0.056	1.5	0.559	0.55	0.475
Statistics (Detects Only)	11	0.072	19.8	4.264	0.45	6.16
Statistics (All: NDs treated as DL value)	38	0.056	19.8	1.632	0.5	3.649
Statistics (All: NDs treated as DL/2 value)	38	0.028	19.8	1.433	0.285	3.695
Statistics (Normal ROS Estimated Data)	38	-9.701	19.8	-1.968	-3.484	5.63
Statistics (Gamma ROS Estimated Data)	38	0	19.8	4.056	4.193	3.53
Statistics (Lognormal ROS Estimated Data)	38	0.0030	19.8	1.266	0.0383	3.744

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	0.417	0.401	10.24	-0.119	2.164	-18.16
Statistics (NDs = DL)	0.495	0.474	3.296	-0.795	1.517	-1.907
Statistics (NDs = DL/2)	0.399	0.385	3.588	-1.288	1.637	-1.271
Statistics (Gamma ROS Estimates)	0.404	0.389	10.05	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-2.646	2.189	-0.827

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.741	0.85	Data Not Normal
Lilliefors (Detects Only)	0.278	0.267	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.47	0.938	Data Not Normal
Lilliefors (NDs = DL)	0.383	0.144	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.427	0.938	Data Not Normal
Lilliefors (NDs = DL/2)	0.442	0.144	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.861	0.938	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.176	0.144	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.769	0.797	
Kolmogorov-Smirnov (Detects Only)	0.253	0.272	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	2.778	0.814	
Kolmogorov-Smirnov (NDs = DL)	0.213	0.151	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	3.961	0.835	
Kolmogorov-Smirnov (NDs = DL/2)	0.3	0.153	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	5.469	0.834	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.361	0.153	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.849	0.85	Data Not Lognormal
Lilliefors (Detects Only)	0.236	0.267	Data Appear Lognormal
Shapiro-Wilks (NDs = DL)	0.904	0.938	Data Not Lognormal
Lilliefors (NDs = DL)	0.201	0.144	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.893	0.938	Data Not Lognormal

Lilliefors (NDs = DL/2)	0.142	0.144	Data Appear Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.878	0.938	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.163	0.144	Data Not Lognormal

Note: DL/2 is not a recommended method.

Chromium (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Chromium (mg/kg) Data	39	0	39	39	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	39	13.1	299	52.43	35.1	59.57

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Full: no NDs)	2.045	1.905	25.64	3.696	0.611	0.165

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.474	0.939	Data Not Normal
Lilliefors (Full: no NDs)	0.379	0.142	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	4.178	0.759	
Kolmogorov-Smirnov (Full: no NDs)	0.265	0.143	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.821	0.939	Data Not Lognormal
Lilliefors (Full: no NDs)	0.188	0.142	Data Not Lognormal

Note: DL/2 is not a recommended method.

Cobalt (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Cobalt (mg/kg) Data	39	0	39	39	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	39	3.7	47	12.94	10.6	7.669

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Full: no NDs)	4.274	3.962	3.027	2.439	0.475	0.195

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.761	0.939	Data Not Normal
Lilliefors (Full: no NDs)	0.228	0.142	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	1.064	0.752	
Kolmogorov-Smirnov (Full: no NDs)	0.165	0.142	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.966	0.939	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.129	0.142	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Copper (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Copper (mg/kg) Data	39	0	39	39	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	39	10.8	23800	1079	39.3	3975

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Full: no NDs)	0.276	0.272	3910	4.449	1.819	0.409

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.304	0.939	Data Not Normal
Lilliefors (Full: no NDs)	0.425	0.142	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	6.8	0.868	
Kolmogorov-Smirnov (Full: no NDs)	0.351	0.154	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.787	0.939	Data Not Lognormal
Lilliefors (Full: no NDs)	0.229	0.142	Data Not Lognormal

Note: DL/2 is not a recommended method.

Iron (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Iron (mg/kg) Data	39	0	39	39	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	39	14100	99900	31724	26200	15583

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.

Statistics (Full: no NDs)	5.96	5.518	5323	10.28	0.399	0.0388

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.785	0.939	Data Not Normal
Lilliefors (Full: no NDs)	0.17	0.142	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.901	0.751	
Kolmogorov-Smirnov (Full: no NDs)	0.152	0.142	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.957	0.939	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.131	0.142	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Lead (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Lead (mg/kg) Data	56	0	56	55	1	1.79%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Detects Only)	55	10.8	25850	762.9	86.2	3496
Statistics (All: NDs treated as DL value)	56	10.5	25850	749.5	73.45	3465
Statistics (All: NDs treated as DL/2 value)	56	5.25	25850	749.4	73.45	3465
Statistics (Normal ROS Estimated Data)	56	-3122	25850	693.6	73.45	3503
Statistics (Gamma ROS Estimated Data)	56	0	25850	749.3	73.45	3465
Statistics (Lognormal ROS Estimated Data)	56	1.017	25850	749.3	73.45	3465

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	0.316	0.311	2412	4.475	1.747	0.39
Statistics (NDs = DL)	0.314	0.309	2389	4.438	1.755	0.395
Statistics (NDs = DL/2)	0.312	0.307	2400	4.425	1.772	0.4
Statistics (Gamma ROS Estimates)	0.27	0.268	2771	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	4.396	1.831	0.417

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.415	0.119	Data Not Normal
Lilliefors (NDs = DL)	0.416	0.118	Data Not Normal
Lilliefors (NDs = DL/2)	0.415	0.118	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.405	0.118	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)

Anderson-Darling (Detects Only)	5.963	0.859	
Kolmogorov-Smirnov (Detects Only)	0.258	0.13	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	6.109	0.86	
Kolmogorov-Smirnov (NDs = DL)	0.256	0.129	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	5.984	0.86	
Kolmogorov-Smirnov (NDs = DL/2)	0.255	0.129	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	5.024	0.877	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.231	0.13	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Lilliefors (Detects Only)	0.118	0.119	Data Appear Lognormal
Lilliefors (NDs = DL)	0.121	0.118	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.116	0.118	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.118	0.118	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Manganese (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Manganese (mg/kg) Data	39	0	39	39	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	39	137	2230	610.1	453	489.8

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Full: no NDs)	2.417	2.248	252.4	6.193	0.638	0.103

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.726	0.939	Data Not Normal
Lilliefors (Full: no NDs)	0.221	0.142	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	1.134	0.757	
Kolmogorov-Smirnov (Full: no NDs)	0.14	0.143	Data appear Approximate Gamma Distribution

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.963	0.939	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.0902	0.142	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Nickel (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Nickel (mg/kg) Data	39	0	39	39	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	39	7.5	404	38.14	22.4	64.29

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Full: no NDs)	1.302	1.219	29.29	3.211	0.773	0.241

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.402	0.939	Data Not Normal
Lilliefors (Full: no NDs)	0.354	0.142	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	2.784	0.771	
Kolmogorov-Smirnov (Full: no NDs)	0.224	0.145	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.911	0.939	Data Not Lognormal
Lilliefors (Full: no NDs)	0.13	0.142	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Silver (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Silver (mg/kg) Data	39	0	39	22	17	43.59%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	17	0.075	1.44	1.072	1.21	0.347
Statistics (Detects Only)	22	0.11	65.2	8.32	0.93	16.61
Statistics (All: NDs treated as DL value)	39	0.075	65.2	5.16	1.075	12.88
Statistics (All: NDs treated as DL/2 value)	39	0.0375	65.2	4.927	0.615	12.95
Statistics (Normal ROS Estimated Data)	39	-20.96	65.2	3.925	0.19	13.84
Statistics (Gamma ROS Estimated Data)	39	0.11	65.2	8.496	8.663	12.35
Statistics (Lognormal ROS Estimated Data)	39	0.0158	65.2	4.86	0.421	12.98

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	0.387	0.374	21.49	0.41	1.894	4.623
Statistics (NDs = DL)	0.45	0.432	11.47	0.205	1.498	7.313
Statistics (NDs = DL/2)	0.39	0.378	12.62	-0.0973	1.591	-16.36
Statistics (Gamma ROS Estimates)	0.635	0.604	13.37	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.274	1.711	-6.238

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.562	0.911	Data Not Normal
Lilliefors (Detects Only)	0.325	0.189	Data Not Normal

Shapiro-Wilks (NDs = DL)	0.427	0.939	Data Not Normal
Lilliefors (NDs = DL)	0.409	0.142	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.42	0.939	Data Not Normal
Lilliefors (NDs = DL/2)	0.414	0.142	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.579	0.939	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.353	0.142	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	1.661	0.829	
Kolmogorov-Smirnov (Detects Only)	0.299	0.199	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	4.589	0.824	
Kolmogorov-Smirnov (NDs = DL)	0.368	0.15	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	5.689	0.837	
Kolmogorov-Smirnov (NDs = DL/2)	0.388	0.152	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	2.073	0.8	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.209	0.148	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.917	0.911	Data Appear Lognormal
Lilliefors (Detects Only)	0.225	0.189	Data Not Lognormal
Shapiro-Wilks (NDs = DL)	0.901	0.939	Data Not Lognormal
Lilliefors (NDs = DL)	0.252	0.142	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.852	0.939	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.274	0.142	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.866	0.939	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.235	0.142	Data Not Lognormal

Note: DL/2 is not a recommended method.

Thallium (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Thallium (mg/kg) Data	32	0	32	21	11	34.38%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	11	0.6	1.62	0.738	0.66	0.294
Statistics (Detects Only)	21	0.099	26.9	3.773	0.25	7.924
Statistics (All: NDs treated as DL value)	32	0.099	26.9	2.73	0.328	6.533
Statistics (All: NDs treated as DL/2 value)	32	0.099	26.9	2.603	0.305	6.574
Statistics (Normal ROS Estimated Data)	32	-1.569	26.9	3.166	0.26	6.556
Statistics (Gamma ROS Estimated Data)	32	0.099	26.9	3.868	0.328	6.379
Statistics (Lognormal ROS Estimated Data)	32	0.099	26.9	2.6	0.26	6.575

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Detects Only)	0.332	0.321	11.38	-0.718	1.826	-2.544
Statistics (NDs = DL)	0.411	0.393	6.645	-0.591	1.486	-2.515
Statistics (NDs = DL/2)	0.373	0.359	6.983	-0.829	1.483	-1.789
Statistics (Gamma ROS Estimates)	0.475	0.451	8.145	--	--	--
Statistics (Lognormal ROS Estimates)	--	--	--	-0.877	1.524	-1.737

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.524	0.908	Data Not Normal
Lilliefors (Detects Only)	0.477	0.193	Data Not Normal
Shapiro-Wilks (NDs = DL)	0.445	0.93	Data Not Normal
Lilliefors (NDs = DL)	0.466	0.157	Data Not Normal
Shapiro-Wilks (NDs = DL/2)	0.424	0.93	Data Not Normal
Lilliefors (NDs = DL/2)	0.482	0.157	Data Not Normal
Shapiro-Wilks (Normal ROS Estimates)	0.585	0.93	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.323	0.157	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	4.288	0.839	
Kolmogorov-Smirnov (Detects Only)	0.463	0.205	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	5.325	0.83	
Kolmogorov-Smirnov (NDs = DL)	0.41	0.166	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	7.446	0.839	
Kolmogorov-Smirnov (NDs = DL/2)	0.48	0.167	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	2.194	0.816	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.285	0.165	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Detects Only)	0.661	0.908	Data Not Lognormal
Lilliefors (Detects Only)	0.388	0.193	Data Not Lognormal
Shapiro-Wilks (NDs = DL)	0.784	0.93	Data Not Lognormal
Lilliefors (NDs = DL)	0.281	0.157	Data Not Lognormal
Shapiro-Wilks (NDs = DL/2)	0.637	0.93	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.403	0.157	Data Not Lognormal
Shapiro-Wilks (Lognormal ROS Estimates)	0.682	0.93	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.303	0.157	Data Not Lognormal

Note: DL/2 is not a recommended method.

Vanadium (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Vanadium (mg/kg) Data	39	0	39	39	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	39	21.6	90.5	49.14	45.3	14.84

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Full: no NDs)	11.95	11.05	4.111	3.852	0.295	0.0765

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)

Shapiro-Wilks (Full: no NDs)	0.933	0.939	Data Not Normal
Lilliefors (Full: no NDs)	0.161	0.142	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	0.569	0.748	
Kolmogorov-Smirnov (Full: no NDs)	0.123	0.141	Data Appear Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.978	0.939	Data Appear Lognormal
Lilliefors (Full: no NDs)	0.104	0.142	Data Appear Lognormal

Note: DL/2 is not a recommended method.

Zinc (mg/kg)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Zinc (mg/kg) Data	39	0	39	39	0	0.00%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Full: no NDs)	39	26	15235	968.7	115	2693

	K Hat	K Star	Theta Hat	Log Mean	Log Stdv	Log C.V.
Statistics (Full: no NDs)	0.379	0.367	2555	5.125	1.561	0.305

Normal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.399	0.939	Data Not Normal
Lilliefors (Full: no NDs)	0.434	0.142	Data Not Normal

Gamma Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Anderson-Darling (Full: no NDs)	5.966	0.84	
Kolmogorov-Smirnov (Full: no NDs)	0.333	0.152	Data Not Gamma Distributed

Lognormal Distribution Test Results

	Test value	Crit. (0.95)	Conclusion with Alpha(0.05)
Shapiro-Wilks (Full: no NDs)	0.803	0.939	Data Not Lognormal
Lilliefors (Full: no NDs)	0.212	0.142	Data Not Lognormal

Note: DL/2 is not a recommended method.

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ss)

Background Data: Aluminum(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Distinct Samples	26	28
Minimum	9770	3620
Maximum	47800	20100
Mean	20179	8300
Median	18500	6705
SD	8046	4279
SE of Mean	1548	808.6

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	1087
WMW Test U-Stat	5.564
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ss)

Background Data: Arsenic(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Distinct Samples	26	24
Minimum	1.79	1.5
Maximum	68.9	10.2
Mean	9.933	3.732
Median	5.3	2.75
SD	13.9	2.33
SE of Mean	2.674	0.44

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	921.5
WMW Test U-Stat	2.778
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.0054

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ss)

Background Data: Chromium(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Distinct Samples	24	27
Minimum	13.1	6.3
Maximum	299	53.3
Mean	57.09	21.09
Median	32.5	22.4
SD	71.29	10.5
SE of Mean	13.72	1.985

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	1014
WMW Test U-Stat	4.335
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	1.4560E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ss)

Background Data: Iron(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Distinct Samples	26	26
Minimum	14100	7250
Maximum	99900	63000
Mean	29765	20108
Median	25000	19750
SD	17492	11869
SE of Mean	3366	2243

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	916.5
WMW Test U-Stat	2.694
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.0070

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ss)

Background Data: Lead(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	33	28
Number of Distinct Samples	32	26
Minimum	18.3	8.9
Maximum	25850	225
Mean	1212	26.96
Median	128	15.15
SD	4481	41.34
SE of Mean	780	7.813

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	1431
WMW Test U-Stat	5.898
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ss)

Background Data: Manganese(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Distinct Samples	27	28
Minimum	137	43
Maximum	2230	2040
Mean	711.4	695.9
Median	548	490
SD	556.4	591.5
SE of Mean	107.1	111.8

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	787
WMW Test U-Stat	0.513
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.608

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ss)

Background Data: Vanadium(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Distinct Samples	26	27
Minimum	21.6	12.2
Maximum	75.6	101
Mean	42.88	33.89
Median	44.6	33.8
SD	10.06	17.78
SE of Mean	1.936	3.36

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	933.5
WMW Test U-Stat	2.98
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.0028

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ss)

Background Data: Zinc(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Distinct Samples	27	28
Minimum	26	7.1
Maximum	15235	216
Mean	1370	41.21
Median	145	29.7
SD	3171	40.24
SE of Mean	610.3	7.605

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	1070
WMW Test U-Stat	5.278
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Antimony(flfa ss)

Background Data: Antimony(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	26	14
Number of Missing Values	0	14
Number of Non-Detect Data	19	14
Number of Detect Data	7	0
Minimum Non-Detect	0.34	0.24
Maximum Non-Detect	3.8	0.36
Percent Non detects	73.08%	100.00%
Minimum Detected	0.43	N/A
Maximum Detected	47.6	N/A
Mean of Detected Data	12.35	N/A
Median of Detected Data	5.3	N/A
SD of Detected Data	17.58	N/A

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 3.8 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	561
WMW Test U-Stat	210
Lower Critical Value (0.025)	84
Upper Critical Value (0.975)	280
Approximate P-Value	0.436

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Barium(flfa ss)

Background Data: Barium(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	0	4
Number of Detect Data	27	24
Minimum Non-Detect	N/A	0.36
Maximum Non-Detect	N/A	1
Percent Non detects	0.00%	14.29%
Minimum Detected	25.3	23.4
Maximum Detected	2630	174
Mean of Detected Data	411.8	75.55
Median of Detected Data	75.5	61.85
SD of Detected Data	765	43.2

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	917
WMW Test U-Stat	2.702
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.0068

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Beryllium(flfa ss)

Background Data: Beryllium(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	18	13
Number of Detect Data	9	15
Minimum Non-Detect	0.64	0.022
Maximum Non-Detect	1.7	0.03
Percent Non detects	66.67%	46.43%
Minimum Detected	0.4	0.61
Maximum Detected	1.72	1.5
Mean of Detected Data	1.011	0.887
Median of Detected Data	1.01	0.87
SD of Detected Data	0.41	0.246

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1.7 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	770
WMW Test U-Stat	0.227
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.82

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Cadmium(flfa ss)

Background Data: Cadmium(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	16	26
Number of Detect Data	11	2
Minimum Non-Detect	0.056	0.02
Maximum Non-Detect	1.5	0.05
Percent Non detects	59.26%	92.86%
Minimum Detected	0.072	0.67
Maximum Detected	19.8	0.82
Mean of Detected Data	4.264	0.745
Median of Detected Data	0.45	0.745
SD of Detected Data	6.16	0.106

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1.5 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	826
WMW Test U-Stat	1.17
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.242

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Calcium(flfa ss)

Background Data: Calcium(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	0	5
Number of Detect Data	27	23
Minimum Non-Detect	N/A	4.6
Maximum Non-Detect	N/A	6.6
Percent Non detects	0.00%	17.86%
Minimum Detected	1280	116
Maximum Detected	55700	7340
Mean of Detected Data	11182	1197
Median of Detected Data	6850	885
SD of Detected Data	12778	1440

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 6.6 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	1101
WMW Test U-Stat	5.8
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Cobalt(flfa ss)

Background Data: Cobalt(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	0	8
Number of Detect Data	27	20
Minimum Non-Detect	N/A	0.11
Maximum Non-Detect	N/A	0.75
Percent Non detects	0.00%	28.57%
Minimum Detected	3.7	5.9
Maximum Detected	47	45.4
Mean of Detected Data	13.54	15.95
Median of Detected Data	11.2	12.1
SD of Detected Data	8.862	10.07

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 0.75 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	824
WMW Test U-Stat	1.136
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.256

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Copper(flfa ss)

Background Data: Copper(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	0	2
Number of Detect Data	27	26
Minimum Non-Detect	N/A	0.17
Maximum Non-Detect	N/A	0.17
Percent Non detects	0.00%	7.14%
Minimum Detected	10.8	2.2
Maximum Detected	23800	13.6
Mean of Detected Data	1546	6.919
Median of Detected Data	64.2	5.35
SD of Detected Data	4728	3.696

Wilcoxon-Mann-Whitney Site vs Background Test

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	1127
WMW Test U-Stat	6.238
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Magnesium(flfa ss)

Background Data: Magnesium(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	0	3
Number of Detect Data	27	25
Minimum Non-Detect	N/A	4.7
Maximum Non-Detect	N/A	5
Percent Non detects	0.00%	10.71%
Minimum Detected	1070	158
Maximum Detected	60400	20400
Mean of Detected Data	11885	2498
Median of Detected Data	7510	913
SD of Detected Data	13642	4334

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 5 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	1054
WMW Test U-Stat	5
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Mercury(flfa ss)

Background Data: Mercury(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	1	25
Number of Detect Data	26	3
Minimum Non-Detect	0.0605	0.019
Maximum Non-Detect	0.0605	0.06
Percent Non detects	3.70%	89.29%
Minimum Detected	0.03	0.07
Maximum Detected	2.2	1.2
Mean of Detected Data	0.334	0.467
Median of Detected Data	0.12	0.13
SD of Detected Data	0.581	0.636

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 0.0605 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	985
WMW Test U-Stat	3.847
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	1.1957E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
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(flfa ss)

Background Data: Mercury(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	1	25
Number of Detect Data	26	3
Minimum Non-Detect	0.0605	0.019
Maximum Non-Detect	0.0605	0.06
Percent Non detects	3.70%	89.29%
Minimum Detected	0.03	0.07
Maximum Detected	2.2	1.2
Mean of Detected Data	0.334	0.467
Median of Detected Data	0.12	0.13
SD of Detected Data	0.581	0.636

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 0.0605 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	985
WMW Test U-Stat	3.847
WMW Critical Value (0.050)	1.645
P-Value	5.9787E-5

Conclusion with Alpha = 0.05

Reject H0, Conclude Site > Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Nickel(flfa ss)

Background Data: Nickel(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	0	11
Number of Detect Data	27	17
Minimum Non-Detect	N/A	0.21
Maximum Non-Detect	N/A	1.3
Percent Non detects	0.00%	39.29%
Minimum Detected	7.5	4.6
Maximum Detected	404	18.1
Mean of Detected Data	40.82	9.935
Median of Detected Data	19.3	9.4
SD of Detected Data	77.38	4.294

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1.3 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	1067
WMW Test U-Stat	5.228
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Potassium(flfa ss)

Background Data: Potassium(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	0	6
Number of Detect Data	27	22
Minimum Non-Detect	N/A	201
Maximum Non-Detect	N/A	271
Percent Non detects	0.00%	21.43%
Minimum Detected	712	166
Maximum Detected	7870	2350
Mean of Detected Data	2336	735.4
Median of Detected Data	2030	509.5
SD of Detected Data	1493	632.6

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 271 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	1076
WMW Test U-Stat	5.371
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Selenium(flfa ss)

Background Data: Selenium(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	11	26
Number of Detect Data	16	2
Minimum Non-Detect	0.25	0.14
Maximum Non-Detect	1.27	0.36
Percent Non detects	40.74%	92.86%
Minimum Detected	0.34	0.64
Maximum Detected	1.3	0.77
Mean of Detected Data	0.7	0.705
Median of Detected Data	0.645	0.705
SD of Detected Data	0.306	0.0919

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1.27 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	784
WMW Test U-Stat	0.463
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.643

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Silver(flfa ss)

Background Data: Silver(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	27	28
Number of Non-Detect Data	8	27
Number of Detect Data	19	1
Minimum Non-Detect	0.075	0.16
Maximum Non-Detect	1.27	0.38
Percent Non detects	29.63%	96.43%
Minimum Detected	0.11	4.3
Maximum Detected	65.2	4.3
Mean of Detected Data	9.481	4.3
Median of Detected Data	0.62	4.3
SD of Detected Data	17.65	N/A

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1.27 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	857.5
WMW Test U-Stat	1.7
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.0891

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Sodium(flfa ss)

Background Data: Sodium(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	23	28
Number of Non-Detect Data	0	27
Number of Detect Data	23	1
Minimum Non-Detect	N/A	10.8
Maximum Non-Detect	N/A	25.9
Percent Non detects	0.00%	96.43%
Minimum Detected	39.5	124
Maximum Detected	3165	124
Mean of Detected Data	577.5	124
Median of Detected Data	357	124
SD of Detected Data	761.1	N/A

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 25.9 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	914
WMW Test U-Stat	5.972
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd SS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Thallium(flfa ss)

Background Data: Thallium(bkgrd ss)

Raw Statistics

	Site	Background
Number of Valid Samples	20	28
Number of Non-Detect Data	11	24
Number of Detect Data	9	4
Minimum Non-Detect	0.6	0.13
Maximum Non-Detect	1.62	0.41
Percent Non detects	55.00%	85.71%
Minimum Detected	0.099	1.3
Maximum Detected	0.316	2.1
Mean of Detected Data	0.185	1.85
Median of Detected Data	0.16	2
SD of Detected Data	0.0695	0.37

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1.62 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	460
WMW Test U-Stat	250
Lower Critical Value (0.025)	128
Upper Critical Value (0.975)	432
Approximate P-Value	0.537

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ts)

Background Data: Aluminum(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	38	79
Number of Missing Values	18	0
Number of Distinct Samples	36	75
Minimum	9770	3620
Maximum	47900	47900
Mean	23419	14204
Median	20150	12100
SD	9836	9433
SE of Mean	1596	1061

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	3117
WMW Test U-Stat	5.087
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ts)

Background Data: Chromium(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	39	79
Number of Missing Values	17	0
Number of Distinct Samples	35	70
Minimum	13.1	6.3
Maximum	299	75.8
Mean	52.43	26.86
Median	35.1	26
SD	59.57	12.51
SE of Mean	9.538	1.408

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	3097
WMW Test U-Stat	4.439
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

	Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs
User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ts)

Background Data: Iron(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	39	79
Number of Missing Values	17	0
Number of Distinct Samples	37	72
Minimum	14100	7250
Maximum	99900	67700
Mean	31724	26963
Median	26200	25200
SD	15583	11990
SE of Mean	2495	1349

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	2558
WMW Test U-Stat	1.356
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.175

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ts)

Background Data: Manganese(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	39	79
Number of Missing Values	17	0
Number of Distinct Samples	39	78
Minimum	137	16.7
Maximum	2230	2040
Mean	610.1	471.4
Median	453	359
SD	489.8	467.1
SE of Mean	78.43	52.55

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	2726
WMW Test U-Stat	2.317
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.0205

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

	Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs
User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ts)

Background Data: Vanadium(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	39	79
Number of Missing Values	17	0
Number of Distinct Samples	38	76
Minimum	21.6	12.2
Maximum	90.5	114
Mean	49.14	45.84
Median	45.3	41.4
SD	14.84	20.38
SE of Mean	2.377	2.293

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	2553
WMW Test U-Stat	1.327
Lower Critical Value (0.025)	-1.96
Upper Critical Value (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)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
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(flfa ts)

Background Data: Zinc(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	39	79
Number of Missing Values	17	0
Number of Distinct Samples	39	76
Minimum	26	4.7
Maximum	15235	598
Mean	968.7	54.94
Median	115	30.2
SD	2693	87.15
SE of Mean	431.2	9.805

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	3421
WMW Test U-Stat	6.293
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Antimony(flfa ts)

Background Data: Antimony(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	34	38
Number of Missing Values	22	41
Number of Non-Detect Data	27	38
Number of Detect Data	7	0
Minimum Non-Detect	0.34	0.23
Maximum Non-Detect	7.14	0.36
Percent Non detects	79.41%	100.00%
Minimum Detected	0.43	N/A
Maximum Detected	47.6	N/A
Mean of Detected Data	12.35	N/A
Median of Detected Data	5.3	N/A
SD of Detected Data	17.58	N/A

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 7.14 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	1279
WMW Test U-Stat	0.423
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.672

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Arsenic(flfa ts)

Background Data: Arsenic(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	36	79
Number of Missing Values	20	0
Number of Non-Detect Data	0	3
Number of Detect Data	36	76
Minimum Non-Detect	N/A	0.09
Maximum Non-Detect	N/A	0.12
Percent Non detects	0.00%	3.80%
Minimum Detected	1.39	1.2
Maximum Detected	68.9	35.9
Mean of Detected Data	8.111	4.989
Median of Detected Data	4.055	3.2
SD of Detected Data	12.41	5.36

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 0.12 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	2386
WMW Test U-Stat	1.794
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.0728

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Barium(flfa ts)

Background Data: Barium(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	39	79
Number of Missing Values	17	0
Number of Non-Detect Data	0	16
Number of Detect Data	39	63
Minimum Non-Detect	N/A	0.36
Maximum Non-Detect	N/A	1.1
Percent Non detects	0.00%	20.25%
Minimum Detected	25.3	23.4
Maximum Detected	2630	174
Mean of Detected Data	308.8	68.4
Median of Detected Data	73.8	56.7
SD of Detected Data	652	40.39

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1.1 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	3136
WMW Test U-Stat	4.663
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Cadmium(flfa ts)

Background Data: Cadmium(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	38	79
Number of Missing Values	18	0
Number of Non-Detect Data	27	66
Number of Detect Data	11	13
Minimum Non-Detect	0.056	0.02
Maximum Non-Detect	1.5	0.05
Percent Non detects	71.05%	83.54%
Minimum Detected	0.072	0.57
Maximum Detected	19.8	2.5
Mean of Detected Data	4.264	1.152
Median of Detected Data	0.45	1.1
SD of Detected Data	6.16	0.585

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1.5 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	2407
WMW Test U-Stat	0.955
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.34

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Cobalt(flfa ts)

Background Data: Cobalt(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	39	79
Number of Missing Values	17	0
Number of Non-Detect Data	0	23
Number of Detect Data	39	56
Minimum Non-Detect	N/A	0.11
Maximum Non-Detect	N/A	0.84
Percent Non detects	0.00%	29.11%
Minimum Detected	3.7	5.9
Maximum Detected	47	130
Mean of Detected Data	12.94	22.23
Median of Detected Data	10.6	13.3
SD of Detected Data	7.669	23.94

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 0.84 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	2439
WMW Test U-Stat	0.672
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.501

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Copper(flfa ts)

Background Data: Copper(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	39	79
Number of Missing Values	17	0
Number of Non-Detect Data	0	2
Number of Detect Data	39	77
Minimum Non-Detect	N/A	0.17
Maximum Non-Detect	N/A	0.17
Percent Non detects	0.00%	2.53%
Minimum Detected	10.8	1.6
Maximum Detected	23800	38.7
Mean of Detected Data	1079	12.25
Median of Detected Data	39.3	9.1
SD of Detected Data	3975	9.397

Wilcoxon-Mann-Whitney Site vs Background Test

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	3672
WMW Test U-Stat	7.729
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

	Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects
User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Lead(flfa ts)

Background Data: Lead(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	56	79
Number of Non-Detect Data	1	0
Number of Detect Data	55	79
Minimum Non-Detect	10.5	N/A
Maximum Non-Detect	10.5	N/A
Percent Non detects	1.79%	0.00%
Minimum Detected	10.8	2.1
Maximum Detected	25850	256
Mean of Detected Data	762.9	22.04
Median of Detected Data	86.2	12
SD of Detected Data	3496	39.85

Wilcoxon-Mann-Whitney Site vs Background Test

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	N/A
WMW Test U-Stat	N/A
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	N/A

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Nickel(flfa ts)

Background Data: Nickel(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	39	79
Number of Missing Values	17	0
Number of Non-Detect Data	0	18
Number of Detect Data	39	61
Minimum Non-Detect	N/A	0.21
Maximum Non-Detect	N/A	1.4
Percent Non detects	0.00%	22.78%
Minimum Detected	7.5	4.6
Maximum Detected	404	94.2
Mean of Detected Data	38.14	17.95
Median of Detected Data	22.4	13.2
SD of Detected Data	64.29	15.68

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1.4 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	3191
WMW Test U-Stat	4.977
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0

Conclusion with Alpha = 0.05

Reject H0, Conclude Site <> Background

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Silver(flfa ts)

Background Data: Silver(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	39	79
Number of Missing Values	17	0
Number of Non-Detect Data	17	78
Number of Detect Data	22	1
Minimum Non-Detect	0.075	0.16
Maximum Non-Detect	1.44	0.42
Percent Non detects	43.59%	98.73%
Minimum Detected	0.11	4.3
Maximum Detected	65.2	4.3
Mean of Detected Data	8.32	4.3
Median of Detected Data	0.93	4.3
SD of Detected Data	16.61	N/A

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1.44 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	2620
WMW Test U-Stat	1.711
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.0872

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

	Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects
User Selected Options	
From File	H:\Risk DB\Radford\Former Lead Furnace Area (FLFA)\FLFA_Jan_2008_revision\Background\Bkgrd TS
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Site or AOC Mean/Median Equal to Background Mean/Median (2 Sided Alternative
Alternative Hypothesis	Site or AOC Mean/Median Not Equal to Background Mean/Median

Area of Concern Data: Thallium(flfa ts)

Background Data: Thallium(bkgrd ts)

Raw Statistics

	Site	Background
Number of Valid Samples	32	79
Number of Missing Values	24	0
Number of Non-Detect Data	11	64
Number of Detect Data	21	15
Minimum Non-Detect	0.6	0.13
Maximum Non-Detect	1.62	0.45
Percent Non detects	34.38%	81.01%
Minimum Detected	0.099	1.3
Maximum Detected	26.9	5
Mean of Detected Data	3.773	2.527
Median of Detected Data	0.25	2.2
SD of Detected Data	7.924	0.932

Wilcoxon-Mann-Whitney Site vs Background Test

All observations <= 1.62 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC = Mean/Median of Background

Site Rank Sum W-Stat	1768
WMW Test U-Stat	0.153
Lower Critical Value (0.025)	-1.96
Upper Critical Value (0.975)	1.96
P-Value	0.878

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Site = Background

P-Value >= alpha (0.05)

Appendix F

SLERA Site Reconnaissance Photographs and Risk Characterization Tables

Appendix F-1

SLERA Site Reconnaissance Photographs

Photo F-1. Photograph overlooking SWMU 17A burn cap with the FLFA in background.

Photo F-2. View of FLFA. Note: staked boring locations LFSB14 at the top center and LFSB13 at the bottom center of the FLFA.

Photo F-3. Close-up view of grassy habitat at FLFA.

Photo F-4. Photograph of FLFA looking up-slope at site. Soil boring LFSB13 in foreground and LFSB14 in background.

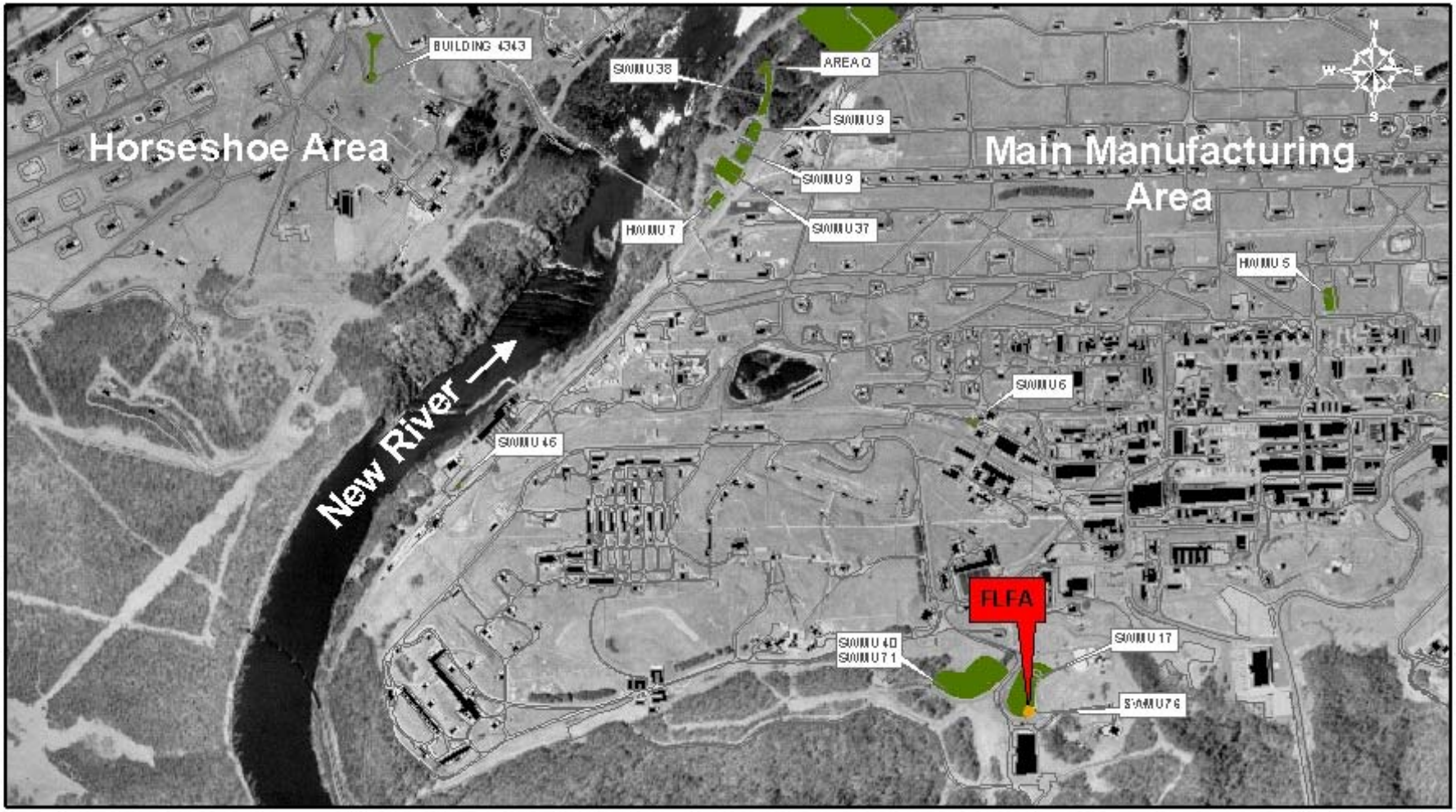


Photo F-5. Aerial view showing location of FLFA.

Appendix F-2

SLERA Risk Characterization Tables

Table F-1
Comparison of Maximum Detection Limits in Surface Soil with Ecological Screening Values at the FLFA

Scenario Timeframe: Current
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	71-55-6	1,1,1-Trichloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	2.98E+01	3.00.E-01	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	1.27E-01	3.00.E-01	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	2.86E+01	3.00.E-01	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	2.01E+01	3.00.E-01	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	8.28E+00	NVA	No
	107-06-2	1,2-Dichloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	2.12E+01	8.70.E+02	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	3.27E+01	NVA	No
	99-35-4	1,3,5-Trinitrobenzene			mg/kg		0/5	1.00E-01 - 2.00E-01	2.00E-01	3.76E-01	NVA	No
	99-65-0	1,3-Dinitrobenzene			mg/kg		0/5	1.00E-01 - 2.00E-01	2.00E-01	6.55E-01	NVA	No
	93-76-5	2,4,5-T			mg/kg		0/3	1.02E-01 - 1.20E-01	1.20E-01	5.96E-01	NVA	No
	93-72-1	2,4,5-TP (Silvex)			mg/kg		0/3	1.02E-01 - 1.20E-01	1.20E-01	1.09E-01	NVA	Yes
	118-96-7	2,4,6-Trinitrotoluene			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	7.00E-01	NVA	No
	94-75-7	2,4-D			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	2.73E-02	NVA	Yes
	94-82-6	2,4-DB			mg/kg		0/3	1.02E+00 - 1.20E+00	1.20E+00	NVA	NVA	No
	105-67-9	2,4-Dimethylphenol			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	1.00E-02	1.00.E-01	Yes
	51-28-5	2,4-Dinitrophenol			mg/kg		0/9	8.50E-01 - 1.10E+00	1.10E+00	2.00E+01	NVA	No
	606-20-2	2,6-Dinitrotoluene			mg/kg		0/9	1.80E-01 - 4.00E-01	4.00E-01	3.28E-02	NVA	Yes
	35572-78-2	2-amino-4,6-Dinitrotoluene			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	5.30E+00	NVA	No
	78-93-3	2-Butanone			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	8.96E+01	NVA	No
	591-78-6	2-Hexanone			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	1.26E+01	NVA	No
	88-74-4	2-Nitroaniline			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	7.41E+01	NVA	No
	88-72-2	2-Nitrotoluene			mg/kg		0/5	4.00E-01 - 8.00E-01	8.00E-01	4.10E+00	NVA	No
	88-85-7	2-sec-butyl-4,6-dinitrophenol			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	2.18E-02	NVA	Yes
	91-94-1	3,3'-Dichlorobenzidine			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	6.46E-01	NVA	No
	99-09-2	3-Nitroaniline			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	3.16E+00	NVA	No
	99-08-1	3-Nitrotoluene			mg/kg		0/5	4.00E-01 - 8.00E-01	8.00E-01	5.30E+00	NVA	No
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/9	8.50E-01 - 1.10E+00	1.10E+00	1.44E-01	NVA	Yes
	19406-51-0	4-amino-2,6-Dinitrotoluene			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	3.60E+00	NVA	No
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	NVA	NVA	No
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	4.43E+02	1.00.E+02	No
	100-01-6	4-Nitroaniline			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	2.19E+01	NVA	No
	100-02-7	4-Nitrophenol			mg/kg		0/9	8.50E-01 - 1.10E+00	1.10E+00	7.00E+00	1.00.E-01	Yes
	99-99-0	4-Nitrotoluene			mg/kg		0/5	4.00E-01 - 8.00E-01	8.00E-01	9.40E+00	NVA	No
	67-64-1	Acetone			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	2.50E+00	NVA	No

Table F-1
Comparison of Maximum Detection Limits in Surface Soil with Ecological Screening Values at the FLFA

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)
	309-00-2	Aldrin			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	3.32E-03	NVA	No
Surface Soil	319-84-6	alpha-BHC			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	9.94E-02	NVA	No
	5103-71-9	alpha-Chlordane			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	2.24E-01	1.00.E-01	No
	12674-11-2	Aroclor 1016			mg/kg		0/23	1.80E-02 - 1.80E-01	1.80E-01	3.71E-01	1.00.E-01	Yes
	11104-28-2	Aroclor 1221			mg/kg		0/23	1.80E-02 - 1.80E-01	1.80E-01	3.71E-01	1.00.E-01	Yes
	11141-16-5	Aroclor 1232			mg/kg		0/23	1.80E-02 - 1.80E-01	1.80E-01	3.71E-01	1.00.E-01	Yes
	53469-21-9	Aroclor 1242			mg/kg		0/23	1.80E-02 - 1.80E-01	1.80E-01	3.71E-01	1.00.E-01	Yes
	12672-29-6	Aroclor 1248			mg/kg		0/23	1.80E-02 - 1.80E-01	1.80E-01	3.71E-01	1.00.E-01	Yes
	71-43-2	Benzene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	2.55E-01	1.00.E-01	No
	65-85-0	Benzoic Acid			mg/kg		0/9	8.50E-01 - 1.10E+00	1.10E+00	7.30E+00	NVA	No
	100-51-6	Benzyl alcohol			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	6.58E+01	NVA	No
	319-85-7	beta-BHC			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	3.98E-03	NVA	No
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/kg		0/9	1.50E-02 - 2.10E-01	2.10E-01	9.26E-01	NVA	No
	75-27-4	Bromodichloromethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	5.40E-01	4.50.E+02	No
	74-83-9	Bromomethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	2.35E-01	NVA	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/7	1.70E-01 - 2.10E-01	2.10E-01	2.39E-01	NVA	No
	86-74-8	Carbazole			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	NVA	NVA	No
	75-15-0	Carbon disulfide			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	9.41E-02	NVA	No
	56-23-5	Carbon tetrachloride			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	2.98E+00	3.00.E-01	No
	108-90-7	Chlorobenzene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	4.00E+01	1.00.E-01	No
	75-00-3	Chloroethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	NVA	NVA	No
	67-66-3	Chloroform			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	1.19E+00	3.00.E-01	No
	74-87-3	Chloromethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	1.04E+01	NVA	No
	156-59-2	cis-1,2-Dichloroethene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	7.84E-01	3.00.E-01	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	3.98E-01	NVA	No
	121-82-4	Cyclonite			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	NVA	NVA	No
	75-99-0	Dalapon			mg/kg		0/3	1.02E+00 - 1.20E+00	1.20E+00	NVA	NVA	No
	319-86-8	delta-BHC			mg/kg		0/2	6.79E-04 - 7.99E-04	7.99E-04	9.94E+00	NVA	No
	124-48-1	Dibromochloromethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	2.05E+00	NVA	No
	1918-00-9	Dicamba			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	NVA	NVA	No
	120-36-5	Dichloroprop			mg/kg		0/3	2.03E-01 - 2.40E-01	2.40E-01	NVA	NVA	No
	60-57-1	Dieldrin			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	4.90E-03	NVA	No
	84-66-2	Diethyl phthalate			mg/kg		0/7	1.70E-01 - 2.10E-01	2.10E-01	1.00E+02	1.00.E-01	Yes
	131-11-3	Dimethylphthalate			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	7.34E+02	1.00.E+01	No
	84-74-2	Di-n-butyl phthalate			mg/kg		0/8	1.70E-01 - 2.10E-01	2.10E-01	2.00E+02	NVA	No
	959-98-8	Endosulfan I			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	1.19E-01	NVA	No
	1031-07-8	Endosulfan sulfate			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	3.58E-02	NVA	No
	72-20-8	Endrin			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	1.01E-02	1.00.E-01	No
	100-41-4	Ethylbenzene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	5.16E+00	1.00.E-01	No
	58-89-9	gamma-BHC (Lindane)			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	5.00E-03	1.00.E-01	No

Table F-1
Comparison of Maximum Detection Limits in Surface Soil with Ecological Screening Values at the FLFA
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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)
	76-44-8	Heptachlor			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	5.98E-03	NVA	No
Surface Soil	1024-57-3	Heptachlor epoxide			mg/kg		0/3	6.79E-04 - 7.99E-04	7.99E-04	1.52E-01	1.00.E-01	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	1.00E+01	NVA	No
	2691-41-0	HMX			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	4.30E+01	NVA	No
	N/A	m+p-Xylenes			mg/kg		0/5	1.00E-02 - 2.40E-02	2.40E-02	1.00E+01	1.00.E-01	No
	94-74-6	MCPA			mg/kg		0/3	1.02E+02 - 1.20E+02	1.20E+02	NVA	NVA	No
	93-65-2	MCPP			mg/kg		0/3	1.02E+01 - 1.20E+02	1.20E+02	NVA	NVA	No
	75-09-2	Methylene chloride			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	4.05E+00	3.00.E-01	No
	55-63-0	Nitroglycerin			mg/kg		0/5	3.05E-01 - 7.19E-01	7.19E-01	1.50E+02	NVA	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	5.44E-01	NVA	No
	95-48-7	o-Cresol			mg/kg		0/8	1.70E-01 - 2.00E-01	2.00E-01	4.04E+01	1.00.E-01	Yes
	95-47-6	o-Xylene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	1.00E+01	1.00.E-01	No
	106-47-8	p-Chloroaniline			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	1.10E+00	NVA	No
	106-44-5	p-Cresol			mg/kg		0/8	1.70E-01 - 2.00E-01	2.00E-01	1.63E+02	1.00.E-01	Yes
	87-86-5	Pentachlorophenol			mg/kg		0/9	8.50E-01 - 1.10E+00	1.10E+00	2.10E+00	1.00.E-01	Yes
	78-11-5	Pentaerythritol tetranitrate			mg/kg		0/5	3.05E-01 - 7.19E-01	7.19E-01	1.40E+04	NVA	No
	108-95-2	Phenol			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	3.00E+01	1.00.E-01	Yes
	110-86-1	Pyridine			mg/kg		0/9	1.70E-01 - 2.10E-01	2.10E-01	1.03E+00	NVA	No
	100-42-5	Styrene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	3.00E+02	1.00.E-01	No
	127-18-4	Tetrachloroethene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	9.92E+00	3.00.E-01	No
	479-45-8	Tetryl			mg/kg		0/5	2.00E-01 - 4.00E-01	4.00E-01	2.00E+00	NVA	No
	108-88-3	Toluene			mg/kg		0/4	5.10E-03 - 1.20E-02	1.20E-02	2.00E+02	1.00.E-01	No
	8001-35-2	Toxaphene			mg/kg		0/3	3.39E-02 - 3.99E-02	3.99E-02	1.19E-01	NVA	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	7.84E-01	3.00.E-01	No
	10061-02-6	trans-1,3-Dichloropropene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	3.98E-01	3.00.E-01	No
	75-25-2	Tribromomethane			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	1.59E+01	NVA	No
	79-01-6	Trichloroethene			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	1.24E+01	3.00.E-01	No
	75-01-4	Vinyl Chloride			mg/kg		0/5	5.10E-03 - 1.20E-02	1.20E-02	6.46E-01	3.00.E-01	No

(1) Maximum non-detect limit value used for screening.
(2) Screening toxicity values from USEPA SSLs (2000); Efroymson et al., PRGs (1997); and USEPA Region 5 ESLs (2003); 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-2
Selection of Ecological Soil Screening Toxicity Values, for Non Detect Constituents, for the FLFA
Page 1 of 3

Parameter	Ecological Soil Screening Levels[a] (mg/kg)	Ecological Preliminary Remediation Goals[b] (mg/kg)	Ecological Screening Levels[c] (mg/kg)	Other Ecological Soil Screening Levels[d] (mg/kg)	Selected Ecological Screening Toxicity Value[e] (mg/kg)
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
1,2-Dichloroethane	NVA	NVA	2.12E+01	--	2.12E+01
1,2-Dichloropropane	NVA	NVA	3.27E+01	--	3.27E+01
1,3,5-Trinitrobenzene	NVA	NVA	3.76E-01	--	3.76E-01
1,3-Dinitrobenzene	NVA	NVA	6.55E-01	--	6.55E-01
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
2,4,6-Trinitrotoluene	NVA	NVA	NVA	7.00E-01	7.00E-01
2,4-D	NVA	NVA	2.73E-02	--	2.73E-02
2,4-DB	NVA	NVA	NVA	NVA	NVA
2,4-Dimethylphenol	NVA	NVA	1.00E-02	--	1.00E-02
2,4-Dinitrophenol	NVA	$20_{(plant)}$	6.09E-02	--	2.00E+01
2,6-Dinitrotoluene	NVA	NVA	3.28E-02	--	3.28E-02
2-amino-4,6-Dinitrotoluene	NVA	NVA	NVA	5.30E+00	5.30E+00
2-Butanone	NVA	NVA	8.96E+01	--	8.96E+01
2-Hexanone	NVA	NVA	1.26E+01	--	1.26E+01
2-Nitroaniline	NVA	NVA	7.41E+01	--	7.41E+01
2-Nitrotoluene	NVA	NVA	NVA	4.1[f]	4.10E+00
2-sec-butyl-4,6-dinitrophenol	NVA	NVA	2.18E-02	--	2.18E-02
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	5.3[f]	5.30E+00
4,6-Dinitro-o-cresol	NVA	NVA	1.44E-01	--	1.44E-01
4-amino-2,6-Dinitrotoluene	NVA	NVA	NVA	3.60E+00	3.60E+00
4-Bromophenyl 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	9.4[f]	9.40E+00
Acetone	NVA	NVA	2.50E+00	--	2.50E+00
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
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
Benzene	NVA	NVA	2.55E-01	--	2.55E-01
Benzoic acid	NVA	NVA	NVA	7.3[f]	7.3
Benzyl alcohol	NVA	NVA	6.58E+01	--	6.58E+01
beta-BHC	NVA	NVA	3.98E-03	--	3.98E-03
bis(2-Ethylhexyl) phthalate	NVA	NVA	9.26E-01	--	9.26E-01
Bromodichloromethane	NVA	NVA	5.40E-01	--	5.40E-01
Bromomethane	NVA	NVA	2.35E-01	--	2.35E-01

Table F-2
Selection of Ecological Soil Screening Toxicity Values, for Non Detect Constituents, for the FLFA
Page 2 of 3

Parameter	Ecological Soil Screening Levels[a] (mg/kg)	Ecological Preliminary Remediation Goals[b] (mg/kg)	Ecological Screening Levels[c] (mg/kg)	Other Ecological Soil Screening Levels[d] (mg/kg)	Selected Ecological Screening Toxicity Value[e] (mg/kg)
Butyl benzyl phthalate	NVA	NVA	2.39E-01	--	2.39E-01
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
Chloroethane	NVA	NVA	NVA	NVA	NVA
Chloroform	NVA	NVA	1.19E+00	--	1.19E+00
Chloromethane	NVA	NVA	1.04E+01	--	1.04E+01
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
Cyclonite	NVA	NVA	NVA	--	NVA
Dalapon	NVA	NVA	NVA	NVA	NVA
delta-BHC	NVA	NVA	9.94E+00	--	9.94E+00
Dibromochloromethane	NVA	NVA	2.05E+00	--	2.05E+00
Dicamba	NVA	NVA	NVA	NVA	NVA
Dichloroprop	NVA	NVA	NVA	NVA	NVA
Dieldrin	4.90E-03	0.011(bird)	2.38E-03	--	4.90E-03
Diethyl phthalate	NVA	NVA	1.00E+02	--	1.00E+02
Dimethylphthalate	NVA	NVA	7.34E+02	--	7.34E+02
Di-n-butyl phthalate	NVA	$200_{(plant)}$	0.14979	--	200
Endosulfan I	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
Ethylbenzene	NVA	NVA	5.16E+00	--	5.16E+00
gamma-BHC (Lindane)	NVA	NVA	5.00E-03	--	5.00E-03
Heptachlor	NVA	NVA	5.98E-03	--	5.98E-03
Heptachlor epoxide	NVA	NVA	1.52E-01	--	1.52E-01
Hexachlorocyclopentadiene	NVA	$10_{(plant)}$	7.55E-01	--	1.00E+01
HMX	NVA	NVA	NVA	4.30E+01	4.30E+01
m+p-Xylenes	NVA	NVA	1.00E+01	--	1.00E+01
MCPA	NVA	NVA	NVA	NVA	NVA
MCPP	NVA	NVA	NVA	NVA	NVA
Methylene chloride	NVA	NVA	4.05E+00	--	4.05E+00
Nitroglycerin	NVA	NVA	NVA	150[f]	1.50E+02
n-Nitroso-di-n-propylamine	NVA	NVA	5.44E-01	--	5.44E-01
o-Cresol	NVA	NVA	4.04E+01	--	4.04E+01
o-Xylene	NVA	NVA	1.00E+01	--	1.00E+01
p-Chloroaniline	NVA	NVA	1.10E+00	--	1.10E+00
p-Cresol	NVA	NVA	1.63E+02	--	1.63E+02
Pentachlorophenol	2.10E+00	$3_{(plant)}$	1.19E-01	--	2.10E+00
Pentaerythritol tetranitrate	NVA	NVA	NVA	1.40E+04	1.40E+04
Phenol	NVA	$30_{(earthworm)}$	1.20E+02	--	3.00E+01
Pyridine	NVA	NVA	1.03E+00	--	1.03E+00
Styrene	NVA	$300_{(plant)}$	4.69E+00	--	3.00E+02
Tetrachloroethene	NVA	NVA	9.92E+00	--	9.92E+00
Tetryl	NVA	NVA	NVA	2.00E+00	2.00E+00
Toluene	NVA	$200_{(plant)}$	5.45	--	200
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

Table F-2
Selection of Ecological Soil Screening Toxicity Values, for Non Detect Constituents, for the FLFA
Page 3 of 3

Parameter	Ecological Soil Screening Levels[a] (mg/kg)	Ecological Preliminary Remediation Goals[b] (mg/kg)	Ecological Screening Levels[c] (mg/kg)	Other Ecological Soil Screening Levels[d] (mg/kg)	Selected Ecological Screening Toxicity Value[e] (mg/kg)
Tribromomethane	NVA	NVA	1.59E+01	--	1.59E+01
Trichloroethene	NVA	NVA	1.24E+01	--	1.24E+01
Vinyl Chloride	NVA	NVA	6.46E-01	--	6.46E-01

[a] Ecological Soil Screening Level Guidance, USEPA, November 2007.

[b] Preliminary Remediation Goals for Ecological Endpoints, R.A. Efroymson et al., August 1997.

[c] Ecological Screening Levels, USEPA Region 5, August 2003.

[d] Other Values.

[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 Screening Levels, USEPA Region 5
3. Other Values.

NVA = No Value Available

[f] Value is from Los Alamos National Laboratory, 2002, Environmental Restoration Project, Environmental Screening Levels.

Table F-3
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%

[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.

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 and red fox),
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),
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-4
Example Calculation of Tier 2 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at the FLFA

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
							---------- unitless ----------					
2,3,7,8-TCDD TE	NA	mg/L	NA	mg/kg	0.0000198	mg/kg	NA	NA	=IF(F8=0,"NA",(EXP(1.18*LN(F8)+3.53)/F8))	=IF(F8=0,"NA",0.0039)	=IF(F8=0,"NA",2.2)	=IF(F8=0,"NA",2.2)
1,2,4-Trichlorobenzene	NA	mg/L	NA	mg/kg	0.0545	mg/kg	NA	NA	=IF(F9=0,"NA", (30.67))	=IF(F9=0,"NA", (0.21))	=IF(F9=0,"NA",0.5)	=IF(F9=0,"NA",0.5)
1,2-Dichlorobenzene	NA	mg/L	NA	mg/kg	0.051	mg/kg	NA	NA	=IF(F10=0,"NA", (42.6))	=IF(F10=0,"NA", (0.49))	=IF(F10=0,"NA",0.5)	=IF(F10=0,"NA",0.5)
1,3-Dichlorobenzene	NA	mg/L	NA	mg/kg	0.051	mg/kg	NA	NA	=IF(F11=0,"NA", (40.71))	=IF(F11=0,"NA", (0.49))	=IF(F11=0,"NA",0.5)	=IF(F11=0,"NA",0.5)
1,4-Dichlorobenzene	NA	mg/L	NA	mg/kg	0.0525	mg/kg	NA	NA	=IF(F12=0,"NA", (19.88))	=IF(F12=0,"NA", (0.49))	=IF(F12=0,"NA",0.5)	=IF(F12=0,"NA",0.5)
4,4'-DDD	NA	mg/L	NA	mg/kg	0.00593	mg/kg	NA	NA	=IF(F13=0,"NA",(EXP(0.6975*LN(F13)+1.1613)/F13))	=IF(F13=0,"NA", (0.16))	=IF(F13=0,"NA",0.5)	=IF(F13=0,"NA",0.5)
4,4'-DDE	NA	mg/L	NA	mg/kg	0.0493	mg/kg	NA	NA	=IF(F14=0,"NA",(EXP(0.8804*LN(F14)+2.4771)/F14))	=IF(F14=0,"NA", (0.13))	=IF(F14=0,"NA", (EXP(0.641*LN(F14)+3.6401)/F14))	=IF(F14=0,"NA", (EXP(0.641*LN(F14)+3.6401)/F14))
4,4'-DDT	NA	mg/L	NA	mg/kg	0.0832	mg/kg	NA	NA	=IF(F15=0,"NA",(EXP(0.8689*LN(F15)+2.1247)/F15))	=IF(F15=0,"NA", (0.0046))	=IF(F15=0,"NA", (EXP(0.7254*LN(F15)+1.1788)/F15))	=IF(F15=0,"NA", (EXP(0.7254*LN(F15)+1.1788)/F15))
4-Chlorophenyl phenylether	NA	mg/L	NA	mg/kg	0.012	mg/kg	NA	NA	=IF(F16=0,"NA", (83.77))	=IF(F16=0,"NA", (0.075))	=IF(F16=0,"NA",0.5)	=IF(F16=0,"NA",0.5)
Acenaphthene	NA	mg/L	NA	mg/kg	0.013	mg/kg	NA	NA	=IF(F17=0,"NA", (1.47))	=IF(F17=0,"NA", (EXP(-0.8556*LN(F17)-5.562)/F17))	NA	NA
Acenaphthylene	NA	mg/L	NA	mg/kg	0.00728	mg/kg	NA	NA	=IF(F18=0,"NA", (22.9))	=IF(F18=0,"NA", (EXP(0.791*LN(F18)-1.144)/F18))	NA	NA
Anthracene	NA	mg/L	NA	mg/kg	0.00476	mg/kg	NA	NA	=IF(F19=0,"NA", (2.42))	=IF(F19=0,"NA", (EXP(0.7784*LN(F19)-0.9887)/F19))	NA	NA
Aroclor 1254	NA	mg/L	NA	mg/kg	0.488	mg/kg	NA	NA	=IF(F20=0,"NA",(EXP(1.29*LN(F20)+1.79)/F20))	=IF(F20=0,"NA", (0.0036))	=IF(F20=0,"NA",0.5)	=IF(F20=0,"NA",0.5)
Aroclor 1260	NA	mg/L	NA	mg/kg	0.219	mg/kg	NA	NA	=IF(F21=0,"NA",(EXP(1.29*LN(F21)+1.79)/F21))	=IF(F21=0,"NA", (0.00064))	=IF(F21=0,"NA",0.5)	=IF(F21=0,"NA",0.5)
Benzo(a)anthracene	NA	mg/L	NA	mg/kg	0.0202	mg/kg	NA	NA	=IF(F22=0,"NA", (1.59))	=IF(F22=0,"NA", (EXP(0.5944*LN(F22)-2.7078)/F22))	NA	NA
Benzo(a)pyrene	NA	mg/L	NA	mg/kg	0.0247	mg/kg	NA	NA	=IF(F23=0,"NA", (1.33))	=IF(F23=0,"NA", (EXP(0.975*LN(F23)-2.0615)/F23))	NA	NA
Benzo(b)fluoranthene	NA	mg/L	NA	mg/kg	0.0482	mg/kg	NA	NA	=IF(F24=0,"NA", (2.6))	=IF(F24=0,"NA", (0.31))	NA	NA
Benzo(g,h,i)perylene	NA	mg/L	NA	mg/kg	0.0185	mg/kg	NA	NA	=IF(F25=0,"NA", (2.94))	=IF(F25=0,"NA", (EXP(1.1829*LN(F25)-0.9313)/F25))	NA	NA
Benzo(k)fluoranthene	NA	mg/L	NA	mg/kg	0.0143	mg/kg	NA	NA	=IF(F26=0,"NA", (2.6))	=IF(F26=0,"NA", (EXP(0.8595*LN(F26)-2.1579)/F26))	NA	NA
Chrysene	NA	mg/L	NA	mg/kg	0.0293	mg/kg	NA	NA	=IF(F27=0,"NA", (2.29))	=IF(F27=0,"NA", (EXP(0.5944*LN(F27)-2.7078)/F27))	NA	NA
Dibenz(a,h)anthracene	NA	mg/L	NA	mg/kg	0.0035	mg/kg	NA	NA	=IF(F28=0,"NA", (2.31))	=IF(F28=0,"NA", (0.13))	NA	NA
Endosulfan II	NA	mg/L	NA	mg/kg	0.0199	mg/kg	NA	NA	=IF(F29=0,"NA", (2.74))	=IF(F29=0,"NA", (0.367))	=IF(F29=0,"NA",0.5)	=IF(F29=0,"NA",0.5)
Endrin aldehyde	NA	mg/L	NA	mg/kg	0.0334	mg/kg	NA	NA	=IF(F30=0,"NA", (21.95))	=IF(F30=0,"NA", (0.065))	=IF(F30=0,"NA",0.5)	=IF(F30=0,"NA",0.5)
Endrin ketone	NA	mg/L	NA	mg/kg	0.00446	mg/kg	NA	NA	=IF(F31=0,"NA", (32.11))	=IF(F31=0,"NA", (0.051))	=IF(F31=0,"NA",0.5)	=IF(F31=0,"NA",0.5)
Fluoranthene	NA	mg/L	NA	mg/kg	0.0385	mg/kg	NA	NA	=IF(F32=0,"NA", (3.04))	=IF(F32=0,"NA", (0.5))	NA	NA
Fluorene	NA	mg/L	NA	mg/kg	0.00567	mg/kg	NA	NA	=IF(F33=0,"NA", (9.57))	=IF(F33=0,"NA", (EXP(-0.8556*LN(F33)-5.562)/F33))	NA	NA
gamma-Chlordane	NA	mg/L	NA	mg/kg	0.00281	mg/kg	NA	NA	=IF(F34=0,"NA", (904.6))	=IF(F34=0,"NA", (0.0243))	=IF(F34=0,"NA",0.5)	=IF(F34=0,"NA",0.5)
Hexachlorobenzene	NA	mg/L	NA	mg/kg	0.02	mg/kg	NA	NA	=IF(F35=0,"NA", (148.59))	=IF(F35=0,"NA", (0.016))	=IF(F35=0,"NA",0.5)	=IF(F35=0,"NA",0.5)
Hexachlorobutadiene	NA	mg/L	NA	mg/kg	0.052	mg/kg	NA	NA	=IF(F36=0,"NA", (92.83))	=IF(F36=0,"NA", (0.072))	=IF(F36=0,"NA",0.5)	=IF(F36=0,"NA",0.5)
Hexachloroethane	NA	mg/L	NA	mg/kg	0.013	mg/kg	NA	NA	=IF(F37=0,"NA", (24.49))	=IF(F37=0,"NA", (0.181))	=IF(F37=0,"NA",0.5)	=IF(F37=0,"NA",0.5)
Indeno(1,2,3-cd)pyrene	NA	mg/L	NA	mg/kg	0.0198	mg/kg	NA	NA	=IF(F38=0,"NA", (2.86))	=IF(F38=0,"NA", (0.11))	NA	NA
Methoxychlor	NA	mg/L	NA	mg/kg	0.000728	mg/kg	NA	NA	=IF(F39=0,"NA", (17.9))	=IF(F39=0,"NA", (0.02))	=IF(F39=0,"NA",0.5)	=IF(F39=0,"NA",0.5)
Phenanthrene	NA	mg/L	NA	mg/kg	0.0384	mg/kg	NA	NA	=IF(F40=0,"NA", (1.72))	=IF(F40=0,"NA", (EXP(0.6203*LN(F40)-0.1665)/F40))	NA	NA
Pyrene	NA	mg/L	NA	mg/kg	0.0396	mg/kg	NA	NA	=IF(F41=0,"NA", (1.75))	=IF(F41=0,"NA", (0.72))	NA	NA
Arsenic	**NA**	**mg/L**	**NA**	**mg/kg**	**14**	**mg/kg**	**NA**	**NA**	**=IF(F42=0,"NA",(EXP(0.706*LN(F42)-1.421)/F42))**	**=IF(F42=0,"NA", (0.03752))**	**=IF(F42=0,"NA", (EXP(0.8188*LN(F42)-4.8471)/F42))**	**=IF(F42=0,"NA", (EXP(0.8188*LN(F42)-4.8471)/F42))**
Cadmium	NA	mg/L	NA	mg/kg	3.274	mg/kg	NA	NA	=IF(F43=0,"NA",(EXP(0.795*LN(F43)+2.114)/F43))	=IF(F43=0,"NA", (EXP(0.546*LN(F43)-0.475)/F43))	=IF(F43=0,"NA", (EXP(0.4723*LN(F43)-1.2571)/F43))	=IF(F43=0,"NA", (EXP(0.4723*LN(F43)-1.2571)/F43))
Chromium	NA	mg/L	NA	mg/kg	116.9	mg/kg	NA	NA	=IF(F44=0,"NA",0.306)	=IF(F44=0,"NA", (0.041))	=IF(F44=0,"NA", (EXP(0.7338*LN(F44)-1.4599)/F44))	=IF(F44=0,"NA", (EXP(0.7338*LN(F44)-1.4599)/F44))
Copper	NA	mg/L	NA	mg/kg	10600	mg/kg	NA	NA	=IF(F45=0,"NA",0.515)	=IF(F45=0,"NA", (EXP(0.394*LN(F45)+0.668)/F45))	=IF(F45=0,"NA", (EXP(0.144*LN(F45)+2.042)/F45))	=IF(F45=0,"NA", (EXP(0.144*LN(F45)+2.042)/F45))
Lead	NA	mg/L	NA	mg/kg	8973	mg/kg	NA	NA	=IF(F46=0,"NA", (EXP(0.807*LN(F46)-0.218)/F46))	=IF(F46=0,"NA", (EXP(0.561*LN(F46)-1.328)/F46))	=IF(F46=0,"NA", (EXP(0.4422*LN(F46)+0.0761)/F46))	=IF(F46=0,"NA", (EXP(0.4422*LN(F46)+0.0761)/F46))
Mercury	NA	mg/L	NA	mg/kg	1.011	mg/kg	NA	NA	=IF(F47=0,"NA", (EXP(0.33*LN(F47)+0.078)/F47))	=IF(F47=0,"NA", (EXP(0.54*LN(F47)-1)/F47))	=IF(F47=0,"NA", (0.192))	=IF(F47=0,"NA", (0.192))
Nickel	NA	mg/L	NA	mg/kg	105.7	mg/kg	NA	NA	=IF(F48=0,"NA", (1.059))	=IF(F48=0,"NA", (EXP(0.748*LN(F48)-2.223)/F48))	=IF(F48=0,"NA", (EXP(0.4658*LN(F48)-0.2462)/F48))	=IF(F48=0,"NA", (EXP(0.4658*LN(F48)-0.2462)/F48))
Selenium	NA	mg/L	NA	mg/kg	0.728	mg/kg	NA	NA	=IF(F49=0,"NA", (EXP(0.733*LN(F49)-0.075)/F49))	=IF(F49=0,"NA", (EXP(1.104*LN(F49)-0.677)/F49))	=IF(F49=0,"NA", (EXP(0.3764*LN(F49)-0.4158)/F49))	=IF(F49=0,"NA", (EXP(0.3764*LN(F49)-0.4158)/F49))
Silver	NA	mg/L	NA	mg/kg	36.29	mg/kg	NA	NA	=IF(F50=0,"NA", (2.045))	=IF(F50=0,"NA", (0.014))	0.004	0.004
Zinc	NA	mg/L	NA	mg/kg	7442	mg/kg	NA	NA	=IF(F51=0,"NA", (EXP(0.328*LN(F51)+4.449)/F51))	=IF(F51=0,"NA", (EXP(0.554*LN(F51)+1.575)/F51))	=IF(F51=0,"NA", (EXP(0.0706*LN(F51)+4.3632)/F51))	=IF(F51=0,"NA", (EXP(0.0706*LN(F51)+4.3632)/F51))

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):
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-4
Example Calculation of Tier 2 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at the FLFA

Hazard Estimate - Tier 2
Red Fox

Chemical	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	PDE Terr. Invert. mg/kg-d
2,3,7,8-TCDD TE	=IF(B8="NA","NA",$AA$69*B8*$AA$71/$AA$67)	=IF(D8="NA","NA",$AA$65*D8*$AA$71/$AA$67)	=$AA$64*F8*$AA$71/$AA$67	=IF(H8="NA","NA",$AA$59*B8*H8*$AA$66*$AA$71/$AA$67)	=IF(I8="NA","NA",$AA$60*D8*I8*$AA$66*$AA$71/$AA$67)	=IF(J8="NA","NA",$AA$61*F8*J8*$AA$66*$AA$71/$AA$67)
1,2,4-Trichlorobenzene	=IF(B9="NA","NA",$AA$69*B9*$AA$71/$AA$67)	=IF(D9="NA","NA",$AA$65*D9*$AA$71/$AA$67)	=$AA$64*F9*$AA$71/$AA$67	=IF(H9="NA","NA",$AA$59*B9*H9*$AA$66*$AA$71/$AA$67)	=IF(I9="NA","NA",$AA$60*D9*I9*$AA$66*$AA$71/$AA$67)	=IF(J9="NA","NA",$AA$61*F9*J9*$AA$66*$AA$71/$AA$67)
1,2-Dichlorobenzene	=IF(B10="NA","NA",$AA$69*B10*$AA$71/$AA$67)	=IF(D10="NA","NA",$AA$65*D10*$AA$71/$AA$67)	=$AA$64*F10*$AA$71/$AA$67	=IF(H10="NA","NA",$AA$59*B10*H10*$AA$66*$AA$71/$AA$67)	=IF(I10="NA","NA",$AA$60*D10*I10*$AA$66*$AA$71/$AA$67)	=IF(J10="NA","NA",$AA$61*F10*J10*$AA$66*$AA$71/$AA$67)
1,3-Dichlorobenzene	=IF(B11="NA","NA",$AA$69*B11*$AA$71/$AA$67)	=IF(D11="NA","NA",$AA$65*D11*$AA$71/$AA$67)	=$AA$64*F11*$AA$71/$AA$67	=IF(H11="NA","NA",$AA$59*B11*H11*$AA$66*$AA$71/$AA$67)	=IF(I11="NA","NA",$AA$60*D11*I11*$AA$66*$AA$71/$AA$67)	=IF(J11="NA","NA",$AA$61*F11*J11*$AA$66*$AA$71/$AA$67)
1,4-Dichlorobenzene	=IF(B12="NA","NA",$AA$69*B12*$AA$71/$AA$67)	=IF(D12="NA","NA",$AA$65*D12*$AA$71/$AA$67)	=$AA$64*F12*$AA$71/$AA$67	=IF(H12="NA","NA",$AA$59*B12*H12*$AA$66*$AA$71/$AA$67)	=IF(I12="NA","NA",$AA$60*D12*I12*$AA$66*$AA$71/$AA$67)	=IF(J12="NA","NA",$AA$61*F12*J12*$AA$66*$AA$71/$AA$67)
4,4'-DDD	=IF(B13="NA","NA",$AA$69*B13*$AA$71/$AA$67)	=IF(D13="NA","NA",$AA$65*D13*$AA$71/$AA$67)	=$AA$64*F13*$AA$71/$AA$67	=IF(H13="NA","NA",$AA$59*B13*H13*$AA$66*$AA$71/$AA$67)	=IF(I13="NA","NA",$AA$60*D13*I13*$AA$66*$AA$71/$AA$67)	=IF(J13="NA","NA",$AA$61*F13*J13*$AA$66*$AA$71/$AA$67)
4,4'-DDE	=IF(B14="NA","NA",$AA$69*B14*$AA$71/$AA$67)	=IF(D14="NA","NA",$AA$65*D14*$AA$71/$AA$67)	=$AA$64*F14*$AA$71/$AA$67	=IF(H14="NA","NA",$AA$59*B14*H14*$AA$66*$AA$71/$AA$67)	=IF(I14="NA","NA",$AA$60*D14*I14*$AA$66*$AA$71/$AA$67)	=IF(J14="NA","NA",$AA$61*F14*J14*$AA$66*$AA$71/$AA$67)
4,4'-DDT	=IF(B15="NA","NA",$AA$69*B15*$AA$71/$AA$67)	=IF(D15="NA","NA",$AA$65*D15*$AA$71/$AA$67)	=$AA$64*F15*$AA$71/$AA$67	=IF(H15="NA","NA",$AA$59*B15*H15*$AA$66*$AA$71/$AA$67)	=IF(I15="NA","NA",$AA$60*D15*I15*$AA$66*$AA$71/$AA$67)	=IF(J15="NA","NA",$AA$61*F15*J15*$AA$66*$AA$71/$AA$67)
4-Chlorophenyl phenylether	=IF(B16="NA","NA",$AA$69*B16*$AA$71/$AA$67)	=IF(D16="NA","NA",$AA$65*D16*$AA$71/$AA$67)	=$AA$64*F16*$AA$71/$AA$67	=IF(H16="NA","NA",$AA$59*B16*H16*$AA$66*$AA$71/$AA$67)	=IF(I16="NA","NA",$AA$60*D16*I16*$AA$66*$AA$71/$AA$67)	=IF(J16="NA","NA",$AA$61*F16*J16*$AA$66*$AA$71/$AA$67)
Acenaphthene	=IF(B17="NA","NA",$AA$69*B17*$AA$71/$AA$67)	=IF(D17="NA","NA",$AA$65*D17*$AA$71/$AA$67)	=$AA$64*F17*$AA$71/$AA$67	=IF(H17="NA","NA",$AA$59*B17*H17*$AA$66*$AA$71/$AA$67)	=IF(I17="NA","NA",$AA$60*D17*I17*$AA$66*$AA$71/$AA$67)	=IF(J17="NA","NA",$AA$61*F17*J17*$AA$66*$AA$71/$AA$67)
Acenaphthylene	=IF(B18="NA","NA",$AA$69*B18*$AA$71/$AA$67)	=IF(D18="NA","NA",$AA$65*D18*$AA$71/$AA$67)	=$AA$64*F18*$AA$71/$AA$67	=IF(H18="NA","NA",$AA$59*B18*H18*$AA$66*$AA$71/$AA$67)	=IF(I18="NA","NA",$AA$60*D18*I18*$AA$66*$AA$71/$AA$67)	=IF(J18="NA","NA",$AA$61*F18*J18*$AA$66*$AA$71/$AA$67)
Anthracene	=IF(B19="NA","NA",$AA$69*B19*$AA$71/$AA$67)	=IF(D19="NA","NA",$AA$65*D19*$AA$71/$AA$67)	=$AA$64*F19*$AA$71/$AA$67	=IF(H19="NA","NA",$AA$59*B19*H19*$AA$66*$AA$71/$AA$67)	=IF(I19="NA","NA",$AA$60*D19*I19*$AA$66*$AA$71/$AA$67)	=IF(J19="NA","NA",$AA$61*F19*J19*$AA$66*$AA$71/$AA$67)
Aroclor 1254	=IF(B20="NA","NA",$AA$69*B20*$AA$71/$AA$67)	=IF(D20="NA","NA",$AA$65*D20*$AA$71/$AA$67)	=$AA$64*F20*$AA$71/$AA$67	=IF(H20="NA","NA",$AA$59*B20*H20*$AA$66*$AA$71/$AA$67)	=IF(I20="NA","NA",$AA$60*D20*I20*$AA$66*$AA$71/$AA$67)	=IF(J20="NA","NA",$AA$61*F20*J20*$AA$66*$AA$71/$AA$67)
Aroclor 1260	=IF(B21="NA","NA",$AA$69*B21*$AA$71/$AA$67)	=IF(D21="NA","NA",$AA$65*D21*$AA$71/$AA$67)	=$AA$64*F21*$AA$71/$AA$67	=IF(H21="NA","NA",$AA$59*B21*H21*$AA$66*$AA$71/$AA$67)	=IF(I21="NA","NA",$AA$60*D21*I21*$AA$66*$AA$71/$AA$67)	=IF(J21="NA","NA",$AA$61*F21*J21*$AA$66*$AA$71/$AA$67)
Benzo(a)anthracene	=IF(B22="NA","NA",$AA$69*B22*$AA$71/$AA$67)	=IF(D22="NA","NA",$AA$65*D22*$AA$71/$AA$67)	=$AA$64*F22*$AA$71/$AA$67	=IF(H22="NA","NA",$AA$59*B22*H22*$AA$66*$AA$71/$AA$67)	=IF(I22="NA","NA",$AA$60*D22*I22*$AA$66*$AA$71/$AA$67)	=IF(J22="NA","NA",$AA$61*F22*J22*$AA$66*$AA$71/$AA$67)
Benzo(a)pyrene	=IF(B23="NA","NA",$AA$69*B23*$AA$71/$AA$67)	=IF(D23="NA","NA",$AA$65*D23*$AA$71/$AA$67)	=$AA$64*F23*$AA$71/$AA$67	=IF(H23="NA","NA",$AA$59*B23*H23*$AA$66*$AA$71/$AA$67)	=IF(I23="NA","NA",$AA$60*D23*I23*$AA$66*$AA$71/$AA$67)	=IF(J23="NA","NA",$AA$61*F23*J23*$AA$66*$AA$71/$AA$67)
Benzo(b)fluoranthene	=IF(B24="NA","NA",$AA$69*B24*$AA$71/$AA$67)	=IF(D24="NA","NA",$AA$65*D24*$AA$71/$AA$67)	=$AA$64*F24*$AA$71/$AA$67	=IF(H24="NA","NA",$AA$59*B24*H24*$AA$66*$AA$71/$AA$67)	=IF(I24="NA","NA",$AA$60*D24*I24*$AA$66*$AA$71/$AA$67)	=IF(J24="NA","NA",$AA$61*F24*J24*$AA$66*$AA$71/$AA$67)
Benzo(g,h,i)perylene	=IF(B25="NA","NA",$AA$69*B25*$AA$71/$AA$67)	=IF(D25="NA","NA",$AA$65*D25*$AA$71/$AA$67)	=$AA$64*F25*$AA$71/$AA$67	=IF(H25="NA","NA",$AA$59*B25*H25*$AA$66*$AA$71/$AA$67)	=IF(I25="NA","NA",$AA$60*D25*I25*$AA$66*$AA$71/$AA$67)	=IF(J25="NA","NA",$AA$61*F25*J25*$AA$66*$AA$71/$AA$67)
Benzo(k)fluoranthene	=IF(B26="NA","NA",$AA$69*B26*$AA$71/$AA$67)	=IF(D26="NA","NA",$AA$65*D26*$AA$71/$AA$67)	=$AA$64*F26*$AA$71/$AA$67	=IF(H26="NA","NA",$AA$59*B26*H26*$AA$66*$AA$71/$AA$67)	=IF(I26="NA","NA",$AA$60*D26*I26*$AA$66*$AA$71/$AA$67)	=IF(J26="NA","NA",$AA$61*F26*J26*$AA$66*$AA$71/$AA$67)
Chrysene	=IF(B27="NA","NA",$AA$69*B27*$AA$71/$AA$67)	=IF(D27="NA","NA",$AA$65*D27*$AA$71/$AA$67)	=$AA$64*F27*$AA$71/$AA$67	=IF(H27="NA","NA",$AA$59*B27*H27*$AA$66*$AA$71/$AA$67)	=IF(I27="NA","NA",$AA$60*D27*I27*$AA$66*$AA$71/$AA$67)	=IF(J27="NA","NA",$AA$61*F27*J27*$AA$66*$AA$71/$AA$67)
Dibenz(a,h)anthracene	=IF(B28="NA","NA",$AA$69*B28*$AA$71/$AA$67)	=IF(D28="NA","NA",$AA$65*D28*$AA$71/$AA$67)	=$AA$64*F28*$AA$71/$AA$67	=IF(H28="NA","NA",$AA$59*B28*H28*$AA$66*$AA$71/$AA$67)	=IF(I28="NA","NA",$AA$60*D28*I28*$AA$66*$AA$71/$AA$67)	=IF(J28="NA","NA",$AA$61*F28*J28*$AA$66*$AA$71/$AA$67)
Endosulfan II	=IF(B29="NA","NA",$AA$69*B29*$AA$71/$AA$67)	=IF(D29="NA","NA",$AA$65*D29*$AA$71/$AA$67)	=$AA$64*F29*$AA$71/$AA$67	=IF(H29="NA","NA",$AA$59*B29*H29*$AA$66*$AA$71/$AA$67)	=IF(I29="NA","NA",$AA$60*D29*I29*$AA$66*$AA$71/$AA$67)	=IF(J29="NA","NA",$AA$61*F29*J29*$AA$66*$AA$71/$AA$67)
Endrin aldehyde	=IF(B30="NA","NA",$AA$69*B30*$AA$71/$AA$67)	=IF(D30="NA","NA",$AA$65*D30*$AA$71/$AA$67)	=$AA$64*F30*$AA$71/$AA$67	=IF(H30="NA","NA",$AA$59*B30*H30*$AA$66*$AA$71/$AA$67)	=IF(I30="NA","NA",$AA$60*D30*I30*$AA$66*$AA$71/$AA$67)	=IF(J30="NA","NA",$AA$61*F30*J30*$AA$66*$AA$71/$AA$67)
Endrin ketone	=IF(B31="NA","NA",$AA$69*B31*$AA$71/$AA$67)	=IF(D31="NA","NA",$AA$65*D31*$AA$71/$AA$67)	=$AA$64*F31*$AA$71/$AA$67	=IF(H31="NA","NA",$AA$59*B31*H31*$AA$66*$AA$71/$AA$67)	=IF(I31="NA","NA",$AA$60*D31*I31*$AA$66*$AA$71/$AA$67)	=IF(J31="NA","NA",$AA$61*F31*J31*$AA$66*$AA$71/$AA$67)
Fluoranthene	=IF(B32="NA","NA",$AA$69*B32*$AA$71/$AA$67)	=IF(D32="NA","NA",$AA$65*D32*$AA$71/$AA$67)	=$AA$64*F32*$AA$71/$AA$67	=IF(H32="NA","NA",$AA$59*B32*H32*$AA$66*$AA$71/$AA$67)	=IF(I32="NA","NA",$AA$60*D32*I32*$AA$66*$AA$71/$AA$67)	=IF(J32="NA","NA",$AA$61*F32*J32*$AA$66*$AA$71/$AA$67)
Fluorene	=IF(B33="NA","NA",$AA$69*B33*$AA$71/$AA$67)	=IF(D33="NA","NA",$AA$65*D33*$AA$71/$AA$67)	=$AA$64*F33*$AA$71/$AA$67	=IF(H33="NA","NA",$AA$59*B33*H33*$AA$66*$AA$71/$AA$67)	=IF(I33="NA","NA",$AA$60*D33*I33*$AA$66*$AA$71/$AA$67)	=IF(J33="NA","NA",$AA$61*F33*J33*$AA$66*$AA$71/$AA$67)
gamma-Chlordane	=IF(B34="NA","NA",$AA$69*B34*$AA$71/$AA$67)	=IF(D34="NA","NA",$AA$65*D34*$AA$71/$AA$67)	=$AA$64*F34*$AA$71/$AA$67	=IF(H34="NA","NA",$AA$59*B34*H34*$AA$66*$AA$71/$AA$67)	=IF(I34="NA","NA",$AA$60*D34*I34*$AA$66*$AA$71/$AA$67)	=IF(J34="NA","NA",$AA$61*F34*J34*$AA$66*$AA$71/$AA$67)
Hexachlorobenzene	=IF(B35="NA","NA",$AA$69*B35*$AA$71/$AA$67)	=IF(D35="NA","NA",$AA$65*D35*$AA$71/$AA$67)	=$AA$64*F35*$AA$71/$AA$67	=IF(H35="NA","NA",$AA$59*B35*H35*$AA$66*$AA$71/$AA$67)	=IF(I35="NA","NA",$AA$60*D35*I35*$AA$66*$AA$71/$AA$67)	=IF(J35="NA","NA",$AA$61*F35*J35*$AA$66*$AA$71/$AA$67)
Hexachlorobutadiene	=IF(B36="NA","NA",$AA$69*B36*$AA$71/$AA$67)	=IF(D36="NA","NA",$AA$65*D36*$AA$71/$AA$67)	=$AA$64*F36*$AA$71/$AA$67	=IF(H36="NA","NA",$AA$59*B36*H36*$AA$66*$AA$71/$AA$67)	=IF(I36="NA","NA",$AA$60*D36*I36*$AA$66*$AA$71/$AA$67)	=IF(J36="NA","NA",$AA$61*F36*J36*$AA$66*$AA$71/$AA$67)
Hexachloroethane	=IF(B37="NA","NA",$AA$69*B37*$AA$71/$AA$67)	=IF(D37="NA","NA",$AA$65*D37*$AA$71/$AA$67)	=$AA$64*F37*$AA$71/$AA$67	=IF(H37="NA","NA",$AA$59*B37*H37*$AA$66*$AA$71/$AA$67)	=IF(I37="NA","NA",$AA$60*D37*I37*$AA$66*$AA$71/$AA$67)	=IF(J37="NA","NA",$AA$61*F37*J37*$AA$66*$AA$71/$AA$67)
Indeno(1,2,3-cd)pyrene	=IF(B38="NA","NA",$AA$69*B38*$AA$71/$AA$67)	=IF(D38="NA","NA",$AA$65*D38*$AA$71/$AA$67)	=$AA$64*F38*$AA$71/$AA$67	=IF(H38="NA","NA",$AA$59*B38*H38*$AA$66*$AA$71/$AA$67)	=IF(I38="NA","NA",$AA$60*D38*I38*$AA$66*$AA$71/$AA$67)	=IF(J38="NA","NA",$AA$61*F38*J38*$AA$66*$AA$71/$AA$67)
Methoxychlor	=IF(B39="NA","NA",$AA$69*B39*$AA$71/$AA$67)	=IF(D39="NA","NA",$AA$65*D39*$AA$71/$AA$67)	=$AA$64*F39*$AA$71/$AA$67	=IF(H39="NA","NA",$AA$59*B39*H39*$AA$66*$AA$71/$AA$67)	=IF(I39="NA","NA",$AA$60*D39*I39*$AA$66*$AA$71/$AA$67)	=IF(J39="NA","NA",$AA$61*F39*J39*$AA$66*$AA$71/$AA$67)
Phenanthrene	=IF(B40="NA","NA",$AA$69*B40*$AA$71/$AA$67)	=IF(D40="NA","NA",$AA$65*D40*$AA$71/$AA$67)	=$AA$64*F40*$AA$71/$AA$67	=IF(H40="NA","NA",$AA$59*B40*H40*$AA$66*$AA$71/$AA$67)	=IF(I40="NA","NA",$AA$60*D40*I40*$AA$66*$AA$71/$AA$67)	=IF(J40="NA","NA",$AA$61*F40*J40*$AA$66*$AA$71/$AA$67)
Pyrene	=IF(B41="NA","NA",$AA$69*B41*$AA$71/$AA$67)	=IF(D41="NA","NA",$AA$65*D41*$AA$71/$AA$67)	=$AA$64*F41*$AA$71/$AA$67	=IF(H41="NA","NA",$AA$59*B41*H41*$AA$66*$AA$71/$AA$67)	=IF(I41="NA","NA",$AA$60*D41*I41*$AA$66*$AA$71/$AA$67)	=IF(J41="NA","NA",$AA$61*F41*J41*$AA$66*$AA$71/$AA$67)
Arsenic	**=IF(B42="NA","NA",$AA$69*B42*$AA$71/$AA$67)**	**=IF(D42="NA","NA",$AA$65*D42*$AA$71/$AA$67)**	**=$AA$64*F42*$AA$71/$AA$67**	**=IF(H42="NA","NA",$AA$59*B42*H42*$AA$66*$AA$71/$AA$67)**	**=IF(I42="NA","NA",$AA$60*D42*I42*$AA$66*$AA$71/$AA$67)**	**=IF(J42="NA","NA",$AA$61*F42*J42*$AA$66*$AA$71/$AA$67)**
Cadmium	=IF(B43="NA","NA",$AA$69*B43*$AA$71/$AA$67)	=IF(D43="NA","NA",$AA$65*D43*$AA$71/$AA$67)	=$AA$64*F43*$AA$71/$AA$67	=IF(H43="NA","NA",$AA$59*B43*H43*$AA$66*$AA$71/$AA$67)	=IF(I43="NA","NA",$AA$60*D43*I43*$AA$66*$AA$71/$AA$67)	=IF(J43="NA","NA",$AA$61*F43*J43*$AA$66*$AA$71/$AA$67)
Chromium	=IF(B44="NA","NA",$AA$69*B44*$AA$71/$AA$67)	=IF(D44="NA","NA",$AA$65*D44*$AA$71/$AA$67)	=$AA$64*F44*$AA$71/$AA$67	=IF(H44="NA","NA",$AA$59*B44*H44*$AA$66*$AA$71/$AA$67)	=IF(I44="NA","NA",$AA$60*D44*I44*$AA$66*$AA$71/$AA$67)	=IF(J44="NA","NA",$AA$61*F44*J44*$AA$66*$AA$71/$AA$67)
Copper	=IF(B45="NA","NA",$AA$69*B45*$AA$71/$AA$67)	=IF(D45="NA","NA",$AA$65*D45*$AA$71/$AA$67)	=$AA$64*F45*$AA$71/$AA$67	=IF(H45="NA","NA",$AA$59*B45*H45*$AA$66*$AA$71/$AA$67)	=IF(I45="NA","NA",$AA$60*D45*I45*$AA$66*$AA$71/$AA$67)	=IF(J45="NA","NA",$AA$61*F45*J45*$AA$66*$AA$71/$AA$67)
Lead	=IF(B46="NA","NA",$AA$69*B46*$AA$71/$AA$67)	=IF(D46="NA","NA",$AA$65*D46*$AA$71/$AA$67)	=$AA$64*F46*$AA$71/$AA$67	=IF(H46="NA","NA",$AA$59*B46*H46*$AA$66*$AA$71/$AA$67)	=IF(I46="NA","NA",$AA$60*D46*I46*$AA$66*$AA$71/$AA$67)	=IF(J46="NA","NA",$AA$61*F46*J46*$AA$66*$AA$71/$AA$67)
Mercury	=IF(B47="NA","NA",$AA$69*B47*$AA$71/$AA$67)	=IF(D47="NA","NA",$AA$65*D47*$AA$71/$AA$67)	=$AA$64*F47*$AA$71/$AA$67	=IF(H47="NA","NA",$AA$59*B47*H47*$AA$66*$AA$71/$AA$67)	=IF(I47="NA","NA",$AA$60*D47*I47*$AA$66*$AA$71/$AA$67)	=IF(J47="NA","NA",$AA$61*F47*J47*$AA$66*$AA$71/$AA$67)
Nickel	=IF(B48="NA","NA",$AA$69*B48*$AA$71/$AA$67)	=IF(D48="NA","NA",$AA$65*D48*$AA$71/$AA$67)	=$AA$64*F48*$AA$71/$AA$67	=IF(H48="NA","NA",$AA$59*B48*H48*$AA$66*$AA$71/$AA$67)	=IF(I48="NA","NA",$AA$60*D48*I48*$AA$66*$AA$71/$AA$67)	=IF(J48="NA","NA",$AA$61*F48*J48*$AA$66*$AA$71/$AA$67)
Selenium	=IF(B49="NA","NA",$AA$69*B49*$AA$71/$AA$67)	=IF(D49="NA","NA",$AA$65*D49*$AA$71/$AA$67)	=$AA$64*F49*$AA$71/$AA$67	=IF(H49="NA","NA",$AA$59*B49*H49*$AA$66*$AA$71/$AA$67)	=IF(I49="NA","NA",$AA$60*D49*I49*$AA$66*$AA$71/$AA$67)	=IF(J49="NA","NA",$AA$61*F49*J49*$AA$66*$AA$71/$AA$67)
Silver	=IF(B50="NA","NA",$AA$69*B50*$AA$71/$AA$67)	=IF(D50="NA","NA",$AA$65*D50*$AA$71/$AA$67)	=$AA$64*F50*$AA$71/$AA$67	=IF(H50="NA","NA",$AA$59*B50*H50*$AA$66*$AA$71/$AA$67)	=IF(I50="NA","NA",$AA$60*D50*I50*$AA$66*$AA$71/$AA$67)	=IF(J50="NA","NA",$AA$61*F50*J50*$AA$66*$AA$71/$AA$67)
Zinc	=IF(B51="NA","NA",$AA$69*B51*$AA$71/$AA$67)	=IF(D51="NA","NA",$AA$65*D51*$AA$71/$AA$67)	=$AA$64*F51*$AA$71/$AA$67	=IF(H51="NA","NA",$AA$59*B51*H51*$AA$66*$AA$71/$AA$67)	=IF(I51="NA","NA",$AA$60*D51*I51*$AA$66*$AA$71/$AA$67)	=IF(J51="NA","NA",$AA$61*F51*J51*$AA$66*$AA$71/$AA$67)

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

n — See appropriate text tables for equations.

Table F-4
Example Calculation of Tier 2 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at the FLFA

Hazard Estimate - Tier 2
Red Fox

Chemical	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	NOAEL mg/kg-d	Adjusted NOAEL mg/kg-d	EEQ N	LOAEL mg/kg-d
2,3,7,8-TCDD TE	=IF(K8="NA","NA",$AA$58*F8*K8*$AA$66*$AA$71/$AA$67)	=IF(L8="NA","NA",$AA$62*F8*L8*$AA$66*$AA$71/$AA$67)	=IF(M8="NA","NA",$AA$63*F8*M8*$AA$66*$AA$71/$AA$67)	=SUM(N8:V8)	8	0.000001	=IF(Y8="NA","NA",Y8/X8)	=IF(Y8="NA","NA",W8/Z8)	0.00001
1,2,4-Trichlorobenzene	=IF(K9="NA","NA",$AA$58*F9*K9*$AA$66*$AA$71/$AA$67)	=IF(L9="NA","NA",$AA$62*F9*L9*$AA$66*$AA$71/$AA$67)	=IF(M9="NA","NA",$AA$63*F9*M9*$AA$66*$AA$71/$AA$67)	=SUM(N9:V9)	8	14.8	=IF(Y9="NA","NA",Y9/X9)	=IF(Y9="NA","NA",W9/Z9)	53.6
1,2-Dichlorobenzene	=IF(K10="NA","NA",$AA$58*F10*K10*$AA$66*$AA$71/$AA$67)	=IF(L10="NA","NA",$AA$62*F10*L10*$AA$66*$AA$71/$AA$67)	=IF(M10="NA","NA",$AA$63*F10*M10*$AA$66*$AA$71/$AA$67)	=SUM(N10:V10)	8	85.7	=IF(Y10="NA","NA",Y10/X10)	=IF(Y10="NA","NA",W10/Z10)	428.5
1,3-Dichlorobenzene	=IF(K11="NA","NA",$AA$58*F11*K11*$AA$66*$AA$71/$AA$67)	=IF(L11="NA","NA",$AA$62*F11*L11*$AA$66*$AA$71/$AA$67)	=IF(M11="NA","NA",$AA$63*F11*M11*$AA$66*$AA$71/$AA$67)	=SUM(N11:V11)	8	85.7	=IF(Y11="NA","NA",Y11/X11)	=IF(Y11="NA","NA",W11/Z11)	428.5
1,4-Dichlorobenzene	=IF(K12="NA","NA",$AA$58*F12*K12*$AA$66*$AA$71/$AA$67)	=IF(L12="NA","NA",$AA$62*F12*L12*$AA$66*$AA$71/$AA$67)	=IF(M12="NA","NA",$AA$63*F12*M12*$AA$66*$AA$71/$AA$67)	=SUM(N12:V12)	8	85.7	=IF(Y12="NA","NA",Y12/X12)	=IF(Y12="NA","NA",W12/Z12)	428.5
4,4'-DDD	=IF(K13="NA","NA",$AA$58*F13*K13*$AA$66*$AA$71/$AA$67)	=IF(L13="NA","NA",$AA$62*F13*L13*$AA$66*$AA$71/$AA$67)	=IF(M13="NA","NA",$AA$63*F13*M13*$AA$66*$AA$71/$AA$67)	=SUM(N13:V13)	8	0.8	=IF(Y13="NA","NA",Y13/X13)	=IF(Y13="NA","NA",W13/Z13)	4
4,4'-DDE	=IF(K14="NA","NA",$AA$58*F14*K14*$AA$66*$AA$71/$AA$67)	=IF(L14="NA","NA",$AA$62*F14*L14*$AA$66*$AA$71/$AA$67)	=IF(M14="NA","NA",$AA$63*F14*M14*$AA$66*$AA$71/$AA$67)	=SUM(N14:V14)	8	0.8	=IF(Y14="NA","NA",Y14/X14)	=IF(Y14="NA","NA",W14/Z14)	4
4,4'-DDT	=IF(K15="NA","NA",$AA$58*F15*K15*$AA$66*$AA$71/$AA$67)	=IF(L15="NA","NA",$AA$62*F15*L15*$AA$66*$AA$71/$AA$67)	=IF(M15="NA","NA",$AA$63*F15*M15*$AA$66*$AA$71/$AA$67)	=SUM(N15:V15)	8	0.8	=IF(Y15="NA","NA",Y15/X15)	=IF(Y15="NA","NA",W15/Z15)	4
4-Chlorophenyl phenylether	=IF(K16="NA","NA",$AA$58*F16*K16*$AA$66*$AA$71/$AA$67)	=IF(L16="NA","NA",$AA$62*F16*L16*$AA$66*$AA$71/$AA$67)	=IF(M16="NA","NA",$AA$63*F16*M16*$AA$66*$AA$71/$AA$67)	=SUM(N16:V16)	8	NA	=IF(Y16="NA","NA",Y16/X16)	=IF(Y16="NA","NA",W16/Z16)	NA
Acenaphthene	=IF(K17="NA","NA",$AA$58*F17*K17*$AA$66*$AA$71/$AA$67)	=IF(L17="NA","NA",$AA$62*F17*L17*$AA$66*$AA$71/$AA$67)	=IF(M17="NA","NA",$AA$63*F17*M17*$AA$66*$AA$71/$AA$67)	=SUM(N17:V17)	8	65.6	=IF(Y17="NA","NA",Y17/X17)	=IF(Y17="NA","NA",W17/Z17)	110
Acenaphthylene	=IF(K18="NA","NA",$AA$58*F18*K18*$AA$66*$AA$71/$AA$67)	=IF(L18="NA","NA",$AA$62*F18*L18*$AA$66*$AA$71/$AA$67)	=IF(M18="NA","NA",$AA$63*F18*M18*$AA$66*$AA$71/$AA$67)	=SUM(N18:V18)	8	65.6	=IF(Y18="NA","NA",Y18/X18)	=IF(Y18="NA","NA",W18/Z18)	110
Anthracene	=IF(K19="NA","NA",$AA$58*F19*K19*$AA$66*$AA$71/$AA$67)	=IF(L19="NA","NA",$AA$62*F19*L19*$AA$66*$AA$71/$AA$67)	=IF(M19="NA","NA",$AA$63*F19*M19*$AA$66*$AA$71/$AA$67)	=SUM(N19:V19)	8	65.6	=IF(Y19="NA","NA",Y19/X19)	=IF(Y19="NA","NA",W19/Z19)	110
Aroclor 1254	=IF(K20="NA","NA",$AA$58*F20*K20*$AA$66*$AA$71/$AA$67)	=IF(L20="NA","NA",$AA$62*F20*L20*$AA$66*$AA$71/$AA$67)	=IF(M20="NA","NA",$AA$63*F20*M20*$AA$66*$AA$71/$AA$67)	=SUM(N20:V20)	8	0.14	=IF(Y20="NA","NA",Y20/X20)	=IF(Y20="NA","NA",W20/Z20)	0.68
Aroclor 1260	=IF(K21="NA","NA",$AA$58*F21*K21*$AA$66*$AA$71/$AA$67)	=IF(L21="NA","NA",$AA$62*F21*L21*$AA$66*$AA$71/$AA$67)	=IF(M21="NA","NA",$AA$63*F21*M21*$AA$66*$AA$71/$AA$67)	=SUM(N21:V21)	8	0.14	=IF(Y21="NA","NA",Y21/X21)	=IF(Y21="NA","NA",W21/Z21)	0.68
Benzo(a)anthracene	=IF(K22="NA","NA",$AA$58*F22*K22*$AA$66*$AA$71/$AA$67)	=IF(L22="NA","NA",$AA$62*F22*L22*$AA$66*$AA$71/$AA$67)	=IF(M22="NA","NA",$AA$63*F22*M22*$AA$66*$AA$71/$AA$67)	=SUM(N22:V22)	8	0.615	=IF(Y22="NA","NA",Y22/X22)	=IF(Y22="NA","NA",W22/Z22)	3.07
Benzo(a)pyrene	=IF(K23="NA","NA",$AA$58*F23*K23*$AA$66*$AA$71/$AA$67)	=IF(L23="NA","NA",$AA$62*F23*L23*$AA$66*$AA$71/$AA$67)	=IF(M23="NA","NA",$AA$63*F23*M23*$AA$66*$AA$71/$AA$67)	=SUM(N23:V23)	8	0.615	=IF(Y23="NA","NA",Y23/X23)	=IF(Y23="NA","NA",W23/Z23)	3.07
Benzo(b)fluoranthene	=IF(K24="NA","NA",$AA$58*F24*K24*$AA$66*$AA$71/$AA$67)	=IF(L24="NA","NA",$AA$62*F24*L24*$AA$66*$AA$71/$AA$67)	=IF(M24="NA","NA",$AA$63*F24*M24*$AA$66*$AA$71/$AA$67)	=SUM(N24:V24)	8	0.615	=IF(Y24="NA","NA",Y24/X24)	=IF(Y24="NA","NA",W24/Z24)	3.07
Benzo(g,h,i)perylene	=IF(K25="NA","NA",$AA$58*F25*K25*$AA$66*$AA$71/$AA$67)	=IF(L25="NA","NA",$AA$62*F25*L25*$AA$66*$AA$71/$AA$67)	=IF(M25="NA","NA",$AA$63*F25*M25*$AA$66*$AA$71/$AA$67)	=SUM(N25:V25)	8	0.615	=IF(Y25="NA","NA",Y25/X25)	=IF(Y25="NA","NA",W25/Z25)	3.07
Benzo(k)fluoranthene	=IF(K26="NA","NA",$AA$58*F26*K26*$AA$66*$AA$71/$AA$67)	=IF(L26="NA","NA",$AA$62*F26*L26*$AA$66*$AA$71/$AA$67)	=IF(M26="NA","NA",$AA$63*F26*M26*$AA$66*$AA$71/$AA$67)	=SUM(N26:V26)	8	0.615	=IF(Y26="NA","NA",Y26/X26)	=IF(Y26="NA","NA",W26/Z26)	3.07
Chrysene	=IF(K27="NA","NA",$AA$58*F27*K27*$AA$66*$AA$71/$AA$67)	=IF(L27="NA","NA",$AA$62*F27*L27*$AA$66*$AA$71/$AA$67)	=IF(M27="NA","NA",$AA$63*F27*M27*$AA$66*$AA$71/$AA$67)	=SUM(N27:V27)	8	0.615	=IF(Y27="NA","NA",Y27/X27)	=IF(Y27="NA","NA",W27/Z27)	3.07
Dibenz(a,h)anthracene	=IF(K28="NA","NA",$AA$58*F28*K28*$AA$66*$AA$71/$AA$67)	=IF(L28="NA","NA",$AA$62*F28*L28*$AA$66*$AA$71/$AA$67)	=IF(M28="NA","NA",$AA$63*F28*M28*$AA$66*$AA$71/$AA$67)	=SUM(N28:V28)	8	0.615	=IF(Y28="NA","NA",Y28/X28)	=IF(Y28="NA","NA",W28/Z28)	3.07
Endosulfan II	=IF(K29="NA","NA",$AA$58*F29*K29*$AA$66*$AA$71/$AA$67)	=IF(L29="NA","NA",$AA$62*F29*L29*$AA$66*$AA$71/$AA$67)	=IF(M29="NA","NA",$AA$63*F29*M29*$AA$66*$AA$71/$AA$67)	=SUM(N29:V29)	8	0.15	=IF(Y29="NA","NA",Y29/X29)	=IF(Y29="NA","NA",W29/Z29)	0.75
Endrin aldehyde	=IF(K30="NA","NA",$AA$58*F30*K30*$AA$66*$AA$71/$AA$67)	=IF(L30="NA","NA",$AA$62*F30*L30*$AA$66*$AA$71/$AA$67)	=IF(M30="NA","NA",$AA$63*F30*M30*$AA$66*$AA$71/$AA$67)	=SUM(N30:V30)	8	0.092	=IF(Y30="NA","NA",Y30/X30)	=IF(Y30="NA","NA",W30/Z30)	0.92
Endrin ketone	=IF(K31="NA","NA",$AA$58*F31*K31*$AA$66*$AA$71/$AA$67)	=IF(L31="NA","NA",$AA$62*F31*L31*$AA$66*$AA$71/$AA$67)	=IF(M31="NA","NA",$AA$63*F31*M31*$AA$66*$AA$71/$AA$67)	=SUM(N31:V31)	8	0.092	=IF(Y31="NA","NA",Y31/X31)	=IF(Y31="NA","NA",W31/Z31)	0.92
Fluoranthene	=IF(K32="NA","NA",$AA$58*F32*K32*$AA$66*$AA$71/$AA$67)	=IF(L32="NA","NA",$AA$62*F32*L32*$AA$66*$AA$71/$AA$67)	=IF(M32="NA","NA",$AA$63*F32*M32*$AA$66*$AA$71/$AA$67)	=SUM(N32:V32)	8	0.615	=IF(Y32="NA","NA",Y32/X32)	=IF(Y32="NA","NA",W32/Z32)	3.07
Fluorene	=IF(K33="NA","NA",$AA$58*F33*K33*$AA$66*$AA$71/$AA$67)	=IF(L33="NA","NA",$AA$62*F33*L33*$AA$66*$AA$71/$AA$67)	=IF(M33="NA","NA",$AA$63*F33*M33*$AA$66*$AA$71/$AA$67)	=SUM(N33:V33)	8	65.6	=IF(Y33="NA","NA",Y33/X33)	=IF(Y33="NA","NA",W33/Z33)	110
gamma-Chlordane	=IF(K34="NA","NA",$AA$58*F34*K34*$AA$66*$AA$71/$AA$67)	=IF(L34="NA","NA",$AA$62*F34*L34*$AA$66*$AA$71/$AA$67)	=IF(M34="NA","NA",$AA$63*F34*M34*$AA$66*$AA$71/$AA$67)	=SUM(N34:V34)	8	4.6	=IF(Y34="NA","NA",Y34/X34)	=IF(Y34="NA","NA",W34/Z34)	9.2
Hexachlorobenzene	=IF(K35="NA","NA",$AA$58*F35*K35*$AA$66*$AA$71/$AA$67)	=IF(L35="NA","NA",$AA$62*F35*L35*$AA$66*$AA$71/$AA$67)	=IF(M35="NA","NA",$AA$63*F35*M35*$AA$66*$AA$71/$AA$67)	=SUM(N35:V35)	8	0.08	=IF(Y35="NA","NA",Y35/X35)	=IF(Y35="NA","NA",W35/Z35)	0.29
Hexachlorobutadiene	=IF(K36="NA","NA",$AA$58*F36*K36*$AA$66*$AA$71/$AA$67)	=IF(L36="NA","NA",$AA$62*F36*L36*$AA$66*$AA$71/$AA$67)	=IF(M36="NA","NA",$AA$63*F36*M36*$AA$66*$AA$71/$AA$67)	=SUM(N36:V36)	8	0.2	=IF(Y36="NA","NA",Y36/X36)	=IF(Y36="NA","NA",W36/Z36)	1
Hexachloroethane	=IF(K37="NA","NA",$AA$58*F37*K37*$AA$66*$AA$71/$AA$67)	=IF(L37="NA","NA",$AA$62*F37*L37*$AA$66*$AA$71/$AA$67)	=IF(M37="NA","NA",$AA$63*F37*M37*$AA$66*$AA$71/$AA$67)	=SUM(N37:V37)	8	1	=IF(Y37="NA","NA",Y37/X37)	=IF(Y37="NA","NA",W37/Z37)	15
Indeno(1,2,3-cd)pyrene	=IF(K38="NA","NA",$AA$58*F38*K38*$AA$66*$AA$71/$AA$67)	=IF(L38="NA","NA",$AA$62*F38*L38*$AA$66*$AA$71/$AA$67)	=IF(M38="NA","NA",$AA$63*F38*M38*$AA$66*$AA$71/$AA$67)	=SUM(N38:V38)	8	0.615	=IF(Y38="NA","NA",Y38/X38)	=IF(Y38="NA","NA",W38/Z38)	3.07
Methoxychlor	=IF(K39="NA","NA",$AA$58*F39*K39*$AA$66*$AA$71/$AA$67)	=IF(L39="NA","NA",$AA$62*F39*L39*$AA$66*$AA$71/$AA$67)	=IF(M39="NA","NA",$AA$63*F39*M39*$AA$66*$AA$71/$AA$67)	=SUM(N39:V39)	8	4	=IF(Y39="NA","NA",Y39/X39)	=IF(Y39="NA","NA",W39/Z39)	8
Phenanthrene	=IF(K40="NA","NA",$AA$58*F40*K40*$AA$66*$AA$71/$AA$67)	=IF(L40="NA","NA",$AA$62*F40*L40*$AA$66*$AA$71/$AA$67)	=IF(M40="NA","NA",$AA$63*F40*M40*$AA$66*$AA$71/$AA$67)	=SUM(N40:V40)	8	65.6	=IF(Y40="NA","NA",Y40/X40)	=IF(Y40="NA","NA",W40/Z40)	110
Pyrene	=IF(K41="NA","NA",$AA$58*F41*K41*$AA$66*$AA$71/$AA$67)	=IF(L41="NA","NA",$AA$62*F41*L41*$AA$66*$AA$71/$AA$67)	=IF(M41="NA","NA",$AA$63*F41*M41*$AA$66*$AA$71/$AA$67)	=SUM(N41:V41)	8	0.615	=IF(Y41="NA","NA",Y41/X41)	=IF(Y41="NA","NA",W41/Z41)	3.07
Arsenic	**=IF(K42="NA","NA",$AA$58*F42*K42*$AA$66*$AA$71/$AA$67)**	**=IF(L42="NA","NA",$AA$62*F42*L42*$AA$66*$AA$71/$AA$67)**	**=IF(M42="NA","NA",$AA$63*F42*M42*$AA$66*$AA$71/$AA$67)**	**=SUM(N42:V42)**	**8**	**0.126**	**=IF(Y42="NA","NA",Y42/X42)**	**=IF(Y42="NA","NA",W42/Z42)**	**1.26**
Cadmium	=IF(K43="NA","NA",$AA$58*F43*K43*$AA$66*$AA$71/$AA$67)	=IF(L43="NA","NA",$AA$62*F43*L43*$AA$66*$AA$71/$AA$67)	=IF(M43="NA","NA",$AA$63*F43*M43*$AA$66*$AA$71/$AA$67)	=SUM(N43:V43)	8	1	=IF(Y43="NA","NA",Y43/X43)	=IF(Y43="NA","NA",W43/Z43)	10
Chromium	=IF(K44="NA","NA",$AA$58*F44*K44*$AA$66*$AA$71/$AA$67)	=IF(L44="NA","NA",$AA$62*F44*L44*$AA$66*$AA$71/$AA$67)	=IF(M44="NA","NA",$AA$63*F44*M44*$AA$66*$AA$71/$AA$67)	=SUM(N44:V44)	8	2737	=IF(Y44="NA","NA",Y44/X44)	=IF(Y44="NA","NA",W44/Z44)	13690
Copper	=IF(K45="NA","NA",$AA$58*F45*K45*$AA$66*$AA$71/$AA$67)	=IF(L45="NA","NA",$AA$62*F45*L45*$AA$66*$AA$71/$AA$67)	=IF(M45="NA","NA",$AA$63*F45*M45*$AA$66*$AA$71/$AA$67)	=SUM(N45:V45)	8	11.7	=IF(Y45="NA","NA",Y45/X45)	=IF(Y45="NA","NA",W45/Z45)	15.1
Lead	=IF(K46="NA","NA",$AA$58*F46*K46*$AA$66*$AA$71/$AA$67)	=IF(L46="NA","NA",$AA$62*F46*L46*$AA$66*$AA$71/$AA$67)	=IF(M46="NA","NA",$AA$63*F46*M46*$AA$66*$AA$71/$AA$67)	=SUM(N46:V46)	8	8	=IF(Y46="NA","NA",Y46/X46)	=IF(Y46="NA","NA",W46/Z46)	80
Mercury	=IF(K47="NA","NA",$AA$58*F47*K47*$AA$66*$AA$71/$AA$67)	=IF(L47="NA","NA",$AA$62*F47*L47*$AA$66*$AA$71/$AA$67)	=IF(M47="NA","NA",$AA$63*F47*M47*$AA$66*$AA$71/$AA$67)	=SUM(N47:V47)	8	1	=IF(Y47="NA","NA",Y47/X47)	=IF(Y47="NA","NA",W47/Z47)	5
Nickel	=IF(K48="NA","NA",$AA$58*F48*K48*$AA$66*$AA$71/$AA$67)	=IF(L48="NA","NA",$AA$62*F48*L48*$AA$66*$AA$71/$AA$67)	=IF(M48="NA","NA",$AA$63*F48*M48*$AA$66*$AA$71/$AA$67)	=SUM(N48:V48)	8	40	=IF(Y48="NA","NA",Y48/X48)	=IF(Y48="NA","NA",W48/Z48)	80
Selenium	=IF(K49="NA","NA",$AA$58*F49*K49*$AA$66*$AA$71/$AA$67)	=IF(L49="NA","NA",$AA$62*F49*L49*$AA$66*$AA$71/$AA$67)	=IF(M49="NA","NA",$AA$63*F49*M49*$AA$66*$AA$71/$AA$67)	=SUM(N49:V49)	8	0.2	=IF(Y49="NA","NA",Y49/X49)	=IF(Y49="NA","NA",W49/Z49)	0.33
Silver	=IF(K50="NA","NA",$AA$58*F50*K50*$AA$66*$AA$71/$AA$67)	=IF(L50="NA","NA",$AA$62*F50*L50*$AA$66*$AA$71/$AA$67)	=IF(M50="NA","NA",$AA$63*F50*M50*$AA$66*$AA$71/$AA$67)	=SUM(N50:V50)	8	22.2	=IF(Y50="NA","NA",Y50/X50)	=IF(Y50="NA","NA",W50/Z50)	222
Zinc	=IF(K51="NA","NA",$AA$58*F51*K51*$AA$66*$AA$71/$AA$67)	=IF(L51="NA","NA",$AA$62*F51*L51*$AA$66*$AA$71/$AA$67)	=IF(M51="NA","NA",$AA$63*F51*M51*$AA$66*$AA$71/$AA$67)	=SUM(N51:V51)	8	160	=IF(Y51="NA","NA",Y51/X51)	=IF(Y51="NA","NA",W51/Z51)	320

ndex (Total EEQ): =SUM(AA8:AA51)

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

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 =	0.36	acres
Frac. home range (FHR) =	=IF(((AA70/AA68)>1),1,(AA70/AA	unitless

Table F-4
Example Calculation of Tier 2 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at the FLFA

Hazard Estimate - Tier 2
Red Fox

Chemical	Adjusted LOAEL mg/kg-d	EEQ L	Percent Contribution to EEQ N	Percent Contribution to EEQ L
2,3,7,8-TCDD TE	=IF(AB8="NA","NA",AB8/X8)	=IF(AB8="NA","NA",W8/AC8)	=IF(Y8="NA","NA",AA8/$AA$54)	=IF(AB8="NA","NA",AD8/$AD$54)
1,2,4-Trichlorobenzene	=IF(AB9="NA","NA",AB9/X9)	=IF(AB9="NA","NA",W9/AC9)	=IF(Y9="NA","NA",AA9/$AA$54)	=IF(AB9="NA","NA",AD9/$AD$54)
1,2-Dichlorobenzene	=IF(AB10="NA","NA",AB10/X10)	=IF(AB10="NA","NA",W10/AC10)	=IF(Y10="NA","NA",AA10/$AA$54)	=IF(AB10="NA","NA",AD10/$AD$54)
1,3-Dichlorobenzene	=IF(AB11="NA","NA",AB11/X11)	=IF(AB11="NA","NA",W11/AC11)	=IF(Y11="NA","NA",AA11/$AA$54)	=IF(AB11="NA","NA",AD11/$AD$54)
1,4-Dichlorobenzene	=IF(AB12="NA","NA",AB12/X12)	=IF(AB12="NA","NA",W12/AC12)	=IF(Y12="NA","NA",AA12/$AA$54)	=IF(AB12="NA","NA",AD12/$AD$54)
4,4'-DDD	=IF(AB13="NA","NA",AB13/X13)	=IF(AB13="NA","NA",W13/AC13)	=IF(Y13="NA","NA",AA13/$AA$54)	=IF(AB13="NA","NA",AD13/$AD$54)
4,4'-DDE	=IF(AB14="NA","NA",AB14/X14)	=IF(AB14="NA","NA",W14/AC14)	=IF(Y14="NA","NA",AA14/$AA$54)	=IF(AB14="NA","NA",AD14/$AD$54)
4,4'-DDT	=IF(AB15="NA","NA",AB15/X15)	=IF(AB15="NA","NA",W15/AC15)	=IF(Y15="NA","NA",AA15/$AA$54)	=IF(AB15="NA","NA",AD15/$AD$54)
4-Chlorophenyl phenylether	=IF(AB16="NA","NA",AB16/X16)	=IF(AB16="NA","NA",W16/AC16)	=IF(Y16="NA","NA",AA16/$AA$54)	=IF(AB16="NA","NA",AD16/$AD$54)
Acenaphthene	=IF(AB17="NA","NA",AB17/X17)	=IF(AB17="NA","NA",W17/AC17)	=IF(Y17="NA","NA",AA17/$AA$54)	=IF(AB17="NA","NA",AD17/$AD$54)
Acenaphthylene	=IF(AB18="NA","NA",AB18/X18)	=IF(AB18="NA","NA",W18/AC18)	=IF(Y18="NA","NA",AA18/$AA$54)	=IF(AB18="NA","NA",AD18/$AD$54)
Anthracene	=IF(AB19="NA","NA",AB19/X19)	=IF(AB19="NA","NA",W19/AC19)	=IF(Y19="NA","NA",AA19/$AA$54)	=IF(AB19="NA","NA",AD19/$AD$54)
Aroclor 1254	=IF(AB20="NA","NA",AB20/X20)	=IF(AB20="NA","NA",W20/AC20)	=IF(Y20="NA","NA",AA20/$AA$54)	=IF(AB20="NA","NA",AD20/$AD$54)
Aroclor 1260	=IF(AB21="NA","NA",AB21/X21)	=IF(AB21="NA","NA",W21/AC21)	=IF(Y21="NA","NA",AA21/$AA$54)	=IF(AB21="NA","NA",AD21/$AD$54)
Benzo(a)anthracene	=IF(AB22="NA","NA",AB22/X22)	=IF(AB22="NA","NA",W22/AC22)	=IF(Y22="NA","NA",AA22/$AA$54)	=IF(AB22="NA","NA",AD22/$AD$54)
Benzo(a)pyrene	=IF(AB23="NA","NA",AB23/X23)	=IF(AB23="NA","NA",W23/AC23)	=IF(Y23="NA","NA",AA23/$AA$54)	=IF(AB23="NA","NA",AD23/$AD$54)
Benzo(b)fluoranthene	=IF(AB24="NA","NA",AB24/X24)	=IF(AB24="NA","NA",W24/AC24)	=IF(Y24="NA","NA",AA24/$AA$54)	=IF(AB24="NA","NA",AD24/$AD$54)
Benzo(g,h,i)perylene	=IF(AB25="NA","NA",AB25/X25)	=IF(AB25="NA","NA",W25/AC25)	=IF(Y25="NA","NA",AA25/$AA$54)	=IF(AB25="NA","NA",AD25/$AD$54)
Benzo(k)fluoranthene	=IF(AB26="NA","NA",AB26/X26)	=IF(AB26="NA","NA",W26/AC26)	=IF(Y26="NA","NA",AA26/$AA$54)	=IF(AB26="NA","NA",AD26/$AD$54)
Chrysene	=IF(AB27="NA","NA",AB27/X27)	=IF(AB27="NA","NA",W27/AC27)	=IF(Y27="NA","NA",AA27/$AA$54)	=IF(AB27="NA","NA",AD27/$AD$54)
Dibenz(a,h)anthracene	=IF(AB28="NA","NA",AB28/X28)	=IF(AB28="NA","NA",W28/AC28)	=IF(Y28="NA","NA",AA28/$AA$54)	=IF(AB28="NA","NA",AD28/$AD$54)
Endosulfan II	=IF(AB29="NA","NA",AB29/X29)	=IF(AB29="NA","NA",W29/AC29)	=IF(Y29="NA","NA",AA29/$AA$54)	=IF(AB29="NA","NA",AD29/$AD$54)
Endrin aldehyde	=IF(AB30="NA","NA",AB30/X30)	=IF(AB30="NA","NA",W30/AC30)	=IF(Y30="NA","NA",AA30/$AA$54)	=IF(AB30="NA","NA",AD30/$AD$54)
Endrin ketone	=IF(AB31="NA","NA",AB31/X31)	=IF(AB31="NA","NA",W31/AC31)	=IF(Y31="NA","NA",AA31/$AA$54)	=IF(AB31="NA","NA",AD31/$AD$54)
Fluoranthene	=IF(AB32="NA","NA",AB32/X32)	=IF(AB32="NA","NA",W32/AC32)	=IF(Y32="NA","NA",AA32/$AA$54)	=IF(AB32="NA","NA",AD32/$AD$54)
Fluorene	=IF(AB33="NA","NA",AB33/X33)	=IF(AB33="NA","NA",W33/AC33)	=IF(Y33="NA","NA",AA33/$AA$54)	=IF(AB33="NA","NA",AD33/$AD$54)
gamma-Chlordane	=IF(AB34="NA","NA",AB34/X34)	=IF(AB34="NA","NA",W34/AC34)	=IF(Y34="NA","NA",AA34/$AA$54)	=IF(AB34="NA","NA",AD34/$AD$54)
Hexachlorobenzene	=IF(AB35="NA","NA",AB35/X35)	=IF(AB35="NA","NA",W35/AC35)	=IF(Y35="NA","NA",AA35/$AA$54)	=IF(AB35="NA","NA",AD35/$AD$54)
Hexachlorobutadiene	=IF(AB36="NA","NA",AB36/X36)	=IF(AB36="NA","NA",W36/AC36)	=IF(Y36="NA","NA",AA36/$AA$54)	=IF(AB36="NA","NA",AD36/$AD$54)
Hexachloroethane	=IF(AB37="NA","NA",AB37/X37)	=IF(AB37="NA","NA",W37/AC37)	=IF(Y37="NA","NA",AA37/$AA$54)	=IF(AB37="NA","NA",AD37/$AD$54)
Indeno(1,2,3-cd)pyrene	=IF(AB38="NA","NA",AB38/X38)	=IF(AB38="NA","NA",W38/AC38)	=IF(Y38="NA","NA",AA38/$AA$54)	=IF(AB38="NA","NA",AD38/$AD$54)
Methoxychlor	=IF(AB39="NA","NA",AB39/X39)	=IF(AB39="NA","NA",W39/AC39)	=IF(Y39="NA","NA",AA39/$AA$54)	=IF(AB39="NA","NA",AD39/$AD$54)
Phenanthrene	=IF(AB40="NA","NA",AB40/X40)	=IF(AB40="NA","NA",W40/AC40)	=IF(Y40="NA","NA",AA40/$AA$54)	=IF(AB40="NA","NA",AD40/$AD$54)
Pyrene	=IF(AB41="NA","NA",AB41/X41)	=IF(AB41="NA","NA",W41/AC41)	=IF(Y41="NA","NA",AA41/$AA$54)	=IF(AB41="NA","NA",AD41/$AD$54)
Arsenic	**=IF(AB42="NA","NA",AB42/X42)**	**=IF(AB42="NA","NA",W42/AC42)**	**=IF(Y42="NA","NA",AA42/$AA$54)**	**=IF(AB42="NA","NA",AD42/$AD$54)**
Cadmium	=IF(AB43="NA","NA",AB43/X43)	=IF(AB43="NA","NA",W43/AC43)	=IF(Y43="NA","NA",AA43/$AA$54)	=IF(AB43="NA","NA",AD43/$AD$54)
Chromium	=IF(AB44="NA","NA",AB44/X44)	=IF(AB44="NA","NA",W44/AC44)	=IF(Y44="NA","NA",AA44/$AA$54)	=IF(AB44="NA","NA",AD44/$AD$54)
Copper	=IF(AB45="NA","NA",AB45/X45)	=IF(AB45="NA","NA",W45/AC45)	=IF(Y45="NA","NA",AA45/$AA$54)	=IF(AB45="NA","NA",AD45/$AD$54)
Lead	=IF(AB46="NA","NA",AB46/X46)	=IF(AB46="NA","NA",W46/AC46)	=IF(Y46="NA","NA",AA46/$AA$54)	=IF(AB46="NA","NA",AD46/$AD$54)
Mercury	=IF(AB47="NA","NA",AB47/X47)	=IF(AB47="NA","NA",W47/AC47)	=IF(Y47="NA","NA",AA47/$AA$54)	=IF(AB47="NA","NA",AD47/$AD$54)
Nickel	=IF(AB48="NA","NA",AB48/X48)	=IF(AB48="NA","NA",W48/AC48)	=IF(Y48="NA","NA",AA48/$AA$54)	=IF(AB48="NA","NA",AD48/$AD$54)
Selenium	=IF(AB49="NA","NA",AB49/X49)	=IF(AB49="NA","NA",W49/AC49)	=IF(Y49="NA","NA",AA49/$AA$54)	=IF(AB49="NA","NA",AD49/$AD$54)
Silver	=IF(AB50="NA","NA",AB50/X50)	=IF(AB50="NA","NA",W50/AC50)	=IF(Y50="NA","NA",AA50/$AA$54)	=IF(AB50="NA","NA",AD50/$AD$54)
Zinc	=IF(AB51="NA","NA",AB51/X51)	=IF(AB51="NA","NA",W51/AC51)	=IF(Y51="NA","NA",AA51/$AA$54)	=IF(AB51="NA","NA",AD51/$AD$54)
		=SUM(AD8:AD51)	=SUM(AE8:AE51)	=SUM(AF8:AF51)

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x \, Cij}{BW} \right) \right] \right)$$

Table F-5
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Meadow Voles at the FLFA

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	Percent Contribution to EEQ N	Percent Contribution to 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	NA	mg/L	NA	mg/kg	4.34E-05	mg/kg	NA	NA	4.21E+01	1.10E-02	2.20E+00	2.20E+00	NA	NA	6.12E-07	NA	NA	0.00E+00	2.81E-07	0.00E+00	0.00E+00	8.93E-07	4	1.00E-06	2.50E-07	3.57E+00	1.00E-05	2.50E-06	3.57E-01	0.59%	0.14%
1,2,4-Trichlorobenzene	NA	mg/L	NA	mg/kg	5.45E-02	mg/kg	NA	NA	3.07E+01	3.10E-01	1.00E+00	1.00E+00	NA	NA	7.69E-04	NA	NA	0.00E+00	9.94E-03	0.00E+00	0.00E+00	1.07E-02	4	1.48E+01	3.70E+00	2.89E-03	5.36E+01	1.34E+01	7.99E-04	0.00%	0.00%
1,2-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.26E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	7.20E-04	NA	NA	0.00E+00	1.47E-02	0.00E+00	0.00E+00	1.54E-02	4	8.57E+01	2.14E+01	7.20E-04	4.29E+02	1.07E+02	1.44E-04	0.00%	0.00%
1,3-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.07E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	7.20E-04	NA	NA	0.00E+00	1.47E-02	0.00E+00	0.00E+00	1.54E-02	4	8.57E+01	2.14E+01	7.20E-04	4.29E+02	1.07E+02	1.44E-04	0.00%	0.00%
1,4-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.25E-02	mg/kg	NA	NA	1.99E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	7.41E-04	NA	NA	0.00E+00	1.51E-02	0.00E+00	0.00E+00	1.59E-02	4	8.57E+01	2.14E+01	7.41E-04	4.29E+02	1.07E+02	1.48E-04	0.00%	0.00%
4,4'-DDD	NA	mg/L	NA	mg/kg	5.93E-03	mg/kg	NA	NA	15.07	5.00E-02	1.00E+00	1.00E+00	NA	NA	8.37E-05	NA	NA	0.00E+00	1.74E-04	0.00E+00	0.00E+00	2.58E-04	4	8.00E-01	2.00E-01	1.29E-03	4.00E+00	1.00E+00	2.58E-04	0.00%	0.00%
4,4'-DDE	NA	mg/L	NA	mg/kg	4.93E-02	mg/kg	NA	NA	17.07	2.00E-02	1.12E+02	1.12E+02	NA	NA	6.96E-04	NA	NA	0.00E+00	5.80E-04	0.00E+00	0.00E+00	1.28E-03	4	8.00E-01	2.00E-01	6.38E-03	4.00E+00	1.00E+00	1.28E-03	0.00%	0.00%
4,4'-DDT	NA	mg/L	NA	mg/kg	8.32E-02	mg/kg	NA	NA	11.60	6.00E-02	6.43E+00	6.43E+00	NA	NA	1.17E-03	NA	NA	0.00E+00	2.94E-03	0.00E+00	0.00E+00	4.11E-03	4	8.00E-01	2.00E-01	2.06E-02	4.00E+00	1.00E+00	4.11E-03	0.00%	0.00%
4-Chlorophenyl phenylether	NA	mg/L	NA	mg/kg	1.20E-02	mg/kg	NA	NA	8.38E+01	1.70E-01	1.00E+00	1.00E+00	NA	NA	1.69E-04	NA	NA	0.00E+00	1.20E-03	0.00E+00	0.00E+00	1.37E-03	4	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	1.47E+00	1.21E+01	NA	NA	NA	NA	1.84E-04	NA	NA	0.00E+00	9.28E-02	NA	NA	9.30E-02	4	6.56E+01	1.64E+01	5.67E-03	1.10E+02	2.75E+01	3.38E-03	0.00%	0.00%
Acenaphthylene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.29E+01	7.90E-01	NA	NA	NA	NA	1.84E-04	NA	NA	0.00E+00	6.04E-03	NA	NA	6.22E-03	4	6.56E+01	1.64E+01	3.79E-04	1.10E+02	2.75E+01	2.26E-04	0.00%	0.00%
Anthracene	NA	mg/L	NA	mg/kg	5.60E-03	mg/kg	NA	NA	2.42E+00	1.17E+00	NA	NA	NA	NA	7.91E-05	NA	NA	0.00E+00	3.87E-03	NA	NA	3.95E-03	4	6.56E+01	1.64E+01	2.41E-04	1.10E+02	2.75E+01	1.43E-04	0.00%	0.00%
Aroclor 1254	NA	mg/L	NA	mg/kg	1.58E+00	mg/kg	NA	NA	6.52E+01	2.20E-02	1.00E+00	1.00E+00	NA	NA	2.23E-02	NA	NA	0.00E+00	2.04E-02	0.00E+00	0.00E+00	4.28E-02	8	1.40E-01	1.75E-02	2.44E+00	6.80E-01	8.50E-02	5.03E-01	0.40%	0.20%
Aroclor 1260	NA	mg/L	NA	mg/kg	1.09E+00	mg/kg	NA	NA	6.52E+01	1.10E-02	1.00E+00	1.00E+00	NA	NA	1.54E-02	NA	NA	0.00E+00	7.05E-03	0.00E+00	0.00E+00	2.24E-02	8	1.40E-01	1.75E-02	1.28E+00	6.80E-01	8.50E-02	2.64E-01	0.21%	0.10%
Benzo(a)anthracene	NA	mg/L	NA	mg/kg	2.80E-02	mg/kg	NA	NA	1.59E+00	2.84E-01	NA	NA	NA	NA	3.95E-04	NA	NA	0.00E+00	4.68E-03	NA	NA	5.08E-03	4	6.15E-01	1.54E-01	3.30E-02	3.07E+00	7.68E-01	6.62E-03	0.01%	0.00%
Benzo(a)pyrene	NA	mg/L	NA	mg/kg	2.80E-02	mg/kg	NA	NA	1.33E+00	1.39E-01	NA	NA	NA	NA	3.95E-04	NA	NA	0.00E+00	2.29E-03	NA	NA	2.69E-03	4	6.15E-01	1.54E-01	1.75E-02	3.07E+00	7.68E-01	3.50E-03	0.00%	0.00%
Benzo(b)fluoranthene	NA	mg/L	NA	mg/kg	6.70E-02	mg/kg	NA	NA	2.60E+00	3.10E-01	NA	NA	NA	NA	9.46E-04	NA	NA	0.00E+00	1.22E-02	NA	NA	1.32E-02	4	6.15E-01	1.54E-01	8.56E-02	3.07E+00	7.68E-01	1.72E-02	0.01%	0.01%
Benzo(g,h,i)perylene	NA	mg/L	NA	mg/kg	2.50E-02	mg/kg	NA	NA	2.94E+00	2.01E-01	NA	NA	NA	NA	3.53E-04	NA	NA	0.00E+00	2.95E-03	NA	NA	3.30E-03	4	6.15E-01	1.54E-01	2.15E-02	3.07E+00	7.68E-01	4.31E-03	0.00%	0.00%
Benzo(k)fluoranthene	NA	mg/L	NA	mg/kg	1.85E-02	mg/kg	NA	NA	2.60E+00	2.02E-01	NA	NA	NA	NA	2.61E-04	NA	NA	0.00E+00	2.20E-03	NA	NA	2.46E-03	4	6.15E-01	1.54E-01	1.60E-02	3.07E+00	7.68E-01	3.21E-03	0.00%	0.00%
Chrysene	NA	mg/L	NA	mg/kg	3.70E-02	mg/kg	NA	NA	2.29E+00	2.54E-01	NA	NA	NA	NA	5.22E-04	NA	NA	0.00E+00	5.53E-03	NA	NA	6.05E-03	4	6.15E-01	1.54E-01	3.93E-02	3.07E+00	7.68E-01	7.88E-03	0.01%	0.00%
Dibenz(a,h)anthracene	NA	mg/L	NA	mg/kg	3.50E-03	mg/kg	NA	NA	2.31E+00	1.30E-01	NA	NA	NA	NA	4.94E-05	NA	NA	0.00E+00	2.68E-04	NA	NA	3.17E-04	4	6.15E-01	1.54E-01	2.06E-03	3.07E+00	7.68E-01	4.13E-04	0.00%	0.00%
Endosulfan II	NA	mg/L	NA	mg/kg	1.99E-02	mg/kg	NA	NA	2.74E+00	3.70E-01	1.00E+00	1.00E+00	NA	NA	2.81E-04	NA	NA	0.00E+00	4.33E-03	0.00E+00	0.00E+00	4.61E-03	4	1.50E-01	3.75E-02	1.23E-01	7.50E-01	1.88E-01	2.46E-02	0.02%	0.01%
Endrin aldehyde	NA	mg/L	NA	mg/kg	3.34E-02	mg/kg	NA	NA	2.20E+01	6.50E-02	1.00E+00	1.00E+00	NA	NA	4.72E-04	NA	NA	0.00E+00	1.28E-03	0.00E+00	0.00E+00	1.75E-03	4	9.20E-02	2.30E-02	7.60E-02	9.20E-01	2.30E-01	7.60E-03	0.01%	0.00%
Endrin ketone	NA	mg/L	NA	mg/kg	4.46E-03	mg/kg	NA	NA	3.21E+01	5.10E-02	1.00E+00	1.00E+00	NA	NA	6.30E-05	NA	NA	0.00E+00	1.34E-04	0.00E+00	0.00E+00	1.97E-04	4	9.20E-02	2.30E-02	8.55E-03	9.20E-01	2.30E-01	8.55E-04	0.00%	0.00%
Fluoranthene	NA	mg/L	NA	mg/kg	5.35E-02	mg/kg	NA	NA	3.04E+00	5.00E-01	NA	NA	NA	NA	7.55E-04	NA	NA	0.00E+00	1.57E-02	NA	NA	1.65E-02	4	6.15E-01	1.54E-01	1.07E-01	3.07E+00	7.68E-01	2.15E-02	0.02%	0.01%
Fluorene	NA	mg/L	NA	mg/kg	9.00E-03	mg/kg	NA	NA	9.57E+00	2.40E+01	NA	NA	NA	NA	1.27E-04	NA	NA	0.00E+00	1.27E-01	NA	NA	1.27E-01	4	6.56E+01	1.64E+01	7.76E-03	1.10E+02	2.75E+01	4.63E-03	0.00%	0.00%
gamma-Chlordane	NA	mg/L	NA	mg/kg	2.81E-03	mg/kg	NA	NA	9.05E+02	2.43E-02	1.00E+00	1.00E+00	NA	NA	3.97E-05	NA	NA	0.00E+00	4.02E-05	0.00E+00	0.00E+00	7.98E-05	4	4.60E+00	1.15E+00	6.94E-05	9.20E+00	2.30E+00	3.47E-05	0.00%	0.00%
Hexachlorobenzene	NA	mg/L	NA	mg/kg	2.00E-02	mg/kg	NA	NA	1.49E+02	2.10E-01	1.00E+00	1.00E+00	NA	NA	2.82E-04	NA	NA	0.00E+00	2.47E-03	0.00E+00	0.00E+00	2.75E-03	4	8.00E-02	2.00E-02	1.38E-01	2.90E-01	7.25E-02	3.80E-02	0.02%	0.01%
Hexachlorobutadiene	NA	mg/L	NA	mg/kg	5.20E-02	mg/kg	NA	NA	9.28E+01	7.20E-02	1.00E+00	1.00E+00	NA	NA	7.34E-04	NA	NA	0.00E+00	2.20E-03	0.00E+00	0.00E+00	2.94E-03	4	2.00E-01	5.00E-02	5.87E-02	1.00E+00	2.50E-01	1.17E-02	0.01%	0.00%
Hexachloroethane	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.45E+01	3.30E-01	1.00E+00	1.00E+00	NA	NA	1.84E-04	NA	NA	0.00E+00	2.52E-03	0.00E+00	0.00E+00	2.71E-03	4	1.00E+00	2.50E-01	1.08E-02	1.50E+01	3.75E+00	7.22E-04	0.00%	0.00%
Indeno(1,2,3-cd)pyrene	NA	mg/L	NA	mg/kg	2.60E-02	mg/kg	NA	NA	2.86E+00	1.10E-01	NA	NA	NA	NA	3.67E-04	NA	NA	0.00E+00	1.68E-03	NA	NA	2.05E-03	4	6.15E-01	1.54E-01	1.33E-02	3.07E+00	7.68E-01	2.67E-03	0.00%	0.00%
Methoxychlor	NA	mg/L	NA	mg/kg	7.28E-04	mg/kg	NA	NA	1.79E+01	4.20E-01	1.00E+00	1.00E+00	NA	NA	1.03E-05	NA	NA	0.00E+00	1.80E-04	0.00E+00	0.00E+00	1.90E-04	4	4.00E+00	1.00E+00	1.90E-04	8.00E+00	2.00E+00	9.51E-05	0.00%	0.00%
Phenanthrene	NA	mg/L	NA	mg/kg	5.50E-02	mg/kg	NA	NA	1.72E+00	2.55E+00	NA	NA	NA	NA	7.76E-04	NA	NA	0.00E+00	8.24E-02	NA	NA	8.32E-02	4	6.56E+01	1.64E+01	5.07E-03	1.10E+02	2.75E+01	3.02E-03	0.00%	0.00%
Pyrene	NA	mg/L	NA	mg/kg	5.05E-02	mg/kg	NA	NA	1.75E+00	7.20E-01	NA	NA	NA	NA	7.13E-04	NA	NA	0.00E+00	2.14E-02	NA	NA	2.21E-02	4	6.15E-01	1.54E-01	1.44E-01	3.07E+00	7.68E-01	2.88E-02	0.02%	0.01%
Arsenic	NA	mg/L	NA	mg/kg	6.89E+01	mg/kg	NA	NA	6.96E-02	3.75E-02	3.65E-03	3.65E-03	NA	NA	9.73E-01	NA	NA	0.00E+00	1.52E+00	0.00E+00	0.00E+00	2.49E+00	4	1.26E-01	3.15E-02	7.92E+01	1.26E+00	3.15E-01	7.92E+00	13.06%	3.08%
Cadmium	NA	mg/L	NA	mg/kg	1.98E+01	mg/kg	NA	NA	4.49E+00	1.60E-01	5.89E-02	5.89E-02	NA	NA	2.80E-01	NA	NA	0.00E+00	1.87E+00	0.00E+00	0.00E+00	2.15E+00	4	1.00E+00	2.50E-01	8.59E+00	1.00E+01	2.50E+00	8.59E-01	1.42%	0.33%
Chromium	NA	mg/L	NA	mg/kg	2.99E+02	mg/kg	NA	NA	3.06E-01	4.10E-02	5.09E-02	5.09E-02	NA	NA	4.22E+00	NA	NA	0.00E+00	7.21E+00	0.00E+00	0.00E+00	1.14E+01	4	2.74E+03	6.84E+02	1.67E-02	1.37E+04	3.42E+03	3.34E-03	0.00%	0.00%
Copper	NA	mg/L	NA	mg/kg	2.38E+04	mg/kg	NA	NA	5.15E-01	4.34E-03	1.38E-03	1.38E-03	NA	NA	3.36E+02	NA	NA	0.00E+00	6.08E+01	0.00E+00	0.00E+00	3.97E+02	8	1.17E+01	1.46E+00	2.71E+02	1.51E+01	1.89E+00	2.10E+02	44.78%	81.74%
Lead	NA	mg/L	NA	mg/kg	2.59E+04	mg/kg	NA	NA	1.13E-01	3.06E-03	3.73E-03	3.73E-03	NA	NA	3.65E+02	NA	NA	0.00E+00	4.66E+01	0.00E+00	0.00E+00	4.12E+02	4	8.00E+00	2.00E+00	2.06E+02	8.00E+01	2.00E+01	2.06E+01	33.96%	8.00%
Mercury	NA	mg/L	NA	mg/kg	2.20E+00	mg/kg	NA	NA	3.30E+01	2.56E-01	1.05E+00	1.05E+00	NA	NA	3.11E-02	NA	NA	0.00E+00	3.31E-01	0.00E+00	0.00E+00	3.62E-01	8	1.00E+00	1.25E-01	2.90E+00	5.00E+00	6.25E-01	5.80E-01	0.48%	0.23%
Nickel	NA	mg/L	NA	mg/kg	4.04E+02	mg/kg	NA	NA	7.80E+00	2.39E-02	3.17E-02	3.17E-02	NA	NA	5.70E+00	NA	NA	0.00E+00	5.67E+00	0.00E+00	0.00E+00	1.14E+01	4	4.00E+01	1.00E+01	1.14E+00	8.00E+01	2.00E+01	5.69E-01	0.19%	0.22%
Selenium	NA	mg/L	NA	mg/kg	1.30E+00	mg/kg	NA	NA	8.65E-01	5.22E-01	5.60E-01	5.60E-01	NA	NA	1.84E-02	NA	NA	0.00E+00	3.99E-01	0.00E+00	0.00E+00	4.18E-01	4	2.00E-01	5.00E-02	8.35E+00	3.30E-01	8.25E-02	5.06E+00	1.38%	1.97%
Silver	NA	mg/L	NA	mg/kg	6.52E+01	mg/kg	NA	NA	2.05E+00	1.40E-02	4.00E-03	4.00E-03	NA	NA	9.20E-01	NA	NA	0.00E+00	5.37E-01	0.00E+00	0.00E+00	1.46E+00	4	2.22E+01	5.55E+00	2.63E-01	2.22E+02	5.55E+01	2.63E-02	0.04%	0.01%
Zinc	NA	mg/L	NA	mg/kg	1.52E+04	mg/kg	NA	NA	1.32E-01	6.58E-02	1.02E-02	1.02E-02	NA	NA	2.15E+02	NA	NA	0.00E+00	5.90E+02	0.00E+00	0.00E+00	8.05E+02	4	1.60E+02	4.00E+01	2.01E+01	3.20E+02	8.00E+01	1.01E+01	3.32%	3.91%
																					Hazard Index (Total EEQ):			6.06E+02			2.57E+02	100.00%	100.00%

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 =	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 =	0.36	acres
Frac. home range (FHR) =	**1.00E+00**	**unitless**

Table F-6
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Meadow Voles at the FLFA

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	Percent Contribution to EEQ N	Percent Contribution to 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	NA	mg/L	NA	mg/kg	1.98E-05	mg/kg	NA	NA	4.86E+00	3.90E-03	2.20E+00	2.20E+00	NA	NA	1.02E-07	NA	NA	0.00E+00	1.67E-08	0.00E+00	0.00E+00	1.18E-07	4	1.00E-06	2.50E-07	4.73E-01	1.00E-05	2.50E-06	4.73E-02	0.52%	0.11%
1,2,4-Trichlorobenzene	NA	mg/L	NA	mg/kg	5.45E-02	mg/kg	NA	NA	3.07E+01	2.10E-01	5.00E-01	5.00E-01	NA	NA	2.80E-04	NA	NA	0.00E+00	2.47E-03	0.00E+00	0.00E+00	2.75E-03	4	1.48E+01	3.70E+00	7.44E-04	5.36E+01	1.34E+01	2.06E-04	0.00%	0.00%
1,2-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.26E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	2.62E-04	NA	NA	0.00E+00	5.40E-03	0.00E+00	0.00E+00	5.67E-03	4	8.57E+01	2.14E+01	2.64E-04	4.29E+02	1.07E+02	5.29E-05	0.00%	0.00%
1,3-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.07E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	2.62E-04	NA	NA	0.00E+00	5.40E-03	0.00E+00	0.00E+00	5.67E-03	4	8.57E+01	2.14E+01	2.64E-04	4.29E+02	1.07E+02	5.29E-05	0.00%	0.00%
1,4-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.25E-02	mg/kg	NA	NA	1.99E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	2.70E-04	NA	NA	0.00E+00	5.56E-03	0.00E+00	0.00E+00	5.83E-03	4	8.57E+01	2.14E+01	2.72E-04	4.29E+02	1.07E+02	5.44E-05	0.00%	0.00%
4,4'-DDD	NA	mg/L	NA	mg/kg	5.93E-03	mg/kg	NA	NA	15.07	1.60E-01	5.00E-01	5.00E-01	NA	NA	3.05E-05	NA	NA	0.00E+00	2.05E-04	0.00E+00	0.00E+00	2.36E-04	4	8.00E-01	2.00E-01	1.18E-03	4.00E+00	1.00E+00	2.36E-04	0.00%	0.00%
4,4'-DDE	NA	mg/L	NA	mg/kg	4.93E-02	mg/kg	NA	NA	17.07	1.30E-01	1.12E+02	1.12E+02	NA	NA	2.53E-04	NA	NA	0.00E+00	1.39E-03	0.00E+00	0.00E+00	1.64E-03	4	8.00E-01	2.00E-01	8.19E-03	4.00E+00	1.00E+00	1.64E-03	0.01%	0.00%
4,4'-DDT	NA	mg/L	NA	mg/kg	8.32E-02	mg/kg	NA	NA	11.60	4.60E-03	6.43E+00	6.43E+00	NA	NA	4.27E-04	NA	NA	0.00E+00	8.28E-05	0.00E+00	0.00E+00	5.10E-04	4	8.00E-01	2.00E-01	2.55E-03	4.00E+00	1.00E+00	5.10E-04	0.00%	0.00%
4-Chlorophenyl phenylether	NA	mg/L	NA	mg/kg	1.20E-02	mg/kg	NA	NA	8.38E+01	7.50E-02	5.00E-01	5.00E-01	NA	NA	6.16E-05	NA	NA	0.00E+00	1.95E-04	0.00E+00	0.00E+00	2.56E-04	4	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	1.47E+00	1.21E+01	NA	NA	NA	NA	6.68E-05	NA	NA	0.00E+00	3.41E-02	NA	NA	3.42E-02	4	6.56E+01	1.64E+01	2.08E-03	1.10E+02	2.75E+01	1.24E-03	0.00%	0.00%
Acenaphthylene	NA	mg/L	NA	mg/kg	7.28E-03	mg/kg	NA	NA	2.29E+01	8.91E-01	NA	NA	NA	NA	3.74E-05	NA	NA	0.00E+00	1.40E-03	NA	NA	1.44E-03	4	6.56E+01	1.64E+01	8.78E-05	1.10E+02	2.75E+01	5.24E-05	0.00%	0.00%
Anthracene	NA	mg/L	NA	mg/kg	4.76E-03	mg/kg	NA	NA	2.42E+00	1.22E+00	NA	NA	NA	NA	2.44E-05	NA	NA	0.00E+00	1.25E-03	NA	NA	1.28E-03	4	6.56E+01	1.64E+01	7.79E-05	1.10E+02	2.75E+01	4.64E-05	0.00%	0.00%
Aroclor 1254	NA	mg/L	NA	mg/kg	4.88E-01	mg/kg	NA	NA	4.86	3.60E-03	5.00E-01	5.00E-01	NA	NA	2.51E-03	NA	NA	0.00E+00	3.80E-04	0.00E+00	0.00E+00	2.89E-03	8	1.40E-01	1.75E-02	1.65E-01	6.80E-01	8.50E-02	3.40E-02	0.18%	0.08%
Aroclor 1260	NA	mg/L	NA	mg/kg	2.19E-01	mg/kg	NA	NA	3.86	6.40E-04	5.00E-01	5.00E-01	NA	NA	1.12E-03	NA	NA	0.00E+00	3.03E-05	0.00E+00	0.00E+00	1.15E-03	8	1.40E-01	1.75E-02	6.60E-02	6.80E-01	8.50E-02	1.36E-02	0.07%	0.03%
Benzo(a)anthracene	NA	mg/L	NA	mg/kg	2.02E-02	mg/kg	NA	NA	1.59E+00	3.25E-01	NA	NA	NA	NA	1.04E-04	NA	NA	0.00E+00	1.42E-03	NA	NA	1.52E-03	4	6.15E-01	1.54E-01	9.90E-03	3.07E+00	7.68E-01	1.98E-03	0.01%	0.00%
Benzo(a)pyrene	NA	mg/L	NA	mg/kg	2.47E-02	mg/kg	NA	NA	1.33E+00	1.40E-01	NA	NA	NA	NA	1.27E-04	NA	NA	0.00E+00	7.46E-04	NA	NA	8.72E-04	4	6.15E-01	1.54E-01	5.67E-03	3.07E+00	7.68E-01	1.14E-03	0.01%	0.00%
Benzo(b)fluoranthene	NA	mg/L	NA	mg/kg	4.82E-02	mg/kg	NA	NA	2.60E+00	3.10E-01	NA	NA	NA	NA	2.48E-04	NA	NA	0.00E+00	3.23E-03	NA	NA	3.48E-03	4	6.15E-01	1.54E-01	2.26E-02	3.07E+00	7.68E-01	4.53E-03	0.02%	0.01%
Benzo(g,h,i)perylene	NA	mg/L	NA	mg/kg	1.85E-02	mg/kg	NA	NA	2.94E+00	1.90E-01	NA	NA	NA	NA	9.50E-05	NA	NA	0.00E+00	7.60E-04	NA	NA	8.55E-04	4	6.15E-01	1.54E-01	5.56E-03	3.07E+00	7.68E-01	1.11E-03	0.01%	0.00%
Benzo(k)fluoranthene	NA	mg/L	NA	mg/kg	1.43E-02	mg/kg	NA	NA	2.60E+00	2.10E-01	NA	NA	NA	NA	7.34E-05	NA	NA	0.00E+00	6.49E-04	NA	NA	7.22E-04	4	6.15E-01	1.54E-01	4.70E-03	3.07E+00	7.68E-01	9.41E-04	0.01%	0.00%
Chrysene	NA	mg/L	NA	mg/kg	2.93E-02	mg/kg	NA	NA	2.29E+00	2.79E-01	NA	NA	NA	NA	1.50E-04	NA	NA	0.00E+00	1.77E-03	NA	NA	1.92E-03	4	6.15E-01	1.54E-01	1.25E-02	3.07E+00	7.68E-01	2.50E-03	0.01%	0.01%
Dibenz(a,h)anthracene	NA	mg/L	NA	mg/kg	3.50E-03	mg/kg	NA	NA	2.31E+00	1.30E-01	NA	NA	NA	NA	1.80E-05	NA	NA	0.00E+00	9.84E-05	NA	NA	1.16E-04	4	6.15E-01	1.54E-01	7.57E-04	3.07E+00	7.68E-01	1.52E-04	0.00%	0.00%
Endosulfan II	NA	mg/L	NA	mg/kg	1.99E-02	mg/kg	NA	NA	2.74E+00	3.67E-01	5.00E-01	5.00E-01	NA	NA	1.02E-04	NA	NA	0.00E+00	1.58E-03	0.00E+00	0.00E+00	1.68E-03	4	1.50E-01	3.75E-02	4.48E-02	7.50E-01	1.88E-01	8.97E-03	0.05%	0.02%
Endrin aldehyde	NA	mg/L	NA	mg/kg	3.34E-02	mg/kg	NA	NA	2.20E+01	6.50E-02	5.00E-01	5.00E-01	NA	NA	1.72E-04	NA	NA	0.00E+00	4.69E-04	0.00E+00	0.00E+00	6.41E-04	4	9.20E-02	2.30E-02	2.79E-02	9.20E-01	2.30E-01	2.79E-03	0.03%	0.01%
Endrin ketone	NA	mg/L	NA	mg/kg	4.46E-03	mg/kg	NA	NA	3.21E+01	5.10E-02	5.00E-01	5.00E-01	NA	NA	2.29E-05	NA	NA	0.00E+00	4.92E-05	0.00E+00	0.00E+00	7.21E-05	4	9.20E-02	2.30E-02	3.13E-03	9.20E-01	2.30E-01	3.13E-04	0.00%	0.00%
Fluoranthene	NA	mg/L	NA	mg/kg	3.85E-02	mg/kg	NA	NA	3.04E+00	5.00E-01	NA	NA	NA	NA	1.98E-04	NA	NA	0.00E+00	4.16E-03	NA	NA	4.36E-03	4	6.15E-01	1.54E-01	2.84E-02	3.07E+00	7.68E-01	5.68E-03	0.03%	0.01%
Fluorene	NA	mg/L	NA	mg/kg	5.67E-03	mg/kg	NA	NA	9.57E+00	5.66E+01	NA	NA	NA	NA	2.91E-05	NA	NA	0.00E+00	6.94E-02	NA	NA	6.94E-02	4	6.56E+01	1.64E+01	4.23E-03	1.10E+02	2.75E+01	2.52E-03	0.00%	0.01%
gamma-Chlordane	NA	mg/L	NA	mg/kg	2.81E-03	mg/kg	NA	NA	9.05E+02	2.43E-02	5.00E-01	5.00E-01	NA	NA	1.44E-05	NA	NA	0.00E+00	1.48E-05	0.00E+00	0.00E+00	2.92E-05	4	4.60E+00	1.15E+00	2.54E-05	9.20E+00	2.30E+00	1.27E-05	0.00%	0.00%
Hexachlorobenzene	NA	mg/L	NA	mg/kg	2.00E-02	mg/kg	NA	NA	1.49E+02	1.60E-02	5.00E-01	5.00E-01	NA	NA	1.03E-04	NA	NA	0.00E+00	6.92E-05	0.00E+00	0.00E+00	1.72E-04	4	8.00E-02	2.00E-02	8.59E-03	2.90E-01	7.25E-02	2.37E-03	0.01%	0.01%
Hexachlorobutadiene	NA	mg/L	NA	mg/kg	5.20E-02	mg/kg	NA	NA	9.28E+01	7.20E-02	5.00E-01	5.00E-01	NA	NA	2.67E-04	NA	NA	0.00E+00	8.10E-04	0.00E+00	0.00E+00	1.08E-03	4	2.00E-01	5.00E-02	2.15E-02	1.00E+00	2.50E-01	4.31E-03	0.02%	0.01%
Hexachloroethane	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.45E+01	1.81E-01	5.00E-01	5.00E-01	NA	NA	6.68E-05	NA	NA	0.00E+00	5.09E-04	0.00E+00	0.00E+00	5.76E-04	4	1.00E+00	2.50E-01	2.30E-03	1.50E+01	3.75E+00	1.53E-04	0.00%	0.00%
Indeno(1,2,3-cd)pyrene	NA	mg/L	NA	mg/kg	1.98E-02	mg/kg	NA	NA	2.86E+00	1.10E-01	NA	NA	NA	NA	1.02E-04	NA	NA	0.00E+00	4.71E-04	NA	NA	5.73E-04	4	6.15E-01	1.54E-01	3.72E-03	3.07E+00	7.68E-01	7.46E-04	0.00%	0.00%
Methoxychlor	NA	mg/L	NA	mg/kg	7.28E-04	mg/kg	NA	NA	1.79E+01	2.00E-02	5.00E-01	5.00E-01	NA	NA	3.74E-06	NA	NA	0.00E+00	3.15E-06	0.00E+00	0.00E+00	6.89E-06	4	4.00E+00	1.00E+00	6.89E-06	8.00E+00	2.00E+00	3.44E-06	0.00%	0.00%
Phenanthrene	NA	mg/L	NA	mg/kg	3.84E-02	mg/kg	NA	NA	1.72E+00	2.92E+00	NA	NA	NA	NA	1.97E-04	NA	NA	0.00E+00	2.42E-02	NA	NA	2.44E-02	4	6.56E+01	1.64E+01	1.49E-03	1.10E+02	2.75E+01	8.88E-04	0.00%	0.00%
Pyrene	NA	mg/L	NA	mg/kg	3.96E-02	mg/kg	NA	NA	1.75E+00	7.20E-01	NA	NA	NA	NA	2.03E-04	NA	NA	0.00E+00	6.16E-03	NA	NA	6.37E-03	4	6.15E-01	1.54E-01	4.14E-02	3.07E+00	7.68E-01	8.30E-03	0.05%	0.02%
Arsenic	NA	mg/L	NA	mg/kg	1.40E+01	mg/kg	NA	NA	1.11E-01	3.75E-02	4.87E-03	4.87E-03	NA	NA	7.19E-02	NA	NA	0.00E+00	1.14E-01	0.00E+00	0.00E+00	1.85E-01	4	1.26E-01	3.15E-02	5.89E+00	1.26E+00	3.15E-01	5.89E-01	6.46%	1.32%
Cadmium	NA	mg/L	NA	mg/kg	3.27E+00	mg/kg	NA	NA	6.49E+00	3.63E-01	1.52E-01	1.52E-01	NA	NA	1.68E-02	NA	NA	0.00E+00	2.57E-01	0.00E+00	0.00E+00	2.74E-01	4	1.00E+00	2.50E-01	1.10E+00	1.00E+01	2.50E+00	1.10E-01	1.20%	0.25%
Chromium	NA	mg/L	NA	mg/kg	1.17E+02	mg/kg	NA	NA	3.06E-01	4.10E-02	6.54E-02	6.54E-02	NA	NA	6.00E-01	NA	NA	0.00E+00	1.04E+00	0.00E+00	0.00E+00	1.64E+00	4	2.74E+03	6.84E+02	2.39E-03	1.37E+04	3.42E+03	4.78E-04	0.00%	0.00%
Copper	NA	mg/L	NA	mg/kg	1.06E+04	mg/kg	NA	NA	5.15E-01	7.09E-03	2.76E-03	2.76E-03	NA	NA	5.44E+01	NA	NA	0.00E+00	1.63E+01	0.00E+00	0.00E+00	7.07E+01	8	1.17E+01	1.46E+00	4.83E+01	1.51E+01	1.89E+00	3.74E+01	53.03%	84.04%
Lead	NA	mg/L	NA	mg/kg	8.97E+03	mg/kg	NA	NA	1.39E-01	4.87E-03	6.73E-03	6.73E-03	NA	NA	4.61E+01	NA	NA	0.00E+00	9.46E+00	0.00E+00	0.00E+00	5.55E+01	4	8.00E+00	2.00E+00	2.78E+01	8.00E+01	2.00E+01	2.78E+00	30.47%	6.23%
Mercury	NA	mg/L	NA	mg/kg	1.01E+00	mg/kg	NA	NA	1.07E+00	3.66E-01	1.92E-01	1.92E-01	NA	NA	5.19E-03	NA	NA	0.00E+00	8.00E-02	0.00E+00	0.00E+00	8.52E-02	8	1.00E+00	1.25E-01	6.82E-01	5.00E+00	6.25E-01	1.36E-01	0.75%	0.31%
Nickel	NA	mg/L	NA	mg/kg	1.06E+02	mg/kg	NA	NA	1.06E+00	3.35E-02	6.48E-02	6.48E-02	NA	NA	5.43E-01	NA	NA	0.00E+00	7.65E-01	0.00E+00	0.00E+00	1.31E+00	4	4.00E+01	1.00E+01	1.31E-01	8.00E+01	2.00E+01	6.54E-02	0.14%	0.15%
Selenium	NA	mg/L	NA	mg/kg	7.28E-01	mg/kg	NA	NA	1.01E+00	4.92E-01	8.04E-01	8.04E-01	NA	NA	3.74E-03	NA	NA	0.00E+00	7.74E-02	0.00E+00	0.00E+00	8.11E-02	4	2.00E-01	5.00E-02	1.62E+00	3.30E-01	8.25E-02	9.83E-01	1.78%	2.21%
Silver	NA	mg/L	NA	mg/kg	3.63E+01	mg/kg	NA	NA	2.05E+00	1.40E-02	4.00E-03	4.00E-03	NA	NA	1.86E-01	NA	NA	0.00E+00	1.10E-01	0.00E+00	0.00E+00	2.96E-01	4	2.22E+01	5.55E+00	5.34E-02	2.22E+02	5.55E+01	5.34E-03	0.06%	0.01%
Zinc	NA	mg/L	NA	mg/kg	7.44E+03	mg/kg	NA	NA	2.14E-01	9.06E-02	1.98E-02	1.98E-02	NA	NA	3.82E+01	NA	NA	0.00E+00	1.46E+02	0.00E+00	0.00E+00	1.84E+02	4	1.60E+02	4.00E+01	4.60E+00	3.20E+02	8.00E+01	2.30E+00	5.05%	5.16%
																					Hazard Index (Total EEQ):			9.1E+01			4.5E+01	100.00%	100.00%

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 =	0.36	acres
Frac. home range (FHR) =	**1.00E+00**	**unitless**

Table F-7
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Short-Tailed Shrews at the FLFA

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	Percent Contribution to EEQ N	Percent Contribution to 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	NA	mg/L	NA	mg/kg	4.34E-05	mg/kg	NA	NA	4.21E+01	1.10E-02	2.20E+00	2.20E+00	NA	NA	1.08E-06	NA	NA	4.38E-04	0.00E+00	0.00E+00	0.00E+00	4.39E-04	8	1.00E-06	1.25E-07	3.51E+03	1.00E-05	1.25E-06	3.51E+02	33.36%	11.50%
1,2,4-Trichlorobenzene	NA	mg/L	NA	mg/kg	5.45E-02	mg/kg	NA	NA	3.07E+01	3.10E-01	1.00E+00	1.00E+00	NA	NA	1.35E-03	NA	NA	4.01E-01	0.00E+00	0.00E+00	0.00E+00	4.03E-01	8	1.48E+01	1.85E+00	2.18E-01	5.36E+01	6.70E+00	6.01E-02	0.00%	0.00%
1,2-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.26E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	1.26E-03	NA	NA	5.21E-01	0.00E+00	0.00E+00	0.00E+00	5.23E-01	8	8.57E+01	1.07E+01	4.88E-02	4.29E+02	5.36E+01	9.76E-03	0.00%	0.00%
1,3-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.07E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	1.26E-03	NA	NA	4.98E-01	0.00E+00	0.00E+00	0.00E+00	5.00E-01	8	8.57E+01	1.07E+01	4.66E-02	4.29E+02	5.36E+01	9.33E-03	0.00%	0.00%
1,4-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.25E-02	mg/kg	NA	NA	1.99E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	1.30E-03	NA	NA	2.50E-01	0.00E+00	0.00E+00	0.00E+00	2.52E-01	8	8.57E+01	1.07E+01	2.35E-02	4.29E+02	5.36E+01	4.70E-03	0.00%	0.00%
4,4'-DDD	NA	mg/L	NA	mg/kg	5.93E-03	mg/kg	NA	NA	15.07	5.00E-02	1.00E+00	1.00E+00	NA	NA	1.47E-04	NA	NA	2.14E-02	0.00E+00	0.00E+00	0.00E+00	2.16E-02	8	8.00E-01	1.00E-01	2.16E-01	4.00E+00	5.00E-01	4.32E-02	0.00%	0.00%
4,4'-DDE	NA	mg/L	NA	mg/kg	4.93E-02	mg/kg	NA	NA	17.07	2.00E-02	1.12E+02	1.12E+02	NA	NA	1.22E-03	NA	NA	2.02E-01	0.00E+00	0.00E+00	0.00E+00	2.03E-01	8	8.00E-01	1.00E-01	2.03E+00	4.00E+00	5.00E-01	4.06E-01	0.02%	0.01%
4,4'-DDT	NA	mg/L	NA	mg/kg	8.32E-02	mg/kg	NA	NA	11.60	6.00E-02	6.43E+00	6.43E+00	NA	NA	2.06E-03	NA	NA	2.32E-01	0.00E+00	0.00E+00	0.00E+00	2.34E-01	8	8.00E-01	1.00E-01	2.34E+00	4.00E+00	5.00E-01	4.67E-01	0.02%	0.02%
4-Chlorophenyl phenylether	NA	mg/L	NA	mg/kg	1.20E-02	mg/kg	NA	NA	8.38E+01	1.70E-01	1.00E+00	1.00E+00	NA	NA	2.98E-04	NA	NA	2.41E-01	0.00E+00	0.00E+00	0.00E+00	2.42E-01	8	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	1.47E+00	1.21E+01	NA	NA	NA	NA	3.22E-04	NA	NA	4.59E-03	0.00E+00	NA	NA	4.91E-03	8	6.56E+01	8.20E+00	5.99E-04	1.10E+02	1.38E+01	3.57E-04	0.00%	0.00%
Acenaphthylene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.29E+01	7.90E-01	NA	NA	NA	NA	3.22E-04	NA	NA	7.14E-02	0.00E+00	NA	NA	7.18E-02	8	6.56E+01	8.20E+00	8.75E-03	1.10E+02	1.38E+01	5.22E-03	0.00%	0.00%
Anthracene	NA	mg/L	NA	mg/kg	5.60E-03	mg/kg	NA	NA	2.42E+00	1.17E+00	NA	NA	NA	NA	1.39E-04	NA	NA	3.25E-03	0.00E+00	NA	NA	3.39E-03	8	6.56E+01	8.20E+00	4.14E-04	1.10E+02	1.38E+01	2.47E-04	0.00%	0.00%
Aroclor 1254	NA	mg/L	NA	mg/kg	1.58E+00	mg/kg	NA	NA	6.52E+01	2.20E-02	1.00E+00	1.00E+00	NA	NA	3.92E-02	NA	NA	2.47E+01	0.00E+00	0.00E+00	0.00E+00	2.48E+01	8	1.40E-01	1.75E-02	1.42E+03	6.80E-01	8.50E-02	2.91E+02	13.45%	9.55%
Aroclor 1260	NA	mg/L	NA	mg/kg	1.09E+00	mg/kg	NA	NA	6.52E+01	1.10E-02	1.00E+00	1.00E+00	NA	NA	2.70E-02	NA	NA	1.71E+01	0.00E+00	0.00E+00	0.00E+00	1.71E+01	8	1.40E-01	1.75E-02	9.77E+02	6.80E-01	8.50E-02	2.01E+02	9.28%	6.59%
Benzo(a)anthracene	NA	mg/L	NA	mg/kg	2.80E-02	mg/kg	NA	NA	1.59E+00	2.84E-01	NA	NA	NA	NA	6.94E-04	NA	NA	1.07E-02	0.00E+00	NA	NA	1.14E-02	8	6.15E-01	7.69E-02	1.48E-01	3.07E+00	3.84E-01	2.97E-02	0.00%	0.00%
Benzo(a)pyrene	NA	mg/L	NA	mg/kg	2.80E-02	mg/kg	NA	NA	1.33E+00	1.39E-01	NA	NA	NA	NA	6.94E-04	NA	NA	8.94E-03	0.00E+00	NA	NA	9.63E-03	8	6.15E-01	7.69E-02	1.25E-01	3.07E+00	3.84E-01	2.51E-02	0.00%	0.00%
Benzo(b)fluoranthene	NA	mg/L	NA	mg/kg	6.70E-02	mg/kg	NA	NA	2.60E+00	3.10E-01	NA	NA	NA	NA	1.66E-03	NA	NA	4.18E-02	0.00E+00	NA	NA	4.35E-02	8	6.15E-01	7.69E-02	5.65E-01	3.07E+00	3.84E-01	1.13E-01	0.01%	0.00%
Benzo(g,h,i)perylene	NA	mg/L	NA	mg/kg	2.50E-02	mg/kg	NA	NA	2.94E+00	2.01E-01	NA	NA	NA	NA	6.20E-04	NA	NA	1.76E-02	0.00E+00	NA	NA	1.83E-02	8	6.15E-01	7.69E-02	2.38E-01	3.07E+00	3.84E-01	4.76E-02	0.00%	0.00%
Benzo(k)fluoranthene	NA	mg/L	NA	mg/kg	1.85E-02	mg/kg	NA	NA	2.60E+00	2.02E-01	NA	NA	NA	NA	4.59E-04	NA	NA	1.15E-02	0.00E+00	NA	NA	1.20E-02	8	6.15E-01	7.69E-02	1.56E-01	3.07E+00	3.84E-01	3.13E-02	0.00%	0.00%
Chrysene	NA	mg/L	NA	mg/kg	3.70E-02	mg/kg	NA	NA	2.29E+00	2.54E-01	NA	NA	NA	NA	9.18E-04	NA	NA	2.03E-02	0.00E+00	NA	NA	2.13E-02	8	6.15E-01	7.69E-02	2.76E-01	3.07E+00	3.84E-01	5.54E-02	0.00%	0.00%
Dibenz(a,h)anthracene	NA	mg/L	NA	mg/kg	3.50E-03	mg/kg	NA	NA	2.31E+00	1.30E-01	NA	NA	NA	NA	8.68E-05	NA	NA	1.94E-03	0.00E+00	NA	NA	2.03E-03	8	6.15E-01	7.69E-02	2.64E-02	3.07E+00	3.84E-01	5.28E-03	0.00%	0.00%
Endosulfan II	NA	mg/L	NA	mg/kg	1.99E-02	mg/kg	NA	NA	2.74E+00	3.70E-01	1.00E+00	1.00E+00	NA	NA	4.94E-04	NA	NA	1.31E-02	0.00E+00	0.00E+00	0.00E+00	1.36E-02	8	1.50E-01	1.88E-02	7.24E-01	7.50E-01	9.38E-02	1.45E-01	0.01%	0.00%
Endrin aldehyde	NA	mg/L	NA	mg/kg	3.34E-02	mg/kg	NA	NA	2.20E+01	6.50E-02	1.00E+00	1.00E+00	NA	NA	8.28E-04	NA	NA	1.76E-01	0.00E+00	0.00E+00	0.00E+00	1.77E-01	8	9.20E-02	1.15E-02	1.54E+01	9.20E-01	1.15E-01	1.54E+00	0.15%	0.05%
Endrin ketone	NA	mg/L	NA	mg/kg	4.46E-03	mg/kg	NA	NA	3.21E+01	5.10E-02	1.00E+00	1.00E+00	NA	NA	1.11E-04	NA	NA	3.44E-02	0.00E+00	0.00E+00	0.00E+00	3.45E-02	8	9.20E-02	1.15E-02	3.00E+00	9.20E-01	1.15E-01	3.00E-01	0.03%	0.01%
Fluoranthene	NA	mg/L	NA	mg/kg	5.35E-02	mg/kg	NA	NA	3.04E+00	5.00E-01	NA	NA	NA	NA	1.33E-03	NA	NA	3.90E-02	0.00E+00	NA	NA	4.04E-02	8	6.15E-01	7.69E-02	5.25E-01	3.07E+00	3.84E-01	1.05E-01	0.00%	0.00%
Fluorene	NA	mg/L	NA	mg/kg	9.00E-03	mg/kg	NA	NA	9.57E+00	2.40E+01	NA	NA	NA	NA	2.23E-04	NA	NA	2.07E-02	0.00E+00	NA	NA	2.09E-02	8	6.56E+01	8.20E+00	2.55E-03	1.10E+02	1.38E+01	1.52E-03	0.00%	0.00%
gamma-Chlordane	NA	mg/L	NA	mg/kg	2.81E-03	mg/kg	NA	NA	9.05E+02	2.43E-02	1.00E+00	1.00E+00	NA	NA	6.97E-05	NA	NA	6.10E-01	0.00E+00	0.00E+00	0.00E+00	6.10E-01	8	4.60E+00	5.75E-01	1.06E+00	9.20E+00	1.15E+00	5.31E-01	0.01%	0.02%
Hexachlorobenzene	NA	mg/L	NA	mg/kg	2.00E-02	mg/kg	NA	NA	1.49E+02	2.10E-01	1.00E+00	1.00E+00	NA	NA	4.96E-04	NA	NA	7.13E-01	0.00E+00	0.00E+00	0.00E+00	7.14E-01	8	8.00E-02	1.00E-02	7.14E+01	2.90E-01	3.63E-02	1.97E+01	0.68%	0.65%
Hexachlorobutadiene	NA	mg/L	NA	mg/kg	5.20E-02	mg/kg	NA	NA	9.28E+01	7.20E-02	1.00E+00	1.00E+00	NA	NA	1.29E-03	NA	NA	1.16E+00	0.00E+00	0.00E+00	0.00E+00	1.16E+00	8	2.00E-01	2.50E-02	4.64E+01	1.00E+00	1.25E-01	9.28E+00	0.44%	0.30%
Hexachloroethane	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.45E+01	3.30E-01	1.00E+00	1.00E+00	NA	NA	3.22E-04	NA	NA	7.64E-02	0.00E+00	0.00E+00	0.00E+00	7.67E-02	8	1.00E+00	1.25E-01	6.14E-01	1.50E+01	1.88E+00	4.09E-02	0.01%	0.00%
Indeno(1,2,3-cd)pyrene	NA	mg/L	NA	mg/kg	2.60E-02	mg/kg	NA	NA	2.86E+00	1.10E-01	NA	NA	NA	NA	6.45E-04	NA	NA	1.78E-02	0.00E+00	NA	NA	1.85E-02	8	6.15E-01	7.69E-02	2.41E-01	3.07E+00	3.84E-01	4.82E-02	0.00%	0.00%
Methoxychlor	NA	mg/L	NA	mg/kg	7.28E-04	mg/kg	NA	NA	1.79E+01	4.20E-01	1.00E+00	1.00E+00	NA	NA	1.81E-05	NA	NA	3.13E-03	0.00E+00	0.00E+00	0.00E+00	3.15E-03	8	4.00E+00	5.00E-01	6.29E-03	8.00E+00	1.00E+00	3.15E-03	0.00%	0.00%
Phenanthrene	NA	mg/L	NA	mg/kg	5.50E-02	mg/kg	NA	NA	1.72E+00	2.55E+00	NA	NA	NA	NA	1.36E-03	NA	NA	2.27E-02	0.00E+00	NA	NA	2.41E-02	8	6.56E+01	8.20E+00	2.94E-03	1.10E+02	1.38E+01	1.75E-03	0.00%	0.00%
Pyrene	NA	mg/L	NA	mg/kg	5.05E-02	mg/kg	NA	NA	1.75E+00	7.20E-01	NA	NA	NA	NA	1.25E-03	NA	NA	2.12E-02	0.00E+00	NA	NA	2.25E-02	8	6.15E-01	7.69E-02	2.92E-01	3.07E+00	3.84E-01	5.85E-02	0.00%	0.00%
Arsenic	NA	mg/L	NA	mg/kg	6.89E+01	mg/kg	NA	NA	6.96E-02	3.75E-02	3.65E-03	3.65E-03	NA	NA	1.71E+00	NA	NA	1.15E+00	0.00E+00	0.00E+00	0.00E+00	2.86E+00	8	1.26E-01	1.58E-02	1.82E+02	1.26E+00	1.58E-01	1.82E+01	1.73%	0.59%
Cadmium	NA	mg/L	NA	mg/kg	1.98E+01	mg/kg	NA	NA	4.49E+00	1.60E-01	5.89E-02	5.89E-02	NA	NA	4.91E-01	NA	NA	2.13E+01	0.00E+00	0.00E+00	0.00E+00	2.18E+01	8	1.00E+00	1.25E-01	1.75E+02	1.00E+01	1.25E+00	1.75E+01	1.66%	0.57%
Chromium	NA	mg/L	NA	mg/kg	2.99E+02	mg/kg	NA	NA	3.06E-01	4.10E-02	5.09E-02	5.09E-02	NA	NA	7.42E+00	NA	NA	2.20E+01	0.00E+00	0.00E+00	0.00E+00	2.94E+01	8	2.74E+03	3.42E+02	8.59E-02	1.37E+04	1.71E+03	1.72E-02	0.00%	0.00%
Copper	NA	mg/L	NA	mg/kg	2.38E+04	mg/kg	NA	NA	5.15E-01	4.34E-03	1.38E-03	1.38E-03	NA	NA	5.90E+02	NA	NA	2.94E+03	0.00E+00	0.00E+00	0.00E+00	3.53E+03	8	1.17E+01	1.46E+00	2.41E+03	1.51E+01	1.89E+00	1.87E+03	22.95%	61.30%
Lead	NA	mg/L	NA	mg/kg	2.59E+04	mg/kg	NA	NA	1.13E-01	3.06E-03	3.73E-03	3.73E-03	NA	NA	6.41E+02	NA	NA	7.02E+02	0.00E+00	0.00E+00	0.00E+00	1.34E+03	8	8.00E+00	1.00E+00	1.34E+03	8.00E+01	1.00E+01	1.34E+02	12.76%	4.40%
Mercury	NA	mg/L	NA	mg/kg	2.20E+00	mg/kg	NA	NA	3.30E+01	2.56E-01	1.05E+00	1.05E+00	NA	NA	5.46E-02	NA	NA	1.74E+01	0.00E+00	0.00E+00	0.00E+00	1.75E+01	8	1.00E+00	1.25E-01	1.40E+02	5.00E+00	6.25E-01	2.80E+01	1.33%	0.92%
Nickel	NA	mg/L	NA	mg/kg	4.04E+02	mg/kg	NA	NA	7.80E+00	2.39E-02	3.17E-02	3.17E-02	NA	NA	1.00E+01	NA	NA	7.56E+02	0.00E+00	0.00E+00	0.00E+00	7.66E+02	8	4.00E+01	5.00E+00	1.53E+02	8.00E+01	1.00E+01	7.66E+01	1.46%	2.51%
Selenium	NA	mg/L	NA	mg/kg	1.30E+00	mg/kg	NA	NA	8.65E-01	5.22E-01	6.15E+01	6.15E+01	NA	NA	3.22E-02	NA	NA	2.70E-01	0.00E+00	0.00E+00	0.00E+00	3.02E-01	8	2.00E-01	2.50E-02	1.21E+01	3.30E-01	4.13E-02	7.32E+00	0.11%	0.24%
Silver	NA	mg/L	NA	mg/kg	6.52E+01	mg/kg	NA	NA	2.05E+00	1.40E-02	4.00E-03	4.00E-03	NA	NA	1.62E+00	NA	NA	3.20E+01	0.00E+00	0.00E+00	0.00E+00	3.36E+01	8	2.22E+01	2.78E+00	1.21E+01	2.22E+02	2.78E+01	1.21E+00	0.12%	0.04%
Zinc	NA	mg/L	NA	mg/kg	1.52E+04	mg/kg	NA	NA	1.32E-01	6.58E-02	1.02E-02	1.02E-02	NA	NA	3.78E+02	NA	NA	4.83E+02	0.00E+00	0.00E+00	0.00E+00	8.61E+02	8	1.60E+02	2.00E+01	4.31E+01	3.20E+02	4.00E+01	2.15E+01	0.41%	0.71%
																					Hazard Index (Total EEQ):			1.05E+04			3.1E+03	100.00%	100.00%

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 =	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 =	0.36	acres
Frac. home range (FHR) =	**1.00E+00**	**unitless**

Table F-8
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Short-Tailed Shrews at the FLFA

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		LOAEL	Adjusted LOAEL		Percent Contribution to	Percent Contribution to
							---------- 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	EEQ N	mg/kg-d	mg/kg-d	EEQ L	EEQ N	EEQ L
2,3,7,8-TCDD TE	NA	mg/L	NA	mg/kg	1.98E-05	mg/kg	NA	NA	4.86E+00	3.90E-03	2.20E+00	2.20E+00	NA	NA	1.14E-07	NA	NA	5.29E-06	0.00E+00	0.00E+00	0.00E+00	5.40E-06	8	1.00E-06	1.25E-07	4.32E+01	1.00E-05	1.25E-06	4.32E+00	8.90%	1.92%
1,2,4-Trichlorobenzene	NA	mg/L	NA	mg/kg	5.45E-02	mg/kg	NA	NA	3.07E+01		5.00E-01	5.00E-01	NA	NA	3.13E-04	NA	NA	9.19E-02	0.00E+00	0.00E+00	0.00E+00	9.22E-02	8	1.48E+01	1.85E+00	4.99E-02	5.36E+01	6.70E+00	1.38E-02	0.01%	0.01%
1,2-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.26E+01		5.00E-01	5.00E-01	NA	NA	2.93E-04	NA	NA	1.19E-01	0.00E+00	0.00E+00	0.00E+00	1.20E-01	8	8.57E+01	1.07E+01	1.12E-02	4.29E+02	5.36E+01	2.24E-03	0.00%	0.00%
1,3-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.07E+01		5.00E-01	5.00E-01	NA	NA	2.93E-04	NA	NA	1.14E-01	0.00E+00	0.00E+00	0.00E+00	1.14E-01	8	8.57E+01	1.07E+01	1.07E-02	4.29E+02	5.36E+01	2.14E-03	0.00%	0.00%
1,4-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.25E-02	mg/kg	NA	NA	1.99E+01		5.00E-01	5.00E-01	NA	NA	3.02E-04	NA	NA	5.74E-02	0.00E+00	0.00E+00	0.00E+00	5.77E-02	8	8.57E+01	1.07E+01	5.39E-03	4.29E+02	5.36E+01	1.08E-03	0.00%	0.00%
4,4'-DDD	NA	mg/L	NA	mg/kg	5.93E-03	mg/kg	NA	NA	15.07		5.00E-01	5.00E-01	NA	NA	3.41E-05	NA	NA	4.91E-03	0.00E+00	0.00E+00	0.00E+00	4.95E-03	8	8.00E-01	1.00E-01	4.95E-02	4.00E+00	5.00E-01	9.90E-03	0.01%	0.00%
4,4'-DDE	NA	mg/L	NA	mg/kg	4.93E-02	mg/kg	NA	NA	17.07		1.12E+02	1.12E+02	NA	NA	2.83E-04	NA	NA	4.63E-02	0.00E+00	0.00E+00	0.00E+00	4.66E-02	8	8.00E-01	1.00E-01	4.66E-01	4.00E+00	5.00E-01	9.31E-02	0.10%	0.04%
4,4'-DDT	NA	mg/L	NA	mg/kg	8.32E-02	mg/kg	NA	NA	11.60	4.60E-03	6.43E+00	6.43E+00	NA	NA	4.78E-04	NA	NA	5.31E-02	0.00E+00	0.00E+00	0.00E+00	5.35E-02	8	8.00E-01	1.00E-01	5.35E-01	4.00E+00	5.00E-01	1.07E-01	0.11%	0.05%
4-Chlorophenyl phenylether	NA	mg/L	NA	mg/kg	1.20E-02	mg/kg	NA	NA	8.38E+01		5.00E-01	5.00E-01	NA	NA	6.90E-05	NA	NA	5.53E-02	0.00E+00	0.00E+00	0.00E+00	5.54E-02	8	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	1.47E+00		NA	NA	NA	NA	7.48E-05	NA	NA	1.05E-03	0.00E+00	NA	NA	1.13E-03	8	6.56E+01	8.20E+00	1.37E-04	1.10E+02	1.38E+01	8.19E-05	0.00%	0.00%
Acenaphthylene	NA	mg/L	NA	mg/kg	7.28E-03	mg/kg	NA	NA	2.29E+01		NA	NA	NA	NA	4.19E-05	NA	NA	9.17E-03	0.00E+00	NA	NA	9.21E-03	8	6.56E+01	8.20E+00	1.12E-03	1.10E+02	1.38E+01	6.70E-04	0.00%	0.00%
Anthracene	NA	mg/L	NA	mg/kg	4.76E-03	mg/kg	NA	NA	2.42E+00		NA	NA	NA	NA	2.74E-05	NA	NA	6.34E-04	0.00E+00	NA	NA	6.61E-04	8	6.56E+01	8.20E+00	8.06E-05	1.10E+02	1.38E+01	4.81E-05	0.00%	0.00%
Aroclor 1254	NA	mg/L	NA	mg/kg	4.88E-01	mg/kg	NA	NA	4.86	3.60E-03	5.00E-01	5.00E-01	NA	NA	2.81E-03	NA	NA	1.31E-01	0.00E+00	0.00E+00	0.00E+00	1.33E-01	8	1.40E-01	1.75E-02	7.62E+00	6.80E-01	8.50E-02	1.57E+00	1.57%	0.70%
Aroclor 1260	NA	mg/L	NA	mg/kg	2.19E-01	mg/kg	NA	NA	3.86	6.40E-04	5.00E-01	5.00E-01	NA	NA	1.26E-03	NA	NA	4.64E-02	0.00E+00	0.00E+00	0.00E+00	4.77E-02	8	1.40E-01	1.75E-02	2.73E+00	6.80E-01	8.50E-02	5.61E-01	0.56%	0.25%
Benzo(a)anthracene	NA	mg/L	NA	mg/kg	2.02E-02	mg/kg	NA	NA	1.59E+00	3.25E-01	NA	NA	NA	NA	1.16E-04	NA	NA	1.77E-03	0.00E+00	NA	NA	1.88E-03	8	6.15E-01	7.69E-02	2.45E-02	3.07E+00	3.84E-01	4.91E-03	0.01%	0.00%
Benzo(a)pyrene	NA	mg/L	NA	mg/kg	2.47E-02	mg/kg	NA	NA	1.33E+00	1.40E-01	NA	NA	NA	NA	1.42E-04	NA	NA	1.81E-03	0.00E+00	NA	NA	1.95E-03	8	6.15E-01	7.69E-02	2.54E-02	3.07E+00	3.84E-01	5.08E-03	0.01%	0.00%
Benzo(b)fluoranthene	NA	mg/L	NA	mg/kg	4.82E-02	mg/kg	NA	NA	2.60E+00	3.10E-01	NA	NA	NA	NA	2.77E-04	NA	NA	6.89E-03	0.00E+00	NA	NA	7.17E-03	8	6.15E-01	7.69E-02	9.33E-02	3.07E+00	3.84E-01	1.87E-02	0.02%	0.01%
Benzo(g,h,i)perylene	NA	mg/L	NA	mg/kg	1.85E-02	mg/kg	NA	NA	2.94E+00	1.90E-01	NA	NA	NA	NA	1.06E-04	NA	NA	2.99E-03	0.00E+00	NA	NA	3.10E-03	8	6.15E-01	7.69E-02	4.03E-02	3.07E+00	3.84E-01	8.07E-03	0.01%	0.00%
Benzo(k)fluoranthene	NA	mg/L	NA	mg/kg	1.43E-02	mg/kg	NA	NA	2.60E+00	2.10E-01	NA	NA	NA	NA	8.22E-05	NA	NA	2.04E-03	0.00E+00	NA	NA	2.13E-03	8	6.15E-01	7.69E-02	2.77E-02	3.07E+00	3.84E-01	5.54E-03	0.01%	0.00%
Chrysene	NA	mg/L	NA	mg/kg	2.93E-02	mg/kg	NA	NA	2.29E+00	2.79E-01	NA	NA	NA	NA	1.68E-04	NA	NA	3.69E-03	0.00E+00	NA	NA	3.86E-03	8	6.15E-01	7.69E-02	5.02E-02	3.07E+00	3.84E-01	1.01E-02	0.01%	0.00%
Dibenz(a,h)anthracene	NA	mg/L	NA	mg/kg	3.50E-03	mg/kg	NA	NA	2.31E+00	1.30E-01	NA	NA	NA	NA	2.01E-05	NA	NA	4.45E-04	0.00E+00	NA	NA	4.65E-04	8	6.15E-01	7.69E-02	6.05E-03	3.07E+00	3.84E-01	1.21E-03	0.00%	0.00%
Endosulfan II	NA	mg/L	NA	mg/kg	1.99E-02	mg/kg	NA	NA	2.74E+00		5.00E-01	5.00E-01	NA	NA	1.14E-04	NA	NA	3.00E-03	0.00E+00	0.00E+00	0.00E+00	3.11E-03	8	1.50E-01	1.88E-02	1.66E-01	7.50E-01	9.38E-02	3.32E-02	0.03%	0.01%
Endrin aldehyde	NA	mg/L	NA	mg/kg	3.34E-02	mg/kg	NA	NA	2.20E+01		5.00E-01	5.00E-01	NA	NA	1.92E-04	NA	NA	4.03E-02	0.00E+00	0.00E+00	0.00E+00	4.05E-02	8	9.20E-02	1.15E-02	3.52E+00	9.20E-01	1.15E-01	3.52E-01	0.73%	0.16%
Endrin ketone	NA	mg/L	NA	mg/kg	4.46E-03	mg/kg	NA	NA	3.21E+01		5.00E-01	5.00E-01	NA	NA	2.56E-05	NA	NA	7.88E-03	0.00E+00	0.00E+00	0.00E+00	7.90E-03	8	9.20E-02	1.15E-02	6.87E-01	9.20E-01	1.15E-01	6.87E-02	0.14%	0.03%
Fluoranthene	NA	mg/L	NA	mg/kg	3.85E-02	mg/kg	NA	NA	3.04E+00	5.00E-01	NA	NA	NA	NA	2.21E-04	NA	NA	6.44E-03	0.00E+00	NA	NA	6.66E-03	8	6.15E-01	7.69E-02	8.66E-02	3.07E+00	3.84E-01	1.74E-02	0.02%	0.01%
Fluorene	NA	mg/L	NA	mg/kg	5.67E-03	mg/kg	NA	NA	9.57E+00		NA	NA	NA	NA	3.26E-05	NA	NA	2.98E-03	0.00E+00	NA	NA	3.02E-03	8	6.56E+01	8.20E+00	3.68E-04	1.10E+02	1.38E+01	2.19E-04	0.00%	0.00%
gamma-Chlordane	NA	mg/L	NA	mg/kg	2.81E-03	mg/kg	NA	NA	9.05E+02	2.43E-02	5.00E-01	5.00E-01	NA	NA	1.62E-05	NA	NA	1.40E-01	0.00E+00	0.00E+00	0.00E+00	1.40E-01	8	4.60E+00	5.75E-01	2.43E-01	9.20E+00	1.15E+00	1.22E-01	0.05%	0.05%
Hexachlorobenzene	NA	mg/L	NA	mg/kg	2.00E-02	mg/kg	NA	NA	1.49E+02		5.00E-01	5.00E-01	NA	NA	1.15E-04	NA	NA	1.63E-01	0.00E+00	0.00E+00	0.00E+00	1.64E-01	8	8.00E-02	1.00E-02	1.64E+01	2.90E-01	3.63E-02	4.51E+00	3.37%	2.01%
Hexachlorobutadiene	NA	mg/L	NA	mg/kg	5.20E-02	mg/kg	NA	NA	9.28E+01		5.00E-01	5.00E-01	NA	NA	2.99E-04	NA	NA	2.65E-01	0.00E+00	0.00E+00	0.00E+00	2.66E-01	8	2.00E-01	2.50E-02	1.06E+01	1.00E+00	1.25E-01	2.13E+00	2.19%	0.95%
Hexachloroethane	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.45E+01		5.00E-01	5.00E-01	NA	NA	7.48E-05	NA	NA	1.75E-02	0.00E+00	0.00E+00	0.00E+00	1.76E-02	8	1.00E+00	1.25E-01	1.41E-01	1.50E+01	1.88E+00	9.38E-03	0.03%	0.00%
Indeno(1,2,3-cd)pyrene	NA	mg/L	NA	mg/kg	1.98E-02	mg/kg	NA	NA	2.86E+00	1.10E-01	NA	NA	NA	NA	1.14E-04	NA	NA	3.11E-03	0.00E+00	NA	NA	3.23E-03	8	6.15E-01	7.69E-02	4.20E-02	3.07E+00	3.84E-01	8.41E-03	0.01%	0.00%
Methoxychlor	NA	mg/L	NA	mg/kg	7.28E-04	mg/kg	NA	NA	1.79E+01		5.00E-01	5.00E-01	NA	NA	4.19E-06	NA	NA	7.17E-04	0.00E+00	0.00E+00	0.00E+00	7.21E-04	8	4.00E+00	5.00E-01	1.44E-03	8.00E+00	1.00E+00	7.21E-04	0.00%	0.00%
Phenanthrene	NA	mg/L	NA	mg/kg	3.84E-02	mg/kg	NA	NA	1.72E+00	2.92E+00	NA	NA	NA	NA	2.21E-04	NA	NA	3.63E-03	0.00E+00	NA	NA	3.85E-03	8	6.56E+01	8.20E+00	4.70E-04	1.10E+02	1.38E+01	2.80E-04	0.00%	0.00%
Pyrene	NA	mg/L	NA	mg/kg	3.96E-02	mg/kg	NA	NA	1.75E+00	7.20E-01	NA	NA	NA	NA	2.28E-04	NA	NA	3.81E-03	0.00E+00	NA	NA	4.04E-03	8	6.15E-01	7.69E-02	5.25E-02	3.07E+00	3.84E-01	1.05E-02	0.01%	0.00%
Arsenic	NA	mg/L	NA	mg/kg	1.40E+01	mg/kg	NA	NA	1.11E-01	3.75E-02	4.87E-03	4.87E-03	NA	NA	8.05E-02	NA	NA	8.56E-02	0.00E+00	0.00E+00	0.00E+00	1.66E-01	8	1.26E-01	1.58E-02	1.05E+01	1.26E+00	1.58E-01	1.05E+00	2.17%	0.47%
Cadmium	NA	mg/L	NA	mg/kg	3.27E+00	mg/kg	NA	NA	6.49E+00	3.63E-01	1.52E-01	1.52E-01	NA	NA	1.88E-02	NA	NA	1.17E+00	0.00E+00	0.00E+00	0.00E+00	1.19E+00	8	1.00E+00	1.25E-01	9.51E+00	1.00E+01	1.25E+00	9.51E-01	1.96%	0.42%
Chromium	NA	mg/L	NA	mg/kg	1.17E+02	mg/kg	NA	NA	3.06E-01	4.10E-02	6.54E-02	6.54E-02	NA	NA	6.72E-01	NA	NA	1.97E+00	0.00E+00	0.00E+00	0.00E+00	2.64E+00	8	2.74E+03	3.42E+02	7.72E-03	1.37E+04	1.71E+03	1.54E-03	0.00%	0.00%
Copper	NA	mg/L	NA	mg/kg	1.06E+04	mg/kg	NA	NA	5.15E-01	7.09E-03	2.76E-03	2.76E-03	NA	NA	6.10E+01	NA	NA	3.00E+02	0.00E+00	0.00E+00	0.00E+00	3.61E+02	8	1.17E+01	1.46E+00	2.47E+02	1.51E+01	1.89E+00	1.91E+02	50.84%	85.18%
Lead	NA	mg/L	NA	mg/kg	8.97E+03	mg/kg	NA	NA	1.39E-01	4.87E-03	6.73E-03	6.73E-03	NA	NA	5.16E+01	NA	NA	6.85E+01	0.00E+00	0.00E+00	0.00E+00	1.20E+02	8	8.00E+00	1.00E+00	1.20E+02	8.00E+01	1.00E+01	1.20E+01	24.72%	5.35%
Mercury	NA	mg/L	NA	mg/kg	1.01E+00	mg/kg	NA	NA	1.07E+00	3.66E-01	1.92E-01	1.92E-01	NA	NA	5.81E-03	NA	NA	5.97E-02	0.00E+00	0.00E+00	0.00E+00	6.55E-02	8	1.00E+00	1.25E-01	5.24E-01	5.00E+00	6.25E-01	1.05E-01	0.11%	0.05%
Nickel	NA	mg/L	NA	mg/kg	1.06E+02	mg/kg	NA	NA	1.06E+00	3.35E-02	6.48E-02	6.48E-02	NA	NA	6.08E-01	NA	NA	6.16E+00	0.00E+00	0.00E+00	0.00E+00	6.76E+00	8	4.00E+01	5.00E+00	1.35E+00	8.00E+01	1.00E+01	6.76E-01	0.28%	0.30%
Selenium	NA	mg/L	NA	mg/kg	7.28E-01	mg/kg	NA	NA	1.01E+00	4.92E-01	8.04E-01	8.04E-01	NA	NA	4.19E-03	NA	NA	4.04E-02	0.00E+00	0.00E+00	0.00E+00	4.46E-02	8	2.00E-01	2.50E-02	1.78E+00	3.30E-01	4.13E-02	1.08E+00	0.37%	0.48%
Silver	NA	mg/L	NA	mg/kg	3.63E+01	mg/kg	NA	NA	2.05E+00		4.00E-03	4.00E-03	NA	NA	2.09E-01	NA	NA	4.08E+00	0.00E+00	0.00E+00	0.00E+00	4.29E+00	8	2.22E+01	2.78E+00	1.55E+00	2.22E+02	2.78E+01	1.55E-01	0.32%	0.07%
Zinc	NA	mg/L	NA	mg/kg	7.44E+03	mg/kg	NA	NA	2.14E-01	9.06E-02	1.98E-02	1.98E-02	NA	NA	4.28E+01	NA	NA	8.76E+01	0.00E+00	0.00E+00	0.00E+00	1.30E+02	8	1.60E+02	2.00E+01	6.52E+00	3.20E+02	4.00E+01	3.26E+00	1.34%	1.45%
																					Hazard Index (Total EEQ):			4.9E+02			2.2E+02	100.00%	100.00%

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 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 =	0.36	acres
Frac. home range (FHR) =	**3.75E-01**	**unitless**

Table F-9
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for American Robins at the FLFA

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	Percent Contribution to EEQ N	Percent Contribution to 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	NA	mg/L	NA	mg/kg	4.34E-05	mg/kg	NA	NA	4.21E+01	1.10E-02	2.20E+00	2.20E+00	NA	NA	5.46E-07	NA	NA	2.18E-04	9.31E-08	0.00E+00	0.00E+00	2.19E-04	8	1.40E-05	1.75E-06	1.25E+02	1.40E-04	1.75E-05	1.25E+01	2.96%	1.40%
1,2,4-Trichlorobenzene	NA	mg/L	NA	mg/kg	5.45E-02	mg/kg	NA	NA	3.07E+01	3.10E-01	1.00E+00	1.00E+00	NA	NA	6.87E-04	NA	NA	2.00E-01	3.30E-03	0.00E+00	0.00E+00	2.04E-01	8	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.26E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	6.43E-04	NA	NA	2.60E-01	4.88E-03	0.00E+00	0.00E+00	2.66E-01	8	1.61E+01	2.01E+00	1.32E-01	8.04E+01	1.01E+01	2.64E-02	0.00%	0.00%
1,3-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.07E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	6.43E-04	NA	NA	2.48E-01	4.88E-03	0.00E+00	0.00E+00	2.54E-01	8	1.61E+01	2.01E+00	1.26E-01	8.04E+01	1.01E+01	2.53E-02	0.00%	0.00%
1,4-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.25E-02	mg/kg	NA	NA	1.99E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	6.61E-04	NA	NA	1.25E-01	5.02E-03	0.00E+00	0.00E+00	1.31E-01	8	1.61E+01	2.01E+00	6.50E-02	8.04E+01	1.01E+01	1.30E-02	0.00%	0.00%
4,4'-DDD	NA	mg/L	NA	mg/kg	5.93E-03	mg/kg	NA	NA	15.07	5.00E-02	1.00E+00	1.00E+00	NA	NA	7.47E-05	NA	NA	1.07E-02	5.79E-05	0.00E+00	0.00E+00	1.08E-02	8	2.80E-03	3.50E-04	3.09E+01	2.80E-02	3.50E-03	3.09E+00	0.73%	0.35%
4,4'-DDE	NA	mg/L	NA	mg/kg	4.93E-02	mg/kg	NA	NA	17.07	2.00E-02	1.12E+02	1.12E+02	NA	NA	6.21E-04	NA	NA	1.01E-01	1.93E-04	0.00E+00	0.00E+00	1.02E-01	8	2.80E-03	3.50E-04	2.90E+02	2.80E-02	3.50E-03	2.90E+01	6.87%	3.24%
4,4'-DDT	NA	mg/L	NA	mg/kg	8.32E-02	mg/kg	NA	NA	11.60	6.00E-02	6.43E+00	6.43E+00	NA	NA	1.05E-03	NA	NA	1.15E-01	9.75E-04	0.00E+00	0.00E+00	1.17E-01	8	2.80E-03	3.50E-04	3.36E+02	2.80E-02	3.50E-03	3.36E+01	7.95%	3.75%
4-Chlorophenyl phenylether	NA	mg/L	NA	mg/kg	1.20E-02	mg/kg	NA	NA	8.38E+01	1.70E-01	1.00E+00	1.00E+00	NA	NA	1.51E-04	NA	NA	1.20E-01	3.98E-04	0.00E+00	0.00E+00	1.21E-01	8	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	1.47E+00	1.21E+01	NA	NA	NA	NA	1.64E-04	NA	NA	2.29E-03	3.08E-02	NA	NA	3.33E-02	8	5.53E+02	6.91E+01	4.81E-04	2.77E+03	3.46E+02	9.63E-05	0.00%	0.00%
Acenaphthylene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.29E+01	7.90E-01	NA	NA	NA	NA	1.64E-04	NA	NA	3.56E-02	2.00E-03	NA	NA	3.78E-02	8	5.53E+02	6.91E+01	5.47E-04	2.77E+03	3.46E+02	1.09E-04	0.00%	0.00%
Anthracene	NA	mg/L	NA	mg/kg	5.60E-03	mg/kg	NA	NA	2.42E+00	1.17E+00	NA	NA	NA	NA	7.06E-05	NA	NA	1.62E-03	1.28E-03	NA	NA	2.98E-03	8	5.53E+02	6.91E+01	4.31E-05	2.77E+03	3.46E+02	8.61E-06	0.00%	0.00%
Aroclor 1254	NA	mg/L	NA	mg/kg	1.58E+00	mg/kg	NA	NA	6.52E+01	2.20E-02	1.00E+00	1.00E+00	NA	NA	1.99E-02	NA	NA	1.23E+01	6.79E-03	0.00E+00	0.00E+00	1.24E+01	8	1.80E-01	2.25E-02	5.49E+02	1.80E+00	2.25E-01	5.49E+01	13.02%	6.13%
Aroclor 1260	NA	mg/L	NA	mg/kg	1.09E+00	mg/kg	NA	NA	6.52E+01	1.10E-02	1.00E+00	1.00E+00	NA	NA	1.37E-02	NA	NA	8.51E+00	2.34E-03	0.00E+00	0.00E+00	8.53E+00	8	1.80E-01	2.25E-02	3.79E+02	1.80E+00	2.25E-01	3.79E+01	8.98%	4.23%
Benzo(a)anthracene	NA	mg/L	NA	mg/kg	2.80E-02	mg/kg	NA	NA	1.59E+00	2.84E-01	NA	NA	NA	NA	3.53E-04	NA	NA	5.33E-03	1.55E-03	NA	NA	7.24E-03	8	5.53E+02	6.91E+01	1.05E-04	2.77E+03	3.46E+02	2.09E-05	0.00%	0.00%
Benzo(a)pyrene	NA	mg/L	NA	mg/kg	2.80E-02	mg/kg	NA	NA	1.33E+00	1.39E-01	NA	NA	NA	NA	3.53E-04	NA	NA	4.46E-03	7.61E-04	NA	NA	5.57E-03	8	5.53E+02	6.91E+01	8.06E-05	2.77E+03	3.46E+02	1.61E-05	0.00%	0.00%
Benzo(b)fluoranthene	NA	mg/L	NA	mg/kg	6.70E-02	mg/kg	NA	NA	2.60E+00	3.10E-01	NA	NA	NA	NA	8.44E-04	NA	NA	2.08E-02	4.06E-03	NA	NA	2.57E-02	8	5.53E+02	6.91E+01	3.73E-04	2.77E+03	3.46E+02	7.45E-05	0.00%	0.00%
Benzo(g,h,i)perylene	NA	mg/L	NA	mg/kg	2.50E-02	mg/kg	NA	NA	2.94E+00	2.01E-01	NA	NA	NA	NA	3.15E-04	NA	NA	8.80E-03	9.80E-04	NA	NA	1.01E-02	8	5.53E+02	6.91E+01	1.46E-04	2.77E+03	3.46E+02	2.92E-05	0.00%	0.00%
Benzo(k)fluoranthene	NA	mg/L	NA	mg/kg	1.85E-02	mg/kg	NA	NA	2.60E+00	2.02E-01	NA	NA	NA	NA	2.33E-04	NA	NA	5.76E-03	7.31E-04	NA	NA	6.72E-03	8	5.53E+02	6.91E+01	9.72E-05	2.77E+03	3.46E+02	1.94E-05	0.00%	0.00%
Chrysene	NA	mg/L	NA	mg/kg	3.70E-02	mg/kg	NA	NA	2.29E+00	2.54E-01	NA	NA	NA	NA	4.66E-04	NA	NA	1.01E-02	1.83E-03	NA	NA	1.24E-02	8	5.53E+02	6.91E+01	1.80E-04	2.77E+03	3.46E+02	3.60E-05	0.00%	0.00%
Dibenz(a,h)anthracene	NA	mg/L	NA	mg/kg	3.50E-03	mg/kg	NA	NA	2.31E+00	1.30E-01	NA	NA	NA	NA	4.41E-05	NA	NA	9.68E-04	8.89E-05	NA	NA	1.10E-03	8	5.53E+02	6.91E+01	1.59E-05	2.77E+03	3.46E+02	3.18E-06	0.00%	0.00%
Endosulfan II	NA	mg/L	NA	mg/kg	1.99E-02	mg/kg	NA	NA	2.74E+00	3.70E-01	1.00E+00	1.00E+00	NA	NA	2.51E-04	NA	NA	6.53E-03	1.44E-03	0.00E+00	0.00E+00	8.21E-03	8	1.00E+01	1.25E+00	6.57E-03	5.00E+01	6.25E+00	1.31E-03	0.00%	0.00%
Endrin aldehyde	NA	mg/L	NA	mg/kg	3.34E-02	mg/kg	NA	NA	2.20E+01	6.50E-02	1.00E+00	1.00E+00	NA	NA	4.21E-04	NA	NA	8.77E-02	4.24E-04	0.00E+00	0.00E+00	8.86E-02	8	3.00E-01	3.75E-02	2.36E+00	1.50E+00	1.88E-01	4.72E-01	0.06%	0.05%
Endrin ketone	NA	mg/L	NA	mg/kg	4.46E-03	mg/kg	NA	NA	3.21E+01	5.10E-02	1.00E+00	1.00E+00	NA	NA	5.62E-05	NA	NA	1.71E-02	4.44E-05	0.00E+00	0.00E+00	1.72E-02	8	3.00E-01	3.75E-02	4.60E-01	1.50E+00	1.88E-01	9.20E-02	0.01%	0.01%
Fluoranthene	NA	mg/L	NA	mg/kg	5.35E-02	mg/kg	NA	NA	3.04E+00	5.00E-01	NA	NA	NA	NA	6.74E-04	NA	NA	1.95E-02	5.22E-03	NA	NA	2.54E-02	8	5.53E+02	6.91E+01	3.67E-04	2.77E+03	3.46E+02	7.34E-05	0.00%	0.00%
Fluorene	NA	mg/L	NA	mg/kg	9.00E-03	mg/kg	NA	NA	9.57E+00	2.40E+01	NA	NA	NA	NA	1.13E-04	NA	NA	1.03E-02	4.22E-02	NA	NA	5.26E-02	8	5.53E+02	6.91E+01	7.61E-04	2.77E+03	3.46E+02	1.52E-04	0.00%	0.00%
gamma-Chlordane	NA	mg/L	NA	mg/kg	2.81E-03	mg/kg	NA	NA	9.05E+02	2.43E-02	1.00E+00	1.00E+00	NA	NA	3.54E-05	NA	NA	3.04E-01	1.33E-05	0.00E+00	0.00E+00	3.04E-01	8	2.14E+00	2.68E-01	1.14E+00	1.07E+01	1.34E+00	2.27E-01	0.03%	0.03%
Hexachlorobenzene	NA	mg/L	NA	mg/kg	2.00E-02	mg/kg	NA	NA	1.49E+02	2.10E-01	1.00E+00	1.00E+00	NA	NA	2.52E-04	NA	NA	3.56E-01	8.20E-04	0.00E+00	0.00E+00	3.57E-01	8	2.25E-01	2.81E-02	1.27E+01	1.13E+00	1.41E-01	2.54E+00	0.30%	0.28%
Hexachlorobutadiene	NA	mg/L	NA	mg/kg	5.20E-02	mg/kg	NA	NA	9.28E+01	7.20E-02	1.00E+00	1.00E+00	NA	NA	6.55E-04	NA	NA	5.78E-01	7.31E-04	0.00E+00	0.00E+00	5.79E-01	8	3.19E+00	3.98E-01	1.45E+00	1.60E+01	1.99E+00	2.90E-01	0.03%	0.03%
Hexachloroethane	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.45E+01	3.30E-01	1.00E+00	1.00E+00	NA	NA	1.64E-04	NA	NA	3.81E-02	8.38E-04	0.00E+00	0.00E+00	3.91E-02	8	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	mg/L	NA	mg/kg	7.28E-04	mg/kg	NA	NA	1.79E+01	4.20E-01	1.00E+00	1.00E+00	NA	NA	9.17E-06	NA	NA	1.56E-03	5.97E-05	0.00E+00	0.00E+00	1.63E-03	8	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	mg/L	NA	mg/kg	5.50E-02	mg/kg	NA	NA	1.72E+00	2.55E+00	NA	NA	NA	NA	6.93E-04	NA	NA	1.13E-02	2.74E-02	NA	NA	3.94E-02	8	5.53E+02	6.91E+01	5.70E-04	2.77E+03	3.46E+02	1.14E-04	0.00%	0.00%
Pyrene	NA	mg/L	NA	mg/kg	5.05E-02	mg/kg	NA	NA	1.75E+00	7.20E-01	NA	NA	NA	NA	6.36E-04	NA	NA	1.06E-02	7.10E-03	NA	NA	1.83E-02	8	5.53E+02	6.91E+01	2.65E-04	2.77E+03	3.46E+02	5.30E-05	0.00%	0.00%
Arsenic	NA	mg/L	NA	mg/kg	6.89E+01	mg/kg	NA	NA	6.96E-02	3.75E-02	3.65E-03	3.65E-03	NA	NA	8.68E-01	NA	NA	5.74E-01	5.05E-01	0.00E+00	0.00E+00	1.95E+00	8	5.14E+00	6.43E-01	3.03E+00	1.28E+01	1.61E+00	1.21E+00	0.07%	0.14%
Cadmium	NA	mg/L	NA	mg/kg	1.98E+01	mg/kg	NA	NA	4.49E+00	1.60E-01	5.89E-02	5.89E-02	NA	NA	2.49E-01	NA	NA	1.06E+01	6.20E-01	0.00E+00	0.00E+00	1.15E+01	8	1.45E+00	1.81E-01	6.35E+01	2.00E+01	2.50E+00	4.60E+00	1.50%	0.51%
Chromium	NA	mg/L	NA	mg/kg	2.99E+02	mg/kg	NA	NA	3.06E-01	4.10E-02	5.09E-02	5.09E-02	NA	NA	3.77E+00	NA	NA	1.10E+01	2.39E+00	0.00E+00	0.00E+00	1.71E+01	8	1.00E+00	1.25E-01	1.37E+02	2.78E+00	3.48E-01	4.92E+01	3.24%	5.50%
Copper	NA	mg/L	NA	mg/kg	2.38E+04	mg/kg	NA	NA	5.15E-01	4.34E-03	1.38E-03	1.38E-03	NA	NA	3.00E+02	NA	NA	1.47E+03	2.02E+01	0.00E+00	0.00E+00	1.79E+03	8	4.70E+01	5.88E+00	3.04E+02	6.20E+01	7.75E+00	2.31E+02	7.21%	25.75%
Lead	NA	mg/L	NA	mg/kg	2.59E+04	mg/kg	NA	NA	1.13E-01	3.06E-03	3.73E-03	3.73E-03	NA	NA	3.26E+02	NA	NA	3.50E+02	1.55E+01	0.00E+00	0.00E+00	6.91E+02	8	3.85E+00	4.81E-01	1.44E+03	1.93E+01	2.41E+00	2.87E+02	34.03%	32.08%
Mercury	NA	mg/L	NA	mg/kg	2.20E+00	mg/kg	NA	NA	3.30E+01	2.56E-01	1.05E+00	1.05E+00	NA	NA	2.77E-02	NA	NA	8.69E+00	1.10E-01	0.00E+00	0.00E+00	8.83E+00	8	4.50E-01	5.63E-02	1.57E+02	9.00E-01	1.13E-01	7.85E+01	3.72%	8.76%
Nickel	NA	mg/L	NA	mg/kg	4.04E+02	mg/kg	NA	NA	7.80E+00	2.39E-02	3.17E-02	3.17E-02	NA	NA	5.09E+00	NA	NA	3.77E+02	1.88E+00	0.00E+00	0.00E+00	3.84E+02	8	7.74E+01	9.68E+00	3.97E+01	1.07E+02	1.34E+01	2.87E+01	0.94%	3.21%
Selenium	NA	mg/L	NA	mg/kg	1.30E+00	mg/kg	NA	NA	8.65E-01	5.22E-01	6.15E+01	6.15E+01	NA	NA	1.64E-02	NA	NA	1.35E-01	1.33E-01	0.00E+00	0.00E+00	2.84E-01	8	5.00E-01	6.25E-02	4.54E+00	1.00E+00	1.25E-01	2.27E+00	0.11%	0.25%
Silver	NA	mg/L	NA	mg/kg	6.52E+01	mg/kg	NA	NA	2.05E+00	1.40E-02	4.00E-03	4.00E-03	NA	NA	8.21E-01	NA	NA	1.60E+01	1.78E-01	0.00E+00	0.00E+00	1.70E+01	8	1.78E+02	2.23E+01	7.62E-01	8.90E+02	1.11E+02	1.52E-01	0.02%	0.02%
Zinc	NA	mg/L	NA	mg/kg	1.52E+04	mg/kg	NA	NA	1.32E-01	6.58E-02	1.02E-02	1.02E-02	NA	NA	1.92E+02	NA	NA	2.41E+02	1.96E+02	0.00E+00	0.00E+00	6.29E+02	8	1.45E+01	1.81E+00	3.47E+02	1.31E+02	1.64E+01	3.84E+01	8.22%	4.29%
Indeno(1,2,3-cd)pyrene	NA	mg/L	NA	mg/kg	2.60E-02	mg/kg	NA	NA	2.86E+00	1.10E-01	NA	NA	NA	NA	3.28E-04	NA	NA	8.90E-03	5.58E-04	NA	NA	9.79E-03	8	5.53E+02	6.91E+01	1.42E-04	2.77E+03	3.46E+02	2.83E-05	0.00%	0.00%

Hazard Index (Total EEQ): 4.22E+03 8.96E+02 100.00% 100.00%

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 =	0.62	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 =	0.36	acres
Frac. home range (FHR) =	**1.00E+00**	**unitless**

Table F-10
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for American Robins at the FLFA

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		LOAEL	Adjusted LOAEL		Percent Contribution to	Percent Contribution to
							---------- 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	EEQ N	mg/kg-d	mg/kg-d	EEQ L	EEQ N	EEQ L
2,3,7,8-TCDD TE	NA	mg/L	NA	mg/kg	1.98E-05	mg/kg	NA	NA	4.86E+00	3.90E-03	2.20E+00	2.20E+00	NA	NA	4.92E-08	NA	NA	2.27E-06	2.97E-09	0.00E+00	0.00E+00	2.32E-06	8	1.40E-05	1.75E-06	1.33E+00	1.40E-04	1.75E-05	1.33E-01	0.40%	0.20%
1,2,4-Trichlorobenzene	NA	mg/L	NA	mg/kg	5.45E-02	mg/kg	NA	NA	3.07E+01	2.10E-01	5.00E-01	5.00E-01	NA	NA	1.35E-04	NA	NA	3.94E-02	4.41E-04	0.00E+00	0.00E+00	4.00E-02	8	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.26E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	1.27E-04	NA	NA	5.13E-02	9.62E-04	0.00E+00	0.00E+00	5.24E-02	8	1.61E+01	2.01E+00	2.60E-02	8.04E+01	1.01E+01	5.21E-03	0.01%	0.01%
1,3-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.07E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	1.27E-04	NA	NA	4.90E-02	9.62E-04	0.00E+00	0.00E+00	5.01E-02	8	1.61E+01	2.01E+00	2.49E-02	8.04E+01	1.01E+01	4.98E-03	0.01%	0.01%
1,4-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.25E-02	mg/kg	NA	NA	1.99E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	1.30E-04	NA	NA	2.46E-02	9.90E-04	0.00E+00	0.00E+00	2.57E-02	8	1.61E+01	2.01E+00	1.28E-02	8.04E+01	1.01E+01	2.56E-03	0.00%	0.00%
4,4'-DDD	NA	mg/L	NA	mg/kg	5.93E-03	mg/kg	NA	NA	15.07	1.60E-02	5.00E-01	5.00E-01	NA	NA	1.47E-05	NA	NA	2.11E-03	3.65E-06	0.00E+00	0.00E+00	2.13E-03	8	2.80E-03	3.50E-04	6.08E+00	2.80E-02	3.50E-03	6.08E-01	1.81%	0.91%
4,4'-DDE	NA	mg/L	NA	mg/kg	4.93E-02	mg/kg	NA	NA	17.07	1.30E-02	1.12E+02	1.12E+02	NA	NA	1.22E-04	NA	NA	1.99E-02	2.47E-05	0.00E+00	0.00E+00	2.00E-02	8	2.80E-03	3.50E-04	5.71E+01	2.80E-02	3.50E-03	5.71E+00	17.02%	8.58%
4,4'-DDT	NA	mg/L	NA	mg/kg	8.32E-02	mg/kg	NA	NA	11.60	4.60E-03	6.43E+00	6.43E+00	NA	NA	2.07E-04	NA	NA	2.28E-02	1.47E-05	0.00E+00	0.00E+00	2.30E-02	8	2.80E-03	3.50E-04	6.57E+01	2.80E-02	3.50E-03	6.57E+00	19.56%	9.86%
4-Chlorophenyl phenylether	NA	mg/L	NA	mg/kg	1.20E-02	mg/kg	NA	NA	8.38E+01	7.50E-02	5.00E-01	5.00E-01	NA	NA	2.98E-05	NA	NA	2.37E-02	3.46E-05	0.00E+00	0.00E+00	2.38E-02	8	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	1.47E+00	1.21E+01	NA	NA	NA	NA	3.23E-05	NA	NA	4.51E-04	6.08E-03	NA	NA	6.56E-03	8	5.53E+02	6.91E+01	9.49E-05	2.77E+03	3.46E+02	1.90E-05	0.00%	0.00%
Acenaphthylene	NA	mg/L	NA	mg/kg	7.28E-03	mg/kg	NA	NA	2.29E+01	8.91E-01	NA	NA	NA	NA	1.81E-05	NA	NA	3.93E-03	2.50E-04	NA	NA	4.20E-03	8	5.53E+02	6.91E+01	6.08E-05	2.77E+03	3.46E+02	1.22E-05	0.00%	0.00%
Anthracene	NA	mg/L	NA	mg/kg	4.76E-03	mg/kg	NA	NA	2.42E+00	1.22E+00	NA	NA	NA	NA	1.18E-05	NA	NA	2.72E-04	2.23E-04	NA	NA	5.07E-04	8	5.53E+02	6.91E+01	7.33E-06	2.77E+03	3.46E+02	1.47E-06	0.00%	0.00%
Aroclor 1254	NA	mg/L	NA	mg/kg	4.88E-01	mg/kg	NA	NA	4.86	3.60E-03	5.00E-01	5.00E-01	NA	NA	1.21E-03	NA	NA	5.60E-02	6.76E-05	0.00E+00	0.00E+00	5.73E-02	8	1.80E-01	2.25E-02	2.55E+00	1.80E+00	2.25E-01	2.55E-01	0.76%	0.38%
Aroclor 1260	NA	mg/L	NA	mg/kg	2.19E-01	mg/kg	NA	NA	3.86	6.40E-04	5.00E-01	5.00E-01	NA	NA	5.44E-04	NA	NA	1.99E-02	5.40E-06	0.00E+00	0.00E+00	2.05E-02	8	1.80E-01	2.25E-02	9.10E-01	1.80E+00	2.25E-01	9.10E-02	0.27%	0.14%
Benzo(a)anthracene	NA	mg/L	NA	mg/kg	2.02E-02	mg/kg	NA	NA	1.59E+00	3.25E-01	NA	NA	NA	NA	5.02E-05	NA	NA	7.58E-04	2.52E-04	NA	NA	1.06E-03	8	5.53E+02	6.91E+01	1.53E-05	2.77E+03	3.46E+02	3.07E-06	0.00%	0.00%
Benzo(a)pyrene	NA	mg/L	NA	mg/kg	2.47E-02	mg/kg	NA	NA	1.33E+00	1.40E-01	NA	NA	NA	NA	6.14E-05	NA	NA	7.75E-04	1.33E-04	NA	NA	9.69E-04	8	5.53E+02	6.91E+01	1.40E-05	2.77E+03	3.46E+02	2.80E-06	0.00%	0.00%
Benzo(b)fluoranthene	NA	mg/L	NA	mg/kg	4.82E-02	mg/kg	NA	NA	2.60E+00	3.10E-01	NA	NA	NA	NA	1.20E-04	NA	NA	2.96E-03	5.75E-04	NA	NA	3.65E-03	8	5.53E+02	6.91E+01	5.28E-05	2.77E+03	3.46E+02	1.06E-05	0.00%	0.00%
Benzo(g,h,i)perylene	NA	mg/L	NA	mg/kg	1.85E-02	mg/kg	NA	NA	2.94E+00	1.90E-01	NA	NA	NA	NA	4.60E-05	NA	NA	1.28E-03	1.35E-04	NA	NA	1.46E-03	8	5.53E+02	6.91E+01	2.12E-05	2.77E+03	3.46E+02	4.24E-06	0.00%	0.00%
Benzo(k)fluoranthene	NA	mg/L	NA	mg/kg	1.43E-02	mg/kg	NA	NA	2.60E+00	2.10E-01	NA	NA	NA	NA	3.55E-05	NA	NA	8.77E-04	1.16E-04	NA	NA	1.03E-03	8	5.53E+02	6.91E+01	1.49E-05	2.77E+03	3.46E+02	2.98E-06	0.00%	0.00%
Chrysene	NA	mg/L	NA	mg/kg	2.93E-02	mg/kg	NA	NA	2.29E+00	2.79E-01	NA	NA	NA	NA	7.28E-05	NA	NA	1.58E-03	3.15E-04	NA	NA	1.97E-03	8	5.53E+02	6.91E+01	2.85E-05	2.77E+03	3.46E+02	5.70E-06	0.00%	0.00%
Dibenz(a,h)anthracene	NA	mg/L	NA	mg/kg	3.50E-03	mg/kg	NA	NA	2.31E+00	1.30E-01	NA	NA	NA	NA	8.69E-06	NA	NA	1.91E-04	1.75E-05	NA	NA	2.17E-04	8	5.53E+02	6.91E+01	3.14E-06	2.77E+03	3.46E+02	6.28E-07	0.00%	0.00%
Endosulfan II	NA	mg/L	NA	mg/kg	1.99E-02	mg/kg	NA	NA	2.74E+00	3.70E-01	5.00E-01	5.00E-01	NA	NA	4.94E-05	NA	NA	1.29E-03	2.83E-04	0.00E+00	0.00E+00	1.62E-03	8	1.00E+01	1.25E+00	1.30E-03	5.00E+01	6.25E+00	2.59E-04	0.00%	0.00%
Endrin aldehyde	NA	mg/L	NA	mg/kg	3.34E-02	mg/kg	NA	NA	2.20E+01	6.50E-02	5.00E-01	5.00E-01	NA	NA	8.30E-05	NA	NA	1.73E-02	8.36E-05	0.00E+00	0.00E+00	1.75E-02	8	3.00E-01	3.75E-02	4.66E-01	1.50E+00	1.88E-01	9.32E-02	0.14%	0.14%
Endrin ketone	NA	mg/L	NA	mg/kg	4.46E-03	mg/kg	NA	NA	3.21E+01	5.10E-02	5.00E-01	5.00E-01	NA	NA	1.11E-05	NA	NA	3.38E-03	8.76E-06	0.00E+00	0.00E+00	3.40E-03	8	3.00E-01	3.75E-02	9.06E-02	1.50E+00	1.88E-01	1.81E-02	0.03%	0.03%
Fluoranthene	NA	mg/L	NA	mg/kg	3.85E-02	mg/kg	NA	NA	3.04E+00	5.00E-01	NA	NA	NA	NA	9.56E-05	NA	NA	2.76E-03	7.41E-04	NA	NA	3.60E-03	8	5.53E+02	6.91E+01	5.21E-05	2.77E+03	3.46E+02	1.04E-05	0.00%	0.00%
Fluorene	NA	mg/L	NA	mg/kg	5.67E-03	mg/kg	NA	NA	9.57E+00	5.66E+01	NA	NA	NA	NA	1.41E-05	NA	NA	1.28E-03	1.24E-02	NA	NA	1.37E-02	8	5.53E+02	6.91E+01	1.98E-04	2.77E+03	3.46E+02	3.95E-05	0.00%	0.00%
gamma-Chlordane	NA	mg/L	NA	mg/kg	2.81E-03	mg/kg	NA	NA	9.05E+02	2.43E-02	5.00E-01	5.00E-01	NA	NA	6.98E-06	NA	NA	6.00E-02	2.63E-06	0.00E+00	0.00E+00	6.00E-02	8	2.14E+00	2.68E-01	2.24E-01	1.07E+01	1.34E+00	4.49E-02	0.07%	0.07%
Hexachlorobenzene	NA	mg/L	NA	mg/kg	2.00E-02	mg/kg	NA	NA	1.49E+02	1.60E-02	5.00E-01	5.00E-01	NA	NA	4.97E-05	NA	NA	7.01E-02	1.23E-05	0.00E+00	0.00E+00	7.02E-02	8	2.25E-01	2.81E-02	2.50E+00	1.13E+00	1.41E-01	4.99E-01	0.74%	0.75%
Hexachlorobutadiene	NA	mg/L	NA	mg/kg	5.20E-02	mg/kg	NA	NA	9.28E+01	7.20E-02	5.00E-01	5.00E-01	NA	NA	1.29E-04	NA	NA	1.14E-01	1.44E-04	0.00E+00	0.00E+00	1.14E-01	8	3.19E+00	3.98E-01	2.87E-01	1.60E+01	1.99E+00	5.73E-02	0.09%	0.09%
Hexachloroethane	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.45E+01	1.80E-01	5.00E-01	5.00E-01	NA	NA	3.23E-05	NA	NA	7.51E-03	9.01E-05	0.00E+00	0.00E+00	7.63E-03	8	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	mg/L	NA	mg/kg	1.98E-02	mg/kg	NA	NA	2.86E+00	1.10E-01	NA	NA	NA	NA	4.92E-05	NA	NA	1.34E-03	8.39E-05	NA	NA	1.47E-03	8	5.53E+02	6.91E+01	2.13E-05	2.77E+03	3.46E+02	4.25E-06	0.00%	0.00%
Methoxychlor	NA	mg/L	NA	mg/kg	7.28E-04	mg/kg	NA	NA	1.79E+01	2.00E-02	5.00E-01	5.00E-01	NA	NA	1.81E-06	NA	NA	3.07E-04	5.61E-07	0.00E+00	0.00E+00	3.10E-04	8	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	mg/L	NA	mg/kg	3.84E-02	mg/kg	NA	NA	1.72E+00	2.92E+00	NA	NA	NA	NA	9.54E-05	NA	NA	1.56E-03	4.32E-03	NA	NA	5.97E-03	8	5.53E+02	6.91E+01	8.64E-05	2.77E+03	3.46E+02	1.73E-05	0.00%	0.00%
Pyrene	NA	mg/L	NA	mg/kg	3.96E-02	mg/kg	NA	NA	1.75E+00	7.20E-01	NA	NA	NA	NA	9.84E-05	NA	NA	1.64E-03	1.10E-03	NA	NA	2.83E-03	8	5.53E+02	6.91E+01	4.10E-05	2.77E+03	3.46E+02	8.19E-06	0.00%	0.00%
Arsenic	NA	mg/L	NA	mg/kg	1.40E+01	mg/kg	NA	NA	1.11E-01	3.75E-02	4.87E-03	4.87E-03	NA	NA	3.48E-02	NA	NA	3.67E-02	2.02E-02	0.00E+00	0.00E+00	9.17E-02	8	5.14E+00	6.43E-01	1.43E-01	1.28E+01	1.61E+00	5.71E-02	0.04%	0.09%
Cadmium	NA	mg/L	NA	mg/kg	3.27E+00	mg/kg	NA	NA	6.49E+00	3.63E-01	1.52E-01	1.52E-01	NA	NA	8.13E-03	NA	NA	5.02E-01	4.58E-02	0.00E+00	0.00E+00	5.56E-01	8	1.45E+00	1.81E-01	3.07E+00	2.00E+01	2.50E+00	2.22E-01	0.91%	0.33%
Chromium	NA	mg/L	NA	mg/kg	1.17E+02	mg/kg	NA	NA	3.06E-01	4.10E-02	6.54E-02	6.54E-02	NA	NA	2.90E-01	NA	NA	8.44E-01	1.85E-01	0.00E+00	0.00E+00	1.32E+00	8	1.00E+00	1.25E-01	1.06E+01	2.78E+00	3.48E-01	3.80E+00	3.14%	5.70%
Copper	NA	mg/L	NA	mg/kg	1.06E+04	mg/kg	NA	NA	5.15E-01	7.09E-03	2.76E-03	2.76E-03	NA	NA	2.63E+01	NA	NA	1.29E+02	2.89E+00	0.00E+00	0.00E+00	1.58E+02	8	4.70E+01	5.88E+00	2.69E+01	6.20E+01	7.75E+00	2.04E+01	8.01%	30.60%
Lead	NA	mg/L	NA	mg/kg	8.97E+03	mg/kg	NA	NA	1.39E-01	4.87E-03	6.73E-03	6.73E-03	NA	NA	2.23E+01	NA	NA	2.94E+01	1.68E+00	0.00E+00	0.00E+00	5.34E+01	8	3.85E+00	4.81E-01	1.11E+02	1.93E+01	2.41E+00	2.22E+01	33.02%	33.28%
Mercury	NA	mg/L	NA	mg/kg	1.01E+00	mg/kg	NA	NA	1.07E+00	3.66E-01	1.92E-01	1.92E-01	NA	NA	2.51E-03	NA	NA	2.56E-02	1.42E-02	0.00E+00	0.00E+00	4.24E-02	8	4.50E-01	5.63E-02	7.53E-01	9.00E-01	1.13E-01	3.77E-01	0.22%	0.57%
Nickel	NA	mg/L	NA	mg/kg	1.06E+02	mg/kg	NA	NA	1.06E+00	3.35E-02	6.48E-02	6.48E-02	NA	NA	2.63E-01	NA	NA	2.64E+00	1.36E-01	0.00E+00	0.00E+00	3.04E+00	8	7.74E+01	9.68E+00	3.14E-01	1.07E+02	1.34E+01	2.27E-01	0.09%	0.34%
Selenium	NA	mg/L	NA	mg/kg	7.28E-01	mg/kg	NA	NA	1.01E+00	4.92E-01	8.04E-01	8.04E-01	NA	NA	1.81E-03	NA	NA	1.73E-02	1.38E-02	0.00E+00	0.00E+00	3.29E-02	8	5.00E-01	6.25E-02	5.27E-01	1.00E+00	1.25E-01	2.63E-01	0.16%	0.40%
Silver	NA	mg/L	NA	mg/kg	3.63E+01	mg/kg	NA	NA	2.05E+00	1.40E-02	4.00E-03	4.00E-03	NA	NA	9.01E-02	NA	NA	1.75E+00	1.96E-02	0.00E+00	0.00E+00	1.86E+00	8	1.78E+02	2.23E+01	8.36E-02	8.90E+02	1.11E+02	1.67E-02	0.02%	0.03%
Zinc	NA	mg/L	NA	mg/kg	7.44E+03	mg/kg	NA	NA	2.14E-01	9.06E-02	1.98E-02	1.98E-02	NA	NA	1.85E+01	NA	NA	3.76E+01	2.60E+01	0.00E+00	0.00E+00	8.20E+01	8	1.45E+01	1.81E+00	4.53E+01	1.31E+02	1.64E+01	5.01E+00	13.48%	7.52%
																					Hazard Index (Total EEQ):			3.36E+02			6.66E+01	100.00%	100.00%

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 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 =	0.36	acres
Frac. home range (FHR) =	**3.00E-01**	**unitless**

Table F-10
Uncertainty Factors[a] for Ecological TRV[b] Extrapolations[c] at the FLFA

Laboratory Animals (toxicity data base)		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		
Brown pelican	G: Pelecanus F: Pelicanidae O: Pelicaniformes		
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		
Japanese quail	G: Coturnix F: Phasianidae O: Galliformes		

Continued on next page

Table F-10
Uncertainty Factors[a] for Ecological TRV[b] Extrapolations[c] at the FLFA
Page 2 of 2

[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; and

Table F-11
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Red-Tailed Hawks at the FLFA

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		LOAEL	Adjusted LOAEL		Percent Contribution to	Percent Contribution to
							---------- 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	EEQ N	mg/kg-d	mg/kg-d	EEQ L	EEQ N	EEQ L
2,3,7,8-TCDD TE	NA	mg/L	NA	mg/kg	4.34E-05	mg/kg	NA	NA	4.21E+01	1.10E-02	2.20E+00	2.20E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.77E-06	1.51E-06	6.28E-06	8	1.40E-05	1.75E-06	3.59E+00	1.40E-04	1.75E-05	3.59E-01	0.28%	0.22%
1,2,4-Trichlorobenzene	NA	mg/L	NA	mg/kg	5.45E-02	mg/kg	NA	NA	3.07E+01	3.10E-01	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.73E-03	8.61E-04	3.59E-03	8	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.26E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.55E-03	8.06E-04	3.36E-03	8	1.61E+01	2.01E+00	1.67E-03	8.04E+01	1.01E+01	3.34E-04	0.00%	0.00%
1,3-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.07E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.55E-03	8.06E-04	3.36E-03	8	1.61E+01	2.01E+00	1.67E-03	8.04E+01	1.01E+01	3.34E-04	0.00%	0.00%
1,4-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.25E-02	mg/kg	NA	NA	1.99E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.63E-03	8.29E-04	3.46E-03	8	1.61E+01	2.01E+00	1.72E-03	8.04E+01	1.01E+01	3.44E-04	0.00%	0.00%
4,4'-DDD	NA	mg/L	NA	mg/kg	5.93E-03	mg/kg	NA	NA	15.07	5.00E-02	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.97E-04	9.37E-05	3.90E-04	8	2.80E-03	3.50E-04	1.12E+00	2.80E-02	3.50E-03	1.12E-01	0.09%	0.07%
4,4'-DDE	NA	mg/L	NA	mg/kg	4.93E-02	mg/kg	NA	NA	17.07	2.00E-02	1.12E+02	1.12E+02	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.77E-01	8.74E-02	3.64E-01	8	2.80E-03	3.50E-04	1.04E+03	2.80E-02	3.50E-03	1.04E+02	82.03%	62.92%
4,4'-DDT	NA	mg/L	NA	mg/kg	8.32E-02	mg/kg	NA	NA	11.60	6.00E-02	6.43E+00	6.43E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.68E-02	8.46E-03	3.52E-02	8	2.80E-03	3.50E-04	1.01E+02	2.80E-02	3.50E-03	1.01E+01	7.94%	6.09%
4-Chlorophenyl phenylether	NA	mg/L	NA	mg/kg	1.20E-02	mg/kg	NA	NA	8.38E+01	1.70E-01	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	6.00E-04	1.90E-04	7.90E-04	8	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	1.47E+00	1.21E+01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Acenaphthylene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.29E+01	7.90E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Anthracene	NA	mg/L	NA	mg/kg	5.60E-03	mg/kg	NA	NA	2.42E+00	1.17E+00	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Aroclor 1254	NA	mg/L	NA	mg/kg	1.58E+00	mg/kg	NA	NA	6.52E+01	2.20E-02	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	7.90E-02	2.50E-02	1.04E-01	8	1.80E-01	2.25E-02	4.62E+00	1.80E+00	2.25E-01	4.62E-01	0.36%	0.28%
Aroclor 1260	**NA**	**mg/L**	**NA**	**mg/kg**	**1.09E+00**	**mg/kg**	**NA**	**NA**	**6.52E+01**	**1.10E-02**	**1.00E+00**	**1.00E+00**	**NA**	**NA**	**0.00E+00**	**NA**	**NA**	**0.00E+00**	**0.00E+00**	**5.45E-02**	**1.72E-02**	**7.18E-02**	**8**	**1.80E-01**	**2.25E-02**	**3.19E+00**	**1.80E+00**	**2.25E-01**	**3.19E-01**	**0.25%**	**0.19%**
Benzo(a)anthracene	NA	mg/L	NA	mg/kg	2.80E-02	mg/kg	NA	NA	1.59E+00	2.84E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Benzo(a)pyrene	NA	mg/L	NA	mg/kg	2.80E-02	mg/kg	NA	NA	1.33E+00	1.39E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Benzo(b)fluoranthene	NA	mg/L	NA	mg/kg	6.70E-02	mg/kg	NA	NA	2.60E+00	3.10E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Benzo(g,h,i)perylene	NA	mg/L	NA	mg/kg	2.50E-02	mg/kg	NA	NA	2.94E+00	2.01E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Benzo(k)fluoranthene	NA	mg/L	NA	mg/kg	1.85E-02	mg/kg	NA	NA	2.60E+00	2.02E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Chrysene	NA	mg/L	NA	mg/kg	3.70E-02	mg/kg	NA	NA	2.29E+00	2.54E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Dibenz(a,h)anthracene	NA	mg/L	NA	mg/kg	3.50E-03	mg/kg	NA	NA	2.31E+00	1.30E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Endosulfan II	NA	mg/L	NA	mg/kg	1.99E-02	mg/kg	NA	NA	2.74E+00	3.70E-01	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	9.96E-04	3.14E-04	1.31E-03	8	1.00E+01	1.25E+00	1.05E-03	5.00E+01	6.25E+00	2.10E-04	0.00%	0.00%
Endrin aldehyde	NA	mg/L	NA	mg/kg	3.34E-02	mg/kg	NA	NA	2.20E+01	6.50E-02	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.67E-03	5.28E-04	2.20E-03	8	3.00E-01	3.75E-02	5.86E-02	1.50E+00	1.88E-01	1.17E-02	0.00%	0.01%
Endrin ketone	NA	mg/L	NA	mg/kg	4.46E-03	mg/kg	NA	NA	3.21E+01	5.10E-02	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.23E-04	7.05E-05	2.94E-04	8	3.00E-01	3.75E-02	7.83E-03	1.50E+00	1.88E-01	1.57E-03	0.00%	0.00%
Fluoranthene	NA	mg/L	NA	mg/kg	5.35E-02	mg/kg	NA	NA	3.04E+00	5.00E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Fluorene	NA	mg/L	NA	mg/kg	9.00E-03	mg/kg	NA	NA	9.57E+00	2.40E+01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
gamma-Chlordane	NA	mg/L	NA	mg/kg	2.81E-03	mg/kg	NA	NA	9.05E+02	2.43E-02	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.41E-04	4.44E-05	1.85E-04	8	2.14E+00	2.68E-01	6.92E-04	1.07E+01	1.34E+00	1.38E-04	0.00%	0.00%
Hexachlorobenzene	NA	mg/L	NA	mg/kg	2.00E-02	mg/kg	NA	NA	1.49E+02	2.10E-01	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.00E-03	3.16E-04	1.32E-03	8	2.25E-01	2.81E-02	4.68E-02	1.13E+00	1.41E-01	9.36E-03	0.00%	0.01%
Hexachlorobutadiene	NA	mg/L	NA	mg/kg	5.20E-02	mg/kg	NA	NA	9.28E+01	7.20E-02	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.60E-03	8.22E-04	3.42E-03	8	3.19E+00	3.98E-01	8.60E-03	1.60E+01	1.99E+00	1.72E-03	0.00%	0.00%
Hexachloroethane	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.45E+01	3.30E-01	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	6.50E-04	2.05E-04	8.56E-04	8	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	mg/L	NA	mg/kg	2.60E-02	mg/kg	NA	NA	2.86E+00	1.10E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Methoxychlor	NA	mg/L	NA	mg/kg	7.28E-04	mg/kg	NA	NA	1.79E+01	4.20E-01	1.00E+00	1.00E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.64E-05	1.15E-05	4.79E-05	8	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	mg/L	NA	mg/kg	5.50E-02	mg/kg	NA	NA	1.72E+00	2.55E+00	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Pyrene	NA	mg/L	NA	mg/kg	5.05E-02	mg/kg	NA	NA	1.75E+00	7.20E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Arsenic	NA	mg/L	NA	mg/kg	6.89E+01	mg/kg	NA	NA	6.96E-02	3.75E-02	3.65E-03	3.65E-03	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.26E-02	3.97E-03	1.65E-02	8	5.14E+00	6.43E-01	2.57E-02	1.28E+01	1.61E+00	1.03E-02	0.00%	0.01%
Cadmium	NA	mg/L	NA	mg/kg	1.98E+01	mg/kg	NA	NA	4.49E+00	1.60E-01	5.89E-02	5.89E-02	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	5.83E-02	1.84E-02	7.67E-02	8	1.45E+00	1.81E-01	4.23E-01	2.00E+01	2.50E+00	3.07E-02	0.03%	0.02%
Chromium	NA	mg/L	NA	mg/kg	2.99E+02	mg/kg	NA	NA	3.06E-01	4.10E-02	5.09E-02	5.09E-02	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	7.62E-01	2.41E-01	1.00E+00	8	1.00E+00	1.25E-01	8.02E+00	2.78E+00	3.48E-01	2.88E+00	0.63%	1.74%
Copper	NA	mg/L	NA	mg/kg	2.38E+04	mg/kg	NA	NA	5.15E-01	4.34E-03	1.38E-03	1.38E-03	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.65E+00	5.20E-01	2.17E+00	8	4.70E+01	5.88E+00	3.69E-01	6.20E+01	7.75E+00	2.79E-01	0.03%	0.17%
Lead	NA	mg/L	NA	mg/kg	2.59E+04	mg/kg	NA	NA	1.13E-01	3.06E-03	3.73E-03	3.73E-03	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.82E+00	1.52E+00	6.35E+00	8	3.85E+00	4.81E-01	1.32E+01	1.93E+01	2.41E+00	2.64E+00	1.04%	1.59%
Mercury	NA	mg/L	NA	mg/kg	2.20E+00	mg/kg	NA	NA	3.30E+01	2.56E-01	1.05E+00	1.05E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.15E-01	3.64E-02	1.51E-01	8	4.50E-01	5.63E-02	2.69E+00	9.00E-01	1.13E-01	1.35E+00	0.21%	0.81%
Nickel	NA	mg/L	NA	mg/kg	4.04E+02	mg/kg	NA	NA	7.80E+00	2.39E-02	3.17E-02	3.17E-02	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	6.40E-01	2.02E-01	8.42E-01	8	7.74E+01	9.68E+00	8.71E-02	1.07E+02	1.34E+01	6.30E-02	0.01%	0.04%
Selenium	NA	mg/L	NA	mg/kg	1.30E+00	mg/kg	NA	NA	8.65E-01	5.22E-01	6.15E+01	6.15E+01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.00E+00	1.26E+00	5.26E+00	8	5.00E-01	6.25E-02	8.42E+01	1.00E+00	1.25E-01	4.21E+01	6.64%	25.46%
Silver	NA	mg/L	NA	mg/kg	6.52E+01	mg/kg	NA	NA	2.05E+00	1.40E-02	4.00E-03	4.00E-03	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.30E-02	4.12E-03	1.72E-02	8	1.78E+02	2.23E+01	7.72E-04	8.90E+02	1.11E+02	1.54E-04	0.00%	0.00%
Zinc	NA	mg/L	NA	mg/kg	1.52E+04	mg/kg	NA	NA	1.32E-01	6.58E-02	1.02E-02	1.02E-02	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	7.75E+00	2.45E+00	1.02E+01	8	1.45E+01	1.81E+00	5.63E+00	1.31E+02	1.64E+01	6.23E-01	0.44%	0.38%

Hazard Index (Total EEQ): 1.27E+03 1.65E+02 100.00% 100.00%

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 =	0.36	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-12
Tier 2 Chemicals of Potential Ecological Concern EEQs and Hazard Indices for Red-Tailed Hawks at the FLFA

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		LOAEL	Adjusted LOAEL		Percent Contribution to	Percent Contribution to
							---------- 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	EEQ N	mg/kg-d	mg/kg-d	EEQ L	EEQ N	EEQ L
2,3,7,8-TCDD TE	NA	mg/L	NA	mg/kg	1.98E-05	mg/kg	NA	NA	4.86E+00	3.90E-03	2.20E+00	2.20E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.98E-10	9.41E-11	3.92E-10	8	1.40E-05	1.75E-06	2.24E-04	1.40E-04	1.75E-05	2.24E-05	0.14%	0.14%
1,2,4-Trichlorobenzene	NA	mg/L	NA	mg/kg	5.45E-02	mg/kg	NA	NA	3.07E+01	2.10E-01	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.86E-07	5.89E-08	2.45E-07	8	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.26E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.74E-07	5.51E-08	2.30E-07	8	1.61E+01	2.01E+00	1.14E-07	8.04E+01	1.01E+01	2.28E-08	0.00%	0.00%
1,3-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.07E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.74E-07	5.51E-08	2.30E-07	8	1.61E+01	2.01E+00	1.14E-07	8.04E+01	1.01E+01	2.28E-08	0.00%	0.00%
1,4-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.25E-02	mg/kg	NA	NA	1.99E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.80E-07	5.67E-08	2.36E-07	8	1.61E+01	2.01E+00	1.18E-07	8.04E+01	1.01E+01	2.35E-08	0.00%	0.00%
4,4'-DDD	NA	mg/L	NA	mg/kg	5.93E-03	mg/kg	NA	NA	15.07	1.60E-02	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.03E-08	6.40E-09	2.67E-08	8	2.80E-03	3.50E-04	7.62E-05	2.80E-02	3.50E-03	7.62E-06	0.05%	0.05%
4,4'-DDE	NA	mg/L	NA	mg/kg	4.93E-02	mg/kg	NA	NA	17.07	1.30E-02	1.12E+02	1.12E+02	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.79E-05	1.20E-05	4.98E-05	8	2.80E-03	3.50E-04	1.42E-01	2.80E-02	3.50E-03	1.42E-02	89.43%	87.54%
4,4'-DDT	NA	mg/L	NA	mg/kg	8.32E-02	mg/kg	NA	NA	11.60	4.60E-03	6.43E+00	6.43E+00	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.66E-06	1.16E-06	4.82E-06	8	2.80E-03	3.50E-04	1.38E-02	2.80E-02	3.50E-03	1.38E-03	8.65%	8.47%
4-Chlorophenyl phenylether	NA	mg/L	NA	mg/kg	1.20E-02	mg/kg	NA	NA	8.38E+01	7.50E-02	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.10E-08	1.30E-08	5.40E-08	8	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	1.47E+00	1.21E+01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Acenaphthylene	NA	mg/L	NA	mg/kg	7.28E-03	mg/kg	NA	NA	2.29E+01	8.91E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Anthracene	NA	mg/L	NA	mg/kg	4.76E-03	mg/kg	NA	NA	2.42E+00	1.22E+00	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Aroclor 1254	NA	mg/L	NA	mg/kg	4.88E-01	mg/kg	NA	NA	4.86	3.60E-03	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.67E-06	5.27E-07	2.20E-06	8	1.80E-01	2.25E-02	9.76E-05	1.80E+00	2.25E-01	9.76E-06	0.06%	0.06%
Aroclor 1260	NA	mg/L	NA	mg/kg	2.19E-01	mg/kg	NA	NA	3.86	6.40E-04	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	7.49E-07	2.37E-07	9.86E-07	8	1.80E-01	2.25E-02	4.38E-05	1.80E+00	2.25E-01	4.38E-06	0.03%	0.03%
Benzo(a)anthracene	NA	mg/L	NA	mg/kg	2.02E-02	mg/kg	NA	NA	1.59E+00	3.25E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Benzo(a)pyrene	NA	mg/L	NA	mg/kg	2.47E-02	mg/kg	NA	NA	1.33E+00	1.40E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Benzo(b)fluoranthene	NA	mg/L	NA	mg/kg	4.82E-02	mg/kg	NA	NA	2.60E+00	3.10E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Benzo(g,h,i)perylene	NA	mg/L	NA	mg/kg	1.85E-02	mg/kg	NA	NA	2.94E+00	1.90E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Benzo(k)fluoranthene	NA	mg/L	NA	mg/kg	1.43E-02	mg/kg	NA	NA	2.60E+00	2.10E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Chrysene	NA	mg/L	NA	mg/kg	2.93E-02	mg/kg	NA	NA	2.29E+00	2.79E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Dibenz(a,h)anthracene	NA	mg/L	NA	mg/kg	3.50E-03	mg/kg	NA	NA	2.31E+00	1.30E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Endosulfan II	NA	mg/L	NA	mg/kg	1.99E-02	mg/kg	NA	NA	2.74E+00	3.70E-01	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	6.81E-08	2.15E-08	8.96E-08	8	1.00E+01	1.25E+00	7.16E-08	5.00E+01	6.25E+00	1.43E-08	0.00%	0.00%
Endrin aldehyde	NA	mg/L	NA	mg/kg	3.34E-02	mg/kg	NA	NA	2.20E+01	6.50E-02	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.14E-07	3.61E-08	1.50E-07	8	3.00E-01	3.75E-02	4.01E-06	1.50E+00	1.88E-01	8.02E-07	0.00%	0.00%
Endrin ketone	NA	mg/L	NA	mg/kg	4.46E-03	mg/kg	NA	NA	3.21E+01	5.10E-02	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.53E-08	4.82E-09	2.01E-08	8	3.00E-01	3.75E-02	5.35E-07	1.50E+00	1.88E-01	1.07E-07	0.00%	0.00%
Fluoranthene	NA	mg/L	NA	mg/kg	3.85E-02	mg/kg	NA	NA	3.04E+00	5.00E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Fluorene	NA	mg/L	NA	mg/kg	5.67E-03	mg/kg	NA	NA	9.57E+00	5.66E+01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
gamma-Chlordane	NA	mg/L	NA	mg/kg	2.81E-03	mg/kg	NA	NA	9.05E+02	2.43E-02	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	9.61E-09	3.03E-09	1.26E-08	8	2.14E+00	2.68E-01	4.73E-08	1.07E+01	1.34E+00	9.45E-09	0.00%	0.00%
Hexachlorobenzene	NA	mg/L	NA	mg/kg	2.00E-02	mg/kg	NA	NA	1.49E+02	1.60E-02	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	6.84E-08	2.16E-08	9.00E-08	8	2.25E-01	2.81E-02	3.20E-06	1.13E+00	1.41E-01	6.40E-07	0.00%	0.00%
Hexachlorobutadiene	NA	mg/L	NA	mg/kg	5.20E-02	mg/kg	NA	NA	9.28E+01	7.20E-02	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.78E-07	5.62E-08	2.34E-07	8	3.19E+00	3.98E-01	5.88E-07	1.60E+01	1.99E+00	1.17E-07	0.00%	0.00%
Hexachloroethane	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.45E+01	1.80E-01	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.45E-08	1.40E-08	5.85E-08	8	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	mg/L	NA	mg/kg	1.98E-02	mg/kg	NA	NA	2.86E+00	1.10E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Methoxychlor	NA	mg/L	NA	mg/kg	7.28E-04	mg/kg	NA	NA	1.79E+01	2.00E-02	5.00E-01	5.00E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.49E-09	7.86E-10	3.28E-09	8	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	mg/L	NA	mg/kg	3.84E-02	mg/kg	NA	NA	1.72E+00	2.92E+00	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Pyrene	NA	mg/L	NA	mg/kg	3.96E-02	mg/kg	NA	NA	1.75E+00	7.20E-01	NA	NA	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	NA	NA	0.00E+00	8	5.53E+02	6.91E+01	0.00E+00	2.77E+03	3.46E+02	0.00E+00	0.00%	0.00%
Arsenic	NA	mg/L	NA	mg/kg	1.40E+01	mg/kg	NA	NA	1.11E-01	3.75E-02	4.87E-03	4.87E-03	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.66E-07	1.47E-07	6.13E-07	8	5.14E+00	6.43E-01	9.55E-07	1.28E+01	1.61E+00	3.82E-07	0.00%	0.00%
Cadmium	NA	mg/L	NA	mg/kg	3.27E+00	mg/kg	NA	NA	6.49E+00	3.63E-01	1.52E-01	1.52E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	3.41E-06	1.08E-06	4.48E-06	8	1.45E+00	1.81E-01	2.47E-05	2.00E+01	2.50E+00	1.79E-06	0.02%	0.01%
Chromium	NA	mg/L	NA	mg/kg	1.17E+02	mg/kg	NA	NA	3.06E-01	4.10E-02	6.54E-02	6.54E-02	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	5.23E-05	1.65E-05	6.88E-05	8	1.00E+00	1.25E-01	5.50E-04	2.78E+00	3.48E-01	1.98E-04	0.35%	1.22%
Copper	NA	mg/L	NA	mg/kg	1.06E+04	mg/kg	NA	NA	5.15E-01	7.09E-03	2.76E-03	2.76E-03	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	2.00E-04	6.32E-05	2.63E-04	8	4.70E+01	5.88E+00	4.48E-05	6.20E+01	7.75E+00	3.40E-05	0.03%	0.21%
Lead	NA	mg/L	NA	mg/kg	8.97E+03	mg/kg	NA	NA	1.39E-01	4.87E-03	6.73E-03	6.73E-03	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.13E-04	1.30E-04	5.44E-04	8	3.85E+00	4.81E-01	1.13E-03	1.93E+01	2.41E+00	2.26E-04	0.71%	1.39%
Mercury	NA	mg/L	NA	mg/kg	1.01E+00	mg/kg	NA	NA	1.07E+00	3.66E-01	1.92E-01	1.92E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.33E-06	4.19E-07	1.75E-06	8	4.50E-01	5.63E-02	3.11E-05	9.00E-01	1.13E-01	1.55E-05	0.02%	0.10%
Nickel	NA	mg/L	NA	mg/kg	1.06E+02	mg/kg	NA	NA	1.06E+00	3.35E-02	6.48E-02	6.48E-02	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.69E-05	1.48E-05	6.17E-05	8	7.74E+01	9.68E+00	6.38E-06	1.07E+02	1.34E+01	4.61E-06	0.00%	0.03%
Selenium	NA	mg/L	NA	mg/kg	7.28E-01	mg/kg	NA	NA	1.01E+00	4.92E-01	8.04E-01	8.04E-01	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	4.01E-06	1.26E-06	5.27E-06	8	5.00E-01	6.25E-02	8.43E-05	1.00E+00	1.25E-01	4.22E-05	0.05%	0.26%
Silver	NA	mg/L	NA	mg/kg	3.63E+01	mg/kg	NA	NA	2.05E+00	1.40E-02	4.00E-03	4.00E-03	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	9.93E-07	3.14E-07	1.31E-06	8	1.78E+02	2.23E+01	5.87E-08	8.90E+02	1.11E+02	1.17E-08	0.00%	0.00%
Zinc	NA	mg/L	NA	mg/kg	7.44E+03	mg/kg	NA	NA	2.14E-01	9.06E-02	1.98E-02	1.98E-02	NA	NA	0.00E+00	NA	NA	0.00E+00	0.00E+00	1.01E-03	3.18E-04	1.33E-03	8	1.45E+01	1.81E+00	7.32E-04	1.31E+02	1.64E+01	8.10E-05	0.46%	0.50%
																					Hazard Index (Total EEQ):			1.59E-01			1.63E-02	100.00%	100.00%

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 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 =	0.36	acres
Frac. home range (FHR) =	**1.73E-04**	**unitless**

Table F-13
Tier 1 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at the FLFA

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	Percent Contribution to EEQ N	Percent Contribution to 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	NA	mg/L	NA	mg/kg	4.34E-05	mg/kg	NA	NA	4.21E+01	1.10E-02	2.20E+00	2.20E+00	NA	NA	1.40E-07	NA	NA	8.41E-06	9.34E-09	7.14E-06	1.54E-06	1.72E-05	8	1.00E-06	1.25E-07	1.38E+02	1.00E-05	1.25E-06	1.38E+01	18.65%	4.65%
1,2,4-Trichlorobenzene	NA	mg/L	NA	mg/kg	5.45E-02	mg/kg	NA	NA	3.07E+01	3.10E-01	1.00E+00	1.00E+00	NA	NA	1.76E-04	NA	NA	7.71E-03	3.31E-04	4.08E-03	8.79E-04	1.32E-02	8	1.48E+01	1.85E+00	7.12E-03	5.36E+01	6.70E+00	1.97E-03	0.00%	0.00%
1,2-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.26E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	1.64E-04	NA	NA	1.00E-02	4.90E-04	3.82E-03	8.23E-04	1.53E-02	8	8.57E+01	1.07E+01	1.43E-03	4.29E+02	5.36E+01	2.86E-04	0.00%	0.00%
1,3-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.07E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	1.64E-04	NA	NA	9.57E-03	4.90E-04	3.82E-03	8.23E-04	1.49E-02	8	8.57E+01	1.07E+01	1.39E-03	4.29E+02	5.36E+01	2.78E-04	0.00%	0.00%
1,4-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.25E-02	mg/kg	NA	NA	1.99E+01	4.90E-01	1.00E+00	1.00E+00	NA	NA	1.69E-04	NA	NA	4.81E-03	5.04E-04	3.93E-03	8.47E-04	1.03E-02	8	8.57E+01	1.07E+01	9.58E-04	4.29E+02	5.36E+01	1.92E-04	0.00%	0.00%
4,4'-DDD	NA	mg/L	NA	mg/kg	5.93E-03	mg/kg	NA	NA	15.07	5.00E-02	1.00E+00	1.00E+00	NA	NA	1.91E-05	NA	NA	4.12E-04	5.81E-06	4.44E-04	9.57E-05	9.77E-04	8	8.00E-01	1.00E-01	9.77E-03	4.00E+00	5.00E-01	1.95E-03	0.00%	0.00%
4,4'-DDE	NA	mg/L	NA	mg/kg	4.93E-02	mg/kg	NA	NA	17.07	2.00E-02	1.12E+02	1.12E+02	NA	NA	1.59E-04	NA	NA	3.88E-03	1.93E-05	4.15E-01	8.93E-02	5.08E-01	8	8.00E-01	1.00E-01	5.08E+00	4.00E+00	5.00E-01	1.02E+00	0.69%	0.34%
4,4'-DDT	NA	mg/L	NA	mg/kg	8.32E-02	mg/kg	NA	NA	11.60	6.00E-02	6.43E+00	6.43E+00	NA	NA	2.68E-04	NA	NA	4.45E-03	9.78E-05	4.01E-02	8.64E-03	5.36E-02	8	8.00E-01	1.00E-01	5.36E-01	4.00E+00	5.00E-01	1.07E-01	0.07%	0.04%
4-Chlorophenyl phenylether	NA	mg/L	NA	mg/kg	1.20E-02	mg/kg	NA	NA	8.38E+01	1.70E-01	1.00E+00	1.00E+00	NA	NA	3.86E-05	NA	NA	4.63E-03	4.00E-05	8.99E-04	1.94E-04	5.81E-03	8	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	1.47E+00	1.21E+01	NA	NA	NA	NA	4.19E-05	NA	NA	8.81E-05	3.09E-03	NA	NA	3.22E-03	8	6.56E+01	8.20E+00	3.93E-04	1.10E+02	1.38E+01	2.34E-04	0.00%	0.00%
Acenaphthylene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.29E+01	7.90E-01	NA	NA	NA	NA	4.19E-05	NA	NA	1.37E-03	2.01E-04	NA	NA	1.62E-03	8	6.56E+01	8.20E+00	1.97E-04	1.10E+02	1.38E+01	1.17E-04	0.00%	0.00%
Anthracene	NA	mg/L	NA	mg/kg	5.60E-03	mg/kg	NA	NA	2.42E+00	1.17E+00	NA	NA	NA	NA	1.80E-05	NA	NA	6.25E-05	1.29E-04	NA	NA	2.09E-04	8	6.56E+01	8.20E+00	2.55E-05	1.10E+02	1.38E+01	1.52E-05	0.00%	0.00%
Aroclor 1254	NA	mg/L	NA	mg/kg	1.58E+00	mg/kg	NA	NA	6.52E+01	2.20E-02	1.00E+00	1.00E+00	NA	NA	5.09E-03	NA	NA	4.75E-01	6.81E-04	1.18E-01	2.55E-02	6.25E-01	8	1.40E-01	1.75E-02	3.57E+01	6.80E-01	8.50E-02	7.35E+00	4.83%	2.48%
Aroclor 1260	**NA**	**mg/L**	**NA**	**mg/kg**	**1.09E+00**	**mg/kg**	**NA**	**NA**	**6.52E+01**	**1.10E-02**	**1.00E+00**	**1.00E+00**	**NA**	**NA**	**3.51E-03**	**NA**	**NA**	**3.28E-01**	**2.35E-04**	**8.17E-02**	**1.76E-02**	**4.31E-01**	**8**	**1.40E-01**	**1.75E-02**	**2.46E+01**	**6.80E-01**	**8.50E-02**	**5.07E+00**	**3.33%**	**1.71%**
Benzo(a)anthracene	NA	mg/L	NA	mg/kg	2.80E-02	mg/kg	NA	NA	1.59E+00	2.84E-01	NA	NA	NA	NA	9.02E-05	NA	NA	2.05E-04	1.56E-04	NA	NA	4.51E-04	8	6.15E-01	7.69E-02	5.87E-03	3.07E+00	3.84E-01	1.18E-03	0.00%	0.00%
Benzo(a)pyrene	NA	mg/L	NA	mg/kg	2.80E-02	mg/kg	NA	NA	1.33E+00	1.39E-01	NA	NA	NA	NA	9.02E-05	NA	NA	1.72E-04	7.63E-05	NA	NA	3.38E-04	8	6.15E-01	7.69E-02	4.40E-03	3.07E+00	3.84E-01	8.81E-04	0.00%	0.00%
Benzo(b)fluoranthene	NA	mg/L	NA	mg/kg	6.70E-02	mg/kg	NA	NA	2.60E+00	3.10E-01	NA	NA	NA	NA	2.16E-04	NA	NA	8.03E-04	4.07E-04	NA	NA	1.43E-03	8	6.15E-01	7.69E-02	1.85E-02	3.07E+00	3.84E-01	3.72E-03	0.00%	0.00%
Benzo(g,h,i)perylene	NA	mg/L	NA	mg/kg	2.50E-02	mg/kg	NA	NA	2.94E+00	2.01E-01	NA	NA	NA	NA	8.05E-05	NA	NA	3.39E-04	9.83E-05	NA	NA	5.18E-04	8	6.15E-01	7.69E-02	6.73E-03	3.07E+00	3.84E-01	1.35E-03	0.00%	0.00%
Benzo(k)fluoranthene	NA	mg/L	NA	mg/kg	1.85E-02	mg/kg	NA	NA	2.60E+00	2.02E-01	NA	NA	NA	NA	5.96E-05	NA	NA	2.22E-04	7.34E-05	NA	NA	3.55E-04	8	6.15E-01	7.69E-02	4.61E-03	3.07E+00	3.84E-01	9.24E-04	0.00%	0.00%
Chrysene	NA	mg/L	NA	mg/kg	3.70E-02	mg/kg	NA	NA	2.29E+00	2.54E-01	NA	NA	NA	NA	1.19E-04	NA	NA	3.91E-04	1.84E-04	NA	NA	6.94E-04	8	6.15E-01	7.69E-02	9.03E-03	3.07E+00	3.84E-01	1.81E-03	0.00%	0.00%
Dibenz(a,h)anthracene	NA	mg/L	NA	mg/kg	3.50E-03	mg/kg	NA	NA	2.31E+00	1.30E-01	NA	NA	NA	NA	1.13E-05	NA	NA	3.73E-05	8.91E-06	NA	NA	5.75E-05	8	6.15E-01	7.69E-02	7.47E-04	3.07E+00	3.84E-01	1.50E-04	0.00%	0.00%
Endosulfan II	NA	mg/L	NA	mg/kg	1.99E-02	mg/kg	NA	NA	2.74E+00	3.70E-01	1.00E+00	1.00E+00	NA	NA	6.41E-05	NA	NA	2.51E-04	1.44E-04	1.49E-03	3.21E-04	2.27E-03	8	1.50E-01	1.88E-02	1.21E-01	7.50E-01	9.38E-02	2.42E-02	0.02%	0.01%
Endrin aldehyde	NA	mg/L	NA	mg/kg	3.34E-02	mg/kg	NA	NA	2.20E+01	6.50E-02	1.00E+00	1.00E+00	NA	NA	1.08E-04	NA	NA	3.38E-03	4.25E-05	2.50E-03	5.39E-04	6.57E-03	8	9.20E-02	1.15E-02	5.71E-01	9.20E-01	1.15E-01	5.71E-02	0.08%	0.02%
Endrin ketone	NA	mg/L	NA	mg/kg	4.46E-03	mg/kg	NA	NA	3.21E+01	5.10E-02	1.00E+00	1.00E+00	NA	NA	1.44E-05	NA	NA	6.60E-04	4.46E-06	3.34E-04	7.20E-05	1.09E-03	8	9.20E-02	1.15E-02	9.44E-02	9.20E-01	1.15E-01	9.44E-03	0.01%	0.00%
Fluoranthene	NA	mg/L	NA	mg/kg	5.35E-02	mg/kg	NA	NA	3.04E+00	5.00E-01	NA	NA	NA	NA	1.72E-04	NA	NA	7.50E-04	5.24E-04	NA	NA	1.45E-03	8	6.15E-01	7.69E-02	1.88E-02	3.07E+00	3.84E-01	3.77E-03	0.00%	0.00%
Fluorene	NA	mg/L	NA	mg/kg	9.00E-03	mg/kg	NA	NA	9.57E+00	2.40E+01	NA	NA	NA	NA	2.90E-05	NA	NA	3.97E-04	4.24E-03	NA	NA	4.66E-03	8	6.56E+01	8.20E+00	5.68E-04	1.10E+02	1.38E+01	3.39E-04	0.00%	0.00%
gamma-Chlordane	NA	mg/L	NA	mg/kg	2.81E-03	mg/kg	NA	NA	9.05E+02	2.43E-02	1.00E+00	1.00E+00	NA	NA	9.05E-06	NA	NA	1.17E-02	1.34E-06	2.11E-04	4.53E-05	1.20E-02	8	4.60E+00	5.75E-01	2.08E-02	9.20E+00	1.15E+00	1.04E-02	0.00%	0.00%
Hexachlorobenzene	NA	mg/L	NA	mg/kg	2.00E-02	mg/kg	NA	NA	1.49E+02	2.10E-01	1.00E+00	1.00E+00	NA	NA	6.44E-05	NA	NA	1.37E-02	8.23E-05	1.50E-03	3.23E-04	1.57E-02	8	8.00E-02	1.00E-02	1.57E+00	2.90E-01	3.63E-02	4.32E-01	0.21%	0.15%
Hexachlorobutadiene	NA	mg/L	NA	mg/kg	5.20E-02	mg/kg	NA	NA	9.28E+01	7.20E-02	1.00E+00	1.00E+00	NA	NA	1.67E-04	NA	NA	2.23E-02	7.34E-05	3.90E-03	8.39E-04	2.72E-02	8	2.00E-01	2.50E-02	1.09E+00	1.00E+00	1.25E-01	2.18E-01	0.15%	0.07%
Hexachloroethane	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.45E+01	3.30E-01	1.00E+00	1.00E+00	NA	NA	4.19E-05	NA	NA	1.47E-03	8.41E-05	9.74E-04	2.10E-04	2.78E-03	8	1.00E+00	1.25E-01	2.22E-02	1.50E+01	1.88E+00	1.48E-03	0.00%	0.00%
Indeno(1,2,3-cd)pyrene	NA	mg/L	NA	mg/kg	2.60E-02	mg/kg	NA	NA	2.86E+00	1.10E-01	NA	NA	NA	NA	8.37E-05	NA	NA	3.43E-04	5.60E-05	NA	NA	4.83E-04	8	6.15E-01	7.69E-02	6.28E-03	3.07E+00	3.84E-01	1.26E-03	0.00%	0.00%
Methoxychlor	NA	mg/L	NA	mg/kg	7.28E-04	mg/kg	NA	NA	1.79E+01	4.20E-01	1.00E+00	1.00E+00	NA	NA	2.34E-06	NA	NA	6.01E-05	5.99E-06	5.45E-05	1.17E-05	1.35E-04	8	4.00E+00	5.00E-01	2.69E-04	8.00E+00	1.00E+00	1.35E-04	0.00%	0.00%
Phenanthrene	NA	mg/L	NA	mg/kg	5.50E-02	mg/kg	NA	NA	1.72E+00	2.55E+00	NA	NA	NA	NA	1.77E-04	NA	NA	4.36E-04	2.74E-03	NA	NA	3.36E-03	8	6.56E+01	8.20E+00	4.09E-04	1.10E+02	1.38E+01	2.44E-04	0.00%	0.00%
Pyrene	NA	mg/L	NA	mg/kg	5.05E-02	mg/kg	NA	NA	1.75E+00	7.20E-01	NA	NA	NA	NA	1.63E-04	NA	NA	4.07E-04	7.12E-04	NA	NA	1.28E-03	8	6.15E-01	7.69E-02	1.67E-02	3.07E+00	3.84E-01	3.34E-03	0.00%	0.00%
Arsenic	NA	mg/L	NA	mg/kg	6.89E+01	mg/kg	NA	NA	6.96E-02	3.75E-02	3.65E-03	3.65E-03	NA	NA	2.22E-01	NA	NA	2.21E-02	5.07E-02	1.88E-02	4.05E-03	3.18E-01	8	1.26E-01	1.58E-02	2.02E+01	1.26E+00	1.58E-01	2.02E+00	2.73%	0.68%
Cadmium	NA	mg/L	NA	mg/kg	1.98E+01	mg/kg	NA	NA	4.49E+00	1.60E-01	5.89E-02	5.89E-02	NA	NA	6.38E-02	NA	NA	4.10E-01	6.22E-02	8.73E-02	1.88E-02	6.42E-01	8	1.00E+00	1.25E-01	5.14E+00	1.00E+01	1.25E+00	5.14E-01	0.69%	0.17%
Chromium	NA	mg/L	NA	mg/kg	2.99E+02	mg/kg	NA	NA	3.06E-01	4.10E-02	5.09E-02	5.09E-02	NA	NA	9.63E-01	NA	NA	4.22E-01	2.40E-01	1.14E+00	2.46E-01	3.01E+00	8	2.74E+03	3.42E+02	8.80E-03	1.37E+04	1.71E+03	1.76E-03	0.00%	0.00%
Copper	NA	mg/L	NA	mg/kg	2.38E+04	mg/kg	NA	NA	5.15E-01	4.34E-03	1.38E-03	1.38E-03	NA	NA	7.66E+01	NA	NA	5.65E+01	2.03E+00	2.46E+00	5.31E-01	1.38E+02	8	1.17E+01	1.46E+00	9.45E+01	1.51E+01	1.89E+00	7.32E+01	12.78%	24.68%
Lead	NA	mg/L	NA	mg/kg	2.59E+04	mg/kg	NA	NA	1.13E-01	3.06E-03	3.73E-03	3.73E-03	NA	NA	8.32E+01	NA	NA	1.35E+01	1.55E+00	7.22E+00	1.56E+00	1.07E+02	8	8.00E+00	1.00E+00	1.07E+02	8.00E+01	1.00E+01	1.07E+01	14.48%	3.61%
Mercury	NA	mg/L	NA	mg/kg	2.20E+00	mg/kg	NA	NA	3.30E+01	2.56E-01	1.05E+00	1.05E+00	NA	NA	7.08E-03	NA	NA	3.35E-01	1.10E-02	1.72E-01	3.71E-02	5.62E-01	8	1.00E+00	1.25E-01	4.50E+00	5.00E+00	6.25E-01	9.00E-01	0.61%	0.30%
Nickel	NA	mg/L	NA	mg/kg	4.04E+02	mg/kg	NA	NA	7.80E+00	2.39E-02	3.17E-02	3.17E-02	NA	NA	1.30E+00	NA	NA	1.45E+01	1.89E-01	9.59E-01	2.06E-01	1.72E+01	8	4.00E+01	5.00E+00	3.44E+00	8.00E+01	1.00E+01	1.72E+00	0.46%	0.58%
Selenium	NA	mg/L	NA	mg/kg	1.30E+00	mg/kg	NA	NA	8.65E-01	5.22E-01	6.15E+01	6.15E+01	NA	NA	4.19E-03	NA	NA	5.18E-03	1.33E-02	5.99E+00	1.29E+00	7.30E+00	8	2.00E-01	2.50E-02	2.92E+02	3.30E-01	4.13E-02	1.77E+02	39.52%	59.71%
Silver	NA	mg/L	NA	mg/kg	6.52E+01	mg/kg	NA	NA	2.05E+00	1.40E-02	4.00E-03	4.00E-03	NA	NA	2.10E-01	NA	NA	6.15E-01	1.79E-02	1.95E-02	4.21E-03	8.66E-01	8	2.22E+01	2.78E+00	3.12E-01	2.22E+02	2.78E+01	3.12E-02	0.04%	0.01%
Zinc	NA	mg/L	NA	mg/kg	1.52E+04	mg/kg	NA	NA	1.32E-01	6.58E-02	1.02E-02	1.02E-02	NA	NA	4.91E+01	NA	NA	9.29E+00	1.97E+01	1.16E+01	2.50E+00	9.21E+01	8	1.60E+02	2.00E+01	4.61E+00	3.20E+02	4.00E+01	2.30E+00	0.62%	0.78%

Hazard Index (Total EEQ): 7.39E+02 2.97E+02 100.00% 100.00%

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 =	0.36	acres
Frac. home range (FHR) =	1.00E+00	unitless

Table F-14
Tier 2 Chemicals of Potential Concern EEQs and Hazard Indices for Red Foxes at the FLFA

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	Percent Contribution to EEQ N	Percent Contribution to 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	NA	mg/L	NA	mg/kg	1.98E-05	mg/kg	NA	NA	4.86E+00	3.90E-03	2.20E+00	2.20E+00	NA	NA	4.78E-12	NA	NA	3.33E-11	1.14E-13	2.45E-10	5.28E-11	3.36E-10	8	1.00E-06	1.25E-07	2.69E-03	1.00E-05	1.25E-06	2.69E-04	24.89%	7.53%
1,2,4-Trichlorobenzene	NA	mg/L	NA	mg/kg	5.45E-02	mg/kg	NA	NA	3.07E+01	2.10E-01	5.00E-01	5.00E-01	NA	NA	1.32E-08	NA	NA	5.79E-07	1.68E-08	1.53E-07	3.30E-08	7.95E-07	8	1.48E+01	1.85E+00	4.30E-07	5.36E+01	6.70E+00	1.19E-07	0.00%	0.00%
1,2-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.26E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	1.23E-08	NA	NA	7.52E-07	3.68E-08	1.43E-07	3.09E-08	9.75E-07	8	8.57E+01	1.07E+01	9.11E-08	4.29E+02	5.36E+01	1.82E-08	0.00%	0.00%
1,3-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.10E-02	mg/kg	NA	NA	4.07E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	1.23E-08	NA	NA	7.19E-07	3.68E-08	1.43E-07	3.09E-08	9.42E-07	8	8.57E+01	1.07E+01	8.79E-08	4.29E+02	5.36E+01	1.76E-08	0.00%	0.00%
1,4-Dichlorobenzene	NA	mg/L	NA	mg/kg	5.25E-02	mg/kg	NA	NA	1.99E+01	4.90E-01	5.00E-01	5.00E-01	NA	NA	1.27E-08	NA	NA	3.61E-07	3.78E-08	1.48E-07	3.18E-08	5.91E-07	8	8.57E+01	1.07E+01	5.52E-08	4.29E+02	5.36E+01	1.10E-08	0.00%	0.00%
4,4'-DDD	NA	mg/L	NA	mg/kg	5.93E-03	mg/kg	NA	NA	15.07	1.60E-01	5.00E-01	5.00E-01	NA	NA	1.43E-09	NA	NA	3.09E-08	1.40E-09	1.67E-08	3.59E-09	5.40E-08	8	8.00E-01	1.00E-01	5.40E-07	4.00E+00	5.00E-01	1.08E-07	0.01%	0.00%
4,4'-DDE	NA	mg/L	NA	mg/kg	4.93E-02	mg/kg	NA	NA	17.07	1.30E-01	1.12E+02	1.12E+02	NA	NA	1.19E-08	NA	NA	2.91E-07	9.43E-09	3.11E-05	6.70E-06	3.81E-05	8	8.00E-01	1.00E-01	3.81E-04	4.00E+00	5.00E-01	7.63E-05	3.53%	2.14%
4,4'-DDT	NA	mg/L	NA	mg/kg	8.32E-02	mg/kg	NA	NA	11.60	4.60E-03	6.43E+00	6.43E+00	NA	NA	2.01E-08	NA	NA	3.34E-07	5.63E-10	3.01E-06	6.49E-07	4.01E-06	8	8.00E-01	1.00E-01	4.01E-05	4.00E+00	5.00E-01	8.03E-06	0.37%	0.22%
4-Chlorophenyl phenylether	NA	mg/L	NA	mg/kg	1.20E-02	mg/kg	NA	NA	8.38E+01	7.50E-02	5.00E-01	5.00E-01	NA	NA	2.90E-09	NA	NA	3.48E-07	1.32E-09	3.37E-08	7.27E-09	3.93E-07	8	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	1.47E+00	1.21E+01	NA	NA	NA	NA	3.14E-09	NA	NA	6.61E-09	2.32E-07	NA	NA	2.42E-07	8	6.56E+01	8.20E+00	2.95E-08	1.10E+02	1.38E+01	1.76E-08	0.00%	0.00%
Acenaphthylene	NA	mg/L	NA	mg/kg	7.28E-03	mg/kg	NA	NA	2.29E+01	8.91E-01	NA	NA	NA	NA	1.76E-09	NA	NA	5.77E-08	9.54E-09	NA	NA	6.90E-08	8	6.56E+01	8.20E+00	8.42E-09	1.10E+02	1.38E+01	5.02E-09	0.00%	0.00%
Anthracene	NA	mg/L	NA	mg/kg	4.76E-03	mg/kg	NA	NA	2.42E+00	1.22E+00	NA	NA	NA	NA	1.15E-09	NA	NA	3.99E-09	8.52E-09	NA	NA	1.37E-08	8	6.56E+01	8.20E+00	1.67E-09	1.10E+02	1.38E+01	9.93E-10	0.00%	0.00%
Aroclor 1254	NA	mg/L	NA	mg/kg	4.88E-01	mg/kg	NA	NA	4.86	3.60E-03	5.00E-01	5.00E-01	NA	NA	1.18E-07	NA	NA	8.22E-07	2.58E-09	1.37E-06	2.96E-07	2.61E-06	8	1.40E-01	1.75E-02	1.49E-04	6.80E-01	8.50E-02	3.07E-05	1.38%	0.86%
Aroclor 1260	NA	mg/L	NA	mg/kg	2.19E-01	mg/kg	NA	NA	3.86	6.40E-04	5.00E-01	5.00E-01	NA	NA	5.29E-08	NA	NA	2.92E-07	2.06E-10	6.16E-07	1.33E-07	1.09E-06	8	1.40E-01	1.75E-02	6.25E-05	6.80E-01	8.50E-02	1.29E-05	0.58%	0.36%
Benzo(a)anthracene	NA	mg/L	NA	mg/kg	2.02E-02	mg/kg	NA	NA	1.59E+00	3.25E-01	NA	NA	NA	NA	4.88E-09	NA	NA	1.11E-08	9.65E-09	NA	NA	2.56E-08	8	6.15E-01	7.69E-02	3.34E-07	3.07E+00	3.84E-01	6.68E-08	0.00%	0.00%
Benzo(a)pyrene	NA	mg/L	NA	mg/kg	2.47E-02	mg/kg	NA	NA	1.33E+00	1.40E-01	NA	NA	NA	NA	5.97E-09	NA	NA	1.14E-08	5.07E-09	NA	NA	2.24E-08	8	6.15E-01	7.69E-02	2.92E-07	3.07E+00	3.84E-01	5.84E-08	0.00%	0.00%
Benzo(b)fluoranthene	NA	mg/L	NA	mg/kg	4.82E-02	mg/kg	NA	NA	2.60E+00	3.10E-01	NA	NA	NA	NA	1.16E-08	NA	NA	4.34E-08	2.20E-08	NA	NA	7.70E-08	8	6.15E-01	7.69E-02	1.00E-06	3.07E+00	3.84E-01	2.01E-07	0.01%	0.01%
Benzo(g,h,i)perylene	NA	mg/L	NA	mg/kg	1.85E-02	mg/kg	NA	NA	2.94E+00	1.90E-01	NA	NA	NA	NA	4.47E-09	NA	NA	1.88E-08	5.17E-09	NA	NA	2.85E-08	8	6.15E-01	7.69E-02	3.70E-07	3.07E+00	3.84E-01	7.42E-08	0.00%	0.00%
Benzo(k)fluoranthene	NA	mg/L	NA	mg/kg	1.43E-02	mg/kg	NA	NA	2.60E+00	2.10E-01	NA	NA	NA	NA	3.45E-09	NA	NA	1.29E-08	4.42E-09	NA	NA	2.07E-08	8	6.15E-01	7.69E-02	2.70E-07	3.07E+00	3.84E-01	5.40E-08	0.00%	0.00%
Chrysene	NA	mg/L	NA	mg/kg	2.93E-02	mg/kg	NA	NA	2.29E+00	2.79E-01	NA	NA	NA	NA	7.08E-09	NA	NA	2.32E-08	1.20E-08	NA	NA	4.23E-08	8	6.15E-01	7.69E-02	5.51E-07	3.07E+00	3.84E-01	1.10E-07	0.01%	0.00%
Dibenz(a,h)anthracene	NA	mg/L	NA	mg/kg	3.50E-03	mg/kg	NA	NA	2.31E+00	1.30E-01	NA	NA	NA	NA	8.46E-10	NA	NA	2.80E-09	6.69E-10	NA	NA	4.31E-09	8	6.15E-01	7.69E-02	5.61E-08	3.07E+00	3.84E-01	1.12E-08	0.00%	0.00%
Endosulfan II	NA	mg/L	NA	mg/kg	1.99E-02	mg/kg	NA	NA	2.74E+00	3.67E-01	5.00E-01	5.00E-01	NA	NA	4.81E-09	NA	NA	1.89E-08	1.07E-08	5.60E-08	1.21E-08	1.02E-07	8	1.50E-01	1.88E-02	5.46E-06	7.50E-01	9.38E-02	1.09E-06	0.05%	0.03%
Endrin aldehyde	NA	mg/L	NA	mg/kg	3.34E-02	mg/kg	NA	NA	2.20E+01	6.50E-02	5.00E-01	5.00E-01	NA	NA	8.07E-09	NA	NA	2.54E-07	3.19E-09	9.39E-08	2.02E-08	3.79E-07	8	9.20E-02	1.15E-02	3.30E-05	9.20E-01	1.15E-01	3.30E-06	0.31%	0.09%
Endrin ketone	NA	mg/L	NA	mg/kg	4.46E-03	mg/kg	NA	NA	3.21E+01	5.10E-02	5.00E-01	5.00E-01	NA	NA	1.08E-09	NA	NA	4.96E-08	3.35E-10	1.25E-08	2.70E-09	6.62E-08	8	9.20E-02	1.15E-02	5.76E-06	9.20E-01	1.15E-01	5.76E-07	0.05%	0.02%
Fluoranthene	NA	mg/L	NA	mg/kg	3.85E-02	mg/kg	NA	NA	3.04E+00	5.00E-01	NA	NA	NA	NA	9.30E-09	NA	NA	4.05E-08	2.83E-08	NA	NA	7.81E-08	8	6.15E-01	7.69E-02	1.02E-06	3.07E+00	3.84E-01	2.04E-07	0.01%	0.01%
Fluorene	NA	mg/L	NA	mg/kg	5.67E-03	mg/kg	NA	NA	9.57E+00	5.66E+01	NA	NA	NA	NA	1.37E-09	NA	NA	1.88E-08	4.72E-07	NA	NA	4.92E-07	8	6.56E+01	8.20E+00	6.00E-08	1.10E+02	1.38E+01	3.58E-08	0.00%	0.00%
gamma-Chlordane	NA	mg/L	NA	mg/kg	2.81E-03	mg/kg	NA	NA	9.05E+02	2.43E-02	5.00E-01	5.00E-01	NA	NA	6.79E-10	NA	NA	8.80E-07	1.00E-10	7.90E-09	1.70E-09	8.90E-07	8	4.60E+00	5.75E-01	1.55E-06	9.20E+00	1.15E+00	7.74E-07	0.01%	0.02%
Hexachlorobenzene	NA	mg/L	NA	mg/kg	2.00E-02	mg/kg	NA	NA	1.49E+02	1.60E-02	5.00E-01	5.00E-01	NA	NA	4.83E-09	NA	NA	1.03E-06	4.71E-10	5.62E-08	1.21E-08	1.10E-06	8	8.00E-02	1.00E-02	1.10E-04	2.90E-01	3.63E-02	3.04E-05	1.02%	0.85%
Hexachlorobutadiene	NA	mg/L	NA	mg/kg	5.20E-02	mg/kg	NA	NA	9.28E+01	7.20E-02	5.00E-01	5.00E-01	NA	NA	1.26E-08	NA	NA	1.67E-06	5.51E-09	1.46E-07	3.15E-08	1.87E-06	8	2.00E-01	2.50E-02	7.47E-05	1.00E+00	1.25E-01	1.49E-05	0.69%	0.42%
Hexachloroethane	NA	mg/L	NA	mg/kg	1.30E-02	mg/kg	NA	NA	2.45E+01	1.81E-01	5.00E-01	5.00E-01	NA	NA	3.14E-09	NA	NA	1.10E-07	3.46E-09	3.66E-08	7.87E-09	1.61E-07	8	1.00E+00	1.25E-01	1.29E-06	1.50E+01	1.88E+00	8.60E-08	0.01%	0.00%
Indeno(1,2,3-cd)pyrene	NA	mg/L	NA	mg/kg	1.98E-02	mg/kg	NA	NA	2.86E+00	1.10E-01	NA	NA	NA	NA	4.78E-09	NA	NA	1.96E-08	3.20E-09	NA	NA	2.76E-08	8	6.15E-01	7.69E-02	3.59E-07	3.07E+00	3.84E-01	7.19E-08	0.00%	0.00%
Methoxychlor	NA	mg/L	NA	mg/kg	7.28E-04	mg/kg	NA	NA	1.79E+01	2.00E-02	5.00E-01	5.00E-01	NA	NA	1.76E-10	NA	NA	4.51E-09	2.14E-11	2.05E-09	4.41E-10	7.20E-09	8	4.00E+00	5.00E-01	1.44E-08	8.00E+00	1.00E+00	7.20E-09	0.00%	0.00%
Phenanthrene	NA	mg/L	NA	mg/kg	3.84E-02	mg/kg	NA	NA	1.72E+00	2.92E+00	NA	NA	NA	NA	9.28E-09	NA	NA	2.29E-08	1.65E-07	NA	NA	1.97E-07	8	6.56E+01	8.20E+00	2.40E-08	1.10E+02	1.38E+01	1.43E-08	0.00%	0.00%
Pyrene	NA	mg/L	NA	mg/kg	3.96E-02	mg/kg	NA	NA	1.75E+00	7.20E-01	NA	NA	NA	NA	9.57E-09	NA	NA	2.40E-08	4.19E-08	NA	NA	7.55E-08	8	6.15E-01	7.69E-02	9.82E-07	3.07E+00	3.84E-01	1.97E-07	0.01%	0.01%
Arsenic	NA	mg/L	NA	mg/kg	1.40E+01	mg/kg	NA	NA	1.11E-01	3.75E-02	4.87E-03	4.87E-03	NA	NA	3.38E-06	NA	NA	5.39E-07	7.73E-07	3.83E-07	8.25E-08	5.16E-06	8	1.26E-01	1.58E-02	3.28E-04	1.26E+00	1.58E-01	3.28E-05	3.03%	0.92%
Cadmium	NA	mg/L	NA	mg/kg	3.27E+00	mg/kg	NA	NA	6.49E+00	3.63E-01	1.52E-01	1.52E-01	NA	NA	7.91E-07	NA	NA	7.36E-06	1.75E-06	2.80E-06	6.03E-07	1.33E-05	8	1.00E+00	1.25E-01	1.06E-04	1.00E+01	1.25E+00	1.06E-05	0.99%	0.30%
Chromium	NA	mg/L	NA	mg/kg	1.17E+02	mg/kg	NA	NA	3.06E-01	4.10E-02	6.54E-02	6.54E-02	NA	NA	2.82E-05	NA	NA	1.24E-05	7.05E-06	4.30E-05	9.26E-06	9.99E-05	8	2.74E+03	3.42E+02	2.92E-07	1.37E+04	1.71E+03	5.84E-08	0.00%	0.00%
Copper	NA	mg/L	NA	mg/kg	1.06E+04	mg/kg	NA	NA	5.15E-01	7.09E-03	2.76E-03	2.76E-03	NA	NA	2.56E-03	NA	NA	1.89E-03	1.11E-04	1.65E-04	3.55E-05	4.76E-03	8	1.17E+01	1.46E+00	3.26E-03	1.51E+01	1.89E+00	2.52E-03	30.15%	70.68%
Lead	NA	mg/L	NA	mg/kg	8.97E+03	mg/kg	NA	NA	1.39E-01	4.87E-03	6.73E-03	6.73E-03	NA	NA	2.17E-03	NA	NA	4.31E-04	6.43E-05	3.40E-04	7.32E-05	3.08E-03	8	8.00E+00	1.00E+00	3.08E-03	8.00E+01	1.00E+01	3.08E-04	28.49%	8.62%
Mercury	NA	mg/L	NA	mg/kg	1.01E+00	mg/kg	NA	NA	1.07E+00	3.66E-01	1.92E-01	1.92E-01	NA	NA	2.44E-07	NA	NA	3.76E-07	5.44E-07	1.09E-06	2.35E-07	2.49E-06	8	1.00E+00	1.25E-01	1.99E-05	5.00E+00	6.25E-01	3.99E-06	0.18%	0.11%
Nickel	NA	mg/L	NA	mg/kg	1.06E+02	mg/kg	NA	NA	1.06E+00	3.35E-02	6.48E-02	6.48E-02	NA	NA	2.55E-05	NA	NA	3.87E-05	5.20E-06	3.85E-05	8.30E-06	1.16E-04	8	4.00E+01	5.00E+00	2.33E-05	8.00E+01	1.00E+01	1.16E-05	0.22%	0.33%
Selenium	NA	mg/L	NA	mg/kg	7.28E-01	mg/kg	NA	NA	1.01E+00	4.92E-01	8.04E-01	8.04E-01	NA	NA	1.76E-07	NA	NA	2.54E-07	5.27E-07	3.29E-06	7.09E-07	4.96E-06	8	2.00E-01	2.50E-02	1.98E-04	3.30E-01	4.13E-02	1.20E-04	1.84%	3.37%
Silver	NA	mg/L	NA	mg/kg	3.63E+01	mg/kg	NA	NA	2.05E+00	1.40E-02	4.00E-03	4.00E-03	NA	NA	8.77E-06	NA	NA	2.57E-05	7.47E-07	8.17E-07	1.76E-07	3.62E-05	8	2.22E+01	2.78E+00	1.30E-05	2.22E+02	2.78E+01	1.30E-06	0.12%	0.04%
Zinc	NA	mg/L	NA	mg/kg	7.44E+03	mg/kg	NA	NA	2.14E-01	9.06E-02	1.98E-02	1.98E-02	NA	NA	1.80E-03	NA	NA	5.51E-04	9.92E-04	8.29E-04	1.78E-04	4.35E-03	8	1.60E+02	2.00E+01	2.17E-04	3.20E+02	4.00E+01	1.09E-04	2.01%	3.05%
																					Hazard Index (Total EEQ):			1.1E-02			3.6E-03	100.00%	100.00%

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 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 =	0.36	acres
Frac. home range (FHR) =	**1.63E-04**	**unitless**

Table F-15
Recommended Bioaccumulation/Bioconcentration Factors or Regression Equations Utilized for the Soil-to-Plant Pathway at the FLFA
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Constituent	USEPA (2008) Eco-SSL Uptake Equation [a]	Alternate Regression Equation [c, d]	Alternate BAF/BCF	Recommended Tier 1 (Maximum) BAF/BCF	Rationale for Recommended Tier 1 BAF/BCF	Recommended Tier 2 (RME) BAF/BCF	Rationale for Recommended Tier 2 BAF/BCF
2,3,7,8-TCDD TE	--[b]	Log (PC)= -0.578(Log[Kow])+1.588[d]	--	0.011	Travis & Arms K_{ow} Regression Eq.	0.0039	Travis & Arms K_{ow} Regression Eq.
1,2,4-Trichlorobenzene	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.31	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.
4,4'-DDD	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.046	Travis & Arms K_{ow} Regression Eq.	0.016	Travis & Arms K_{ow} Regression Eq.
4,4'-DDE	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.020	Travis & Arms K_{ow} Regression Eq.	0.013	Travis & Arms K_{ow} Regression Eq.
4,4'-DDT	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.058	Travis & Arms K_{ow} Regression Eq.	0.0046	Travis & Arms K_{ow} Regression Eq.
4-Chlorophenyl phenylether	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.17	Travis & Arms K_{ow} Regression Eq.	0.075	Travis & Arms K_{ow} Regression Eq.
Acenaphthene	ln (Pc)= -0.8556(ln[soil])-5.562	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Acenaphthylene	ln (Pc)= 0.791(ln[soil])-1.144	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Anthracene	ln (Pc)= 0.7784(ln[soil])-0.9887	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Aroclor 1254	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.022	Travis & Arms K_{ow} Regression Eq.	0.0036	Travis & Arms K_{ow} Regression Eq.
Aroclor 1260	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.011	Travis & Arms K_{ow} Regression Eq.	0.00064	Travis & Arms K_{ow} Regression Eq.
Benzo(a)anthracene	ln (Pc)= 0.5944(ln[soil])-2.7078	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Benzo(a)pyrene	ln (Pc)= 0.9750(ln[soil])-2.0615	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Benzo(b)fluoranthene	Pc= 0.31(soil)	--	--	0.31	Recommended BAF from USEPA (2008)	0.31	Recommended BAF from USEPA (2008)
Benzo(g,h,i)perylene	ln (Pc)= 1.1829(ln[soil])-0.9313	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Benzo(k)fluoranthene	ln (Pc)= 0.8595(ln[soil])-2.1579	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Chrysene	ln (Pc)= 0.5944(ln[soil])-2.7078	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Dibenz(a,h)anthracene	Pc= 0.13(soil)	--	--	0.13	Recommended BAF from USEPA (2008)	0.13	Recommended BAF from USEPA (2008)
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 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 (2008)	0.50	Recommended BAF from USEPA (2008)
Fluorene	ln (Pc)= -0.8556(ln[soil])-5.562	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
gamma-Chlordane	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.0243	Travis & Arms K_{ow} Regression Eq.	0.0243	Travis & Arms K_{ow} Regression Eq.
Hexachlorobenzene	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.21	Travis & Arms K_{ow} Regression Eq.	0.016	Travis & Arms K_{ow} Regression Eq.
Hexachlorobutadiene	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.072	Travis & Arms K_{ow} Regression Eq.	0.072	Travis & Arms K_{ow} Regression Eq.
Hexachloroethane	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.33	Travis & Arms K_{ow} Regression Eq.	0.18	Travis & Arms K_{ow} Regression Eq.
Indeno(1,2,3-cd)pyrene	Pc= 0.11(soil)	--	--	0.11	Recommended BAF from USEPA (2008)	0.11	Recommended BAF from USEPA (2008)
Methoxychlor	--	Log (PC)= -0.578(Log[Kow])+1.588	--	0.42	Travis & Arms K_{ow} Regression Eq.	0.020	Travis & Arms K_{ow} Regression Eq.
Phenanthrene	ln (Pc)= 0.6203(ln[soil])-0.1665	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Pyrene	Pc= 0.72(soil)	--	--	0.72	Recommended BAF from USEPA (2008)	0.72	Recommended BAF from USEPA (2008)
Arsenic	Pc= 0.03752(soil)	--	--	0.03752	Recommended BAF from USEPA (2008)	0.0375	Recommended BAF from USEPA (2008)
Cadmium	ln (Pc)= 0.546(ln[soil])-0.475	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Chromium	Pc= 0.041(soil)	--	--	0.041	Recommended BAF from USEPA (2008)	0.041	Recommended BAF from USEPA (2008)
Copper	ln (Pc)= 0.394(ln[soil])+0.668	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Lead	ln (Pc)= 0.561(ln[soil])-1.328	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)

Table F-15
Recommended Bioaccumulation/Bioconcentration Factors or Regression Equations Utilized for the Soil-to-Plant Pathway at the FLFA

Constituent	USEPA (2008) Eco-SSL Uptake Equation [a]	Alternate Regression Equation [c, d]	Alternate BAF/BCF	Recommended Tier 1 (Maximum) BAF/BCF	Rationale for Recommended Tier 1 BAF/BCF	Recommended Tier 2 (RME) 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 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Selenium	ln (Pc)= 1.104(ln[soil])-0.677	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Silver	Pc= 0.014(soil)	--	--	0.014	Recommended BAF from USEPA (2008)	0.014	Recommended BAF from USEPA (2008)
Zinc	ln (Pc)= 0.554(ln[soil])+1.575	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)

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).

[a] USEPA, 2008, Ecological Soil Screening Level Guidance, Soil to Plant Uptake Equations, OSWER Directive 9285.7-55.

[b] -- indicates that a BAF/BCF or regression equation is not available or not applicable.

[c] for organic chemicals: BAF estimated using Travis and Arms (1988) K_{ow} regression equation, with the the lowest log K_{ow} literature value (Tier 1) or the recommended log K_{ow} from http://www.syrres.com/esc/est_kowdemo.htm (Tier 2). The lowest literature value is presented in parenthesis if the Syrres value is less than the literature value. The log K_{ow} values are summarized as follows:

Constituent	Tier 1 Log K_{ow}	Tier 1 Reference	Tier 2 Log K_{ow}
2,3,7,8-TCDD TE	6.15	Montgomery, 1996	6.92
1,2,4-Trichlorobenzene	3.63	Montgomery, 1996	3.93
1,2-Dichlorobenzene	3.28 (3.34; Montgomery, 1996)	http://www.syrres.com/esc/est_kowdemo.htm	3.28
1,3-Dichlorobenzene	3.28 (3.38; Montgomery, 1996)	http://www.syrres.com/esc/est_kowdemo.htm	3.28
1,4-Dichlorobenzene	3.28 (3.37; Montgomery, 1996)	http://www.syrres.com/esc/est_kowdemo.htm	3.28
4,4'-DDD	5.06	Montgomery, 1996	5.87
4,4'-DDE	5.69	Montgomery, 1996	6.00
4,4'-DDT	4.89	Montgomery, 1996	6.79
4-Chlorophenyl phenylether	4.08	Montgomery, 1996	4.69
Aroclor 1254	5.61	Montgomery, 1996	6.98
Aroclor 1260	6.11	Montgomery, 1996	8.27
Endosulfan II	3.50 (3.62; Montgomery, 1996)	http://www.syrres.com/esc/est_kowdemo.htm	3.50
Endrin aldehyde	4.80 (5.60; Montgomery, 1996)	http://www.syrres.com/esc/est_kowdemo.htm	4.80
Endrin ketone	4.99	http://www.syrres.com/esc/est_kowdemo.htm	4.99
gamma-Chlordane	5.54 (6.22; Simpson et al., 1995)	http://www.syrres.com/esc/chemfate.htm	5.54
Hexachlorobenzene	3.93	Montgomery, 1996	5.86
Hexachlorobutadiene	4.72 (4.78; Montgomery, 1996)	http://www.syrres.com/esc/est_kowdemo.htm	4.72
Hexachloroethane	3.58	Montgomery, 1996	4.03
Methoxychlor	3.40	Montgomery, 1996	5.67

[d] 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.

Table F-16
Recommended Bioaccumulation/Bioconcentration Factors or Regression Equations Utilized for the Soil-to-Earthworm Pathway at the FLFA
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Constituent	USEPA (2008) Eco-SSL Uptake Equation [a]	Sample et al., 1998 [b]			Sample et al., 1999 [c]	Recommended Tier 1 (Maximum) BAF/BCF	Rationale for Recommended Tier 1 BAF/BCF	Recommended Tier 2 (RME) 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.
1,2,4-Trichlorobenzene	--	--	--	--	--	30.67	Kow Regression Eq., using geo-mean TOC[e]	30.67	Kow Regression Eq., using average TOC[e]
1,2-Dichlorobenzene	--	--	--	--	--	42.60	Kow Regression Eq., using geo-mean TOC	42.60	Kow Regression Eq., using average TOC
1,3-Dichlorobenzene	--	--	--	--	--	40.71	Kow Regression Eq., using geo-mean TOC	40.71	Kow Regression Eq., using average TOC
1,4-Dichlorobenzene	--	--	--	--	--	19.88	Kow Regression Eq., using geo-mean TOC	19.88	Kow Regression Eq., using average TOC
4,4'-DDD	ln (EW)= 0.6975(ln[soil])+1.1613	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
4,4'-DDE	ln (EW)= 0.8804(ln[soil])+2.4771	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
4,4'-DDT	ln (EW)= 0.8689(ln[soil])+2.1247	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
4-Chlorophenyl phenylether	--	--	--	--	--	83.77	Kow Regression Eq., using geo-mean TOC	83.77	Kow Regression Eq., using average TOC
Acenaphthene	(EW)= 1.47(soil)	--	--	--	--	1.47	Recommended BAF (USEPA 2008)	1.47	Recommended BAF (USEPA 2008)
Acenaphthylene	(EW)= 22.9(soil)	--	--	--	--	22.9	Recommended BAF (USEPA 2008)	22.9	Recommended BAF (USEPA 2008)
Anthracene	(EW)= 2.42(soil)	--	--	--	--	2.42	Recommended BAF (USEPA 2008)	2.42	Recommended BAF (USEPA 2008)
Aroclor 1254	--	10.6667	23.4945	65.227	ln (EW)=1.29(ln[soil])+1.79	65.227	Maximum value	Regression Eq.	Chemical-specific Regression Eq.
Aroclor 1260	--	10.6667	23.4945	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 2008)	1.59	Recommended BAF (USEPA 2008)
Benzo(a)pyrene	(EW)= 1.33(soil)	--	--	--	--	1.33	Recommended BAF (USEPA 2008)	1.33	Recommended BAF (USEPA 2008)
Benzo(b)fluoranthene	(EW)= 2.6(soil)	--	--	--	--	2.6	Recommended BAF (USEPA 2008)	2.6	Recommended BAF (USEPA 2008)
Benzo(g,h,i)perylene	(EW)= 2.94(soil)	--	--	--	--	2.94	Recommended BAF (USEPA 2008)	2.94	Recommended BAF (USEPA 2008)
Benzo(k)fluoranthene	(EW)= 2.6(soil)	--	--	--	--	2.6	Recommended BAF (USEPA 2008)	2.6	Recommended BAF (USEPA 2008)
Chrysene	(EW)= 2.29(soil)	--	--	--	--	2.29	Recommended BAF (USEPA 2008)	2.29	Recommended BAF (USEPA 2008)
Dibenz(a,h)anthracene	(EW)= 2.31(soil)	--	--	--	--	2.31	Recommended BAF (USEPA 2008)	2.31	Recommended BAF (USEPA 2008)
Endosulfan II	--	--	--	--	--	2.74	Kow Regression Eq., using geo-mean TOC	2.74	Kow Regression Eq., using average TOC
Endrin aldehyde	--	--	--	--	--	21.95	Kow Regression Eq., using geo-mean TOC	21.95	Kow Regression Eq., using average TOC
Endrin ketone	--	--	--	--	--	32.11	Kow Regression Eq., using geo-mean TOC	32.11	Kow Regression Eq., using average TOC
Fluoranthene	(EW)= 3.04(soil)	--	--	--	--	3.04	Recommended BAF (USEPA 2008)	3.04	Recommended BAF (USEPA 2008)
Fluorene	(EW)= 9.57(soil)	--	--	--	--	9.57	Recommended BAF (USEPA 2008)	9.57	Recommended BAF (USEPA 2008)
gamma-Chlordane	--	--	--	--	--	904.6	Kow Regression Eq., using geo-mean TOC	904.6	Kow Regression Eq., using average TOC
Hexachlorobenzene	--	--	--	--	--	148.59	Kow Regression Eq., using geo-mean TOC	148.59	Kow Regression Eq., using average TOC
Hexachlorobutadiene	--	--	--	--	--	92.83	Kow Regression Eq., using geo-mean TOC	92.83	Kow Regression Eq., using average TOC
Hexachloroethane	--	--	--	--	--	24.49	Kow Regression Eq., using geo-mean TOC	24.49	Kow Regression Eq., using average TOC
Indeno(1,2,3-cd)pyrene	(EW)= 2.86(soil)	--	--	--	--	2.86	Recommended BAF (USEPA 2008)	2.86	Recommended BAF (USEPA 2008)
Methoxychlor	--	--	--	--	--	17.90	Kow Regression Eq., using geo-mean TOC	17.90	Kow Regression Eq., using average TOC
Phenanthrene	(EW)= 1.72(soil)	--	--	--	--	1.72	Recommended BAF (USEPA 2008)	1.72	Recommended BAF (USEPA 2008)
Pyrene	(EW)= 1.75(soil)	--	--	--	--	1.75	Recommended BAF (USEPA 2008)	1.75	Recommended BAF (USEPA 2008)
Arsenic	ln (EW)= 0.706(ln[soil])-1.421	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Cadmium	ln (EW)= 0.795(ln[soil])+2.114	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Chromium	(EW)= 0.306(soil)	--	--	--	--	0.306	Recommended BAF (USEPA 2008)	0.306	Recommended BAF (USEPA 2008)
Copper	(EW)= 0.515(soil)	--	--	--	--	0.515	Recommended BAF (USEPA 2008)	0.515	Recommended BAF (USEPA 2008)
Lead	ln (EW)= 0.807(ln[soil])-0.218	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
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	--	7.8	Maximum value	1.059	Median Value
Selenium	ln (EW)= 0.733(ln[soil])-0.075	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)
Silver	(EW)= 2.045(soil)	--	--	--	--	2.045	Recommended BAF (USEPA 2008)	2.045	Recommended BAF (USEPA 2008)
Zinc	ln (EW)= 0.328(ln[soil])+4.449	--	--	--	--	Regression Eq.	Recommended Equation (USEPA 2008)	Regression Eq.	Recommended Equation (USEPA 2008)

Table F-16
Recommended Bioaccumulation/Bioconcentration Factors or Regression Equations Utilized for the Soil-to-Earthworm Pathway at the FLFA

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).

[a] USEPA, 2008, 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., 18:2,110-2,120. (models from Table 3 of publication). EW = earthworm tissue concentration.

[d] -- indicates that a BAF/BCF or regression equation is not available or not applicable.

[e] USEPA, 2008, EcoSSL regression equation using site-specific TOC values and chemical-specific Kow and Koc values.

TOC concentrations utilized are as follows: Tier I: Lower-bound (geometric mean) surface soil TOC = 0.374%; Tier II arithmetic mean surface soil TOC = 0.374% (one surface soil sample [LFSB12C]).

Log Kow values from: http://www.syrres.com/esc/est_kowdemo.htm or http://www.syrres.com/esc/chemfate.htm

Koc values from: http://www.syrres.com/esc/chemfate.htm

$$BAF = \frac{((10^{(0.87*\log Kow-2)})/0.16)}{foc^{*}\ Koc}$$

Constituent	Koc	Log Kow	Constituent	Koc	Log Kow
1,2,4-Trichlorobenzene	1430	3.93	Endrin ketone	11420 (Endrin)	4.99
1,2-Dichlorobenzene	280	3.28	gamma-Chlordane	1220	5.54
1,3-Dichlorobenzene	293	3.28	Hexachlorobenzene	14100	5.86
1,4-Dichlorobenzene	600	3.28	Hexachlorobutadiene	2300	4.72
4-Chlorophenyl phenylether	2400	4.69	Hexachloroethane	2188	4.03
Endosulfan II	6770	3.50	Methoxychlor	80000	5.67
Endrin aldehyde	11420	4.80			

Table F-17
Recommended Bioaccumulation/Bioconcentration Factors Utilized for the Soil-to-Small Mammal and Bird Pathways at the FLFA

Constituent	USEPA (2008) Eco-SSL Uptake Equation [a]	Sample et al., 1998 [b]						Recommended Tier 1 (Maximum) BAF/BCF	Rationale for Recommended Tier 1 BAF/BCF	Recommended Tier 2 (90th Percentile - RME) 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
1,2,4-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"
4,4'-DDD	--	--	--	--	--	--	--	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'-DDE	ln(mam)= 0.641(ln[soil])+3.6401	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2008)	Regression Eq.	Recommended Regression Eq. (USEPA 2008)
4,4'-DDT	ln(mam)= 0.7254(ln[soil])+1.1788	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2008)	Regression Eq.	Recommended Regression Eq. (USEPA 2008)
4-Chlorophenyl phenylether	--	--	--	--	--	--	--	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 [e]	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Acenaphthylene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Anthracene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2008)	0	Uptake assumed to be negligible (USEPA 2008)
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"
Aroclor 1260	--	--	--	--	--	--	--	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 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Benzo(a)pyrene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Benzo(b)fluoranthene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Benzo(g,h,i)perylene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Benzo(k)fluoranthene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Chrysene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Dibenz(a,h)anthracene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2008)	0	Uptake assumed to be negligible (USEPA 2008)
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 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 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Fluorene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2008)	0	Uptake assumed to be negligible (USEPA 2008)
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"
Hexachlorobenzene	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Hexachlorobutadiene	--	--	--	--	--	--	--	1 [f]	Conservative value for Tier 2 organics see footnote "f"	0.5 [f]	Conservative value for Tier 2 organics see footnote "f"
Hexachloroethane	--	--	--	--	--	--	--	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 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Methoxychlor	--	--	--	--	--	--	--	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 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Pyrene	Mam = 0	--	--	--	--	--	--	0	Uptake assumed to be negligible (USEPA 2008)	0	Uptake assumed to be negligible (USEPA 2008)
Arsenic	ln(mam)= 0.8188(ln[soil])-4.8471	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2008)	Regression Eq.	Recommended Regression Eq. (USEPA 2008)
Cadmium	ln(mam)= 0.4723(ln[soil])-1.2571	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2008)	Regression Eq.	Recommended Regression Eq. (USEPA 2008)
Chromium	ln(mam)= 0.7338(ln[soil])-1.4599	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2008)	Regression Eq.	Recommended Regression Eq. (USEPA 2008)
Copper	ln(mam)= 0.144(ln[soil])+2.042	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2008)	Regression Eq.	Recommended Regression Eq. (USEPA 2008)
Lead	ln(mam)= 0.4422(ln[soil])+0.0761	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2008)	Regression Eq.	Recommended Regression Eq. (USEPA 2008)
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 2008)	Regression Eq.	Recommended Regression Eq. (USEPA 2008)
Selenium	ln(mam)= 0.3764(ln[soil])-0.4158	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2008)	Regression Eq.	Recommended Regression Eq. (USEPA 2008)
Silver	(mam)= 0.004(soil)	--	--	--	--	--	--	0.004	Recommended BAF (USEPA 2008)	0.004	Recommended BAF (USEPA 2008)
Zinc	ln(mam)= 0.0706(ln[soil])+4.3632	--	--	--	--	--	--	Regression Eq.	Recommended Regression Eq. (USEPA 2008)	Regression Eq.	Recommended Regression Eq. (USEPA 2008)

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, 2008, 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 2008).

[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-18
NOAEL Toxicity Reference Values Used to Derive
Wildlife Toxicity Benchmarks for COPECs at the FLFA

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)
1,2,4-Trichlorobenzene	--	14.8	rat	IRIS (EPA, 2008)	N/A	N/A	N/A	N/A
1,2-Dichlorobenzene	--	85.7	rat	IRIS (EPA, 2008)	1608 (LD50)	16.08	Northern bobwhite	Based on 1,4-Dichlorobenzene, EEDB (EPA, 2000)
1,3-Dichlorobenzene	--	85.7	rat	Based on 1,2-Dichlorobenzene, IRIS (EPA, 2008)	1608 (LD50)	16.08	Northern bobwhite	Based on 1,4-Dichlorobenzene, EEDB (EPA, 2000)
1,4-Dichlorobenzene	--	85.7	rat	Based on 1,2-Dichlorobenzene, IRIS (EPA, 2008)	1608 (LD50)	16.08	Northern bobwhite	EEDB (EPA, 2000)
4,4-DDD	--	0.8	rat	Sample et al. (1996)	--	0.0028	brown pelican	Sample et al. (1996)
4,4-DDE	--	0.8	rat	Sample et al. (1996)	--	0.0028	brown pelican	Sample et al. (1996)
4,4-DDT	--	0.8	rat	Sample et al. (1996)	--	0.0028	brown pelican	Sample et al. (1996)
4-Chlorophenyl phenylether	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Acenaphthene	--	65.6	rat	EcoSSL (EPA, 2008)	--	553.0	mallard duck	Based on B(a)P, Eisler (1987)
Acenaphthylene	--	65.6	rat	EcoSSL (EPA, 2008)	--	553.0	mallard duck	Based on B(a)P, Eisler (1987)
Anthracene	--	65.6	rat	EcoSSL (EPA, 2008)	--	553.0	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)
Aroclor - 1260	--	0.14	mink	Based on Aroclor 1254, Sample et al. (1996)	--	0.18	ringed pheasant	Based on Aroclor 1254, Sample et al. (1996)
Benzo(a)anthracene	--	0.615	mouse	EcoSSL (EPA, 2008)	--	553.0	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(a)pyrene	--	0.615	mouse	EcoSSL (EPA, 2008)	--	553.0	mallard duck	Eisler (1987)
Benzo(b)fluoranthene	--	0.615	mouse	EcoSSL (EPA, 2008)	--	553.0	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(g,h,i)perylene	--	0.615	mouse	EcoSSL (EPA, 2008)	--	553.0	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(k)fluoranthene	--	0.615	mouse	EcoSSL (EPA, 2008)	--	553.0	mallard duck	Based on B(a)P, Eisler (1987)
Chrysene	--	0.615	mouse	EcoSSL (EPA, 2008)	--	553.0	mallard duck	Based on B(a)P, Eisler (1987)
Dibenz(a,h)anthracene	--	0.615	mouse	EcoSSL (EPA, 2008)	--	553.0	mallard duck	Based on B(a)P, Eisler (1987)
Endosulfan II	--	0.15	rat	Sample et al. (1996)	--	10.0	gray partridge	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, 2008)	--	553.0	mallard duck	Based on B(a)P, Eisler (1987)
Fluorene	--	65.6	rat	EcoSSL (EPA, 2008)	--	553.0	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)
Hexachlorobenzene	--	0.08	rat	IRIS (EPA, 2008)	--	0.225	Japanese quail	Terr. Tox. Database (USACHPPM, 2002)
Hexachlorobutadiene	--	0.2	rat	USEPA (1999)	--	3.19	Japanese quail	USEPA (1999)
Hexachloroethane	--	1.0	rat	IRIS (EPA, 2008)	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	--	0.615	mouse	EcoSSL (EPA, 2008)	--	553.0	mallard duck	Based on B(a)P, Eisler (1987)
Methoxychlor	--	4.0	rat	Sample et al. (1996)	NA	NA	NA	NA
Phenanthrene	--	65.6	rat	EcoSSL (EPA, 2008)	--	553	mallard duck	Based on B(a)P, Eisler (1987)
Pyrene	--	0.615	mouse	EcoSSL (EPA, 2008)	--	553	mallard duck	Based on B(a)P, Eisler (1987)

Table F-18
NOAEL Toxicity Reference Values Used to Derive
Wildlife Toxicity Benchmarks for COPECs at the FLFA
Page 2 of 2

COPEC	Mammalian Data				Avian Data			
	Toxicity Value	NOAEL (mg/kg/d)	Test Species	Reference	Toxicity Value	NOAEL (mg/kg/d)	Test Species	Reference
Inorganics								
Arsenic	--	0.126	mouse	Sample et al. (1996)	--	5.14	mallard duck	Sample et al. (1996)
Cadmium	--	1.0	rat	Sample et al. (1996)	--	1.45	mallard duck	Sample et al. (1996)
Chromium	--	2,737	rat	Sample et al. (1996)	--	1.0	black duck	Sample et al. (1996)
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	--	0.20	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.

ATSDR, 1990, Toxicological Profile for Silver, U.S. Public Health Service.
Eisler, 1987, PAH Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review.
Sample et al., 1996, Toxicological Benchmarks for Wildlife.
USACHPPM, 2002, Terrestrial Toxicity Database.
USEPA, 1999, SLERA Protocol for Hazardous Waste Combustion Faclilties.
USEPA, 2000, OPP (Office of Pesticide Programs). Environmental Effects Database (EEDB).
USEPA, 2008, Ecological Screening Levels (Eco-SSL).
USEPA, 2008, Integrated Risk Information System (IRIS).

Table F-19
LOAEL Toxicity Reference Values Used to Derive
Wildlife Toxicity Benchmarks for COPECs at the FLFA

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)
1,2,4-Trichlorobenzene	--	53.6	rat	IRIS (EPA, 2008)	N/A	N/A	N/A	N/A
1,2-Dichlorobenzene	85.7 (NOAEL)	428.5	rat	IRIS (EPA, 2008)	1608 (LD50)	80.4	Northern bobwhite	Based on 1,4-Dichlorobenzene, EEDB (EPA, 2000)
1,3-Dichlorobenzene	85.7 (NOAEL)	428.5	rat	Based on 1,2-Dichlorobenzene, IRIS (EPA, 2008)	1608 (LD50)	80.4	Northern bobwhite	Based on 1,4-Dichlorobenzene, EEDB (EPA, 2000)
1,4-Dichlorobenzene	85.7 (NOAEL)	428.5	rat	Based on 1,2-Dichlorobenzene, IRIS (EPA, 2008)	1608 (LD50)	80.4	Northern bobwhite	EEDB (EPA, 2000)
4,4-DDD	--	4.0	rat	Sample et al. (1996)	--	0.028	brown pelican	Sample et al. (1996)
4,4-DDE	--	4.0	rat	Sample et al. (1996)	--	0.028	brown pelican	Sample et al. (1996)
4,4-DDT	--	4.0	rat	Sample et al. (1996)	--	0.028	brown pelican	Sample et al. (1996)
4-Chlorophenyl phenylether	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Acenaphthene	--	110	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Eisler (1987)
Acenaphthylene	--	110	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Anthracene	--	110	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Eisler (1987)
Aroclor - 1254	--	0.68	mouse	Sample et al. (1996)	--	1.8	ring-necked pheasant	Sample et al. (1996)
Aroclor - 1260	--	0.68	mouse	Based on Arochlor-1254, Sample et al. (1996)	--	1.8	ring-necked pheasant	Based on Arochlor-1254, Sample et al. (1996)
Benzo(a)anthracene	--	3.07	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(a)pyrene	--	3.07	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Eisler (1987)
Benzo(b)fluoranthene	--	3.07	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(g,h,i)perylene	--	3.07	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Benzo(k)fluoranthene	--	3.07	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Chrysene	--	3.07	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Dibenz(a,h)anthracene	--	3.07	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Endosulfan II	0.15 (NOAEL)	0.75	rat	Sample et al. (1996)	10 (NOAEL)	50.0	gray partridge	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, 2008)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Fluorene	--	110	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Based on Benzo(a)pyrene, Eisler (1987)
gamma-Chlordane	--	9.20	mouse	Sample et al. (1996)	--	10.7	red-winged blackbird	Sample et al. (1996)
Hexachlorobenzene	--	0.29	rat	IRIS (EPA, 2008)	0.225 (NOAEL)	1.125	Japanese quail	Terr. Tox. Database (USACHPPM, 2002)
Hexachlorobutadiene	0.2 (NOAEL)	1	rat	USEPA (1999)	3.19 (NOAEL)	16.0	Japanese quail	USEPA (1999)
Hexachloroethane	--	15	rat	IRIS (EPA, 2008)	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	--	3.07	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Methoxychlor	--	8	rat	Sample et al. (1996)	NA	NA	NA	NA
Phenanthrene	--	110	mouse	EcoSSL (EPA, 2008)	553 (NOAEL)	2765	mallard duck	Based on B(a)P, Eisler (1987)
Pyrene	--	3.07	mouse	EcoSSL (EPA, 2008)	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	--	10.0	rat	Sample et al. (1996)	--	20	mallard duck	Sample et al. (1996)

Table F-19
LOAEL Toxicity Reference Values Used to Derive
Wildlife Toxicity Benchmarks for COPECs at the FLFA

COPEC	Mammalian Data				Avian Data			
	Toxicity Value	LOAEL (mg/kg/d)	Test Species	Reference	Toxicity Value	LOAEL (mg/kg/d)	Test Species	Reference
Chromium	2,737 (NOAEL)	13690	rat	Sample et al. (1996)	--	2.78	chicken, black duck, turkey	USEPA (2008)
Copper	--	15.10	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)	--	1.0	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)

NA 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.

ATSDR, 1990, Toxicological Profile for Silver, U.S. Public Health Service.
Eisler, 1987, PAH Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review.
Sample et al., 1996, Toxicological Benchmarks for Wildlife.
USACHPPM, 2002, Terrestrial Toxicity Database.
USEPA, 1999, SLERA Protocol for Hazardous Waste Combustion Faclilties.
USEPA, 2000, OPP (Office of Pesticide Programs). Environmental Effects Database (EEDB).
USEPA, 2008, Ecological Screening Levels (Eco-SSL).
USEPA, 2008, Integrated Risk Information System (IRIS).

Appendix G

USEPA Guidance Documents and Remedial Goal Calculations

Appendix G-1

USEPA Guidance Documents

United States Environmental Protection Agency | Solid Waste and Emergency Response (5101) | EPA540-F-98-030 NTIS: PB98-963 244 August 1998

EPA

Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities

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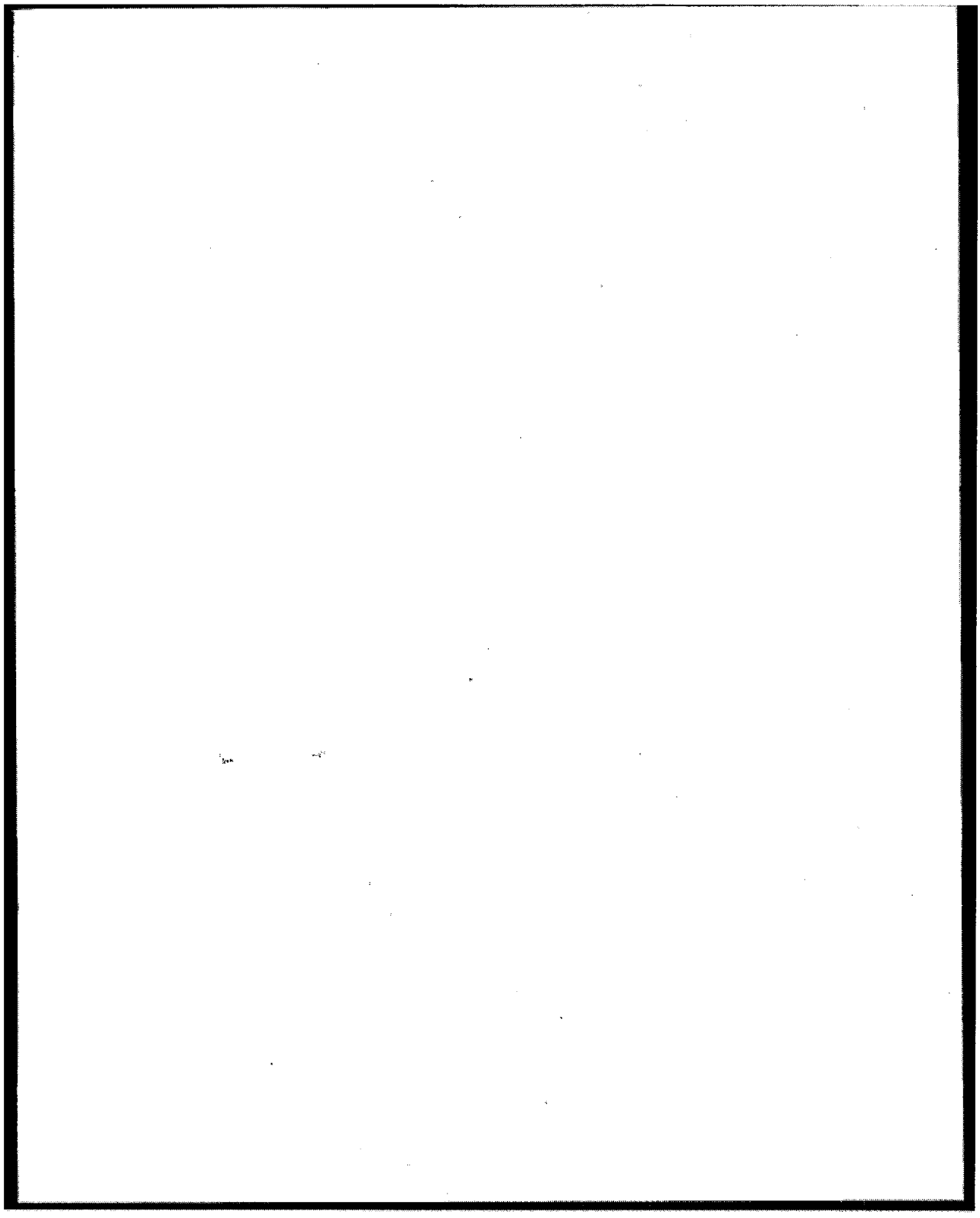

CLARIFICATION TO THE 1994 REVISED INTERIM SOIL LEAD GUIDANCE FOR CERCLA SITES AND RCRA CORRECTIVE ACTION FACILITIES

OSWER DIRECTIVE # 9200.4-27

AUGUST 1998

OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

9200.4-27
EPA/540/F-98/030
PB98-963244

AUG 27 1998

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

OSWER Directive # 9200.4-27P

MEMORANDUM

SUBJECT: Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities

FROM: Timothy Fields, Jr.
Acting Assistant Administrator

TO: Regional Administrators I-X

PURPOSE

This directive clarifies the existing 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, OSWER Directive 9355.4-12. Specifically, this directive clarifies OSWER's policy on (1) using EPA's Science Advisory Board (SAB) reviewed Integrated Exposure Uptake Biokinetic Model (IEUBK) and blood lead studies, (2) determining the geographic area to use in evaluating human exposure to lead contamination ("exposure units"), (3) addressing multimedia lead contamination and (4) determining appropriate response actions at lead sites. The purpose for clarifying the existing 1994 directive is to promote national consistency in decision-making at CERCLA and RCRA lead sites across the country.

BACKGROUND

OSWER Directive 9355.4-12, issued on July 14, 1994 established OSWER's current approach to addressing lead in soil at CERCLA and RCRA sites. The existing directive established a streamlined approach for determining protective levels for lead in soil at CERCLA sites and RCRA facilities as follows:

- It recommends a 400 ppm screening level for lead in soil at residential properties;
- It describes how to develop site-specific preliminary remediation goals (PRGs) at CERCLA sites and media cleanup standards at RCRA Corrective Action facilities for

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residential land use; and,

- It describes a strategy for management of lead contamination at CERCLA sites and RCRA Corrective Action facilities that have multiple sources of lead.

The existing interim directive provides direction regarding risk assessment and risk management approaches for addressing soil lead contaminated sites. The OSWER directive states that, " ... implementation of this guidance is expected to provide more consistent decisions across the country ..." However, since that directive was released, OSWER determined that clarification of the guidance is needed. Key areas being clarified by issuance of this directive include: (1) using the IEUBK model and blood lead studies, (2) determining exposure units to be considered in evaluating risk and developing risk management strategies, (3) addressing multimedia lead contamination and (4) determining appropriate response actions at residential lead sites. The existing directive provides the following guidance on these areas:

1. The OSWER directive recommends using the Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children (Pub. # 9285.7-15-1, PB93-963510) for setting site-specific residential preliminary risk-based remediation goals (PRGs) at CERCLA sites and media cleanup standards (MCSs) at RCRA corrective actions Facilities. The directive states that the IEUBK model is the best tool currently available for predicting the potential blood lead levels of children exposed to lead in the environment. OSWER's directive also recommends the evaluation of blood lead data, where available, and states that well-conducted blood lead studies provide useful information to site managers. The directive however recommends that "... blood lead data not be used alone to assess risk from lead exposure or to develop soil lead cleanup levels."

2. The directive describes OSWER's risk reduction goal as "...generally, OSWER will attempt to limit exposure to soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of exceeding a 10 ug/dl blood lead level." The directive also states that "... EPA recommends that a soil lead concentration be determined so that a typical child or group of children exposed to lead at this level would have an estimated risk of no more than 5% of exceeding a blood lead of 10 ug/dl." OSWER generally defines an exposure unit as a geographic area where exposures occur to the receptor of concern during the time of interest and believes that for a child or group of similarly exposed children, this is typically the individual residence and other areas where routine exposures are occurring.

3. The directive recommends that risk managers assess the contribution of multiple environmental sources of lead to overall lead exposure (e.g., consideration of the importance of soil lead levels relative to lead from drinking water, paint, and household dust) which promotes development of risk reduction strategies that address all sources that contribute significantly to exposure.

4. The OSWER directive states that the IEUBK model is not the only factor to be considered in establishing lead cleanup goals. Rather, the IEUBK model is the primary risk assessment tool available for evaluating lead risk and the results of the model are used to guide selection of appropriate risk management strategies for each site.

Since the OSWER directive was issued in 1994, there has been a trend toward a more consistent approach to managing risk at residential lead sites, however, OSWER was interested in identifying areas requiring additional clarification to facilitate more effective implementation of the directive. As a first step in the process, meetings were held with various EPA Regions, States and local governments to discuss how the directive has been implemented nationally at lead sites since 1994. By participating in these meetings and by reviewing the decisions that are being made across the country, OSWER believed that clarification of certain aspects of the 1994 directive would be useful.

All of the documents and guidance referenced in this directive are available through the National Technical Information Service (NTIS) at 703-605-6000 or could be downloaded electronically from: http//epa.gov/superfund/oerr/ini_prod/lead/prods.htm.

OBJECTIVE

At lead contaminated residential sites, OSWER seeks assurance that the health of the most susceptible population (children and women of child bearing age) is protected and promotes a program that proactively assesses and addresses risk. OSWER believes that predictive tools should be used to evaluate the risk of lead exposure, and that cleanup actions should be designed to address both current and potential future risk.

While health studies, surveys, and monitoring can be valuable in identifying current exposures and promoting improved public health, they are not definitive tools in evaluating potential risk from exposure to environmental contaminants. In the case of lead exposure, blood lead monitoring programs can be of critical importance in identifying individuals experiencing potential negative health outcomes and directing education and intervention resources to address those risks. However, CERCLA §121(b) requires EPA to select cleanup approaches that are protective of human health and the environment and that utilize permanent solutions to the maximum extent practicable. To comply with the requirements set forth in CERCLA § 121(b), OSWER will generally require selection of cleanup programs that are proactive in mitigating risk and that do not simply rely on biological monitoring programs to determine if an exposure has already occurred.

To meet these objectives, OSWER will seek actions that limit exposure to soil lead levels such that a typical child or group of similarly exposed children would have an estimated risk of no more than 5% of exceeding a 10 ug/dl blood lead level. If lead is predicted to pose a risk to the susceptible population, OSWER recommends that actions be taken to significantly minimize or eliminate this exposure to lead.

The principles laid out in the four attached factsheets (Appendix) support OSWER's goals by encouraging appropriate assessment and response actions at CERCLA and RCRA lead sites across the country.

This clarification directive emphasizes the following key messages regarding the four areas and encourages the users of this directive, be they EPA Regions, States, or other stakeholders, to adopt these principles in assessing and managing CERCLA and RCRA lead sites across the country. The critical elements of the attached papers are as follows:

I. Using Blood Lead Studies and IEUBK Model at Lead Sites:

OSWER emphasizes the use of the IEUBK Model for estimating risks for childhood lead exposure from a number of sources, such as soils, dust, air, water, and other sources to predict blood lead levels in children 6 months to 84 (7 years) months old. The 1994 directive also recommended evaluation of available blood lead data and stated that data from a well-conducted blood lead study of children could provide useful information to site managers. In summary, OSWER's clarification policy on the appropriate use of the IEUBK and blood lead studies is that:

- OSWER recommends that the IEUBK model be used as the primary tool to generate risk-based soil cleanup levels at lead sites for current or future residential land use. If Regions propose an alternative method for generating cleanup levels, they are required to submit their approach to the national Lead Sites Consultation Group (LSCG)(1) for review and comment ;
- Response actions can be taken using IEUBK predictions alone; blood lead studies are not required; and
- Blood lead studies and surveys are useful tools at lead sites and can be used to identify key site-specific exposure pathways and to direct health professionals to individuals needing immediate assistance in minimizing lead exposure; however, OSWER recommends that blood lead studies not be used for establishing long-term remedial or non-time-critical removal cleanup levels at lead sites.

II. Determining Exposure and Remediation Units at Lead Sites

OSWER recommends that cleanup levels at lead sites be designed to reduce risk to a typical or individual child receiving exposures at the residence to meet Agency guidelines (i.e., no greater

(1) The Lead Sites Consultation Group (LSCG) is comprised of senior management representatives from the Waste Management Divisions in all 10 EPA regions along with senior representatives from the Office of Emergency and Remedial Response in EPA headquarters. The LSCG is supported by EPA's Technical Review Workgroup (TRW) for lead and the national Lead Sites Workgroup (LSW). The TRW consists of key scientific experts in lead risk assessment from various EPA Regions, labs and headquarters. The LSW is comprised of senior Regional Project Managers from various Regions and key representatives from headquarters who are experienced in addressing lead threats at Superfund sites.

than a 5% chance of exceeding a 10 ug/dl blood-lead level for a full-time child resident).

Therefore, it is recommended that risk assessments conducted at lead-contaminated residential sites use the individual residence as the primary exposure unit of concern. This does not mean that a risk assessment should be conducted for every yard, rather that the soil lead contamination data from yards and other residential media (for example, interior dust and drinking water) should be input into the IEUBK model to provide a preliminary remediation goal (PRG) for the residential setting. When applicable, potential exposure to accessible site-related lead sources outside the residential setting should also be evaluated to understand how these other potential exposures contribute to the overall risk to children, and to suggest appropriate cleanup measures for those areas.

III. Addressing Multimedia Contamination at Lead Sites

EPA generally has limited legal authority to use Superfund to address exposure from **interior lead-based paint**. As a policy matter, OSWER recommends that such exposures not be addressed through actual abatement activities. However, EPA Regions should promote addressing interior paint risks through actions by others (e.g., potentially responsible parties (PRPs), other government programs, etc.) as a component of an overall site management strategy.

Because of other competing demands on the Superfund Trust Fund, OSWER recommends that EPA Regions avoid using the Superfund Trust Fund for removing **exterior lead-based paint** and soil contaminated from lead-based paint. Superfund dollars *may* however be used in limited circumstances to remediate exterior lead-based paint in order to protect the overall site remedy (i.e., to avoid re-contamination of soils that have been remediated) but generally only after determining that other funding sources are unavailable. As with interior lead-based paint abatement, EPA Regions should promote remediation of exterior lead-based paint by others, such as PRPs, local governments or individual homeowners.

IV. Determining Appropriate Response Actions at Lead Sites

In selecting site management strategies, it is OSWER's preference to seek early risk reduction with a combination of engineering controls (actions which permanently remove or treat contaminants, or create reliable barriers to mitigate the risk of exposure) and non-engineering response actions. All potential lead sources should be identified in site assessment activities. Non-engineering response actions, such as education and health intervention programs, should be considered an integral part of early risk reduction efforts because of their potential to provide immediate health benefits. In addition, engineering controls should be implemented early at sites presenting the greatest risk to children and other susceptible subpopulations.

As a given project progresses, OSWER's goal should be to reduce the reliance on education and intervention programs to mitigate risk. The goal should be cleanup strategies that move away from reliance on long-term changes in community behavior to be protective since behavioral

changes may be difficult to maintain over time. The actual remedy selected at each CERCLA site must be determined by application of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (55 FR 8666- 8865, March 8, 1990) remedy selection criteria to site-specific circumstances. This approach also recognizes the NCP preference for permanent remedies and emphasizes selection of engineering over non-engineering remedies for long-term response actions.

This directive clarifies OSWER's policy on four key issue areas addressed in the 1994 OSWER soil lead directive in order to promote a nationally consistent decision-making process for assessing and managing risks associated with lead contaminated sites across the country. The policy presented in these specific issue areas supersedes all existing OSWER policy and directives on these subjects. No other aspects of the existing 1994 directive are affected.

IMPLEMENTATION

The principles laid out in this directive (which includes the four attached factsheets) are meant to apply to all residential lead sites currently being evaluated through the CERCLA Remedial Investigation/Feasibility Study process and all future CERCLA Sites and RCRA Corrective Action Facilities contaminated with lead. The Regions will be required to submit their rationale for deviating from the policies laid out in this directive to the Lead Sites Consultation Group. This directive does not apply to previous remedy selection decisions.

Attachments

cc: Waste Management Policy Managers (Regions I-X)
Stephen Luftig, OERR
Elizabeth Cotsworth, OSW
James Woolford, FFRRO
Barry Breen, OSRE
Larry Reed, OERR
Tom Sheckells, OERR
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John Cunningham, OERR
Paul Nadeau, OERR
Bruce Means, OERR
Earl Salo, OERR

NOTICE: This document provides guidance to EPA staff. The document does not, however, substitute for EPA's statutes or regulations, nor is it a regulation itself. Thus it cannot impose legally-binding requirements on EPA, states, or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA may change this guidance in the future, as appropriate.

Appendix
OSWER Directive # 9200.4-27P
August 1998

Factsheet: Using the IEUBK Model and Blood Lead Studies at Residential Lead Sites

Question: What is OSWER's policy on using the IEUBK model and blood-lead studies in conducting risk assessments and setting cleanup standards at residential lead contamination sites?

Answer: OSWER's policy on using the IEUBK model and blood-lead studies in conducting risk assessment and setting cleanup standards is as follows:

A. Use of the IEUBK Model:

1. The IEUBK model is a good predictor of potential long-term blood-lead levels for children in residential settings. OSWER recommends that the IEUBK model be used as the primary tool to generate risk-based soil cleanup levels at lead sites for current or future residential land use. If Regions propose an alternative method for generating cleanup levels, they are required to submit their approach to the National Lead Sites Consultation Group (LSCG) for review and comment.

2. Blood-lead distributions predicted by the IEUBK model illustrate a plausible range of variability in children's physiology, behavior, and household conditions.

3. Response actions can be taken, and remedial goals developed, using IEUBK predictions alone.

B. Use of Blood-Lead Studies/Data:

1. Blood-lead studies, surveys, and monitoring are useful tools at lead sites and can be used to help identify key site-specific exposure pathways and direct health professionals to individuals needing immediate assistance in minimizing lead exposure.

2. The utility of blood lead testing results and studies depends on how representative the information is of the population being evaluated, the design of the data collection, and the quality of the laboratory analysis. To this end, OSWER recommends that EPA Regions consult with ATSDR or CDC to assess or design studies according to their intended use.

3. Many blood-lead screening, monitoring, or testing programs differ from blood lead studies in that they do not attempt to identify risk factors for childhood exposure to lead sources. Although these programs may be extremely beneficial in identifying children with elevated blood lead levels and identifying candidates for referral to medical professionals for evaluation, they may not provide an accurate representation of community-wide exposure.

4. Well-designed blood lead studies may be used to identify site specific factors and pathways to be considered in applying the IEUBK model at residential lead sites. However, OSWER recommends that blood-lead studies not be used to determine future long-term risk where exposure conditions are expected to change over time; rather, they should be considered a snapshot of ongoing exposure under a specific set of circumstances (including community awareness and education) at a specific time. Long-term studies may be helpful in understanding exposure trends within a community and evaluating the effectiveness of cleanup strategies over time.

C. **IEUBK and Blood-Lead Studies/Data:**

1. Blood-lead data and IEUBK model predictions are expected to show a general concordance for most sites. However, some deviations between measured and predicted levels are expected. On some occasions, declines in blood-lead levels have been observed in association with lead exposure-reduction and health education. However, long-term cleanup goals should be protective in the absence of changes in community behavior as there is little evidence of the sustained effectiveness of these education/intervention programs over long periods of time.

2. Where actual blood-lead data varies significantly from IEUBK Model predictions, the model parameters should not automatically be changed. In such a case, the issue should be raised to the Lead Technical Review Workgroup (TRW) to further identify the source of those differences. Site work need not be put on hold while the issue is being reviewed by the TRW; the site manager should review other elements of the lead directive and the "Removal Actions at Lead Sites" guidance to determine appropriate interim actions to be taken at the site.

The Regions will be required to submit their rationale for deviating from the policies laid out in this factsheet to the Lead Sites Consultation Group.

Appendix
OSWER Directive # 9200.4-27P
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Factsheet: Determining Exposure and Remediation Units at Residential Lead Sites

Question: How does OSWER define an exposure unit, and subsequently apply this definition in conducting risk assessment and risk management activities at residential lead sites?

Answer: OSWER recognizes that defining and characterizing exposure unit(s) for a site is critically important in undertaking risk assessment activities and in designing protective cleanup strategies. An **exposure unit** is defined as a geographic area where exposures occur to the receptor of concern during the time of interest and that for a child, or group of similarly exposed children, this is typically the individual residence and other areas where chronic or ongoing exposures are occurring.

Various approaches to characterizing and managing risks by exposure units have been examined by OSWER. OSWER recognizes that lead ingestion can also cause adverse health effects in adults and fetuses but believes that by adequately limiting lead exposures to young children at residential sites, these other receptors will generally be likewise protected from adverse health impacts.

EPA's goal is to protect human health and the environment under current and future exposure scenarios. At lead sites, OSWER wants to assure that children's health is protected and promotes a program that proactively assesses risks rather than relying on biological monitoring to determine if an exposure has already occurred. OSWER emphasizes actions be taken at lead sites that will minimize or eliminate exposure of children to environmental lead contamination.

To achieve the above stated goal, OSWER recommends characterizing **exposure units as exposure potential at the individual residence as the primary unit of concern for evaluating potential risk at lead contaminated residential sites**. This recognizes that there are children whose domain and activities occur principally within the confines of a particular residential property. For determining exposure potential (and ultimately developing protective cleanup levels) at the individual home, OSWER recommends the scenario to be evaluated (through use of the IEUBK Model) would be a young child in full-time residence. This approach helps achieve OSWER's recommended health protection goal that an individual child or group of similarly exposed children would have <5% chance of exceeding a blood-lead concentration of 10 ug/dl. In designing community wide cleanup strategies, it is essential that non-residential areas (e.g., parks, day care facilities, playgrounds, etc.), where lead exposure may occur, also be characterized with respect to their contribution to soil-lead exposure, and appropriate cleanup actions implemented.

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OSWER recommends that risk management decisions for response to residential lead contamination sites focus on reducing risk at residences, but also recommends that response strategies be developed for other site locations (exposure units) where children receive exposure. Flexibility in determining appropriate response actions that provide protection at the individual residence should be considered in context of the NCP remedy selection criteria. The lead exposure issues are complex and OSWER recommends that EPA Regions try to communicate clearly the risk characterization and risk management decisions to the site residents. Affected communities must clearly understand the context of risk management decisions, how these decisions affect the health of their children, and how cleanup actions will influence the future growth and development of the community.

The Regions will be required to submit their rationale for deviating from the policies laid out in this factsheet to the Lead Sites Consultation Group.

Appendix
OSWER Directive # 9200.4-27P
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Factsheet: Addressing Multimedia Contamination at Residential Lead Sites

Question: What is OSWER's policy on addressing multimedia contamination at residential lead sites?

Answer: OSWER recognizes that several sources of lead-contamination, including soil, ground water, airborne particulates, lead plumbing, interior dust, and interior and exterior lead-based paint may be present at Superfund sites where children are at risk or have documented lead exposure. These lead sources may contribute to elevated blood-lead levels and may need to be evaluated in determining risks and cleanup actions at residential lead sites. However, there are limitations on the Agency's statutory authority under CERCLA to abate some of these sources, such as indoor lead-based paint and lead plumbing because CERCLA responses may be taken only to releases or threatened releases into the environment (CERCLA §104 (a)(3) and (4)).

When EPA's resources, or authority to respond or to expend monies under Superfund is limited, OSWER recommends that EPA Regions identify and coordinate to the greatest extent possible with other authorities and funding sources (e.g., other federal agencies and state or local programs). EPA Regions should coordinate with these other authorities to design a comprehensive, cost-effective response strategy that addresses as many sources of lead as practicable. These strategies should include actions to respond to lead-based paint, interior dust, and lead plumbing, as well as ground water sources and lead-contaminated soil.

Although OSWER will encourage that EPA Regions fully cooperate in the development of a comprehensive site management strategy, OSWER realizes that complete active cleanup of these other sources may be difficult to complete due to limited funding available to other authorities. Since complete cleanups of these sources is not guaranteed, and at most sites may be unlikely, OSWER recommends that the soil cleanup levels not be compromised. In other words, the soil cleanup levels should be calculated with the IEUBK model using existing pre-response action site specific data. This is due to the fact that soil cleanup levels at residential lead sites are generally established to protect individuals, from excess exposures to soils, and house dust attributable to those soils, and are not attributable to exposure to other sources such as interior lead paint which should be managed on a residence specific basis. Remediation of non-soil lead sources to mitigate overall lead exposure at individual residences should therefore not be used to modify sitewide soil lead cleanup levels.

The recommendations provided below represent OSWER's policy on addressing lead-contaminated media and/or sources for which EPA has limited or no authority to remediate.

Interior Paint: EPA has limited legal authority to use Superfund to address exposure from

interior lead-based paint. As a policy matter, OSWER recommends that such exposures not be addressed through actual abatement activities. However, EPA Regions should promote addressing interior paint risks through actions by others, such as HUD, local governments, or individual home owners as a component of an overall site management strategy. Any activities to clean up interior lead-based paint by PRPs or other parties should not result in an increase of the risk-based soil cleanup levels.

Exterior Paint: Because of other competing demands on the Superfund Trust Fund, OSWER recommends that EPA Regions avoid using the Superfund Trust Fund for removing exterior lead-based paint and soil contaminated from lead-based paint. Superfund dollars *may* be used to respond to exterior lead-based paint for protecting the overall site remedy (i.e., to prevent re-contamination of soils that have been remediated) but only after determining that other funding sources are unavailable. Where other sources of funding are not available, EPA may utilize the CERCLA monies to remediate exterior lead-based paint on homes/buildings, around which soil contaminated by other sources has been cleaned up to prevent recontamination of the soil. The Superfund should not be used to remediate exterior lead-based paint where no soil cleanup has occurred. As with interior lead-based paint abatement, EPA Regions should promote remediation of exterior lead-based paint by others, such as PRPs, local governments or individual homeowners. Cleanup activities of exterior paint conducted by PRPs or other parties should not result in an increase of the risk-based soil cleanup levels.

Interior Dust: Lead contaminated interior dust can be derived from several sources, including interior paint, home owner hobbies, exterior soil, and other exterior sources. In many cases, it may be difficult to differentiate the source(s) for the lead contamination in the dust. In general, EPA Regions should refrain from using the Superfund Trust Fund to remediate interior dust. Because of the multi-source aspects of interior dust contamination, potential for recontamination, and the need for a continuing effort to manage interior dust exposure, OSWER recommends the use of an aggressive health education program to address interior dust exposure. Such programs, administered through the local health department (or other local agency), should be implemented in conjunction with actions to control the dust source. At a minimum, the program should include blood-lead monitoring, and personal hygiene and good housekeeping education for the residents. OSWER believes that EPA Regions can also support the program by providing HEPA vacuums to the health agency for use in thoroughly cleaning home interiors.

Lead Plumbing: Generally CERCLA does not provide for legal authority to respond to risks posed by lead plumbing within residential dwellings. It should be noted that the water purveyor is responsible for providing clean water to the residences. As with interior dust, OSWER recommends that EPA Regions coordinate with local agencies to establish a health education program to inform residents of the hazards associated with lead plumbing and how to protect themselves by regularly flushing, or preferably, replacing lead pipes. Soil cleanup levels should not be adjusted to account for possible remediation of lead plumbing.

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Factsheet: Determining Appropriate Response Actions at Residential Lead Sites

Question: What is OSWER's position on the appropriate use of engineering and non-engineering response actions in developing risk management strategies for lead sites?

Answer: One goal emphasized in the recent third round of Superfund Reforms is for EPA to take a consistent approach in selecting and implementing both long- and short-term response actions at lead sites in all regions. One obstacle to achieving this consistency has been differing degrees of reliance on non-engineering response actions in reducing risk.

Site management strategies at lead sites typically include a range of response actions. Alternatives range from engineering controls that permanently remove or treat the contaminant source to non-engineering response actions, such as educational programs and land use restrictions. This continuum represents the range of response options available to risk managers. This position paper clarifies the relationship between engineering and non-engineering response actions in developing site management strategies.

In selecting site management strategies, OSWER's policy will be to seek early risk reduction with a combination of engineering controls (actions which permanently remove or treat contaminants, or which create reliable barriers to mitigate the risk of exposure) and non-engineering response actions. All potential lead sources should be identified in site assessment activities. Non-engineering response actions, such as education and health intervention programs, should be considered an integral part of early risk reduction efforts due to their potential to provide immediate health benefits [2]. In addition, engineering controls should be implemented early at sites presenting the greatest risk to children and other susceptible subpopulations. Community concerns should receive a high priority in site decision-making; local support is vital to the success of health intervention and education programs.

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(2) The actual effectiveness of health intervention and educational programs in reducing risk continues to be a subject of discussion. Anecdotal information suggests that such programs can provide short-term benefits in some populations. Rigorous statistical studies demonstrating the benefits of educational programs in preventing lead exposure are lacking. It is generally recognized that not all segments of the population will be influenced by such programs, and that long-term benefits are less certain. Local support for such programs is critical. The active (and long-term) participation of local and state public health agencies is needed in implementing institutional controls, including health intervention and education programs; without local implementation of such programs their success is uncertain. Additional research on the effectiveness of these programs is critical to consideration of their use in future cleanups.

As the project progresses, OSWER's goal should be to reduce reliance on education and intervention programs to mitigate risk. The goal should be cleanup strategies that move away from reliance on long-term changes in community behavior to be protective; behavioral changes may be difficult to maintain over time. The actual remedy selected at each site must be determined by application of the NCP remedy selection criteria to site-specific circumstances. However, this approach recognizes the NCP preference for permanent remedies and emphasizes the use of engineering controls for long-term response actions. This approach also recognizes that well-designed health intervention and education programs, when combined with deed restrictions and/or other institutional controls, may be appropriate for reducing future exposure potential and may supplement engineering controls.

In instances where Regions believe that the use of engineering controls is impracticable, and education, health intervention, or institutional controls are proposed as the sole remedy, Regions will be required to consult with the LSCG.

The LSW
Who Are We?
Risk Management

The TRW
Who Are We?
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Adult Lead Methodology

The Adult Lead Methodology (*Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil*, December 1996), the TRW's review of adult lead models, and the NHANES Report (March 2002) may be downloaded from the Products page.

Adult Lead Methodology (ALM) Frequently Asked Questions (FAQs)

The following FAQs were compiled from requests for assistance on proper use of the Adult Lead Methodology made to the Pb Hotline either by telephone (1-866-282-8622) or e-mail. Please refer to Technical Assistance for further information on the Pb Hotline.

Who is the receptor population for the Adult Lead Methodology?

In the commercial/industrial setting, the most sensitive receptor is the fetus of a worker who develops a body burden as a result of non-residential exposure to lead. This body burden is available to transfer to the fetus for several years after exposure ends (Gulson *et al.*, 1998; Gulson *et al.*, 1999). Based on the available scientific data, a fetus is more sensitive to the adverse effects of lead than an adult (National Academy of Sciences, 1993). We assume that cleanup goals (preliminary remediation goals, 'PRGs') that are protective of a fetus will also afford protection for male or female adult workers (see Stern section of Adult Lead Methodology Review Report). The model equations were developed to calculate cleanup goals such that there would be no more than a 5% probability that fetuses exposed to lead would exceed a blood lead (PbB) of 10 µg/dL. This same approach also appears to be protective for lead's effect on blood pressure in adult males (see Adult Lead Methodology Review Report).

Does the adult lead methodology calculate a value for a commercial worker or an industrial worker?

The ALM guidance does not distinguish between commercial and industrial workers; rather, it is applicable to non-residential exposure scenarios. According to EPA's ALM guidance, a soil ingestion rate of 50 mg/day is recommended as a plausible central tendency value for non-contact-intensive activities (U.S. Environmental Protection Agency, 1997). Either commercial or industrial workers may work primarily indoors, so that exposure to soil occurs primarily via indoor dust. Workers' limited and occasional contact with outdoor soils (*e.g.*, walking at noontime, picnicking, walking to parking lots, standing on a loading dock) should be adequately accounted for via the 50 mg/day incidental soil ingestion.If an individual is performing a contact-intensive activity with soil, then a soil ingestion rate greater than 50 mg/day would be expected. At sites where lead materials have been

historically used, exposure scenarios would have to be evaluated individually to determine the indoor and outdoor activities that may result in greater exposure to soil and the corresponding soil ingestion rate.

What is a reasonable screening value for soil lead at commercial/industrial sites?

A screening goal is often more protective than a cleanup goal. A screening goal is intended to provide health protection without knowledge of the specific exposure conditions at a site. A cleanup goal can be derived using exposure assumptions based on site-specific data rather than default values (which are often more conservative). An updated screening level for soil lead at commercial/industrial (*i.e.*, non-residential) sites of 800 ppm is based on a recent analysis of the combined phases of NHANES III that choose a cleanup goal protective for all subpopulations.

What is a reasonable baseline blood lead level (PbB_0) to use for a future exposure scenario?

Although the best estimates for PbB_0 are based on site-specific data, such information may not be available for a future exposure scenario. Application of this value should consider the proportion of each population (present on the site or anticipated in the future) as defined by the NHANES III study and as described in the recommendations of the TRW for use of the NHANES III data for adult lead risk assessment (see section 3.4, page 9 of Report). For site applications of the ALM, estimates of the $PbB_{adult,0}$ and $GSD_{i,adult}$ parameters could be based on either race/ethnicity or geographic categories determined appropriate based on the specific demographic or geographic characteristics of the site... It is not recommended to base estimates of the $PbB_{adult,0}$ and $GSD_{i,adult}$ from the NHANES III survey that are stratified by both census region and race/ethnicity group in the ALM to estimate site-specific risks because of the small sample sizes.

What is an appropriate GSD for my site?

The Geometric Standard Deviation (GSD) blood lead (PbB) for a population is a measure of inter-individual variability of observed blood lead levels. Factors that may contribute to variability in a population include occupational exposure, exposure history, socioeconomic and ethnic characteristics, activity patterns, degree of urbanization, geographic location, and sources of lead. A homogeneous population (*i.e.*, expected to have a low GSD) may have similar characteristics and exposure histories, and live within a small geographic area; there may be a single dominant source of lead exposure (*e.g.*, an ethnically and culturally homogeneous population living in a small town). By contrast, individuals with diverse backgrounds, who are exposed to multiple sources of lead within an urban community, may be considered a heterogeneous population.In the absence of demographic and environmental information that would indicate that the population is either homogeneous or heterogenous, an appropriate value for GSD would be based on analysis of the combined phases of NHANES III across all quadrants appropriate for the site. For site applications of the ALM, estimates of the $PbB_{adult,0}$ and $GSD_{i,adult}$ parameters could be based on either race/ethnicity or geographic categories determined appropriate based on the specific demographic or geographic characteristics of the site... It is not recommended to base estimates of the $PbB_{adult,0}$ and $GSD_{i,adult}$ from the NHANES III survey that are stratified by both census region and race/ethnicity group in the ALM to estimate site-specific risks because of the small sample sizes. Site-specific values should consider the region

as well as the present and future ethnicity of the exposed population. Application of this value should consider future land uses or development plans if available, whether any sensitive groups are present, and whether any major future changes in population are anticipated.

Should I assume that the indoor dust lead level is the same as the outdoor soil (dust) lead concentration when I run the model?

An appropriate assumption is that the concentration of lead in (sieved) outdoor soil and indoor soil-derived dust is the same. This is not the same as assuming the concentration of lead in outdoor soil and all sources of dust (*i.e.*, aggregate dust) are equal. The concentration of lead in aggregate dust may reflect a combination of outdoor soil, indoor lead sources (*e.g.*, paint), and non-lead sources (*e.g.*, organic material). Since the default assumption for the model is that soil ingestion represents outdoor soil and indoor soil-derived dust only (without contributions from other sources of lead), no distinction is needed between soil and dust concentrations.

What is the appropriate exposure frequency for a typical commercial/industrial worker -- 250 days, 219 days, or some other derived value for intermittent exposure?

The model default value for exposure frequency (EF) is 219 days/year. This value is a central tendency estimate for non-residential exposure scenarios (*i.e.*, both commercial and industrial), and corresponds to the average time spent at work by both full- and part-time workers engaged in non-contact-intensive activities. If workers are engaged in full-time activities, then an EF greater than 219 days/year may be appropriate.The model is designed to estimate blood lead concentrations (PbB) for workers who have a sustained period of contact with exposure media. The default assumption for the averaging time (AT) is 1 year (365 days), which is sufficient time for PbB to approach quasi-steady state (see ALM Guidance). If exposures are expected to occur over a shorter time interval, then EF should not be prorated over the entire year. For example, average daily lead intake from soil for a construction worker who works 5 days a week on a 26-week construction project and is not on site during the other 26 weeks (EF=130 days) would be assessed using an averaging time of 26 weeks (AT=182 days) rather than 52 weeks to avoid "diluting" the exposures over the entire year.

What is the shortest period of time for which I can apply the model?

The exposure duration (ED) should be sufficiently long to allow blood lead concentrations (PbB) to approach quasi-steady state. As discussed in the guidance, the shortest period of time appropriate for ED is 3 months (90 days). A minimum frequency of exposure of 1 day per week is also recommended. The ALM is recommended for repeated intermittent or continuous exposures over extended periods of time; it should not be used for acute exposures.

Is soil lead (from Equation 1) the site soil concentration to which the adult is exposed?

Yes, the soil lead in Equation 1 refers to the exposure point concentration. In most cases, exposure is assumed to be predominantly to the top layers of the soil (the recommendation is the top 2 cm); however, if that is not representative or available

then the most shallow samples of contaminated soil that can be collected under site conditions (see EPA Soil Screening Guidance, 1996) which give rise to transportable soil-derived dust should be considered. Exposure to soil-derived dust occurs in both outdoor and indoor environments, the latter occurring where soil-derived dust has been transported indoors. The model accounts for exposures that occur on a regular basis. Under both current and future exposure scenarios, an arithmetic mean concentration should be estimated from sampling data within the exposure area that a worker would be expected to have access to on a regular basis. Half an acre is a reasonable default assumption. Site-specific information may suggest workers are exposed to a greater area (*e.g.*, lineman) or a smaller area (*e.g.*, small commercial facility site).

Can the model be used to estimate adolescent trespassing? How would the model be applied when the receptor is an adolescent? What baseline blood lead level is appropriate? What about other input parameter values?

The adolescent population may be considered sensitive, since exposures during these years may result in a body burden of lead that is available to transfer to the fetus later in life. Given the limitations of currently available modeling tools, it is reasonable to apply the model to adolescent receptors (*e.g.*, trespasser scenarios), provided that appropriate values can be selected for important model parameters: (1) exposure frequency (EF); (2) exposure duration (ED); (3) baseline blood lead (PbB_0); (4) absorption fraction (AF). At this time, while empirical data on biokinetic slope factors (BKSF) appear to be similar for young children and adults, uncertainty arises when applying a similar estimate for adolescence (Mahaffey *et al.*, 1998). In addition, selecting an appropriate baseline blood lead (PbB_0) is likely to be difficult. Brody *et al.* (1994) reported low PbB_0 for children between the ages of 12 and 18 years (which results in PRGs ranging from 1800 to 2000 ppm). The low PbB_0 may be due to a growth spurt in which there is a increase in bone deposition that results in a lower concentration of lead in the blood; the total body burden of lead may still be increasing (Muth & Globel, 1983). Other factors may also contribute, such as increases in blood volume during periods of rapid growth. National databases (*e.g.*, NHANES III) can provide quality information on PbB_0. Presentation of calculations using a range of PbB_0 values is recommended. There is also a potential that lead absorption (AF) will be higher in adolescents than in adults.

Is 10 µg/dL (in the construction scenario) a level that should never be exceeded?

No. The 10 µg/dL is a multi-Agency goal that has been designated by the US Centers for Disease Control (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR) as a level of concern to protect sensitive populations (neonates, infants, and children). The protection of sensitive populations is assumed to also provide protection for adults. The EPA's stated goal for lead is that children (up to 84 months of age) exposed at a risk-based cleanup level would have no more than a 5% probability of exceeding the level of concern (U.S. Environmental Protection Agency, 1994; U.S. Environmental Protection Agency, 1998). The ALM extends that same concept to develop cleanup goals preventive of fetal risk. As a statistical goal, a probability of exceedance of up to 5% of the goal is acceptable.

Can the adult lead methodology be used to determine dermal exposure to lead at a site?

Although percutaneous absorption is generally not a significant route of exposure for inorganic lead, technically, the model can evaluate dermal exposure by incorporating the lead uptake from this pathway into the appropriate equation (see Equation A-3 in the Guidance). However, at this time, quantifying uptake from dermal exposure to soil-borne lead is not recommended due to the uncertainty in assigning a dermal absorption fraction that would apply to the numerous inorganic forms of lead that are typically found in environmental settings.

Should sieving be used to characterize samples for non-residential sites?

The lead concentration in the sieved (250 micron) fraction of surface soil provides the best estimate of the soil lead that is incidentally ingested and should be used in the ALM. However, sieving of samples from all depths may be useful in site characterization; users should proceed with caution when developing ratios between sieved and unsieved samples. Link to Sieving Short Sheet [EPA-540-F-00-010] in PDF format (87 KB, 3 pages).

Is there an appropriate default value for fish ingestion rate, or is this a site-specific issue? Can the ALM be used to establish fish advisories?

Fish ingestion rate is a site-specific parameter and therefore no appropriate default value exists. For fish advisories, it is recommended that concentration data be used to back-calculate an acceptable intake of fish. An appropriate absorption fraction should be used based on site specific data (portion of fish consumed -- fillets or entire fish).

What is an appropriate soil ingestion rate for a construction scenario (*i.e.*, soil contact-intensive scenario)?

The TRW recommends 50 mg/day as the default ingestion rate for indoor workers. This soil ingestion value is cited in two EPA documents: Recommendation of the Technical Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil (U.S. EPA, 1996), and the Exposure Factors Handbook (U.S. EPA, 1997). A reasonable default value that has been commonly used as a central tendency estimate for contact-intensive adult scenarios (such as an agricultural or construction worker) is 100 mg/day.There is high uncertainty in soil ingestion rates (IRs) for adults due to sparse empirical data. Empirical data on adult soil ingestion rates are available from two studies (Calabrese *et al.*, 1990; Calabrese *et al.*, 1997), each conducted concurrently with a study of childhood soil ingestion rates. Neither study group targeted a population expected to engage in frequent contact with soil, such as construction workers. The purpose of the pilot studies was to verify the tracer mass balance methodology used in the child studies, rather than to investigate the amount of soil normally ingested by adults. Despite their limitations, these studies provide an estimate of the amount of soil ingested by adults.The value of 50 mg/day represents a reasonable central tendency estimate of adult soil ingestion based on available data and is the recommended mean value. The value of 100 mg/day is equal to the recommended mean soil ingestion rate for young children, whose daily ingestion rates are expected to exceed that of adults (U.S. EPA, 1997). For construction workers and other soil contact-intensive occupations, OSWER guidance recommends an upper bound value for IRs of 330 mg/day based on Stanek et al. (1997) (as cited by EPA's Supplemental Guidance for Developing Soil Screening

Levels for Superfund Sites, 2001). The basis of the default IR is the 95th percentile value (330 mg/day). In this study, Stanek *et al.* (1997) also report the median, 75th percentile, and mean values as 1, 49, and 10 mg/day (SD = 94), respectively. The CV of 9.4 is indicative of significant uncertainties in these estimates. Because central tendency values are recommended as inputs to both the IEUBK Model for Lead in Children and the ALM model, a more plausible range for a soil lead IR is 50 to 200 mg/day for adult contact-intense soil exposures. Thus, there is reasonable support for use of 100 mg/day as a soil ingestion rate for the contact-intense worker scenario in the ALM.Although studies to directly measure adult soil ingestion are currently lacking, soil ingestion rates can be compared to measures of soil adherence to hands to provide additional perspective. Soil adhered to hands is relevant to soil ingestion because it is available for ingestion from hand-to-mouth activities. While soil adhesion to hands could be helpful in estimating soil ingestion, an accepted methodology that reliably estimates soil ingestion using soil adhesion data has not been developed for hazardous waste risk assessments.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 13 1998

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

OSWER Directive 9200.4-26

MEMORANDUM

SUBJECT: Approach for Addressing Dioxin in Soil at CERCLA and RCRA Sites

FROM: Timothy Fields, Jr. Acting Administrator
Office of Solid Waste and Emergency Response

TO: Director, Office of Site Remediation and Restoration
Region I
Director, Emergency and Remedial Response Division
Region II
Director, Division of Environmental Planning and Protection
Region II
Director, Hazardous Waste Management Division
Regions IX
Director, Waste Management Division
Region IV
Director, Waste, Pesticides, & Toxics Division
Region V
Director, RCRA Multimedia Planning & Permitting Division
Region V
Director, Superfund Division
Regions III, V, VI, VII
Assistant Regional Administrator, Office of Ecosystems Protection and Remediation
Region VIII
Director, Hazardous Waste Program
Region VIII
Director, Office of Environmental Cleanup
Region X
Director, Office of Waste and Chemical Management
Region X

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PURPOSE

The purpose of this Directive is to recommend preliminary remediation goals (PRGs) or starting points for setting cleanup levels for dioxin in soil at Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) corrective action sites. These recommended levels are to be used pending the release of the U.S. Environmental Protection Agency (EPA) comprehensive dioxin reassessment report and cross-program assessment of the impacts of the report. One ppb (TEQs, or toxicity equivalents) is to be generally used as a starting point for setting cleanup levels for CERCLA removal sites and as a PRG for remedial sites for dioxin in surface soil involving a residential exposure scenario. For commercial/industrial exposure scenarios, a soil level within the range of 5 ppb to 20 ppb (TEQs) should generally be used as a starting point for setting cleanup levels at CERCLA removal sites and as a PRG for remedial sites for dioxin in surface soil. These levels are recommended unless extenuating site-specific circumstances warrant a different level.

The dioxin levels discussed in this Directive are also generally recommended for actions taken under RCRA at corrective action sites. The recommended levels of 1 ppb (TEQs) for residential soils and within the range of 5 ppb to 20 ppb (TEQs) for commercial/industrial soils should generally be used as starting points in setting soil cleanup levels at RCRA corrective action sites. These levels are generally consistent with soil cleanup levels set at RCRA facilities throughout the country where dioxin is a principal contaminant of concern at the facility. However, because states are the primary implementors of the RCRA Corrective Action program, this Directive does not prescribe specific procedures for implementation under RCRA.

This Directive sets forth the policy basis for these recommended levels and prescribes procedures for implementing these recommendations.

BACKGROUND

To date, EPA has generally selected 1 ppb as a cleanup level for dioxin in residential soils at Superfund and RCRA cleanup sites where dioxin is a principal contaminant of concern at the facility. EPA has also, to date, generally selected a cleanup level for dioxin within the range of 5 ppb to 20 ppb for commercial/industrial soils at Superfund and RCRA cleanup sites where dioxin is a principal contaminant of concern at the facility. The levels that EPA has selected at these sites are protective of human health and the environment. Based on presently available information, and using standard default assumptions for reasonable maximum exposure scenarios, the upper-

bound lifetime excess cancer risk from residential exposure to a concentration of 1 ppb dioxin is approximately 2.5×10^{-4}, which is at the higher end of the range of excess cancer risks that are generally acceptable at Superfund sites. The calculated upper-bound excess cancer risk associated with a lifetime commercial/industrial exposure to 5 ppb, or the lower end of the range recommended for commercial/industrial soils, is approximately 1.3×10^{-4}, which is also within the CERCLA risk range. It should be noted that there is more difficulty in generalizing about the cancer risk associated with commercial/industrial cleanup levels than there is with residential cleanup levels due to the greater variability in exposures associated with commercial/industrial scenarios. Accordingly, the consultation process for Superfund sites referenced in the implementation section of this Directive should be used to ensure the selection of appropriate, protective dioxin levels at CERCLA commercial/industrial sites. Similarly, for RCRA corrective action sites, please refer to the implementation section of this Directive.

EPA is presently completing work on a comprehensive reassessment of the toxicity of dioxin, to be embodied in the documents entitled "Health Assessment Document for 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds" and "Estimating Exposure to Dioxin-like Compounds." The reassessment report, which is scheduled to be issued in 1998, will represent the culmination of an Agency-wide effort to collect, analyze and synthesize all of the available information about dioxin. It has undergone significant internal and external review and is one of the most comprehensive evaluations of toxicity of a chemical ever performed by the Agency. Following release of the report, the Office of Solid Waste and Emergency Response (OSWER) will participate in a cross-program review of the implications of the report for the regulation and management of dioxin by EPA. We anticipate that this review will culminate in OSWER guidance addressing the management of dioxin at CERCLA and RCRA sites.

The Office of Solid Waste and Emergency Response does not believe it is prudent to establish new, and possibly varying, precedents for Superfund or RCRA dioxin levels just prior to the release of this reassessment report. As with any other pollutant, it is important that EPA ensure appropriate national consistency in remediation efforts. The Agency has used 1 ppb as a residential cleanup level and between 5 ppb and 20 ppb as a commercial/industrial cleanup level at CERCLA and RCRA cleanup sites for dioxin in soil in the past; it is anticipated that OSWER will be issuing guidance, informed by the reassessment effort, that will provide a basis for the selection of dioxin cleanup levels in the near future. In the interim, for sites that require the establishment of a final dioxin soil cleanup level prior to the release of the reassessment report and

development of OSWER guidance, EPA should generally use 1 ppb (TEQs) as a starting point for residential soil cleanup levels for CERCLA non-time critical removal sites (time permitting, for emergency and time critical sites) and as a PRG for remedial sites. EPA should generally use a level within the range of 5 ppb to 20 ppb (TEQs) as a starting point for cleanup levels at CERCLA non-time critical removal sites (time permitting, for emergency and time critical sites) and as a PRG for remedial sites for commercial/industrial soil. These levels should also be used as starting points in setting soil cleanup levels at RCRA corrective action sites.

For CERCLA remedial sites, consistent with 40 CFR § 300.430(f)(5)(iii)(D), EPA should commit to reviewing Records of Decision (RODs) (i.e., RODs in which this Directive has been used to develop dioxin soil cleanup levels) promptly following the release and analysis of the reassessment report and OSWER guidance, and, if necessary, to making changes to the RODs and cleanup actions, based on the information contained in the reassessment report and in the OSWER guidance. Similarly, in the case of non-time critical removal actions (time permitting, for emergency and time critical actions), EPA should commit to reviewing Action Memoranda promptly following the release and analysis of the reassessment report and OSWER guidance, and, if necessary, to making changes to the Action Memoranda and cleanup actions, based on the information contained in the reassessment report and the OSWER guidance. EPA should similarly commit to reviewing RCRA cleanup decisions (i.e., decisions for which this Directive has been used) promptly following the release and analysis of the reassessment report and OSWER guidance.

IMPLEMENTATION

Regional management should consult with the appropriate Office of Emergency and Remedial Response (OERR) Regional Centers on all proposed Fund and Potentially Responsible Party-lead site decisions under CERCLA, including other Federal agency-lead and state-lead site decisions, involving the development of dioxin soil cleanup levels for non-time critical removal sites (time permitting, for emergency and time critical removal sites) and remedial sites. Consultation should be initiated at the risk assessment stage. For Federal agency-lead sites, OERR will, in turn, notify the Federal Facilities Restoration Reuse Office of ongoing consultations. The Office of Site Remediation Enforcement will provide support if enforcement issues are identified. For consultation procedures, refer to the OSWER "Headquarters Consultation for Dioxin Sites", 9200.4-19, December 13, 1996, plus the OSWER "Consolidated Guide to Consultation Procedures for Superfund Response Decisions", 9200.1-18FS, May 1997.

In the case of EPA-lead RCRA corrective action sites, Regions should provide the Office of Solid Waste Permits and State Programs Division (OSW/PSPD) with proposed dioxin soil cleanup levels (i.e., prior to notice and comment) in order to ensure appropriate implementation of this Directive. For state-lead RCRA corrective action sites, it is also recommended that states use the dioxin levels recommended by this Directive as starting points in setting soil cleanup levels. States are encouraged to share their approaches with the Regions in a manner consistent with established procedures for EPA support and oversight of state RCRA Corrective Action programs.

The levels in this Directive are recommended unless extenuating site-specific circumstances warrant different levels, a more stringent state applicable or relevant and appropriate requirement (ARAR) establishes a cleanup level at CERCLA sites, or a more stringent state requirement applies at RCRA sites. We recommend that levels other than 1 ppb (TEQs) for residential soils and outside the range of 5 ppb to 20 ppb (TEQs) for commercial/industrial soils be used only where evidence exists that risks posed by the site differ from risks estimated using standard national default guidance values. These recommendations apply to RCRA corrective actions, CERCLA non-time critical removal actions (time permitting, for emergency and time-critical actions) and CERCLA remedial actions where cleanup levels are to be developed for dioxin in soil, regardless of whether dioxin itself drives the decision-making process.

The recommended levels found in this Directive, generally considered protective of human health and the environment, apply to surface soils. Please note that with respect to human health, these levels are based on the direct contact exposure pathway. The recommended levels in this Directive do not apply to other exposure pathways, such as migration of soil contaminants to ground water or to agricultural products. While the focus of this Directive is on soils, these recommended levels also apply to sediments in the event that this environmental medium is considered to be a direct exposure pathway for human receptors.

This document provides guidance to EPA staff. The guidance is designed to communicate national policy on dioxin cleanups for soil. The document does not, however, substitute for EPA's statutes or regulations, nor is it a regulation itself. Thus, it cannot impose legally-binding requirements on EPA, states, or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA may change this guidance in the future, as appropriate.

If you have any questions concerning this Directive, please contact either Marlene Berg at (703)603-8701 in Headquarters or Elmer Akin of Region 4 at (404)562-8634, as Marlene and Elmer are

co-chairs of the Superfund Dioxin Workgroup. For the RCRA Corrective Action program, please contact Robert Hall of the Office of Solid Waste Permits and State Programs Division at (703)308-8484. Attached, for your information, is a list of Regional points of contact who are serving on the dioxin workgroup.

Attachment: Superfund Dioxin Workgroup: Regional Points of Contact

cc: Mike Shapiro, OSWER
Peter Grevatt, OSWER
Steve Luftig, OERR
Elaine Davies, OERR
Larry Reed, OERR
Gershon Bergeisen, OERR
David Bennett, OERR
Bruce Means, OERR
Betsy Shaw, OERR
Paul Nadeau, OERR
Tom Sheckells, OERR
Murray Newton, OERR
John Cunningham, OERR
Dave Evans, OERR
Joe LaFornara, OERR
Mark Mjoness, OERR
Jim Woolford, FFRRO
Elizabeth Cotsworth, OSW
Barry Breen, OSRE
Tudor Davies, OW
Craig Hooks, FFEO
Earl Salo, OGC
Bill Sanders, OPPT
Bill Farland, ORD
Regional Counsel, Regions I-X
Peggy Schwebke, Region 5
Superfund Dioxin Workgroup

Appendix G-2

Remedial Goal Calculations

Remediation goals (RGs) based on carcinogenic effects were developed for arsenic in soil at the FLFA. These goals were derived for three commercial/industrial scenarios (maintenance worker, excavation worker, and industrial worker) and two resident scenarios (adult and child). For each scenario, RGs based on carcinogenic effects were calculated at risk levels of 10^{-6}, 10^{-5}, and 10^{-4}.

By specifying the target risk and target HI, the RGs were back-calculated by re-arranging the risk and hazard calculations described in *Section 6.4*. The RGs for arsenic were based on calculations for carcinogenic effects, as follows:

$$RG = \frac{TR \text{ x } BW \text{ x } AT \text{ x } 10^{6} \text{ mg/kg}}{EF \text{ x } ED \text{ x } FI \left[A + B + C\right]}$$

where:

RG = remediation goal (mg/kg)
TR = target risk (unitless)
BW = body weight (kg)
AT = averaging time (days)
EF = exposure frequency (days/year)
ED = exposure duration (years)
FI = fraction ingested (unitless)

A – Ingestion Pathway

$A = (CSF_{oral})\ (IR_{oral})$

where:

CSF_{oral} = oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$
IR_{oral} = ingestion rate (mg/day)

B – Dermal Absorption Pathway

$B = (CSF_{dermal})\ (SSA)\ (SSAF)\ (DABS)$

where:

CSF_{dermal} = oral Cancer Slope Factor, adjusted by oral absorption factor $(mg/kg\text{-}day)^{-1}$
SSA = skin surface area (cm^2)
SSAF = soil to skin adherence factor (mg/cm^2-day)
DABS = dermal absorption factor

C – Inhalation Pathway

$C = (CSF_{inhl})\ (IR_{inhl})\ (1/_{VF})\ (1/_{PEF})$

where:

CSF_{inhl}	=	inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$
IR_{inhl}	=	inhalation rate (m^3/day)
VF	=	volatilization factor (m^3/day)
PEF	=	particulate emission factor (m^3/day)

To be consistent with the exposure parameters that were used in the risk and hazard calculations in *Section 6.0*, the same parameters were applied in derivation of RGs. The exposure parameters for the maintenance worker, excavation worker, adult resident, and child resident are summarized in **Appendix E-1, Tables E-7 through E-10.**

For purposes of the CMS, an additional commercial/industrial receptor was added to the scenarios used in the HHRA. An industrial outdoor worker was included to account for standard commercial/industrial exposures. The exposure parameters for this receptor are similar to those used for the maintenance worker except that the exposure frequency of 225 days/year is used rather than the more limited exposure frequency of 50 days/year.

The RGs for arsenic are shown in **Table G-1.**

Table G-1
Summary of Remediation Goal for Arsenic[a]

Medium	Receptor	Risk = 10^{-6}	Risk = 10^{-5}	Risk = 10^{-4}
Surface Soil	Future Maintenance Worker	7.9	79	790
Surface Soil	Future Industrial Worker	1.8	18	180

[a] Values presented are in milligrams per kilogram.

RGs based on noncarcinogenic effects were developed for copper in soil at the FLFA. These goals were derived for three commercial/industrial scenarios (maintenance worker, excavation worker, and industrial worker) and two resident scenarios (adult and child). For each scenario, RGs were calculated at target hazard index (HI) values of 1.0, 0.5, and 0.1.

By specifying the target HI, the RGs were back-calculated by re-arranging the risk and hazard calculations described in *Section 6.4*. Because levels of copper in soil resulted in exceedances of the HI, the RGs were based on calculations for noncarcinogenic effects, as follows:

$$RG = \frac{THI \ x \ BW \ x \ AT \ x 10^{6} \ mg/kg}{EF \ x \ ED \ x \ FI \left[A + B + C\right]}$$

where:

RG = remediation goal (mg/kg)
THI = target hazard index (unitless)
BW = body weight (kg)
AT = averaging time (days)
EF = exposure frequency (days/year)
ED = exposure duration (years)
FI = fraction ingested (unitless)

A – Ingestion Pathway

$A = (1/RfD_{oral})\ (IR_{oral})$

where:

RfD_{oral} = oral Reference Dose (mg/kg-day)
IR_{oral} = ingestion rate (mg/day)

B – Dermal Absorption Pathway

$B = (1/RfD_{dermal})\ (SA)\ (SSAF)\ (DABS)$

where:

RfD_{dermal} = oral Reference Dose, adjusted by oral absorption factor (mg/kg-day)
SSA = skin surface area (cm^2)
SSAF = soil to skin adherence factor (mg/cm^2-day)
DABS = dermal absorption factor

C – Inhalation Pathway

$C = (1/RfD_{inhl})\ (IR_{inhl})\ (1/_{VF})\ (1/_{PEF})$

where:

RfD_{inhl} = inhalation Reference Dose (mg/kg-day)
IR_{inhl} = inhalation rate (m^3/day)
VF = volatilization factor (m^3/day)
PEF = particulate emission factor (m^3/day)

To be consistent with the exposure parameters that were used in the risk and hazard calculations in *Section 6.0*, the same parameters were applied in derivation of RGs. The exposure parameters for the maintenance worker, excavation worker, adult resident, and child resident are summarized in **Appendix E-1, Tables E-7 through E-10**.

For purposes of the CMS, an additional commercial/industrial receptor was added to the scenarios used in the HHRA. An industrial outdoor worker was included to account for standard commercial/industrial exposures. The exposure parameters for this receptor are similar to those used for the maintenance worker except that the exposure frequency of 225 days/year is used rather than the more limited exposure frequency of 50 days/year.

As stated, these RGs are based on HIs for noncarcinogenic effects. Although arsenic has noncarcinogenic effects, the resulting HIs for arsenic were below 1.0. The RGs calculated for the carcinogenic effects of arsenic are more conservative and, therefore, would be protective of noncarcinogenic effects.

The RGs for copper are shown in **Table G-2**.

Table G-2
Summary of Remediation Goals for Copper[a]

Medium	Receptor	Remediation Goals for Copper[a]		
		HI = 1.0	HI = 0.5	HI = 0.1
Total Soil	Child Resident	2890	1445	289

[a] Values presented are in milligrams per kilogram

Appendix H

National Environmental Policy Act Compliance Evaluation

Appendix H

Compliance With NEPA Requirements
FLFA

Environmental Consideration (i.e., Attributes)	**Alternative One:** No Further Action	**Alternative Two:** Institutional Controls (Land Use Controls, Groundwater Monitoring)	**Alternative Three:** Excavation with Waste in Place, Off-site Disposal, and Institutional Controls	**Alternative Four:** Excavation for Clean Close Out and Off-site Disposal,
Ecology – Impact on Wetlands	No wetlands identified at the FLFA. No impact to wetlands.	No wetlands identified at the FLFA. No impact to wetlands.	No wetlands identified at the FLFA. No impact to wetlands.	No wetlands identified at the FLFA. 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. Some habitat may be disturbed during excavation activities in the excavation area. The area affected is minimal compared to overall site. Therefore, effects are expected to be minimal.	While not observed during site reconnaissance, several threatened and endangered species have been found within the grassland community type at RFAAP. Some habitat may be disturbed during excavation activities in the excavation area. The area affected is minimal compared to overall site. Therefore, effects are expected to be minimal.
Ecology – Impact on Vegetation	No impact.	No impact.	Limited vegetation will be removed during excavation activities. No impact otherwise.	Limited vegetation will be removed during excavation activities. No impact otherwise.
Archeological	None present in the FLFA area.	None present in the FLFA area.	None present in the FLFA area.	None present in the FLFA area.
Noise	None.	None.	Slight increase in noise levels (dB) due to excavation activities. Increases will not be significant.	Slight increase in noise levels (dB) due to excavation 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 surface and subsurface soil. Therefore, no migration of contaminants to groundwater will occur. Erosion control measures will be employed to prevent impacts to surface water bodies.	Contaminants would be removed from surface and subsurface soil. Therefore, no migration of contaminants to groundwater will occur. Erosion control measures will be employed to prevent impacts to surface water bodies.
Human Aspects	No human impact.	No human impact.	There will be minimal increase in traffic due to excavation activities.	There will be minimal increase in traffic due to excavation activities.
Land – Soil erosion, land use	No effect.	No effect.	Erosion control measures must be implemented during excavation activities. No impacts on current land use.	Erosion control measures must be implemented during excavation activities. No impacts on current land use.

Appendix H

Compliance With NEPA Requirements
FLFA

Environmental Consideration (i.e., Attributes)	**Alternative One:** No Further Action	**Alternative Two:** Institutional Controls (Land Use Controls, Groundwater Monitoring)	**Alternative Three:** Excavation with Waste in Place, Off-site Disposal, and Institutional Controls	**Alternative Four:** Excavation for Clean Close Out and Off-site Disposal,
Waste disposal – solid waste, hazardous waste	No effect. No waste generated.	No effect. No waste generated.	Will require disposal of decontamination water. In addition, soil will be disposed at appropriate (RCRA Subtitle C or D) landfill facility.	Will require disposal of decontamination water. In addition, soil will be disposed at appropriate (RCRA Subtitle C or D) landfill facility.
Resources	No effect. No increased use of 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. Arsenic, lead, copper, Aroclor-1254, and/or dioxins/furans are not likely to be carried on soil particles through air or volatilized into atmosphere.	Essentially no effect. Arsenic, lead, copper, Aroclor-1254, and/or dioxins/furans are not likely to be carried on soil particles through air or volatilized into atmosphere.	Increase in dust during excavation activities. Dust suppression measures will be employed to keep dust generation to a minimum.	Increase in dust during excavation 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