Appendices for Area O RFI/CMS

Approved Draft

August 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), nitrate, nitrite, sulfate, chloride, explosives, full toxicity characteristic leaching procedure (TCLP) analysis, ignitability, reactive sulfide, reactive cyanide, and corrosivity as pH. Accutest used laboratory SOP for the methane, ethane, and ethene analysis. Accutest used *USEPA Methods for Chemical Analysis of Water and Wastes* (MCAWW) (USEPA, 1983) for chemical oxygen demand (COD), biological oxygen demand (BOD), pH, total alkalinity, and total organic carbon (TOC) 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.

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
Polynuclear Aromatic Hydrocarbons	Aqueous	USEPA SW-846 3510C/8270C SIM
	Soil	USEPA SW-846 3550B/8270C SIM
Natural Attenuation Parameters		
Methane, Ethane, Ethene	Aqueous	Method RSK147
Nitate, Nitrite, Chloride, Sulfate	Aqueous	USEPA SW-846 9056
pH	Aqueous	USEPA MCAWW 150.1
Total Organic Carbon	Aqueous	USEPA MCAWW 415.1
Total Alkalinity	Aqueous	USEPA MCAWW 310.1
Sulfide	Aqueous	USEPA MCAWW 376.1

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

Organics

Target compound list (TCL) VOCs, TCL SVOCs, and PAHs were analyzed using USEPA-approved methodologies. The laboratory procedures and methodologies for organic compounds are summarized below.

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.

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, including nitroglycerin (NG) and pentaerythritol tetranitrate (PETN), chemical oxygen demand (COD), biological oxygen demand (BOD), and corrosivity as pH. The laboratory procedures and methodologies are summarized below.

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, SVOCs, pesticides, herbicides, and metals. Brief discussions of the procedures and methodologies are presented below and in the prior section.

Explosives: Aqueous and solid 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 and PETN: Aqueous and solid 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.

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. Samples were prepared for analysis using extraction techniques. Soil samples were extracted using ultrasonic extraction according to USEPA SW-846 Method 3550B. 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 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 and solid 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 using USEPA SW-846 3010A/6010B. 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.

The TCLP extracts were analyzed for mercury using CVAA according to USEPA SW-846 Method 7470A. 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.

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.

Natural Attenuation Parameters

Aqueous samples were collected for natural attenuation parameters using USEPA-approved methodologies, including methane, ethane, ethane, nitate, nitrite, chloride, sulfate, pH, total organic carbon, total alkalinity, and sulfide. The laboratory procedures and methodologies are summarized below.

Total Alkalinity: Aqueous samples were analyzed for total alkalinity using USEPA MCAWW Method 310.1. Aqueous samples were titrated to an electrometrically-determined end point of pH 4.5. The sample were not filtered, diluted, concentrated, or altered by the laboratory in any way.

Ethene, Methane, and Ethane: Aqueous samples were analyzed for ethene, methane and ethane using lab Method RSK147. This method uses a gas chromatograph equipped with a thermal conductivity detector. For aqueous samples, an inert gas was bubbled through a 5 mL sample at ambient temperature. The vapor was swept through a sorbent column where the purgeable compounds were trapped. After purging was completed for aqueous samples, the sorbent column was heated and back-flushed with the inert gas to desorb the purgeable compounds onto a gas chromatography programmed to separate them. The purgeable compounds were then detected with the thermal conductivity detector.

Sulfide: Aqueous samples were analyzed for sulfide using USEPA MCAWW Method 376.1. This procedure is a titrimetric determination. Excess iodine was added to each sample which was treated with zinc acetate to produce zinc sulfide. The iodine oxidized the sulfide to sulfur under acidic conditions. The excess iodine was back-titrated with sodium thiosulfate.

Chloride, Nitrate, Nitrite, and Sulfate: Aqueous samples were analyzed for chloride, nitrate, nitrite, and sulfate using ion chromatography method USEPA SW-846 9056. The anions of interest were separated on the basis of their relative affinities for a low capacity, strong basic anion exchanger when they are converted to their highly conductive acid forms and measured by conductivity on the basis of retention times.

pH: Aqueous samples were analyzed for pH using USEPA SW-846 MCAWW Method 150.1. A sample's pH was directly measured electrometrically using either a combination electrode.

Total Organic Carbon (TOC): Aqueous samples were analyzed for TOC using USEPA SW-846 Method 9060A. Aqueous samples were subjected to a catalytic combustion to convert the organic carbon in the sample to carbon dioxide. The carbon dioxide formed was then measured directly by an infrared detector and measured by a flame ionization detector. The amount of carbon dioxide or methane produced was directly proportional to the concentration of carbonaceous material.

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 Area O. 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
P-3	acenaphthene	MS/MSD	None	High RPD
P-3	acenaphthylene	MS/MSD	None	High RPD
P-3	1-methylnaphthalene	MS/MSD	None	High RPD
P-3	2-methylnaphthalene	MS/MSD	None	High RPD
P-3	naphthalene	MS/MSD	None	High RPD

- **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
AOSW01	TMSW01	phenanthrene	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 blanks were non-detect for all target compounds of interest except for chloroform and methylene chloride for select sample delivery groups (SDGs). For solid matrices, all method blanks were non-detect for all target compounds of interest. 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
OMW1	chloroform	0.42	JB	UG/L	TMMW1	chloroform	0.48	JB	UG/L

J (All) = Indicates an estimated value for estimating a concentration <MRL and ≥ MDL.
B = The analyte or compound has been detected in the sample and laboratory method blank.

- **Rinse Blank Analysis:** Rinse blank 082307R (low-flow pump) applies to the groundwater samples collected at the Area O. The surface water samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the surface water samples. Rinse blank RB071807 applies to the sediment samples collected at the Area O. These rinse blanks were taken from the stainless steel bowl and trowel used to collect the field soil samples. For rinse blank 082307R, all target compounds of concern were non-detect. For rinse blank RB071807, all target compounds of concern were non-detect except for 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 TB071807W applies to the surface water samples and TB071807S applies to the sediment samples collected on 07/18/07. The trip blank TB081607 applies to the soil samples collected on 08/16/07. The trip blanks 082307T, 082407T, TB082707, and TB082807 apply to the ground water samples collected on 08/23/07, 08/24/07, 08/27/07, and 08/28/07, respectively. For trip blank 082307T, all target compounds of concern were non-detect except for toluene and chloroform. For trip blanks TB082707 and TB082807, all target compounds of concern were non-detect except for methylene chloride. For trip blanks 082407T, all target compounds of concern were non-detect except for chloroform. For trip blanks TB071807W, TB071807S, and TB081607, all target compounds of concern were non-detect. 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 all target compounds of concern except for 1,3-dichlorobenzene, 1,4-dichlorobenzene, hexachlorobutadiene, hexachloroethane, chloromethane, trans-1,3-dichloropropene, benzo(a)pyrene, benzo(b)flouranthene, benzo(k)flouranthene, chrysene, flouranthene, naphthalene, phenanthene, pyrene, 1-methylnaphthalene, 2-methylnaphthalene, and benzoic acid for select SDGs. The solid LCS samples were within specified criteria for all compounds of concern except for bromomethane, chloromethane, vinyl chloride, bis(2-chloroethoxy)methane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and hexachloroethane for select SDGs. Data qualifiers were applied as appropriate to associated samples based upon these outliers. Benzoic acid was qualified rejected "R" for samples AOSW01, AOSW02, and TMSW01 based upon the grossly low (i.e. <10%) recovery found in the associated LCS. 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 for a majority of the data, 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 Area O samples were evaluated. For MS/MSD samples, USACE DoD QSM and laboratory criteria limits were used for each method in the validation process. For aqueous matrices, MS and MSD samples were within specified criteria for all compounds of interest except for acetone, 2-hexanone, 4-methyl-2-pentanone, bromomethane, methyl ethyl ketone, chloroethane, chloromethane, bromomethane, vinyl chloride, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 4-nitrophenol, 3,3'-dichlorobenzidine, acenaphthene, acenaphthylene, anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, dibenzo(a,h)anthracene, flouranthene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthene, and pyrene for select SDGs. For solid matrices, MS and MSD samples were within specified criteria for all compounds of interest except for 1,3-dichlorobenzene, 1,4-dichlorobenzene, 3,3'-dichlorobenzidine, hexachlorocyclopentadiene, hexachloroethane, acetone, bromoform, chloroethane, carbon tetrachloride, dibromochloromethane, trans-1,3-dichloropropene, 2-hexanone, 4-methyl-2-pentanone, methyl bromide, methyl ethyl ketone, methylene chloride, toluene, methyl chloride, and vinyl chloride 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:** Five surface soil samples, ten subsurface soil, two sediment samples, two surface water samples, twenty groundwater samples, five field duplicate samples (one surface soil, one subsurface soil, one sediment, two groundwater), two project wide IDM samples (one aqueous and one solid), seven trip blanks, and two rinse blanks were proposed for collection at the Area O as specified in MWP Addendum 019 (Shaw, 2007). The subsurface soil samples were proposed to be collected adjacent to the tank in the leak area. This area was underneath the concrete secondary containment for the tank and the samples were not collected because: 1) the concrete prevents the completion of exposure pathways for human and ecological receptors; and 2) the integrity of the secondary containment for the tank outweighed the importance of the samples. Ten direct push groundwater samples were proposed for the area downgradient of the tank. The purpose of these samples was to evaluate the groundwater in the overburden. Permanent monitoring wells at the site and downgradient from the site provide good coverage of the bedrock aquifer near the site. Water was only encountered at one of the direct push locations in the overburden. Three subsurface soil samples were added onto the scope. These subsurface soil samples were collected from three of the direct push borings where PID reading indicated the potential presence of oil breakdown products. The field duplicates, rinse blanks, and IDM samples were collected on a site-wide basis. All collected samples were analyzed for the parameters as specified in MWP Addendum 019. The resulting sampling completeness quotient including all proposed samples, QC samples, and IDM is 56.4% (31 out of 55), which does not meet the pre-defined goals of 90% for the sampling program. While the percent completeness was below the pre-defined goals, the impact to the RFI is low. Groundwater samples were intended to be collected from the overburden and the absence of water in these borings provides valuable information about groundwater flow immediately downgradient of the site. The added soil samples provided the needed information about the presence of oil-related constituents in the overburden in this area.

  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 2,486 out of 2,489 data points deemed to be useable, generating an overall analytical completeness quotient of 99.9%. The rejected data points resulted from an out of compliance aqueous LCS recovery for the SVOC compound benzoic acid. The aqueous SVOC percent completeness was 99.6% (830 out of 833). 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 Area O 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 Area O 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:

- 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.

- **Area O 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, 1,2-dichloropropane (SW only), benzene (SW only), bromodichloromethane, bromomethane (SW only), carbon tetrachloride, chloroform, dibromochloromethane, tetrachloroethene, trichloroethene, vinyl chloride, 2-methylnaphthalene (GW only), benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene (GW only), dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene (GW only), 1,2,4-trichlorobenzene (GW only), 1,3-dichlorobenzene (GW only), 1,4-dichlorobenzene, 2,4,6-trichlorophenol (GW only), 2,4-dichlorophenol (GW only), 2,4-dinitrophenol, 2,4-dinitrotoluene (GW only), 2,6-dinitrotoluene (GW only), 2-chlorophenol (GW only), 3,3'-dichlorobenzidine, 4-chloroaniline (GW only), 3&4-methylphenol (GW only), 4-nitrophenol (GW only), bis(2-chloroethyl)ether, bis(2-ethylhexyl)phthalate (GW only), bis(chloroisopropyl)ether, carbazole (GW only), dibenzofuran (GW only), hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene (GW only), hexachloroethane (GW only), nitrobenzene, n-nitrosodi-n-propylamine, n-nitrosodiphenylamine (GW only), and pentachlorophenol 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, benzo(a)pyrene (GW only), bis(2-ethylhexyl)phthalate (GW only), hexachlorobenzene, and pentachlorophenol 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), and n-nitrosodi-n-propylamine (sediment only) 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, all target compounds had MDLs less than the given industrial RBCs for all samples. The samples had higher sensitivities due to the given available USEPA method sensitivity capabilities as well as percent solid adjustments for dryness, and any required sample dilutions or sample volume adjustments due to either high analyte concentration and/or matrix interferences. Though an uncertainty may be present with these sensitivity gaps between the residential RBCs and industrial RBCs 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

Shaw Environmental & Infrastructure, Inc.

Technology Applications
312 Directors Drive
Knoxville, TN 37923
Phone: 865.690.3211
FAX: 865.694.9573

Shaw The Shaw Group Inc.™

STATEMENT OF ANALYSIS

Client: Shaw Environmental, Inc. Date: September 17, 2007

Contact: Eric Malarek Project No. 123461

Client Project Name / ID:	Radford Army Ammunition Plant
Date Received by Lab:	August 28, 2007
Number of Samples:	Twelve (12)
Sample Type:	Groundwater

1.0 Introduction

On August 28, 2007 twelve (12) groundwater sample arrived at Shaw Environmental, Inc. Technology Development Laboratory in Knoxville, Tennessee. The microbial communities from the groundwater samples were screened for the presence of *Dehalococcoides* species.

2.0 Overview of Analytical Methodology

A Roche Real-Time LightCycler PCR instrument was used to determine the presence of and quantify *Dehalococcoides* sp. in groundwater. All cells (animals, plants, fungi, and bacteria) contain DNA that allows for their identification. The polymerase chain reaction (PCR) is a method of copying a specific sequence of DNA into a quantity that can be detected. If the sequence in *Dehalococcoides* sp. is located, the reaction creates multiple copies. During this reaction a genetic fluorescent tag specific for the region attaches to each copied strand of DNA, which is then detected by the instrument. A *Dehalococcoides* species DNA standard, a positive control, and two negative controls are analyzed to verify the test results.

3.0 Results

The microbial communities in the groundwater samples were screened for the presence of *Dehalococcoides* species. The results are shown in the Table 1 below.

Table 1. Dehalococcoides Results

Sample No.	Shaw Sample No.	Concentration (cells / milliliter)
AOGWO2	1325	**4.3×10^4**
P-3	1326	**7.0×10^3**
P-2	1327	**4.9×10^3**
TM-3	1328	**5.4×10^3**
P-1	1329	**5.1×10^3**
OMW2	1330	1.0×10^1U
OMW2-Dup	1330	1.0×10^1U
S4W-1	1331	1.4×10^1U
P4	1332	1.0×10^1U
B8	1333	**1.3×10^5**
OMW1	1339	**4.5×10^4**
TMMW1	1340	**4.4×10^4**
WC1-2	1341	1.0×10^1U
Dehalococcoides – Standard		**7.6×10^7**
Dehalococcoides – Standard	--	**7.2×10^7**
Negative (no DNA template control)	--	1.0×10^1U
Negative (no DNA template control)	--	1.0×10^1U

U: Less than method detection limit (Due to the amount of groundwater filtered)

4.0 Quality Control (QC)

A DNA melt analysis is conducted as a quality control measure for each result.

Analyst: Kit Daniels

Reviewed and Approved

Robert Mayer
Shaw Environmental, Inc.

CHAIN OF CUSTODY

ACCUTEST Laboratories

4405 VINELAND ROAD • SUITE C-15
ORLANDO, FL 32811
TEL: 407-425-6700 • FAX: 407-425-0707

ACCUTEST JOB #:

ACCUTEST QUOTE #:

CLIENT INFORMATION

NAME: Chris Jones
Shaw Env.
ADDRESS: 2113 Emmorton Park Rd
CITY: Edgewood STATE: MD ZIP: 21040
SEND REPORT TO:
PHONE #: Eric Malarek

FACILITY INFORMATION

PROJECT NAME: Radford Field Inv.
LOCATION: Radford AAP, VA
PROJECT NO.: 123461
FAX #:

ANALYTICAL INFORMATION

DHC

MATRIX CODES

DW - DRINKING WATER
GW - GROUND WATER
WW - WASTE WATER
SO - SOIL
SL - SLUDGE
OI - OIL
LIQ - OTHER LIQUID
SOL - OTHER SOLID

ACCUTEST SAMPLE #	FIELD ID / POINT OF COLLECTION	COLLECTION DATE	COLLECTION TIME	SAMPLED BY:	MATRIX	# OF BOTTLES	PRESERVATION HCl	NaOH	HNO3	H2SO4	NONE	DHC	LAB USE ONLY
Sek-1325	AOGW02	8-23	0900	CJ BS	GW	1					✓	✓	
1326	P-3	8-23	1310		GW	1					✓	✓	
1327	P-2	8-23	1330		GW	1					✓	✓	
1328	TM-3	8-23	1330		GW	1					✓	✓	
1329	P-1	8-23	1440		GW	1					✓	✓	
Sek-1339	OMW1	8-24	0915		GW	1					✓	✓	
Sek-1340	TMMW1	8-24	0915		GW	1					✓	✓	
Sek 1330	OMW2	8-24	0915		GW	3					✓	✓	Extra for MS/MSD
1331	S4W-1	8-27	0930		GW	1					✓	✓	
1332	P4	8-27	0940		GW	1					✓	✓	
1333	B8	8-27	1050		GW	1					✓	✓	

DATA TURNAROUND INFORMATION

- [X] STANDARD
- [ ] 48 HOUR RUSH
- [ ] 24 HOUR EMERGENCY
- [ ] OTHER

APPROVED BY:

EMERGENCY OR RUSH IS FAX DATA UNLESS PREVIOUSLY APPROVED

DATA DELIVERABLE INFORMATION

- [X] STANDARD
- [ ] COMMERCIAL "B"
- [ ] DISK DELIVERABLE
- [ ] STATE FORMS
- [ ] OTHER (SPECIFY)

COMMENTS/REMARKS

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESION, INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER	DATE TIME:	RECEIVED BY:	RELINQUISHED BY:	DATE TIME:	RECEIVED BY:
1. Christopher S Jones	1700 8/27	1.	2.		2.
3.		3.	4.		4.
5.		5.	SEAL #	PRESERVE WHERE APPLICABLE ☐	ON ICE ☐ TEMPERATURE ____ C

CHAIN OF CUSTODY

ACCUTEST Laboratories

4405 VINELAND ROAD • SUITE C-15
ORLANDO, FL 32811
TEL: 407-425-6700 • FAX: 407-425-0707

ACCUTEST JOB #:

ACCUTEST QUOTE #:

CLIENT INFORMATION

NAME: Chris Jones
ADDRESS: Shaw Env. 2113 Emmorton Park Rd
CITY: Edgewood STATE: MD ZIP: 21040
SEND REPORT TO: Eric Molacek
PHONE #:
FAX #:

FACILITY INFORMATION

PROJECT NAME: Radford Field Inv.
LOCATION: Radford AAP, VA
PROJECT NO.: 123461

ANALYTICAL INFORMATION

DHC

MATRIX CODES

DW - DRINKING WATER
GW - GROUND WATER
WW - WASTE WATER
SO - SOIL
SL - SLUDGE
OI - OIL
LIQ - OTHER LIQUID
SOL - OTHER SOLID

LAB USE ONLY

ACCUTEST SAMPLE #	FIELD ID / POINT OF COLLECTION	COLLECTION DATE	TIME	SAMPLED BY:	MATRIX	# OF BOTTLES	PRESERVATION HCl	NaOH	HNO3	H2SO4	NONE	DHC
SEK-1341	WC1-2	8-28	1315	CS BS	GW	1					X	✓

DATA TURNAROUND INFORMATION

- [X] STANDARD
- [ ] 48 HOUR RUSH
- [ ] 24 HOUR EMERGENCY
- [ ] OTHER

APPROVED BY:

EMERGENCY OR RUSH IS FAX DATA UNLESS PREVIOUSLY APPROVED

DATA DELIVERABLE INFORMATION

- [X] STANDARD
- [ ] COMMERCIAL "B"
- [ ] DISK DELIVERABLE
- [ ] STATE FORMS
- [ ] OTHER (SPECIFY)

COMMENTS/REMARKS

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESION, INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE TIME:	RECEIVED BY:	RELINQUISHED BY:	DATE TIME:	RECEIVED BY:
1. Christopher R Jones	8/28/07 1600	1.	2.		2.
RELINQUISHED BY:	DATE TIME:	RECEIVED BY:	RELINQUISHED BY:	DATE TIME:	RECEIVED BY:
3.		3.	4.		4.
RELINQUISHED BY:	DATE TIME:	RECEIVED BY:	SEAL #	PRESERVE WHERE APPLICABLE ☐	ON ICE ☐ TEMPER
5.		5.			

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

Shaw® Shaw Environmental, Inc.

MEMORANDUM

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

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Semi-Volatiles & Polynuclear Aromatic Hydrocarbons Accutest Laboratories, Inc., SDG F51154

DATE: September 25, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on July 18, 2007 and July 19, 2007. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW846 Methods 3510C/8270C for aqueous matrices and USEPA SW846 Methods 3550B/8270C for solid matrices. The polynuclear aromatic hydrocarbons (PAHs) were analyzed using selective ion monitoring (SIM) techniques. A total of seven aqueous samples and nineteen solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
AOSW01	F51154-1	LFSW01	F51154-17
AOSW02	F51154-2	APSD01	F51154-18
TMSW01	F51154-3	41SD11	F51154-22
AOSD01	F51154-4	49SS02	F51154-23
AOSD02	F51154-5	49SS03	F51154-24
41SW08	F51154-6	49SS04	F51154-25
41SW09	F51154-7	49SS05	F51154-26
41SW10	F51154-8	59SS06	F51154-27
41SD08	F51154-9	59SS07	F51154-28
41SD09	F51154-10	59SS08	F51154-29
41SD10	F51154-11	59SS09	F51154-30
LFSD01	F51154-15	59SS10	F51154-31
TMSD01	F51154-16	TMSS05	F51154-32

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

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
X		Laboratory Control Sample
X		Matrix Spike/Spike Duplicate
X		Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications, except for the following. Benzoic acid was qualified rejected "R" for samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) based upon the grossly low (i.e. <10% recovery) found in the associated LCS (see Section VIII).

Eric Malarek, Chemist

9/25/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F51154

I-Holding Times and Preservation

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

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

- Holding Time Review: The aqueous samples were collected on 07/18/07 and 07/19/07. For the surface water samples collected 07/18/07 and 07/19/07, the SVOCs were extracted on 07/24/07 and 07/26/07 and analyzed on 07/31/07. For the surface water samples collected 07/18/07 and 07/19/07, the PAHs by SIM were extracted on 07/24/07 and 07/26/07 and analyzed on 07/30/07 and 07/31/07. For the sediment and soil samples collected 07/18/07 and 07/19/07, the SVOCs were extracted on 07/25/07, 07/27/07, and 08/06/07 (49SS03 (F51154-24) confirmation) and analyzed on 07/26/07, 07/30/07, and 08/06/07 (49SS03 (F51154-24) confirmation). Sample 49SS03 (F51154-24) was re-extracted and re-analyzed for confirmation out of holding time for compound di-n-butylphthalate; however, the original sample was reported. No qualifiers were applied based upon this outlier. For the sediment and soil samples collected 07/18/07 and 07/19/07, the PAHs by SIM were extracted on 07/27/07 and analyzed on 07/27/07, 07/31/07, and 08/01/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check

GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for compounds on the semivolatile target compound list (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. The minimum relative response factor (RRF) criteria must be ≥0.05. The DoD QSM specifies that the initial calibration percent relative standard deviation (%RSD) must be ≤15% on the average for all compounds (<30% for CCCs). All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- Initial calibration for the SVOCs was performed on 07/05/07 on instrument MSBNA02. Target compounds 2,4-dinitrophenol (19.7%) and 4,6-dinitro-2-methylphenol (25.9%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 2,4-dinitrophenol (r=0.9950) and 4,6-dinitro-2-methylphenol (r=0.9975) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Sample LFSW01 (F51154-17) was analyzed using this initial calibration.

- Initial calibration for the SVOCs was performed on 07/23/07 on instrument MSBNA03. Target compounds 2,4-dinitrophenol (49.6%; grossly exceeding) and 4,6-dinitro-2-methylphenol (32.7%; grossly exceeding) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 2,4-dinitrophenol (r=0.9956) and 4,6-dinitro-2-methylphenol (r=0.9972) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Samples AOSD01 (F51154-4), AOSD02 (F51154-5), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) were analyzed using this initial calibration.

- Initial calibration for the SVOCs was performed on 07/31/07 on instrument MSBNA03. Target compounds 2,4-dinitrophenol (43.8%; grossly exceeding) and 4,6-dinitro-2-methylphenol (22.8%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 2,4-dinitrophenol (r=0.9962) and 4,6-dinitro-2-methylphenol (r=0.9982) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. No samples reported were analyzed using this initial calibration.

- Initial calibration for the SVOCs was performed on 07/13/07 on instrument MSBNA04. Target compounds 2,4-dinitrophenol (42.0%; grossly exceeding) and 4,6-dinitro-2-methylphenol (24.0%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 2,4-dinitrophenol (r=0.9988) and 4,6-dinitro-2-methylphenol (r=0.9995) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) as well as the confirmation for sample 49SS03 (F51154-24) were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 07/27/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. Samples AOSD01 (F51154-4), AOSD02 (F51154-5), LFSW01 (F51154-17), AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), 41SW10 (F51154-8), 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥0.05. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ±20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For SVOC initial calibration verification performed on 07/05/07 @15:27 on instrument MSBNA02, 3-nitroaniline (26.0%) was outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 3-nitroaniline. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC initial calibration verification performed on 07/05/07 @15:55 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 07/31/07 @09:50 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. Sample LFSW01 (F51154-17) applies to this continuing calibration.

- For SVOC initial calibration verification performed on 07/23/07 @18:28 on instrument MSBNA03, 4-chloroaniline (44.6%; grossly exceeding) and 3-nitroaniline (27.8%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 4-chloroaniline and 3-nitroaniline. No samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 07/23/07 @18:58 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 07/26/07 @09:59 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this continuing calibration.

- For SVOC continuing calibration performed on 07/30/07 @09:46 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this continuing calibration.

- For SVOC initial calibration verification performed on 07/31/07 @16:11 on instrument MSBNA03, 4-chloroaniline (43.4%; grossly exceeding) and 3-nitroaniline (35.4%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 4-chloroaniline and 3-nitroaniline. No samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 07/31/07 @16:42 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 08/01/07 @12:32 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For SVOC initial calibration verification performed on 07/13/07 @13:48 on instrument MSBNA04, 4-chloroaniline (38.2%) and 3-nitroaniline (39.0%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 4-chloroaniline and 3-nitroaniline. No samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 07/13/07 @14:19 on instrument MSBNA04, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 07/31/07 @11:19 on instrument MSBNA04, all criteria were met for all target compounds. No qualifiers were applied. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this continuing calibration.

- For SVOC continuing calibration performed on 08/06/07 @11:28 on instrument MSBNA04, all criteria were met for all target compounds. No qualifiers were applied. Confirmation for sample 49SS03 (F51154-24) applies to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 07/27/07 @20:02 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 07/30/07 @11:52 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples apply to this continuing calibration.

- For PAH by SIM continuing calibration performed on 07/30/07 @23:02 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Sample LFSW01 (F51154-17) applies to this continuing calibration.

- For PAH by SIM continuing calibration performed on 07/30/07 @11:52 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this continuing calibration.

- For PAH by SIM continuing calibration performed on 07/31/07 @09:58 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples 41SD08 (F51154-9) and 41SD09 (F51154-10) apply to this continuing calibration.

- For PAH by SIM continuing calibration performed on 08/01/07 @13:31 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one and for solid matrices were converted to soil values (soil conversion factor = 33) if needed. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to the groundwater "GW" samples in this SDG. The surface water "SW" samples were collected directly into the laboratory bottles; therefore, no rinse blank applies for the SW samples. Rinse blanks 072407R (F51275-1) and 072507R (F51300-31) apply to the surface soil "SS" and subsurface soil "SB" samples in this SDG. Rinse blank RB071807 (F51154-12) applies to the sediment "SD" samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
07/31/07	OP21580-MB	All SVOC target <½MRL	NA	NA	None
08/01/07	OP21580-MB	All SVOC target <½MRL	NA	NA	None
07/31/07	OP21610-MB	All SVOC target <½MRL	NA	NA	None
07/30/07	OP21581-MB	All PAH SIM target <½MRL	NA	NA	None
07/30/07	OP21611-MB	All PAH SIM target <½MRL	NA	NA	None
07/05/07	OP21206-MB	All PAH SIM target <½MRL	NA	NA	None
09/15/07	RB083007	All SVOC target <½MRL	NA	NA	None
09/20/07	RB083007	All PAH SIM target <½MRL	NA	NA	None

Table 2 Blank Contamination Analysis Summary, Continued

Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
07/26/07	OP21602-MB	All SVOC target <½MRL	NA	NA	None
07/30/07	OP21634-MB	All SVOC target <½MRL	NA	NA	None
07/27/07	OP21630-MB	All PAH SIM target <½MRL	NA	NA	None
07/31/07	OP21636-MB	All PAH SIM target <½MRL	NA	NA	None
08/01/07	OP21636-MB	All PAH SIM target <½MRL	NA	NA	None
07/31/07	RB071807	All SVOC target <½MRL	NA	NA	None
07/30/07	RB071807	All PAH SIM target <½MRL	NA	NA	None
08/02/07	072407R	All SVOC target <½MRL	NA	NA	None
08/02/07	072407R	All PAH SIM target <½MRL	NA	NA	None
08/02/07	072507R	All SVOC target <½MRL	NA	NA	None
08/02/07	072507R	All PAH SIM target <½MRL	NA	NA	None

NA = Not applicable.
MRL = Method reporting limit.

VI-Surrogate Spikes

Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-2 and Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:
2-Fluorophenol (14-62%) – (DoD QSM = 20-110%)
Phenol – d5 (10-40%) – (DoD QSM = 10-115%)
2,4,6-Tribromophenol (33-118%) – (DoD QSM = 40-125%)
Nitrobenzene-d5 (42-108%) – (DoD QSM = 40-110%)
2-Fluorobiphenyl (40-106%) – (DoD QSM = 50-110%)
p-Terphenyl – d14 (39-121%) – (DoD QSM = 50-135%)

Solid Criteria:
2-Fluorophenol (40-102%) – (DoD QSM = 35-105%)
Phenol – d5 (41-100%) – (DoD QSM = 40-100%)
2,4,6-Tribromophenol (42-108%) – (DoD QSM = 35-125%)
Nitrobenzene-d5 (40-105%) – (DoD QSM = 35-100%)
2-Fluorobiphenyl (43-107%) – (DoD QSM = 45-105%)
p-Terphenyl – d14 (45-119%) – (DoD QSM = 30-125%)

- For soil sample 49SS03 (F51154-24), 2,4,6-tribromophenol (41.0%) was outside lab criteria; however within DoD QSM criteria. Since all other surrogates were within criteria, no qualifiers were applied based upon this outlier. The sample was rerun for confirmation with 59.0% recovery.

- For all other field samples, all surrogates were within criteria limits. No qualifiers were applied.

VII-Internal Standards

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Sample

Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD LCS aqueous recovery limits are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). DoD LCS solid recovery limits are specified in Table D-2 and Table D-7 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP21580-BS was used as the aqueous LCS for the SVOC analysis on 07/31/07. Benzoic acid (8%) was grossly below (i.e. <10%R) the laboratory and/or the DoD QSM criteria. Benzoic acid was qualified rejected "R" based upon the very low recovery. All other compounds were within criteria. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this LCS.

- Sample OP21610-BS was used as the aqueous LCS for the SVOC analysis on 07/31/07. All criteria were met. No qualifiers were applied. Sample LFSW01 (F51154-17) applies to this LCS.

- Sample OP21602-BS was used as the solid LCS for the SVOC analysis on 07/26/07. All criteria were met. No qualifiers were applied. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this LCS.

- Sample OP21634-BS was used as the solid LCS for the SVOC analysis on 07/30/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

- Sample OP21581-BS was used as the aqueous LCS for the PAH SIM analysis on 07/30/07. All criteria were met. No qualifiers were applied. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this LCS.

- Sample OP21611-BS was used as the aqueous LCS for the PAH SIM analysis on 07/30/07. 1-Methylnaphthalene (57%) and 2-methylnaphthalene (55%) were below laboratory criteria. The associated sample was non-detect for these compounds and was qualified bias low "UL" based upon the low recoveries. Sample LFSW01 (F51154-17) applies to this LCS.

- Sample OP21630-BS was used as the solid LCS for the PAH SIM analysis on 07/27/07. All criteria were met. No qualifiers were applied. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this LCS.

- Sample OP21636-BS was used as the solid LCS for the PAH SIM analysis on 07/31/07. All criteria were met. No qualifiers were applied. No samples reported were analyzed using this LCS.

- Sample OP21636-BS was used as the solid LCS for the PAH SIM analysis on 08/01/07. All criteria were met. No qualifiers were applied. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate

Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). DoD solid MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-7 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample AOSW02 (F51154-2) was used for the aqueous MS/MSD for SVOC analysis on 07/31/07. All criteria were met. No qualifiers were applied. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this MS/MSD.

- Sample LFSW01 (F51154-17) was used for the aqueous MS/MSD for SVOC analysis on 07/31/07. 4-Nitrophenol (56%) and phenol (56%, 56%) were above laboratory accuracy criteria; however, within DoD QSM criteria. All other target compounds were within criteria. The associated aqueous LCS was within criteria and all surface water samples were non-detect for these compounds. No qualifiers were applied for 4-nitrophenol and phenol based upon these outliers. Sample LFSW01 (F51154-17) applies to this MS/MSD.

- Sample F51123-5 was used for the MS/MSD for the solid SVOC analysis on 07/26/07. The spiked sample was not a RFAAP site sample; therefore, it was not evaluated. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this MS/MSD.

- Sample APSD01 (F51154-18) was used for the solid MS/MSD for SVOC analysis on 07/30/07. Benzoic acid (RPD=37%), 1,3-dichlorobenzene (43%), 1,4-dichlorobenzene (44%), 3,3'-dichlorobenzidine (25%, 24%), hexachlorocyclopentadiene (13%, 10%), and hexachloroethane (41%, 33%) were below laboratory and/or DoD QSM accuracy criteria. All other target compounds were within criteria. The associated solid LCS was within criteria and all solid samples were non-detect for these compounds. 1,3-Dichlorobenzene, 1,4-dichlorobenzene, 3,3'-dichlorobenzidine, hexachlorocyclopentadiene, and hexachloroethane were non-detect for the spiked sample and qualified "UL" based upon the low recoveries. No qualifiers were applied for benzoic acid based upon this outlier. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

- Sample AOSW02 (F51154-2) was used for the aqueous MS/MSD for PAH SIM analysis on 07/03/07. All criteria were met. No qualifiers were applied. Samples AOSW01 (F51154-1), AOSW02 (F51154-2), TMSW01 (F51154-3), 41SW08 (F51154-6), 41SW09 (F51154-7), and 41SW10 (F51154-8) apply to this MS/MSD.

- Sample LFSW01 (F51154-17) was used for the aqueous MS/MSD for PAH SIM analysis on 07/03/07. All criteria were met. No qualifiers were applied. Sample LFSW01 (F51154-17) applies to this MS/MSD.

- Sample F51296-22 was used for the MS/MSD for the solid PAH SIM analysis on 07/28/07. The spiked sample was not a RFAAP site sample; therefore, it was not evaluated. Samples AOSD01 (F51154-4) and AOSD02 (F51154-5) apply to this MS/MSD.

- Sample 41SD09 (F51154-10) was used for the solid MS/MSD for PAH SIM analysis on 07/31/07. Benzo(g,h,i)perylene (53%), indeno(1,2,3-cd)pyrene (56%), benzo(b)fluoranthene (67%, 65%), benzo(k)fluoranthene (60%), chrysene (57%), benzo(a)pyrene (68%), and benzo(a)anthracene (61%) were below laboratory; however, within DoD QSM accuracy criteria. All other target compounds were within criteria. The associated solid LCS was within criteria. Benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, benzo(a)pyrene, and benzo(a)anthracene were detected for the spiked sample and qualified "L" based upon the low recoveries. Samples 41SD08 (F51154-9), 41SD09 (F51154-10), 41SD10 (F51154-11), LFSD01 (F51154-15), TMSD01 (F51154-16), APSD01 (F51154-18), 41SD11 (F51154-22), 49SS02 (F51154-23), 49SS03 (F51154-24), 49SS04 (F51154-25), 49SS05 (F51154-26), 59SS06 (F51154-27), 59SS07 (F51154-28), 59SS08 (F51154-29), 59SS09 (F51154-30), 59SS10 (F51154-31), and TMSS05 (F51154-32) apply to this MS/MSD.

X-Field Duplicate Sample Analysis

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

- Field surface water sample duplicate pair AOSW01 (F51154-1) and TMSW01 (F51154-3) was collected for TCL SVOCs and PAHs. All detected TCL SVOCs and PAHs found in the sample and its duplicate pair and associated %RPD are noted in **Table 3**. All other TCL SVOC and PAH target compounds were non-detect. Phenanthrene (58.5%) was above criteria due to low concentration levels detected below the MRL. Phenanthrene was qualified estimated "J" for the original and duplicate pair samples based upon this outlier. For all other compounds, all criteria were met.

Table 3 Field Precision Hits Analysis Summary for TCL SVOCs and PAHs for Duplicate Pair AOSW01 (F51154-1) and TMSW01 (F51154-3)

Compound	Original Sample (µg/L)	Duplicate Pair (µg/L)	%RPD
Acenaphthene	0.91J	0.75J	19.3
Phenanthrene	0.95J	0.52J	58.5
Fluorene	1.7	1.3	26.7
1-Methylnaphthalene	4.8	3.4	34.2

J = Estimated value <MRL and >MDL.

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

- Field sediment sample duplicate pair LFSD01 (F51154-15) and TMSD01 (F51154-16) was collected for TCL SVOCs and PAHs. All detected TCL SVOCs and PAHs found in the sample and its duplicate pair and associated %RPD are noted in **Table 4**. All other TCL SVOC and PAH target compounds were non-detect. All criteria were met. No qualifiers were applied.

Table 4 Field Precision Hits Analysis Summary for TCL SVOCs and PAHs for Duplicate Pair LFSD01 (F51154-15) and TMSD01 (F51154-16)

Compound	Original Sample (µg/kg)	Duplicate Pair (µg/kg)	%RPD
Benzo(g,h,i)perylene	92U	20.8J	NA
Indeno(1,2,3-cd)pyrene	92U	20.2J	NA
Benzo(b)fluoranthene	45.6J	37.5J	19.5
Benzo(k)fluoranthene	31.2J	26.9J	14.8
Chrysene	43.0J	32.8J	26.9
Benzo(a)pyrene	31.9J	27.9J	13.4
Benzo(a)anthracene	29.0J	26.2J	10.1

J = Estimated value <MRL and >MDL.
U = Non-detect as <MRL.
NA = Not Applicable

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: AOSW02MS (F51154-2MS), bis(2-ethylhexyl)phthalate

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:

	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (381474 * 40 * 1000 * 1) / (413841 * 0.892 * 480 * 1) = 86.1 ng/mL
= 86.1 µg/L

Reported Value = 86.2 µg/L
% Difference = 0.1%
Values were within 10% difference.

Sample: AOSW01 (F51154-1), fluorene

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (71366 * 4 * 1000 * 1) / (128124 * 1.333 * 980 * 1) = 1.7 ng/mL
= 1.7 µg/L

Reported Value = 1.7 µg/L
% Difference = 0.0%
Values were within 10% difference.

Sample: 49SS02 (F51154-23), di-n-butyl phthalate

Conc. µg/kg = (Ax * Is * Vt * DF) / (Ais * RRF * Vi * Ws * D)

where:	Conc.	= Sample concentration in µg/kg
	Ax	= Area of characteristic ion for compound being measured.
	Is	= Amount of internal standard injected (ng).
	Vt	= Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 uL.
	Ais	= Area of characteristic ion for the internal standard.
	RRF	= Average relative response factor for compound being measured (from ICAL)
	Vi	= Volume of extract injected (uL).
	W(s)	= Weight of sample extracted or diluted in grams.
	D	= Percent dry weight (100 - % moisture in sample)/100
	DF	= Dilution factor

Conc. µg/kg = (47730 * 40 * 1000 * 1) / (452232 * 1.278 * 1 * 30.0 * 0.8960) = 123 µg/kg
Reported Value = 123 µg/kg
% Difference = 0.0%
Values were within 10% difference

Sample: 49SS02 (F51154-23), chrysene

Conc. µg/kg = (Ax * Is * Vt * DF) / (Ais * RRF * Vi * Ws * D)

where: Conc. = Sample concentration in µg/kg
Ax = Area of characteristic ion for compound being measured.
Is = Amount of internal standard injected (ng).
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 uL.
Ais = Area of characteristic ion for the internal standard.
RRF = Average relative response factor for compound being measured (from ICAL)
Vi = Volume of extract injected (uL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100
DF = Dilution factor

Conc. µg/kg = (3895 * 4.0 * 1000 * 4) / (81063 * 1.670 * 1 * 30.0 * 0.8960) = 17.1 µg/kg
Reported Value = 17.1 µg/kg
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

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

Laboratory Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

D = Indicates sample was analyzed at a dilution.

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

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

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

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

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

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

Raw Data: U003663.D

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

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		

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

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 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

Form I Copy

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 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

From I Orig

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 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

Form I copy

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 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

Form I copy

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 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

Form I Copy

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 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

Form I Copy

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

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD01		
Lab Sample ID:	F51154-4	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C 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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD01		
Lab Sample ID:	F51154-4	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C 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

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD01		
Lab Sample ID:	F51154-4	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	66.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035879.D	4	07/27/07	RB	07/27/07	OP21630	SW1858
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	400	100	ug/kg	
208-96-8	Acenaphthylene	ND	400	100	ug/kg	
120-12-7	Anthracene	ND	400	60	ug/kg	
56-55-3	Benzo(a)anthracene	ND	80	20	ug/kg	
50-32-8	Benzo(a)pyrene	ND	80	20	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	80	20	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	80	20	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	80	20	ug/kg	
218-01-9	Chrysene	ND	80	20	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	80	20	ug/kg	
206-44-0	Fluoranthene	ND	400	70	ug/kg	
86-73-7	Fluorene	ND	400	60	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	80	20	ug/kg	
90-12-0	1-Methylnaphthalene	ND	400	60	ug/kg	
91-57-6	2-Methylnaphthalene	ND	400	60	ug/kg	
91-20-3	Naphthalene	ND	400	60	ug/kg	
85-01-8	Phenanthrene	ND	400	60	ug/kg	
129-00-0	Pyrene	ND	400	70	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	76%		40-105%
321-60-8	2-Fluorobiphenyl	82%		43-107%
1718-51-0	Terphenyl-d14	78%		45-119%

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

Raw Data: R09440.D

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 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

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 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

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 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

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 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

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 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

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 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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 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

Form I Org

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

Form I Copy

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 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

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 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

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 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

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 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

Form I Corg

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

Form I OR

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 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

Form I Copy

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 SW846 3550B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	400	100	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	400	200	ug/kg	
84-66-2	Diethyl phthalate	ND	400	100	ug/kg	
131-11-3	Dimethyl phthalate	ND	400	100	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	400	200	ug/kg	
118-74-1	Hexachlorobenzene	ND	200	40	ug/kg	
87-68-3	Hexachlorobutadiene	ND	200	81	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	200	81	ug/kg	
67-72-1	Hexachloroethane	ND	200	81	ug/kg	
78-59-1	Isophorone	ND	200	40	ug/kg	
88-74-4	2-Nitroaniline	ND	400	100	ug/kg	
99-09-2	3-Nitroaniline	ND	400	100	ug/kg	
100-01-6	4-Nitroaniline	ND	400	140	ug/kg	
98-95-3	Nitrobenzene	ND	200	40	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	200	81	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	200	40	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	200	40	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	66%		40-102%
4165-62-2	Phenol-d5	73%		41-100%
118-79-6	2,4,6-Tribromophenol	72%		42-108%
4165-60-0	Nitrobenzene-d5	60%		40-105%
321-60-8	2-Fluorobiphenyl	62%		43-107%
1718-51-0	Terphenyl-d14	76%		45-119%

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

Raw Data: W035943.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035943.D	4	07/31/07	RB	07/27/07	OP21636	SW1861
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	320	81	ug/kg	
208-96-8	Acenaphthylene	ND	320	81	ug/kg	
120-12-7	Anthracene	ND	320	49	ug/kg	
56-55-3	Benzo(a)anthracene	17.4 L	65	16	ug/kg	J
50-32-8	Benzo(a)pyrene	22.9 L	65	16	ug/kg	J
205-99-2	Benzo(b)fluoranthene	40.2 L	65	16	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	20.0 L	65	16	ug/kg	J
207-08-9	Benzo(k)fluoranthene	24.2 L	65	16	ug/kg	J
218-01-9	Chrysene	34.0 L	65	16	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	65	16	ug/kg	
206-44-0	Fluoranthene	ND	320	57	ug/kg	
86-73-7	Fluorene	ND	320	49	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	21.0 L	65	16	ug/kg	J
90-12-0	1-Methylnaphthalene	ND	320	49	ug/kg	
91-57-6	2-Methylnaphthalene	ND	320	49	ug/kg	
91-20-3	Naphthalene	ND	320	49	ug/kg	
85-01-8	Phenanthrene	ND	320	49	ug/kg	
129-00-0	Pyrene	ND	320	57	ug/kg	

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

Raw Data: R09470.D

Run 1 only

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09470.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.4 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	1000	420	ug/kg	
95-57-8	2-Chlorophenol	ND	210	42	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	210	42	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	210	42	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	210	42	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1000	420	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	420	83	ug/kg	
95-48-7	2-Methylphenol	ND	210	42	ug/kg	
	3&4-Methylphenol	ND	210	42	ug/kg	
88-75-5	2-Nitrophenol	ND	210	42	ug/kg	
100-02-7	4-Nitrophenol	ND	1000	420	ug/kg	
87-86-5	Pentachlorophenol	ND	1000	420	ug/kg	
108-95-2	Phenol	ND	210	42	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	210	42	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	210	42	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	210	42	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	420	100	ug/kg	
100-51-6	Benzyl Alcohol	ND	210	42	ug/kg	
91-58-7	2-Chloronaphthalene	ND	210	42	ug/kg	
106-47-8	4-Chloroaniline	ND	420	170	ug/kg	
86-74-8	Carbazole	ND	210	42	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	210	42	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	210	83	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	210	42	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	210	42	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	210	42	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	210	42	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	210	42	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	210	83	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	210	83	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	420	210	ug/kg	
132-64-9	Dibenzofuran	ND	210	42	ug/kg	

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

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	420	100	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	420	210	ug/kg	
84-66-2	Diethyl phthalate	ND	420	100	ug/kg	
131-11-3	Dimethyl phthalate	ND	420	100	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	420	210	ug/kg	
118-74-1	Hexachlorobenzene	ND	210	42	ug/kg	
87-68-3	Hexachlorobutadiene	ND	210	83	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	210	83	ug/kg	
67-72-1	Hexachloroethane	ND	210	83	ug/kg	
78-59-1	Isophorone	ND	210	42	ug/kg	
88-74-4	2-Nitroaniline	ND	420	100	ug/kg	
99-09-2	3-Nitroaniline	ND	420	100	ug/kg	
100-01-6	4-Nitroaniline	ND	420	150	ug/kg	
98-95-3	Nitrobenzene	ND	210	42	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	210	83	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	210	42	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	210	42	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	68%		40-102%
4165-62-2	Phenol-d5	77%		41-100%
118-79-6	2,4,6-Tribromophenol	80%		42-108%
4165-60-0	Nitrobenzene-d5	64%		40-105%
321-60-8	2-Fluorobiphenyl	69%		43-107%
1718-51-0	Terphenyl-d14	81%		45-119%

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

Raw Data: W035973.D

Form I COM

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD10		
Lab Sample ID:	F51154-11	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	79.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035973.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.4 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	330	83	ug/kg	
208-96-8	Acenaphthylene	ND	330	83	ug/kg	
120-12-7	Anthracene	ND	330	50	ug/kg	
56-55-3	Benzo(a)anthracene	46.3 J	66	17	ug/kg	J
50-32-8	Benzo(a)pyrene	67.3	66	17	ug/kg	
205-99-2	Benzo(b)fluoranthene	113	66	17	ug/kg	
191-24-2	Benzo(g,h,i)perylene	53.9 J	66	17	ug/kg	J
207-08-9	Benzo(k)fluoranthene	64.7 J	66	17	ug/kg	J
218-01-9	Chrysene	90.1	66	17	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	66	17	ug/kg	
206-44-0	Fluoranthene	154 J	330	58	ug/kg	J
86-73-7	Fluorene	ND	330	50	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	57.2 J	66	17	ug/kg	J
90-12-0	1-Methylnaphthalene	ND	330	50	ug/kg	
91-57-6	2-Methylnaphthalene	ND	330	50	ug/kg	
91-20-3	Naphthalene	ND	330	50	ug/kg	
85-01-8	Phenanthrene	60.2 J	330	50	ug/kg	J
129-00-0	Pyrene	141 J	330	58	ug/kg	J

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

Raw Data: R09471.D

For I Only

Accutest Laboratories

Report of Analysis

3,15
3

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

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L037535.D	1	07/31/07	RB	07/26/07	OP21610	SL1920
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	9.8	ug/l	
95-57-8	2-Chlorophenol	ND	4.9	0.98	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.9	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.9	0.98	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.9	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	9.8	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.8	2.0	ug/l	
95-48-7	2-Methylphenol	ND	4.9	0.98	ug/l	
	3&4-Methylphenol	ND	4.9	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	4.9	0.98	ug/l	
100-02-7	4-Nitrophenol	ND	25	9.8	ug/l	
87-86-5	Pentachlorophenol	ND	25	9.8	ug/l	
108-95-2	Phenol	ND	4.9	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.9	0.98	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.9	0.98	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.9	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.9	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	4.9	0.98	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.9	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	4.9	2.0	ug/l	
86-74-8	Carbazole	ND	4.9	0.98	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.9	0.98	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.9	0.98	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.9	0.98	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.9	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.9	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	4.9	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	4.9	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.9	0.98	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.9	0.98	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.8	2.0	ug/l	
132-64-9	Dibenzofuran	ND	4.9	0.98	ug/l	

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

Form 1 only

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	4.9	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	4.9	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	4.9	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	4.9	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	4.9	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	4.9	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	4.9	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.9	1.5	ug/l	
67-72-1	Hexachloroethane	ND	4.9	1.9	ug/l	
78-59-1	Isophorone	ND	4.9	0.98	ug/l	
88-74-4	2-Nitroaniline	ND	9.8	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	9.8	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	9.8	2.0	ug/l	
98-95-3	Nitrobenzene	ND	4.9	0.98	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.9	0.98	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.9	0.98	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	4.9	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	46%		14-62%
4165-62-2	Phenol-d5	32%		10-40%
118-79-6	2,4,6-Tribromophenol	80%		33-118%
4165-60-0	Nitrobenzene-d5	79%		42-108%
321-60-8	2-Fluorobiphenyl	79%		40-106%
1718-51-0	Terphenyl-d14	76%		39-121%

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

Raw Data: W035923.D

Form I GC/MS

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSW01		
Lab Sample ID:	F51154-17	Date Sampled:	07/19/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035923.D	1	07/31/07	RB	07/26/07	OP21611	SW1860
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result		RL	MDL	Units	Q
83-32-9	Acenaphthene	ND		0.98	0.49	ug/l	
208-96-8	Acenaphthylene	ND		0.98	0.49	ug/l	
120-12-7	Anthracene	ND		0.98	0.49	ug/l	
56-55-3	Benzo(a)anthracene	ND		0.20	0.049	ug/l	
50-32-8	Benzo(a)pyrene	ND		0.20	0.098	ug/l	
205-99-2	Benzo(b)fluoranthene	ND		0.20	0.049	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND		0.20	0.098	ug/l	
207-08-9	Benzo(k)fluoranthene	ND		0.20	0.098	ug/l	
218-01-9	Chrysene	ND		0.20	0.098	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND		0.20	0.049	ug/l	
206-44-0	Fluoranthene	ND		0.98	0.25	ug/l	
86-73-7	Fluorene	ND		0.98	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND		0.20	0.049	ug/l	
90-12-0	1-Methylnaphthalene	ND	VL	0.98	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	VL	0.98	0.25	ug/l	
91-20-3	Naphthalene	ND		0.98	0.25	ug/l	
85-01-8	Phenanthrene	ND		0.98	0.49	ug/l	
129-00-0	Pyrene	ND		0.98	0.25	ug/l	

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

Raw Data: R09473.D

For I COA

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09473.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	940	380	ug/kg	
95-57-8	2-Chlorophenol	ND	190	38	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	38	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	38	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	38	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	940	380	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	380	75	ug/kg	
95-48-7	2-Methylphenol	ND	190	38	ug/kg	
	3&4-Methylphenol	ND	190	38	ug/kg	
88-75-5	2-Nitrophenol	ND	190	38	ug/kg	
100-02-7	4-Nitrophenol	ND	940	380	ug/kg	
87-86-5	Pentachlorophenol	ND	940	380	ug/kg	
108-95-2	Phenol	ND	190	38	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	38	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	38	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	38	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	380	94	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	38	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	38	ug/kg	
106-47-8	4-Chloroaniline	ND	380	150	ug/kg	
86-74-8	Carbazole	ND	190	38	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	38	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	75	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	38	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	38	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	38	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND VL	190	38	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND VL	190	38	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	75	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	75	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND VL	380	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	38	ug/kg	

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

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	380	94	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	380	190	ug/kg	
84-66-2	Diethyl phthalate	ND	380	94	ug/kg	
131-11-3	Dimethyl phthalate	ND	380	94	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	380	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	38	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	75	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND VL	190	75	ug/kg	
67-72-1	Hexachloroethane	ND VL	190	75	ug/kg	
78-59-1	Isophorone	ND	190	38	ug/kg	
88-74-4	2-Nitroaniline	ND	380	94	ug/kg	
99-09-2	3-Nitroaniline	ND	380	94	ug/kg	
100-01-6	4-Nitroaniline	ND	380	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	38	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	75	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	38	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	38	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	66%		40-102%
4165-62-2	Phenol-d5	71%		41-100%
118-79-6	2,4,6-Tribromophenol	66%		42-108%
4165-60-0	Nitrobenzene-d5	59%		40-105%
321-60-8	2-Fluorobiphenyl	60%		43-107%
1718-51-0	Terphenyl-d14	64%		45-119%

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

Raw Data: W035976.D

Form I OM

Accutest Laboratories

Report of Analysis

Client Sample ID:	APSD01		
Lab Sample ID:	F51154-18	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035976.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	300	75	ug/kg	
208-96-8	Acenaphthylene	ND	300	75	ug/kg	
120-12-7	Anthracene	ND	300	45	ug/kg	
56-55-3	Benzo(a)anthracene	16.2 J	60	15	ug/kg	J
50-32-8	Benzo(a)pyrene	18.0 J	60	15	ug/kg	J
205-99-2	Benzo(b)fluoranthene	24.7 J	60	15	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	15.1 J	60	15	ug/kg	J
207-08-9	Benzo(k)fluoranthene	15.2 J	60	15	ug/kg	J
218-01-9	Chrysene	21.1 J	60	15	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	60	15	ug/kg	
206-44-0	Fluoranthene	ND	300	53	ug/kg	
86-73-7	Fluorene	ND	300	45	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	15.1 J	60	15	ug/kg	J
90-12-0	1-Methylnaphthalene	ND	300	45	ug/kg	
91-57-6	2-Methylnaphthalene	ND	300	45	ug/kg	
91-20-3	Naphthalene	ND	300	45	ug/kg	
85-01-8	Phenanthrene	ND	300	45	ug/kg	
129-00-0	Pyrene	ND	300	53	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09476.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	950	380	ug/kg	
95-57-8	2-Chlorophenol	ND	190	38	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	38	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	38	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	38	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	950	380	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	380	76	ug/kg	
95-48-7	2-Methylphenol	ND	190	38	ug/kg	
	3&4-Methylphenol	ND	190	38	ug/kg	
88-75-5	2-Nitrophenol	ND	190	38	ug/kg	
100-02-7	4-Nitrophenol	ND	950	380	ug/kg	
87-86-5	Pentachlorophenol	ND	950	380	ug/kg	
108-95-2	Phenol	ND	190	38	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	38	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	38	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	38	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	380	95	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	38	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	38	ug/kg	
106-47-8	4-Chloroaniline	ND	380	150	ug/kg	
86-74-8	Carbazole	ND	190	38	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	38	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	76	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	38	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	38	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	38	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	190	38	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	190	38	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	76	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	76	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	380	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	38	ug/kg	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	380	95	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	380	190	ug/kg	
84-66-2	Diethyl phthalate	ND	380	95	ug/kg	
131-11-3	Dimethyl phthalate	ND	380	95	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	380	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	38	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	76	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	190	76	ug/kg	
67-72-1	Hexachloroethane	ND	190	76	ug/kg	
78-59-1	Isophorone	ND	190	38	ug/kg	
88-74-4	2-Nitroaniline	ND	380	95	ug/kg	
99-09-2	3-Nitroaniline	ND	380	95	ug/kg	
100-01-6	4-Nitroaniline	ND	380	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	38	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	76	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	38	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	38	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	67%		40-102%
4165-62-2	Phenol-d5	72%		41-100%
118-79-6	2,4,6-Tribromophenol	70%		42-108%
4165-60-0	Nitrobenzene-d5	64%		40-105%
321-60-8	2-Fluorobiphenyl	63%		43-107%
1718-51-0	Terphenyl-d14	82%		45-119%

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

Raw Data: W035977.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD11		
Lab Sample ID:	F51154-22	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	86.8
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035977.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	310	76	ug/kg	
208-96-8	Acenaphthylene	ND	310	76	ug/kg	
120-12-7	Anthracene	ND	310	46	ug/kg	
56-55-3	Benzo(a)anthracene	ND	61	15	ug/kg	
50-32-8	Benzo(a)pyrene	ND	61	15	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	61	15	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	61	15	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	61	15	ug/kg	
218-01-9	Chrysene	ND	61	15	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	61	15	ug/kg	
206-44-0	Fluoranthene	ND	310	53	ug/kg	
86-73-7	Fluorene	ND	310	46	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	61	15	ug/kg	
90-12-0	1-Methylnaphthalene	ND	310	46	ug/kg	
91-57-6	2-Methylnaphthalene	ND	310	46	ug/kg	
91-20-3	Naphthalene	ND	310	46	ug/kg	
85-01-8	Phenanthrene	ND	310	46	ug/kg	
129-00-0	Pyrene	ND	310	53	ug/kg	

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

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09477.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	930	370	ug/kg	
95-57-8	2-Chlorophenol	ND	190	37	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	37	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	37	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	37	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	930	370	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	370	74	ug/kg	
95-48-7	2-Methylphenol	ND	190	37	ug/kg	
	3&4-Methylphenol	ND	190	37	ug/kg	
88-75-5	2-Nitrophenol	ND	190	37	ug/kg	
100-02-7	4-Nitrophenol	ND	930	370	ug/kg	
87-86-5	Pentachlorophenol	ND	930	370	ug/kg	
108-95-2	Phenol	ND	190	37	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	37	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	37	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	37	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	370	93	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	37	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	37	ug/kg	
106-47-8	4-Chloroaniline	ND	370	150	ug/kg	
86-74-8	Carbazole	ND	190	37	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	37	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	74	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	37	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	37	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	37	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	190	37	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	190	37	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	74	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	74	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	370	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	37	ug/kg	

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

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	123 J	370	93	ug/kg	J
117-84-0	Di-n-octyl phthalate	ND	370	190	ug/kg	
84-66-2	Diethyl phthalate	ND	370	93	ug/kg	
131-11-3	Dimethyl phthalate	ND	370	93	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	370	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	37	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	74	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	190	74	ug/kg	
67-72-1	Hexachloroethane	ND	190	74	ug/kg	
78-59-1	Isophorone	ND	190	37	ug/kg	
88-74-4	2-Nitroaniline	ND	370	93	ug/kg	
99-09-2	3-Nitroaniline	ND	370	93	ug/kg	
100-01-6	4-Nitroaniline	ND	370	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	37	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	74	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	37	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	37	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	69%		40-102%
4165-62-2	Phenol-d5	79%		41-100%
118-79-6	2,4,6-Tribromophenol	79%		42-108%
4165-60-0	Nitrobenzene-d5	66%		40-105%
321-60-8	2-Fluorobiphenyl	74%		43-107%
1718-51-0	Terphenyl-d14	77%		45-119%

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

Raw Data: W035978.D

Form I Cpy

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS02		
Lab Sample ID:	F51154-23	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	89.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035978.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	300	74	ug/kg	
208-96-8	Acenaphthylene	ND	300	74	ug/kg	
120-12-7	Anthracene	ND	300	45	ug/kg	
56-55-3	Benzo(a)anthracene	ND	60	15	ug/kg	
50-32-8	Benzo(a)pyrene	ND	60	15	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	60	15	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	60	15	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	60	15	ug/kg	
218-01-9	Chrysene	17.1 J	60	15	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	60	15	ug/kg	
206-44-0	Fluoranthene	ND	300	52	ug/kg	
86-73-7	Fluorene	ND	300	45	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	60	15	ug/kg	
90-12-0	1-Methylnaphthalene	65.4 J	300	45	ug/kg	J
91-57-6	2-Methylnaphthalene	117 J	300	45	ug/kg	J
91-20-3	Naphthalene	ND	300	45	ug/kg	
85-01-8	Phenanthrene	75.1 J	300	45	ug/kg	J
129-00-0	Pyrene	ND	300	52	ug/kg	

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

Raw Data: R09478.D U003771.D

Run 1 OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	R09478.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2 [b]	U003771.D	1	08/06/07	NJ	08/03/07	OP21735	SU184

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2	30.0 g	1.0 ml

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	910	360	ug/kg	
95-57-8	2-Chlorophenol	ND	180	36	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	180	36	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	180	36	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	180	36	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	910	360	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	360	72	ug/kg	
95-48-7	2-Methylphenol	ND	180	36	ug/kg	
	3&4-Methylphenol	ND	180	36	ug/kg	
88-75-5	2-Nitrophenol	ND	180	36	ug/kg	
100-02-7	4-Nitrophenol	ND	910	360	ug/kg	
87-86-5	Pentachlorophenol	ND	910	360	ug/kg	
108-95-2	Phenol	ND	180	36	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	180	36	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	180	36	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	180	36	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	360	91	ug/kg	
100-51-6	Benzyl Alcohol	ND	180	36	ug/kg	
91-58-7	2-Chloronaphthalene	ND	180	36	ug/kg	
106-47-8	4-Chloroaniline	ND	360	140	ug/kg	
86-74-8	Carbazole	ND	180	36	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	180	36	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	180	72	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	180	36	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	180	36	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	180	36	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	180	36	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	180	36	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	180	72	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	180	72	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	360	180	ug/kg	
132-64-9	Dibenzofuran	ND	180	36	ug/kg	

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

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	128 J	360	91	ug/kg	J
117-84-0	Di-n-octyl phthalate	ND	360	180	ug/kg	
84-66-2	Diethyl phthalate	ND	360	91	ug/kg	
131-11-3	Dimethyl phthalate	ND	360	91	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	360	180	ug/kg	
118-74-1	Hexachlorobenzene	ND	180	36	ug/kg	
87-68-3	Hexachlorobutadiene	ND	180	72	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	180	72	ug/kg	
67-72-1	Hexachloroethane	ND	180	72	ug/kg	
78-59-1	Isophorone	ND	180	36	ug/kg	
88-74-4	2-Nitroaniline	ND	360	91	ug/kg	
99-09-2	3-Nitroaniline	ND	360	91	ug/kg	
100-01-6	4-Nitroaniline	ND	360	130	ug/kg	
98-95-3	Nitrobenzene	ND	180	36	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	180	72	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	180	36	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	180	36	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	45%	53%	40-102%
4165-62-2	Phenol-d5	48%	62%	41-100%
118-79-6	2,4,6-Tribromophenol	41%	59%	42-108%
4165-60-0	Nitrobenzene-d5	50%	56%	40-105%
321-60-8	2-Fluorobiphenyl	49%	60%	43-107%
1718-51-0	Terphenyl-d14	51%	64%	45-119%

(a) All hits confirmed by re-extraction and reanalysis beyond holdtime.
(b) Confirmation run.

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

Form I OM

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS03		
Lab Sample ID:	F51154-24	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035979.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	290	72	ug/kg	
208-96-8	Acenaphthylene	ND	290	72	ug/kg	
120-12-7	Anthracene	ND	290	43	ug/kg	
56-55-3	Benzo(a)anthracene	ND	58	14	ug/kg	
50-32-8	Benzo(a)pyrene	ND	58	14	ug/kg	
205-99-2	Benzo(b)fluoranthene	21.1 J	58	14	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	ND	58	14	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	58	14	ug/kg	
218-01-9	Chrysene	22.9 J	58	14	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	58	14	ug/kg	
206-44-0	Fluoranthene	ND	290	51	ug/kg	
86-73-7	Fluorene	ND	290	43	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	58	14	ug/kg	
90-12-0	1-Methylnaphthalene	49.5 J	290	43	ug/kg	J
91-57-6	2-Methylnaphthalene	60.7 J	290	43	ug/kg	J
91-20-3	Naphthalene	ND	290	43	ug/kg	
85-01-8	Phenanthrene	60.9 J	290	43	ug/kg	J
129-00-0	Pyrene	ND	290	51	ug/kg	

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

Raw Data: R09479.D

Form I OM

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09479.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	950	380	ug/kg	
95-57-8	2-Chlorophenol	ND	190	38	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	38	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	38	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	38	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	950	380	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	380	76	ug/kg	
95-48-7	2-Methylphenol	ND	190	38	ug/kg	
	3&4-Methylphenol	ND	190	38	ug/kg	
88-75-5	2-Nitrophenol	ND	190	38	ug/kg	
100-02-7	4-Nitrophenol	ND	950	380	ug/kg	
87-86-5	Pentachlorophenol	ND	950	380	ug/kg	
108-95-2	Phenol	ND	190	38	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	38	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	38	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	38	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	380	95	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	38	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	38	ug/kg	
106-47-8	4-Chloroaniline	ND	380	150	ug/kg	
86-74-8	Carbazole	ND	190	38	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	38	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	76	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	38	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	38	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	38	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	190	38	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	190	38	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	76	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	76	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	380	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	38	ug/kg	

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

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	380	95	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	380	190	ug/kg	
84-66-2	Diethyl phthalate	ND	380	95	ug/kg	
131-11-3	Dimethyl phthalate	ND	380	95	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	380	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	38	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	76	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	190	76	ug/kg	
67-72-1	Hexachloroethane	ND	190	76	ug/kg	
78-59-1	Isophorone	ND	190	38	ug/kg	
88-74-4	2-Nitroaniline	ND	380	95	ug/kg	
99-09-2	3-Nitroaniline	ND	380	95	ug/kg	
100-01-6	4-Nitroaniline	ND	380	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	38	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	76	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	38	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	38	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	73%		40-102%
4165-62-2	Phenol-d5	78%		41-100%
118-79-6	2,4,6-Tribromophenol	82%		42-108%
4165-60-0	Nitrobenzene-d5	69%		40-105%
321-60-8	2-Fluorobiphenyl	70%		43-107%
1718-51-0	Terphenyl-d14	83%		45-119%

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

Raw Data: W035980.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS04		
Lab Sample ID:	F51154-25	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	87.5
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035980.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	300	76	ug/kg	
208-96-8	Acenaphthylene	ND	300	76	ug/kg	
120-12-7	Anthracene	ND	300	46	ug/kg	
56-55-3	Benzo(a)anthracene	ND	61	15	ug/kg	
50-32-8	Benzo(a)pyrene	ND	61	15	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	61	15	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	61	15	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	61	15	ug/kg	
218-01-9	Chrysene	ND	61	15	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	61	15	ug/kg	
206-44-0	Fluoranthene	ND	300	53	ug/kg	
86-73-7	Fluorene	ND	300	46	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	61	15	ug/kg	
90-12-0	1-Methylnaphthalene	ND	300	46	ug/kg	
91-57-6	2-Methylnaphthalene	ND	300	46	ug/kg	
91-20-3	Naphthalene	ND	300	46	ug/kg	
85-01-8	Phenanthrene	ND	300	46	ug/kg	
129-00-0	Pyrene	ND	300	53	ug/kg	

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

Raw Data: R09480.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09480.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.6 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	950	380	ug/kg	
95-57-8	2-Chlorophenol	ND	190	38	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	38	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	38	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	38	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	950	380	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	380	76	ug/kg	
95-48-7	2-Methylphenol	ND	190	38	ug/kg	
	3&4-Methylphenol	ND	190	38	ug/kg	
88-75-5	2-Nitrophenol	ND	190	38	ug/kg	
100-02-7	4-Nitrophenol	ND	950	380	ug/kg	
87-86-5	Pentachlorophenol	ND	950	380	ug/kg	
108-95-2	Phenol	ND	190	38	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	38	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	38	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	38	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	380	95	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	38	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	38	ug/kg	
106-47-8	4-Chloroaniline	ND	380	150	ug/kg	
86-74-8	Carbazole	ND	190	38	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	38	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	76	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	38	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	38	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	38	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	190	38	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	190	38	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	76	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	76	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	380	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	38	ug/kg	

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

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	380	95	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	380	190	ug/kg	
84-66-2	Diethyl phthalate	ND	380	95	ug/kg	
131-11-3	Dimethyl phthalate	ND	380	95	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	380	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	38	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	76	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	190	76	ug/kg	
67-72-1	Hexachloroethane	ND	190	76	ug/kg	
78-59-1	Isophorone	ND	190	38	ug/kg	
88-74-4	2-Nitroaniline	ND	380	95	ug/kg	
99-09-2	3-Nitroaniline	ND	380	95	ug/kg	
100-01-6	4-Nitroaniline	ND	380	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	38	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	76	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	38	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	38	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	64%		40-102%
4165-62-2	Phenol-d5	69%		41-100%
118-79-6	2,4,6-Tribromophenol	66%		42-108%
4165-60-0	Nitrobenzene-d5	59%		40-105%
321-60-8	2-Fluorobiphenyl	60%		43-107%
1718-51-0	Terphenyl-d14	66%		45-119%

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

Raw Data: W035981.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035981.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.6 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	300	76	ug/kg	
208-96-8	Acenaphthylene	ND	300	76	ug/kg	
120-12-7	Anthracene	ND	300	46	ug/kg	
56-55-3	Benzo(a)anthracene	ND	61	15	ug/kg	
50-32-8	Benzo(a)pyrene	ND	61	15	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	61	15	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	61	15	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	61	15	ug/kg	
218-01-9	Chrysene	ND	61	15	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	61	15	ug/kg	
206-44-0	Fluoranthene	ND	300	53	ug/kg	
86-73-7	Fluorene	ND	300	46	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	61	15	ug/kg	
90-12-0	1-Methylnaphthalene	ND	300	46	ug/kg	
91-57-6	2-Methylnaphthalene	ND	300	46	ug/kg	
91-20-3	Naphthalene	ND	300	46	ug/kg	
85-01-8	Phenanthrene	ND	300	46	ug/kg	
129-00-0	Pyrene	ND	300	53	ug/kg	

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

Raw Data: R09481.D

Form I copy

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

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09482.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	890	360	ug/kg	
95-57-8	2-Chlorophenol	ND	180	36	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	180	36	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	180	36	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	180	36	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	890	360	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	360	71	ug/kg	
95-48-7	2-Methylphenol	ND	180	36	ug/kg	
	3&4-Methylphenol	ND	180	36	ug/kg	
88-75-5	2-Nitrophenol	ND	180	36	ug/kg	
100-02-7	4-Nitrophenol	ND	890	360	ug/kg	
87-86-5	Pentachlorophenol	ND	890	360	ug/kg	
108-95-2	Phenol	ND	180	36	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	180	36	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	180	36	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	180	36	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	360	89	ug/kg	
100-51-6	Benzyl Alcohol	ND	180	36	ug/kg	
91-58-7	2-Chloronaphthalene	ND	180	36	ug/kg	
106-47-8	4-Chloroaniline	ND	360	140	ug/kg	
86-74-8	Carbazole	ND	180	36	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	180	36	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	180	71	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	180	36	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	180	36	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	180	36	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	180	36	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	180	36	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	180	71	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	180	71	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	360	180	ug/kg	
132-64-9	Dibenzofuran	ND	180	36	ug/kg	

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

Form I OZ

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	360	89	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	360	180	ug/kg	
84-66-2	Diethyl phthalate	ND	360	89	ug/kg	
131-11-3	Dimethyl phthalate	ND	360	89	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	360	180	ug/kg	
118-74-1	Hexachlorobenzene	ND	180	36	ug/kg	
87-68-3	Hexachlorobutadiene	ND	180	71	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	180	71	ug/kg	
67-72-1	Hexachloroethane	ND	180	71	ug/kg	
78-59-1	Isophorone	ND	180	36	ug/kg	
88-74-4	2-Nitroaniline	ND	360	89	ug/kg	
99-09-2	3-Nitroaniline	ND	360	89	ug/kg	
100-01-6	4-Nitroaniline	ND	360	120	ug/kg	
98-95-3	Nitrobenzene	ND	180	36	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	180	71	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	180	36	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	180	36	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	71%		40-102%
4165-62-2	Phenol-d5	79%		41-100%
118-79-6	2,4,6-Tribromophenol	77%		42-108%
4165-60-0	Nitrobenzene-d5	66%		40-105%
321-60-8	2-Fluorobiphenyl	65%		43-107%
1718-51-0	Terphenyl-d14	87%		45-119%

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

Raw Data: W035983.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS07		
Lab Sample ID:	F51154-28	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	91.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035983.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.7 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	280	71	ug/kg	
208-96-8	Acenaphthylene	ND	280	71	ug/kg	
120-12-7	Anthracene	ND	280	43	ug/kg	
56-55-3	Benzo(a)anthracene	21.0 J	57	14	ug/kg	J
50-32-8	Benzo(a)pyrene	19.6 J	57	14	ug/kg	J
205-99-2	Benzo(b)fluoranthene	22.6 J	57	14	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	ND	57	14	ug/kg	
207-08-9	Benzo(k)fluoranthene	18.0 J	57	14	ug/kg	J
218-01-9	Chrysene	22.7 J	57	14	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	57	14	ug/kg	
206-44-0	Fluoranthene	ND	280	50	ug/kg	
86-73-7	Fluorene	ND	280	43	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	57	14	ug/kg	
90-12-0	1-Methylnaphthalene	ND	280	43	ug/kg	
91-57-6	2-Methylnaphthalene	ND	280	43	ug/kg	
91-20-3	Naphthalene	ND	280	43	ug/kg	
85-01-8	Phenanthrene	ND	280	43	ug/kg	
129-00-0	Pyrene	ND	280	50	ug/kg	

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

Form I Cap

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09483.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.3 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	930	370	ug/kg	
95-57-8	2-Chlorophenol	ND	190	37	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	190	37	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	190	37	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	190	37	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	930	370	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	370	74	ug/kg	
95-48-7	2-Methylphenol	ND	190	37	ug/kg	
	3&4-Methylphenol	ND	190	37	ug/kg	
88-75-5	2-Nitrophenol	ND	190	37	ug/kg	
100-02-7	4-Nitrophenol	ND	930	370	ug/kg	
87-86-5	Pentachlorophenol	ND	930	370	ug/kg	
108-95-2	Phenol	ND	190	37	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	190	37	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	190	37	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	190	37	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	370	93	ug/kg	
100-51-6	Benzyl Alcohol	ND	190	37	ug/kg	
91-58-7	2-Chloronaphthalene	ND	190	37	ug/kg	
106-47-8	4-Chloroaniline	ND	370	150	ug/kg	
86-74-8	Carbazole	ND	190	37	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	190	37	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	190	74	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	190	37	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	190	37	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	190	37	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	190	37	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	190	37	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	190	74	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	190	74	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	370	190	ug/kg	
132-64-9	Dibenzofuran	ND	190	37	ug/kg	

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

Form I 03

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS08		
Lab Sample ID:	F51154-29	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	89.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	370	93	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	370	190	ug/kg	
84-66-2	Diethyl phthalate	ND	370	93	ug/kg	
131-11-3	Dimethyl phthalate	ND	370	93	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	370	190	ug/kg	
118-74-1	Hexachlorobenzene	ND	190	37	ug/kg	
87-68-3	Hexachlorobutadiene	ND	190	74	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	190	74	ug/kg	
67-72-1	Hexachloroethane	ND	190	74	ug/kg	
78-59-1	Isophorone	ND	190	37	ug/kg	
88-74-4	2-Nitroaniline	ND	370	93	ug/kg	
99-09-2	3-Nitroaniline	ND	370	93	ug/kg	
100-01-6	4-Nitroaniline	ND	370	130	ug/kg	
98-95-3	Nitrobenzene	ND	190	37	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	190	74	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	190	37	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	190	37	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	75%		40-102%
4165-62-2	Phenol-d5	82%		41-100%
118-79-6	2,4,6-Tribromophenol	83%		42-108%
4165-60-0	Nitrobenzene-d5	72%		40-105%
321-60-8	2-Fluorobiphenyl	73%		43-107%
1718-51-0	Terphenyl-d14	90%		45-119%

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

Raw Data: W035984.D

Form I OR

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09484.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	880	350	ug/kg	
95-57-8	2-Chlorophenol	ND	180	35	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	180	35	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	180	35	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	180	35	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	880	350	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	350	70	ug/kg	
95-48-7	2-Methylphenol	ND	180	35	ug/kg	
	3&4-Methylphenol	ND	180	35	ug/kg	
88-75-5	2-Nitrophenol	ND	180	35	ug/kg	
100-02-7	4-Nitrophenol	ND	880	350	ug/kg	
87-86-5	Pentachlorophenol	ND	880	350	ug/kg	
108-95-2	Phenol	ND	180	35	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	180	35	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	180	35	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	180	35	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	350	88	ug/kg	
100-51-6	Benzyl Alcohol	ND	180	35	ug/kg	
91-58-7	2-Chloronaphthalene	ND	180	35	ug/kg	
106-47-8	4-Chloroaniline	ND	350	140	ug/kg	
86-74-8	Carbazole	ND	180	35	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	180	35	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	180	70	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	180	35	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	180	35	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	180	35	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	180	35	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	180	35	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	180	70	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	180	70	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	350	180	ug/kg	
132-64-9	Dibenzofuran	ND	180	35	ug/kg	

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

Form I only

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	350	88	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	350	180	ug/kg	
84-66-2	Diethyl phthalate	ND	350	88	ug/kg	
131-11-3	Dimethyl phthalate	ND	350	88	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	350	180	ug/kg	
118-74-1	Hexachlorobenzene	ND	180	35	ug/kg	
87-68-3	Hexachlorobutadiene	ND	180	70	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	180	70	ug/kg	
67-72-1	Hexachloroethane	ND	180	70	ug/kg	
78-59-1	Isophorone	ND	180	35	ug/kg	
88-74-4	2-Nitroaniline	ND	350	88	ug/kg	
99-09-2	3-Nitroaniline	ND	350	88	ug/kg	
100-01-6	4-Nitroaniline	ND	350	120	ug/kg	
98-95-3	Nitrobenzene	ND	180	35	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	180	70	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	180	35	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	180	35	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	62%		40-102%
4165-62-2	Phenol-d5	72%		41-100%
118-79-6	2,4,6-Tribromophenol	72%		42-108%
4165-60-0	Nitrobenzene-d5	67%		40-105%
321-60-8	2-Fluorobiphenyl	67%		43-107%
1718-51-0	Terphenyl-d14	82%		45-119%

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

Raw Data: W035985.D

Form I Cor

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS09		
Lab Sample ID:	F51154-30	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	95.1
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035985.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result		RL	MDL	Units	Q
83-32-9	Acenaphthene	ND		280	70	ug/kg	
208-96-8	Acenaphthylene	ND		280	70	ug/kg	
120-12-7	Anthracene	ND		280	42	ug/kg	
56-55-3	Benzo(a)anthracene	ND		56	14	ug/kg	
50-32-8	Benzo(a)pyrene	ND		56	14	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND		56	14	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND		56	14	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND		56	14	ug/kg	
218-01-9	Chrysene	ND		56	14	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND		56	14	ug/kg	
206-44-0	Fluoranthene	ND		280	49	ug/kg	
86-73-7	Fluorene	ND		280	42	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND		56	14	ug/kg	
90-12-0	1-Methylnaphthalene	92.0	J	280	42	ug/kg	J
91-57-6	2-Methylnaphthalene	115	J	280	42	ug/kg	J
91-20-3	Naphthalene	82.2	J	280	42	ug/kg	J
85-01-8	Phenanthrene	65.4	J	280	42	ug/kg	J
129-00-0	Pyrene	ND		280	49	ug/kg	

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

Raw Data: R09485.D

Form I OA

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09485.D	1	07/30/07	NJ	07/27/07	OP21634	SR448
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	870	350	ug/kg	
95-57-8	2-Chlorophenol	ND	170	35	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	170	35	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	170	35	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	170	35	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	870	350	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	350	69	ug/kg	
95-48-7	2-Methylphenol	ND	170	35	ug/kg	
	3&4-Methylphenol	ND	170	35	ug/kg	
88-75-5	2-Nitrophenol	ND	170	35	ug/kg	
100-02-7	4-Nitrophenol	ND	870	350	ug/kg	
87-86-5	Pentachlorophenol	ND	870	350	ug/kg	
108-95-2	Phenol	ND	170	35	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	170	35	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	170	35	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	170	35	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	350	87	ug/kg	
100-51-6	Benzyl Alcohol	ND	170	35	ug/kg	
91-58-7	2-Chloronaphthalene	ND	170	35	ug/kg	
106-47-8	4-Chloroaniline	ND	350	140	ug/kg	
86-74-8	Carbazole	ND	170	35	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	170	35	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	170	69	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	170	35	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	170	35	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	170	35	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	170	35	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	170	35	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	170	69	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	170	69	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	350	170	ug/kg	
132-64-9	Dibenzofuran	ND	170	35	ug/kg	

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

Am I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	350	87	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	350	170	ug/kg	
84-66-2	Diethyl phthalate	ND	350	87	ug/kg	
131-11-3	Dimethyl phthalate	ND	350	87	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	350	170	ug/kg	
118-74-1	Hexachlorobenzene	ND	170	35	ug/kg	
87-68-3	Hexachlorobutadiene	ND	170	69	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	170	69	ug/kg	
67-72-1	Hexachloroethane	ND	170	69	ug/kg	
78-59-1	Isophorone	ND	170	35	ug/kg	
88-74-4	2-Nitroaniline	ND	350	87	ug/kg	
99-09-2	3-Nitroaniline	ND	350	87	ug/kg	
100-01-6	4-Nitroaniline	ND	350	120	ug/kg	
98-95-3	Nitrobenzene	ND	170	35	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	170	69	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	170	35	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	170	35	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	44%		40-102%
4165-62-2	Phenol-d5	49%		41-100%
118-79-6	2,4,6-Tribromophenol	55%		42-108%
4165-60-0	Nitrobenzene-d5	46%		40-105%
321-60-8	2-Fluorobiphenyl	49%		43-107%
1718-51-0	Terphenyl-d14	57%		45-119%

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

Raw Data: W035986.D

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS10		
Lab Sample ID:	F51154-31	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	95.7
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035986.D	4	08/01/07	RB	07/27/07	OP21636	SW1862
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	280	69	ug/kg	
208-96-8	Acenaphthylene	ND	280	69	ug/kg	
120-12-7	Anthracene	ND	280	42	ug/kg	
56-55-3	Benzo(a)anthracene	ND	56	14	ug/kg	
50-32-8	Benzo(a)pyrene	ND	56	14	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	56	14	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	56	14	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	56	14	ug/kg	
218-01-9	Chrysene	ND	56	14	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	56	14	ug/kg	
206-44-0	Fluoranthene	ND	280	49	ug/kg	
86-73-7	Fluorene	ND	280	42	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	56	14	ug/kg	
90-12-0	1-Methylnaphthalene	51.4 J	280	42	ug/kg	J
91-57-6	2-Methylnaphthalene	56.4 J	280	42	ug/kg	J
91-20-3	Naphthalene	ND	280	42	ug/kg	
85-01-8	Phenanthrene	45.3 J	280	42	ug/kg	J
129-00-0	Pyrene	ND	280	49	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09486.D

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
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

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 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

for I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 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

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 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

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 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

For I COPY

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSW02		
Lab Sample ID:	F51154-2	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031449.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	7.0 J	25	5.0	ug/l	J
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

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

Form I copy

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 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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMSW01		
Lab Sample ID:	F51154-3		
Matrix:	AQ - Surface Water	Date Sampled:	07/18/07
Method:	SW846 8260B	Date Received:	07/19/07
Project:	WPA 019 Field Investigation; Radford AAP, VA	Percent Solids:	n/a

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	97%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	106%		84-120%

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

Raw Data: H044667.D

For I Only

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD01		
Lab Sample ID:	F51154-4	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	66.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044667.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	3.53 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND UJ	110	53	ug/kg	
71-43-2	Benzene	ND	11	4.3	ug/kg	
75-27-4	Bromodichloromethane	ND	11	4.3	ug/kg	
75-25-2	Bromoform	ND	11	4.3	ug/kg	
108-90-7	Chlorobenzene	ND	11	4.3	ug/kg	
75-00-3	Chloroethane	ND	11	6.4	ug/kg	
67-66-3	Chloroform	ND	11	4.3	ug/kg	
75-15-0	Carbon disulfide	ND	11	4.3	ug/kg	
56-23-5	Carbon tetrachloride	ND	11	4.3	ug/kg	
75-34-3	1,1-Dichloroethane	ND	11	4.3	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	11	4.3	ug/kg	
107-06-2	1,2-Dichloroethane	ND	11	4.3	ug/kg	
78-87-5	1,2-Dichloropropane	ND	11	4.3	ug/kg	
124-48-1	Dibromochloromethane	ND	11	4.3	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	11	4.3	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	11	4.3	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	11	4.3	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	11	4.3	ug/kg	
100-41-4	Ethylbenzene	ND	11	4.3	ug/kg	
591-78-6	2-Hexanone	ND	53	21	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	53	21	ug/kg	
74-83-9	Methyl bromide	ND	11	4.3	ug/kg	
74-87-3	Methyl chloride	ND UL	11	4.3	ug/kg	
75-09-2	Methylene chloride	ND	21	11	ug/kg	
78-93-3	Methyl ethyl ketone	ND	53	21	ug/kg	
100-42-5	Styrene	ND	11	4.3	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	11	4.3	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	11	4.3	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	11	4.3	ug/kg	
127-18-4	Tetrachloroethylene	ND	11	4.3	ug/kg	
108-88-3	Toluene	ND	11	4.3	ug/kg	
79-01-6	Trichloroethylene	ND	11	4.3	ug/kg	

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

Form I COM

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD01		
Lab Sample ID:	F51154-4	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	66.2
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	11	4.3	ug/kg	
	m,p-Xylene	ND	21	6.4	ug/kg	
95-47-6	o-Xylene	ND	11	4.3	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		80-121%
2037-26-5	Toluene-D8	99%		71-130%
460-00-4	4-Bromofluorobenzene	109%		59-148%
17060-07-0	1,2-Dichloroethane-D4	105%		77-123%

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

Raw Data: H044668.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD02		
Lab Sample ID:	F51154-5	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	59.3
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044668.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	4.36 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	87.7 J	97	48	ug/kg	J
71-43-2	Benzene	ND	9.7	3.9	ug/kg	
75-27-4	Bromodichloromethane	ND	9.7	3.9	ug/kg	
75-25-2	Bromoform	ND VL	9.7	3.9	ug/kg	
108-90-7	Chlorobenzene	ND	9.7	3.9	ug/kg	
75-00-3	Chloroethane	ND VL	9.7	5.8	ug/kg	
67-66-3	Chloroform	ND	9.7	3.9	ug/kg	
75-15-0	Carbon disulfide	ND	9.7	3.9	ug/kg	
56-23-5	Carbon tetrachloride	ND VL	9.7	3.9	ug/kg	
75-34-3	1,1-Dichloroethane	ND	9.7	3.9	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	9.7	3.9	ug/kg	
107-06-2	1,2-Dichloroethane	ND	9.7	3.9	ug/kg	
78-87-5	1,2-Dichloropropane	ND	9.7	3.9	ug/kg	
124-48-1	Dibromochloromethane	ND VL	9.7	3.9	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	9.7	3.9	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	9.7	3.9	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	9.7	3.9	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND VL	9.7	3.9	ug/kg	
100-41-4	Ethylbenzene	ND	9.7	3.9	ug/kg	
591-78-6	2-Hexanone	ND VL	48	19	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND VL	48	19	ug/kg	
74-83-9	Methyl bromide	ND VL	9.7	3.9	ug/kg	
74-87-3	Methyl chloride	ND VL	9.7	3.9	ug/kg	
75-09-2	Methylene chloride	ND	19	9.7	ug/kg	
78-93-3	Methyl ethyl ketone	ND VL	48	19	ug/kg	
100-42-5	Styrene	ND	9.7	3.9	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	9.7	3.9	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	9.7	3.9	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	9.7	3.9	ug/kg	
127-18-4	Tetrachloroethylene	ND	9.7	3.9	ug/kg	
108-88-3	Toluene	ND	9.7	3.9	ug/kg	
79-01-6	Trichloroethylene	ND	9.7	3.9	ug/kg	

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

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	AOSD02		
Lab Sample ID:	F51154-5	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	59.3
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	9.7	3.9	ug/kg	
	m,p-Xylene	ND	19	5.8	ug/kg	
95-47-6	o-Xylene	ND	9.7	3.9	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		80-121%
2037-26-5	Toluene-D8	101%		71-130%
460-00-4	4-Bromofluorobenzene	125%		59-148%
17060-07-0	1,2-Dichloroethane-D4	104%		77-123%

(a) CCV outside of control limits; results may be biased high.

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

Raw Data: J031454.D

Form 1 Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031454.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

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

Form I OA1

Accutest Laboratories

Report of Analysis

3.3
3

Client Sample ID:	41SW08		
Lab Sample ID:	F51154-6	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	97%		76-127%
2037-26-5	Toluene-D8	99%		86-112%
460-00-4	4-Bromofluorobenzene	107%		84-120%

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

Raw Data: J031455.D

Form I COA

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031455.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

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

For I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW09		
Lab Sample ID:	F51154-7	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	97%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	109%		84-120%

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

Raw Data: J031456.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031456.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND VL	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

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

Form I only

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SW10		
Lab Sample ID:	F51154-8	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		87-116%
17060-07-0	1,2-Dichloroethane-D4	95%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	109%		84-120%

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

Form I OR

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044671.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2 [a]	H044689.D	1	07/27/07	SH	n/a	n/a	VH1663

	Initial Weight
Run #1	3.92 g
Run #2	4.24 g

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [b]	253 J	170	86	ug/kg	
71-43-2	Benzene	ND	17	6.9	ug/kg	
75-27-4	Bromodichloromethane	ND	17	6.9	ug/kg	
75-25-2	Bromoform	ND	17	6.9	ug/kg	
108-90-7	Chlorobenzene	ND	17	6.9	ug/kg	
75-00-3	Chloroethane	ND	17	10	ug/kg	
67-66-3	Chloroform	ND	17	6.9	ug/kg	
75-15-0	Carbon disulfide	ND	17	6.9	ug/kg	
56-23-5	Carbon tetrachloride	ND	17	6.9	ug/kg	
75-34-3	1,1-Dichloroethane	ND	17	6.9	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	17	6.9	ug/kg	
107-06-2	1,2-Dichloroethane	ND	17	6.9	ug/kg	
78-87-5	1,2-Dichloropropane	ND	17	6.9	ug/kg	
124-48-1	Dibromochloromethane	ND	17	6.9	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	17	6.9	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	17	6.9	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	17	6.9	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	17	6.9	ug/kg	
100-41-4	Ethylbenzene	ND	17	6.9	ug/kg	
591-78-6	2-Hexanone	ND	86	35	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	86	35	ug/kg	
74-83-9	Methyl bromide	ND	17	6.9	ug/kg	
74-87-3	Methyl chloride	ND VL	17	6.9	ug/kg	
75-09-2	Methylene chloride	ND	35	17	ug/kg	
78-93-3	Methyl ethyl ketone	48.8 J	86	35	ug/kg	J
100-42-5	Styrene	ND	17	6.9	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	17	6.9	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	17	6.9	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	17	6.9	ug/kg	
127-18-4	Tetrachloroethylene	ND	17	6.9	ug/kg	
108-88-3	Toluene	ND	17	6.9	ug/kg	
79-01-6	Trichloroethylene	ND	17	6.9	ug/kg	

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

For I Corr

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD08		
Lab Sample ID:	F51154-9	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	36.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	17	6.9	ug/kg	
	m,p-Xylene	ND	35	10	ug/kg	
95-47-6	o-Xylene	ND	17	6.9	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%	101%	80-121%
2037-26-5	Toluene-D8	110%	105%	71-130%
460-00-4	4-Bromofluorobenzene	129%	134%	59-148%
17060-07-0	1,2-Dichloroethane-D4	98%	100%	77-123%

(a) Confirmation run.
(b) CCV outside of control limits; results may be biased high.

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

Raw Data: H044672.D

Form I OV

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044672.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	5.48 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND UJ	55	28	ug/kg	
71-43-2	Benzene	ND	5.5	2.2	ug/kg	
75-27-4	Bromodichloromethane	ND	5.5	2.2	ug/kg	
75-25-2	Bromoform	ND	5.5	2.2	ug/kg	
108-90-7	Chlorobenzene	ND	5.5	2.2	ug/kg	
75-00-3	Chloroethane	ND	5.5	3.3	ug/kg	
67-66-3	Chloroform	ND	5.5	2.2	ug/kg	
75-15-0	Carbon disulfide	ND	5.5	2.2	ug/kg	
56-23-5	Carbon tetrachloride	ND	5.5	2.2	ug/kg	
75-34-3	1,1-Dichloroethane	ND	5.5	2.2	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	5.5	2.2	ug/kg	
107-06-2	1,2-Dichloroethane	ND	5.5	2.2	ug/kg	
78-87-5	1,2-Dichloropropane	ND	5.5	2.2	ug/kg	
124-48-1	Dibromochloromethane	ND	5.5	2.2	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	5.5	2.2	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	5.5	2.2	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	5.5	2.2	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	5.5	2.2	ug/kg	
100-41-4	Ethylbenzene	ND	5.5	2.2	ug/kg	
591-78-6	2-Hexanone	ND	28	11	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	28	11	ug/kg	
74-83-9	Methyl bromide	ND	5.5	2.2	ug/kg	
74-87-3	Methyl chloride	ND UL	5.5	2.2	ug/kg	
75-09-2	Methylene chloride	ND	11	5.5	ug/kg	
78-93-3	Methyl ethyl ketone	ND	28	11	ug/kg	
100-42-5	Styrene	ND	5.5	2.2	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	5.5	2.2	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	5.5	2.2	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	5.5	2.2	ug/kg	
127-18-4	Tetrachloroethylene	ND	5.5	2.2	ug/kg	
108-88-3	Toluene	ND	5.5	2.2	ug/kg	
79-01-6	Trichloroethylene	ND	5.5	2.2	ug/kg	

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

For I Only

Accutest Laboratories

Report of Analysis

Client Sample ID:	41SD09		
Lab Sample ID:	F51154-10	Date Sampled:	07/18/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	82.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	5.5	2.2	ug/kg	
	m,p-Xylene	ND	11	3.3	ug/kg	
95-47-6	o-Xylene	ND	5.5	2.2	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		80-121%
2037-26-5	Toluene-D8	104%		71-130%
460-00-4	4-Bromofluorobenzene	131%		59-148%
17060-07-0	1,2-Dichloroethane-D4	108%		77-123%

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

Raw Data: H044673.D H044690.D

Form I Copy

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	LFSD01		
Lab Sample ID:	F51154-15	Date Sampled:	07/19/07
Matrix:	SO - Sediment	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	57.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044674.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2							

	Initial Weight
Run #1	5.78 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND UJ	75	37	ug/kg	
71-43-2	Benzene	ND	7.5	3.0	ug/kg	
75-27-4	Bromodichloromethane	ND	7.5	3.0	ug/kg	
75-25-2	Bromoform	ND	7.5	3.0	ug/kg	
108-90-7	Chlorobenzene	ND	7.5	3.0	ug/kg	
75-00-3	Chloroethane	ND	7.5	4.5	ug/kg	
67-66-3	Chloroform	ND	7.5	3.0	ug/kg	
75-15-0	Carbon disulfide	ND	7.5	3.0	ug/kg	
56-23-5	Carbon tetrachloride	ND	7.5	3.0	ug/kg	
75-34-3	1,1-Dichloroethane	ND	7.5	3.0	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	7.5	3.0	ug/kg	
107-06-2	1,2-Dichloroethane	ND	7.5	3.0	ug/kg	
78-87-5	1,2-Dichloropropane	ND	7.5	3.0	ug/kg	
124-48-1	Dibromochloromethane	ND	7.5	3.0	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	7.5	3.0	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	7.5	3.0	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	7.5	3.0	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	7.5	3.0	ug/kg	
100-41-4	Ethylbenzene	ND	7.5	3.0	ug/kg	
591-78-6	2-Hexanone	ND	37	15	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	37	15	ug/kg	
74-83-9	Methyl bromide	ND	7.5	3.0	ug/kg	
74-87-3	Methyl chloride	ND VL	7.5	3.0	ug/kg	
75-09-2	Methylene chloride	ND	15	7.5	ug/kg	
78-93-3	Methyl ethyl ketone	ND	37	15	ug/kg	
100-42-5	Styrene	ND	7.5	3.0	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	7.5	3.0	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	7.5	3.0	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	7.5	3.0	ug/kg	
127-18-4	Tetrachloroethylene	ND	7.5	3.0	ug/kg	
108-88-3	Toluene	ND	7.5	3.0	ug/kg	
79-01-6	Trichloroethylene	ND	7.5	3.0	ug/kg	

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

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

Am I Op

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

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	H044681.D	1	07/26/07	SH	n/a	n/a	VH1662
Run #2 [a]	H044693.D	1	07/27/07	SH	n/a	n/a	VH1663

	Initial Weight
Run #1	3.67 g
Run #2	2.93 g

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND VJ	79	40	ug/kg	
71-43-2	Benzene	ND	7.9	3.2	ug/kg	
75-27-4	Bromodichloromethane	ND	7.9	3.2	ug/kg	
75-25-2	Bromoform	ND	7.9	3.2	ug/kg	
108-90-7	Chlorobenzene	ND	7.9	3.2	ug/kg	
75-00-3	Chloroethane	ND	7.9	4.8	ug/kg	
67-66-3	Chloroform	ND	7.9	3.2	ug/kg	
75-15-0	Carbon disulfide	ND	7.9	3.2	ug/kg	
56-23-5	Carbon tetrachloride	ND	7.9	3.2	ug/kg	
75-34-3	1,1-Dichloroethane	ND	7.9	3.2	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	7.9	3.2	ug/kg	
107-06-2	1,2-Dichloroethane	ND	7.9	3.2	ug/kg	
78-87-5	1,2-Dichloropropane	ND	7.9	3.2	ug/kg	
124-48-1	Dibromochloromethane	ND	7.9	3.2	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	7.9	3.2	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	7.9	3.2	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	7.9	3.2	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	7.9	3.2	ug/kg	
100-41-4	Ethylbenzene	ND	7.9	3.2	ug/kg	
591-78-6	2-Hexanone	ND	40	16	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	40	16	ug/kg	
74-83-9	Methyl bromide	ND	7.9	3.2	ug/kg	
74-87-3	Methyl chloride	ND VL	7.9	3.2	ug/kg	
75-09-2	Methylene chloride	ND	16	7.9	ug/kg	
78-93-3	Methyl ethyl ketone	ND	40	16	ug/kg	
100-42-5	Styrene	ND	7.9	3.2	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	7.9	3.2	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	7.9	3.2	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	7.9	3.2	ug/kg	
127-18-4	Tetrachloroethylene	ND	7.9	3.2	ug/kg	
108-88-3	Toluene	ND	7.9	3.2	ug/kg	
79-01-6	Trichloroethylene	ND	7.9	3.2	ug/kg	

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

Form I Corg

Accutest Laboratories

Report of Analysis

Client Sample ID:	49SS05		
Lab Sample ID:	F51154-26	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	85.9
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND VL	7.9	3.2	ug/kg	
	m,p-Xylene	ND	16	4.8	ug/kg	
95-47-6	o-Xylene	ND	7.9	3.2	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	110%	107%	80-121%
2037-26-5	Toluene-D8	107%	113%	71-130%
460-00-4	4-Bromofluorobenzene	138%	130%	59-148%
17060-07-0	1,2-Dichloroethane-D4	115%	115%	77-123%

(a) Confirmation run.

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

Raw Data: F022458.D

For I only

Accutest Laboratories

Report of Analysis

Client Sample ID:	59SS06		
Lab Sample ID:	F51154-27	Date Sampled:	07/19/07
Matrix:	SO - Soil	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	92.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	F022458.D	1	07/27/07	WJ	n/a	n/a	VF413
Run #2							

	Initial Weight
Run #1	4.45 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND VT	61	31	ug/kg	
71-43-2	Benzene	ND	6.1	2.4	ug/kg	
75-27-4	Bromodichloromethane	ND	6.1	2.4	ug/kg	
75-25-2	Bromoform	ND	6.1	2.4	ug/kg	
108-90-7	Chlorobenzene	ND	6.1	2.4	ug/kg	
75-00-3	Chloroethane	ND	6.1	3.7	ug/kg	
67-66-3	Chloroform	ND	6.1	2.4	ug/kg	
75-15-0	Carbon disulfide	ND	6.1	2.4	ug/kg	
56-23-5	Carbon tetrachloride	ND	6.1	2.4	ug/kg	
75-34-3	1,1-Dichloroethane	ND	6.1	2.4	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	6.1	2.4	ug/kg	
107-06-2	1,2-Dichloroethane	ND	6.1	2.4	ug/kg	
78-87-5	1,2-Dichloropropane	ND	6.1	2.4	ug/kg	
124-48-1	Dibromochloromethane	ND	6.1	2.4	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	6.1	2.4	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	6.1	2.4	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	6.1	2.4	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	6.1	2.4	ug/kg	
100-41-4	Ethylbenzene	ND	6.1	2.4	ug/kg	
591-78-6	2-Hexanone	ND	31	12	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	31	12	ug/kg	
74-83-9	Methyl bromide	ND	6.1	2.4	ug/kg	
74-87-3	Methyl chloride	ND	6.1	2.4	ug/kg	
75-09-2	Methylene chloride	ND	12	6.1	ug/kg	
78-93-3	Methyl ethyl ketone	ND	31	12	ug/kg	
100-42-5	Styrene	ND	6.1	2.4	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	6.1	2.4	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	6.1	2.4	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	6.1	2.4	ug/kg	
127-18-4	Tetrachloroethylene	ND	6.1	2.4	ug/kg	
108-88-3	Toluene	ND	6.1	2.4	ug/kg	
79-01-6	Trichloroethylene	ND	6.1	2.4	ug/kg	

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

Form I OA

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

Accutest Laboratories

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

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 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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J031457.D	1	07/26/07	JG	n/a	n/a	VJ2187
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	2.7 J	5.0	1.0	ug/l	J
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	RB071807		
Lab Sample ID:	F51154-12	Date Sampled:	07/18/07
Matrix:	AQ - Surface Water	Date Received:	07/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

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

Form I Copy

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		

	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 – Semi-Volatiles & Polynuclear Aromatic Hydrocarbons Accutest Laboratories, Inc., SDG F51875

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 16, 2007. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW846 Methods 3550B/8270C for solid matrices. The polynuclear aromatic hydrocarbons (PAHs) were analyzed using selective ion monitoring (SIM) techniques. A total of three solid samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
AOGW09S	F51875-1	AOGW02S	F51875-3
AOGW08S	F51875-2		

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

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
X		Laboratory Control Sample
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

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

Eric Malarek, Chemist

10/8/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F51875

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 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 08/16/07, the cooler was received by the primary laboratory (Accutest) on 08/17/07 at 1.0°C. Even though the receipt temperature was below criteria, there were no impacts to the data quality. No qualifiers were applied based upon this outlier.

- Holding Time Review: For the soil samples collected 08/16/07, the SVOCs were extracted on 08/30/07 and analyzed on 09/10/07. The PAHs by SIM were extracted on 08/30/07 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 08/21/07 on instrument MSBNA02. Target compound 4,6-dinitro-2-methylphenol (16.5%) was outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compound 4,6-dinitro-2-methylphenol (r=0.9984) was quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSD. Samples AOGW09S (F51875-1), AOGW08S (F51875-2), and AOGW02S (F51875-3) 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 AOGW09S (F51875-1), AOGW08S (F51875-2), and AOGW02S (F51875-3) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥0.05. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ±20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For SVOC initial calibration verification performed on 08/21/07 @15:20 on instrument MSBNA02, 4-chloroaniline (45.7%; grossly exceeding) and 3-nitroaniline (30.2%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 4-chloroaniline and 3-nitroaniline. 4-Chloroaniline would be qualified bias low non-detect "UL"; however, no samples were reported using this initial calibration verification. Therefore, no qualifiers were applied based upon this outlier.

- For SVOC initial calibration verification performed on 08/21/07 @15:48 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 09/10/07 @20:28 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. Samples AOGW09S (F51875-1), AOGW08S (F51875-2), and AOGW02S (F51875-3) apply to this continuing calibration.

- For SVOC continuing calibration performed on 09/12/07 @16:19 on instrument MSBNA02, 4-nitrophenol (34.0%) was outside criteria. All samples were non-detect for 4-nitrophenol; therefore, no qualifiers were applied based upon this outlier. For all other target SVOCs, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/05/07 @00:35 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/12/07 @09:59 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples AOGW09S (F51875-1), AOGW08S (F51875-2), and AOGW02S (F51875-3) 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. No rinse blank was collected for the soil samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
09/10/07	OP22122-MB	All SVOC target <½MRL	NA	NA	None
09/12/07	OP22122-MB	All SVOC target <½MRL	NA	NA	None
09/12/07	OP22123-MB	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.

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 AOGW09S (F51875-1), 2-Fluorobiphenyl (42.0%) was outside laboratory and 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 42.0% 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 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 OP22122-BS was used as the solid LCS for the SVOC analysis on 09/10/07. Bis(2-chloroethoxy)methane (60%), 1,2-dichlorobenzene (46%), 1,3-dichlorobenzene (38%), 1,4-dichlorobenzene (41%), and hexachloroethane (41%) were below the laboratory and/or the DoD QSM criteria. Bis(2-chloroethoxy)methane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and hexachloroethane were non-detect for all samples and were qualified bias low non-detect "UL" based upon the low recoveries. All other compounds were within criteria. Samples AOGW09S (F51875-1), AOGW08S (F51875-2), and AOGW02S (F51875-3) apply to this LCS.

- Sample OP22122-BS was used as the solid LCS for the SVOC analysis on 09/12/07. Bis(2-chloroethoxy)methane (61%), 1,2-dichlorobenzene (45%), 1,3-dichlorobenzene (38%), 1,4-dichlorobenzene (41%), and hexachloroethane (43%) were below the laboratory and/or the DoD QSM criteria. All other target compounds were within criteria. Bis(2-chloroethoxy)methane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and hexachloroethane were non-detect for all samples and would be qualified bias low non-detect "UL" based upon the low recoveries; however, no samples were reported using this LCS.

- Sample OP22123-BS was used as the solid LCS for the PAH SIM analysis on 09/12/07. All criteria were met. No qualifiers were applied. Samples AOGW09S (F51875-1), AOGW08S (F51875-2), and AOGW02S (F51875-3) 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 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 F51932-9 was used for the MS/MSD for the solid SVOC analysis on 09/12/07. The spiked sample was not a RFAAP site sample; therefore, it was not evaluated. Samples AOGW09S (F51875-1), AOGW08S (F51875-2), and AOGW02S (F51875-3) apply to this MS/MSD.

- Sample F51932-10 was used for the MS/MSD for the solid PAH SIM analysis on 09/12/07. The spiked sample was not a RFAAP site sample; therefore, it was not evaluated. Samples AOGW09S (F51875-1), AOGW08S (F51875-2), and AOGW02S (F51875-3) 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 solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No project specific soil 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: OP22122-BS, 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 = (483744 * 40 * 1000 * 1) / (348434 * 1.367 * 1 * 30.0 * 1.0000) = 1350 µg/kg
Reported Value = 1350 µg/kg
% Difference = 0.0%
Values were within 10% difference

Sample: OP22122-BS, 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 = (78355 * 4.0 * 1000 * 1) / (91657 * 1.539 * 1 * 30.0 * 1.0000) = 74.1 µg/kg
Reported Value = 74.1 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: L038294.D L038339.D

Form I copy

Accutest LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	A0GW09S		
Lab Sample ID:	F51875-1	Date Sampled:	08/16/07
Matrix:	SO - Soil	Date Received:	08/17/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	75.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038294.D	1	09/10/07	RB	08/30/07	OP22122	SL1951
Run #2 [a]	L038339.D	1	09/12/07	RB	08/30/07	OP22122	SL1953

	Initial Weight	Final Volume
Run #1	30.4 g	1.0 ml
Run #2	30.4 g	1.0 ml

ABN TCL List w/o PAHs

CAS No.	Compound	Result		RL	MDL	Units	Q
65-85-0	Benzoic acid	ND		1100	440	ug/kg	
95-57-8	2-Chlorophenol	ND		220	44	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND		220	44	ug/kg	
120-83-2	2,4-Dichlorophenol	ND		220	44	ug/kg	
105-67-9	2,4-Dimethylphenol	ND		220	44	ug/kg	
51-28-5	2,4-Dinitrophenol	ND		1100	440	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND		440	88	ug/kg	
95-48-7	2-Methylphenol	ND		220	44	ug/kg	
	3&4-Methylphenol	ND		220	44	ug/kg	
88-75-5	2-Nitrophenol	ND		220	44	ug/kg	
100-02-7	4-Nitrophenol	ND		1100	440	ug/kg	
87-86-5	Pentachlorophenol	ND		1100	440	ug/kg	
108-95-2	Phenol	ND		220	44	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND		220	44	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND		220	44	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND		220	44	ug/kg	
85-68-7	Butyl benzyl phthalate	ND		440	110	ug/kg	
100-51-6	Benzyl Alcohol	ND		220	44	ug/kg	
91-58-7	2-Chloronaphthalene	ND		220	44	ug/kg	
106-47-8	4-Chloroaniline	ND		220	88	ug/kg	
86-74-8	Carbazole	ND		220	44	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	UL	220	44	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND		220	44	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND		220	44	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND		220	44	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	UL	220	44	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	UL	220	44	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	UL	220	44	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND		220	44	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND		220	44	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND		440	88	ug/kg	
132-64-9	Dibenzofuran	ND		220	44	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

Report of Analysis

Client Sample ID:	A0GW09S		
Lab Sample ID:	F51875-1	Date Sampled:	08/16/07
Matrix:	SO - Soil	Date Received:	08/17/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	75.0
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	440	110	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	440	110	ug/kg	
84-66-2	Diethyl phthalate	ND	440	220	ug/kg	
131-11-3	Dimethyl phthalate	ND	440	110	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	440	220	ug/kg	
118-74-1	Hexachlorobenzene	ND	220	44	ug/kg	
87-68-3	Hexachlorobutadiene	ND	220	44	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	220	44	ug/kg	
67-72-1	Hexachloroethane	ND VL	220	44	ug/kg	
78-59-1	Isophorone	ND	220	44	ug/kg	
88-74-4	2-Nitroaniline	ND	440	88	ug/kg	
99-09-2	3-Nitroaniline	ND	440	88	ug/kg	
100-01-6	4-Nitroaniline	ND	440	88	ug/kg	
98-95-3	Nitrobenzene	ND	220	44	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	220	44	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	220	44	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	220	44	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	44%	45%	40-102%
4165-62-2	Phenol-d5	49%	50%	41-100%
118-79-6	2,4,6-Tribromophenol	57%	45%	42-108%
4165-60-0	Nitrobenzene-d5	40%	43%	40-105%
321-60-8	2-Fluorobiphenyl	42% [b]	42%	43-107%
1718-51-0	Terphenyl-d14	54%	49%	45-119%

(a) Confirmation run.
(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: W036800.D

Form I copy

Accutest LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	A0GW09S		
Lab Sample ID:	F51875-1	**Date Sampled:**	08/16/07
Matrix:	SO - Soil	**Date Received:**	08/17/07
Method:	SW846 8270C BY SIM SW846 3550B	**Percent Solids:**	75.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036800.D	4	09/12/07	RB	08/30/07	OP22123	SW1898
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	350	88	ug/kg	
208-96-8	Acenaphthylene	ND	350	88	ug/kg	
120-12-7	Anthracene	ND	350	53	ug/kg	
56-55-3	Benzo(a)anthracene	ND	70	18	ug/kg	
50-32-8	Benzo(a)pyrene	ND	70	18	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	70	18	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	70	18	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	70	18	ug/kg	
218-01-9	Chrysene	ND	70	18	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	70	18	ug/kg	
206-44-0	Fluoranthene	ND	350	61	ug/kg	
86-73-7	Fluorene	ND	350	53	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	70	18	ug/kg	
90-12-0	1-Methylnaphthalene	ND	350	53	ug/kg	
91-57-6	2-Methylnaphthalene	ND	350	53	ug/kg	
91-20-3	Naphthalene	ND	350	53	ug/kg	
85-01-8	Phenanthrene	ND	350	53	ug/kg	
129-00-0	Pyrene	ND	350	61	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: L038295.D

Form I Org

Accutest LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	A0GW08S		
Lab Sample ID:	F51875-2	Date Sampled:	08/16/07
Matrix:	SO - Soil	Date Received:	08/17/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	62.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038295.D	1	09/10/07	RB	08/30/07	OP22122	SL1951
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	1300	520	ug/kg	
95-57-8	2-Chlorophenol	ND	260	52	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	260	52	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	260	52	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	260	52	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1300	520	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	520	100	ug/kg	
95-48-7	2-Methylphenol	ND	260	52	ug/kg	
	3&4-Methylphenol	ND	260	52	ug/kg	
88-75-5	2-Nitrophenol	ND	260	52	ug/kg	
100-02-7	4-Nitrophenol	ND	1300	520	ug/kg	
87-86-5	Pentachlorophenol	ND	1300	520	ug/kg	
108-95-2	Phenol	ND	260	52	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	260	52	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	260	52	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	260	52	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	520	130	ug/kg	
100-51-6	Benzyl Alcohol	ND	260	52	ug/kg	
91-58-7	2-Chloronaphthalene	ND	260	52	ug/kg	
106-47-8	4-Chloroaniline	ND	260	100	ug/kg	
86-74-8	Carbazole	ND	260	52	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND VL	260	52	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	260	52	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	260	52	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	260	52	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND VL	260	52	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND VL	260	52	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND VL	260	52	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	260	52	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	260	52	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	520	100	ug/kg	
132-64-9	Dibenzofuran	ND	260	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

Form I Copy

Accutest LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	A0GW08S		
Lab Sample ID:	F51875-2	Date Sampled:	08/16/07
Matrix:	SO - Soil	Date Received:	08/17/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	62.4
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	520	130	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	520	130	ug/kg	
84-66-2	Diethyl phthalate	ND	520	260	ug/kg	
131-11-3	Dimethyl phthalate	ND	520	130	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	520	260	ug/kg	
118-74-1	Hexachlorobenzene	ND	260	52	ug/kg	
87-68-3	Hexachlorobutadiene	ND	260	52	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	260	52	ug/kg	
67-72-1	Hexachloroethane	ND VL	260	52	ug/kg	
78-59-1	Isophorone	ND	260	52	ug/kg	
88-74-4	2-Nitroaniline	ND	520	100	ug/kg	
99-09-2	3-Nitroaniline	ND	520	100	ug/kg	
100-01-6	4-Nitroaniline	ND	520	100	ug/kg	
98-95-3	Nitrobenzene	ND	260	52	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	260	52	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	260	52	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	260	52	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	64%		40-102%
4165-62-2	Phenol-d5	73%		41-100%
118-79-6	2,4,6-Tribromophenol	63%		42-108%
4165-60-0	Nitrobenzene-d5	61%		40-105%
321-60-8	2-Fluorobiphenyl	60%		43-107%
1718-51-0	Terphenyl-d14	67%		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: W036801.D

Form I Copy

Accutest LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	A0GW08S		
Lab Sample ID:	F51875-2	Date Sampled:	08/16/07
Matrix:	SO - Soil	Date Received:	08/17/07
Method:	SW846 8270C BY SIM SW846 3550B	Percent Solids:	62.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036801.D	4	09/12/07	RB	08/30/07	OP22123	SW1898
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	420	100	ug/kg	
208-96-8	Acenaphthylene	ND	420	100	ug/kg	
120-12-7	Anthracene	ND	420	63	ug/kg	
56-55-3	Benzo(a)anthracene	ND	84	21	ug/kg	
50-32-8	Benzo(a)pyrene	ND	84	21	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	84	21	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	84	21	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	84	21	ug/kg	
218-01-9	Chrysene	ND	84	21	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	84	21	ug/kg	
206-44-0	Fluoranthene	ND	420	73	ug/kg	
86-73-7	Fluorene	ND	420	63	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	84	21	ug/kg	
90-12-0	1-Methylnaphthalene	ND	420	63	ug/kg	
91-57-6	2-Methylnaphthalene	ND	420	63	ug/kg	
91-20-3	Naphthalene	ND	420	63	ug/kg	
85-01-8	Phenanthrene	ND	420	63	ug/kg	
129-00-0	Pyrene	ND	420	73	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: L038296.D

Form I Copy

Accutest LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	A0GW02S		
Lab Sample ID:	F51875-3	Date Sampled:	08/16/07
Matrix:	SO - Soil	Date Received:	08/17/07
Method:	SW846 8270C SW846 3550B	Percent Solids:	80.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038296.D	1	09/10/07	RB	08/30/07	OP22122	SL1951
Run #2							

	Initial Weight	Final Volume
Run #1	30.5 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	410	ug/kg	
95-57-8	2-Chlorophenol	ND	200	41	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	200	41	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	200	41	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	200	41	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1000	410	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	410	81	ug/kg	
95-48-7	2-Methylphenol	ND	200	41	ug/kg	
	3&4-Methylphenol	ND	200	41	ug/kg	
88-75-5	2-Nitrophenol	ND	200	41	ug/kg	
100-02-7	4-Nitrophenol	ND	1000	410	ug/kg	
87-86-5	Pentachlorophenol	ND	1000	410	ug/kg	
108-95-2	Phenol	ND	200	41	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	200	41	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	200	41	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	200	41	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	410	100	ug/kg	
100-51-6	Benzyl Alcohol	ND	200	41	ug/kg	
91-58-7	2-Chloronaphthalene	ND	200	41	ug/kg	
106-47-8	4-Chloroaniline	ND	200	81	ug/kg	
86-74-8	Carbazole	ND	200	41	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND VL	200	41	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	200	41	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	200	41	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	200	41	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND VL	200	41	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND VL	200	41	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND VL	200	41	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	200	41	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	200	41	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	410	81	ug/kg	
132-64-9	Dibenzofuran	ND	200	41	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

Report of Analysis

Client Sample ID:	A0GW02S		
Lab Sample ID:	F51875-3	**Date Sampled:**	08/16/07
Matrix:	SO - Soil	**Date Received:**	08/17/07
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	80.6
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	410	100	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	410	100	ug/kg	
84-66-2	Diethyl phthalate	ND	410	200	ug/kg	
131-11-3	Dimethyl phthalate	ND	410	100	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	410	200	ug/kg	
118-74-1	Hexachlorobenzene	ND	200	41	ug/kg	
87-68-3	Hexachlorobutadiene	ND	200	41	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	200	41	ug/kg	
67-72-1	Hexachloroethane	ND VL	200	41	ug/kg	
78-59-1	Isophorone	ND	200	41	ug/kg	
88-74-4	2-Nitroaniline	ND	410	81	ug/kg	
99-09-2	3-Nitroaniline	ND	410	81	ug/kg	
100-01-6	4-Nitroaniline	ND	410	81	ug/kg	
98-95-3	Nitrobenzene	ND	200	41	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	200	41	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	200	41	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	200	41	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	62%		40-102%
4165-62-2	Phenol-d5	70%		41-100%
118-79-6	2,4,6-Tribromophenol	73%		42-108%
4165-60-0	Nitrobenzene-d5	58%		40-105%
321-60-8	2-Fluorobiphenyl	59%		43-107%
1718-51-0	Terphenyl-d14	73%		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: W036802.D

Form I Org

Accutest LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	A0GW02S		
Lab Sample ID:	F51875-3	**Date Sampled:**	08/16/07
Matrix:	SO - Soil	**Date Received:**	08/17/07
Method:	SW846 8270C BY SIM SW846 3550B	**Percent Solids:**	80.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036802.D	4	09/12/07	RB	08/30/07	OP22123	SW1898
Run #2							

	Initial Weight	Final Volume
Run #1	30.5 g	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	330	81	ug/kg	
208-96-8	Acenaphthylene	ND	330	81	ug/kg	
120-12-7	Anthracene	ND	330	49	ug/kg	
56-55-3	Benzo(a)anthracene	ND	65	16	ug/kg	
50-32-8	Benzo(a)pyrene	ND	65	16	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	65	16	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	65	16	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	65	16	ug/kg	
218-01-9	Chrysene	ND	65	16	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	65	16	ug/kg	
206-44-0	Fluoranthene	ND	330	57	ug/kg	
86-73-7	Fluorene	ND	330	49	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	65	16	ug/kg	
90-12-0	1-Methylnaphthalene	ND	330	49	ug/kg	
91-57-6	2-Methylnaphthalene	ND	330	49	ug/kg	
91-20-3	Naphthalene	ND	330	49	ug/kg	
85-01-8	Phenanthrene	ND	330	49	ug/kg	
129-00-0	Pyrene	ND	330	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

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 F51875

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 16, 2007. The samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) using USEPA SW846 Method 5035/8260B for solid matrices, except for sample AOGW09S (F51875-1). Sample AOGW09S (F51875-1) was received in bulk container and analyzed by USEPA SW846 5030A/8260B procedures. A total of three solid samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
AOGW09S	F51875-1	AOGW02S	F51875-3
AOGW08S	F51875-2		

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

Table 1 Laboratory Performance Criteria

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

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

Eric Malarek, Chemist

10/8/07
Date

RFAAP VALIDATION REPORT
VOLATILES REVIEW
SDG F51875

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 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 08/16/07, the cooler was received by the primary laboratory (Accutest) on 08/17/07 at 1.0°C. Even though the receipt temperature was below criteria, there were no impacts to the data quality. No qualifiers were applied based upon this outlier.

- Holding Time Review: For the solid samples collected 08/16/07, the VOCs were prepped and analyzed on 08/25/07. Sample AOGW09S (F51875-1) was received in bulk container and analyzed by USEPA 5030A/8260B procedures. 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 MSVOA9, target compounds bromomethane (26.6%), chloroethane (16.5%), methylene chloride (55.1%; grossly exceeding), and acetone (19.7%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds bromomethane (r=0.9943), chloroethane (r=0.9950), methylene chloride (r=0.9967) and acetone (r=0.9949) were quantified using linear or second order regression with correlation coefficients >0.995; except for bromomethane and acetone. Bromomethane and acetone were non-detect for all associated samples and were qualified estimated "UJ" for non-detects based upon these outliers. Samples 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 @13:11 on instrument MSVOA9, chloromethane (20.5%), vinyl chloride (21.8%), bromomethane (37.2%), chloroethane (24.8%), and acetone (25.9%) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Chloromethane, vinyl chloride, bromomethane, chloroethane, and acetone 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 these outliers.

- For continuing calibration performed on 08/25/07 @11:36 on instrument MSVOA9, target compounds bromomethane (48.7%; grossly exceeding), chloroethane (39.6%), methylene chloride (42.3%; grossly exceeding), acetone (58.4%; grossly exceeding), carbon tetrachloride (22.8%), 1,1,1-trichloroethane (21.8%), and 2-butanone (22.1%) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Bromomethane, methylene chloride, and acetone were qualified estimated "J" for detects and "UJ" for non-detects based upon the very high %Ds/%Drifts. Chloroethane, carbon tetrachloride, 1,1,1-trichloroethane, and 2-butanone were non-detect for all associated samples; therefore, no qualifiers were applied based upon these outliers. Samples AOGW09S (F51875-1), AOGW08S (F51875-2), and AOGW02S (F51875-3) 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 and for solid matrices were converted to soil values (soil conversion factor = 1) as needed. No rinse blank was collected for the soil samples in this SDG. The trip blank TB081607 (F51875-1) applies to the solid samples collected 08/16/07.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
08/25/07	VF435-MB	All target <½MRL	NA	NA	None
08/16/07	TB081607	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 VF435-BS was used as the solid LCS for the VOC analysis on 08/25/07. Bromomethane (155%) was outside laboratory criteria; however, within DoD QSM criteria. All associated samples were non-detect for this compound; therefore, no qualifiers were applied based upon this outlier. For all other target VOCs, all criteria were met. No qualifiers were applied. Samples AOGW09S (F51875-1), AOGW08S (F51875-2), and AOGW02S (F51875-3) 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 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 AOGW09S (F51875-1) was used for the solid MS/MSD analysis on 08/25/07. Acetone (36%, 34%), 2-hexanone (57%, 55%), 4-methyl-2-pentanone (64%, 61%), bromomethane (182%, 177%), and methyl ethyl ketone (50%, 48%) were outside laboratory 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 bromomethane. The spiked sample was qualified bias low "UL" for non-detects for acetone, 2-hexanone, 4-methyl-2-pentanone, and methyl ethyl ketone based upon the low recoveries. No qualifiers were applied for bromomethane (a.k.a. methyl bromide) based upon the high recoveries (all of the samples were non-detect for this compound). All other percent recoveries were within criteria for all target compounds. Samples AOGW09S (F51875-1), AOGW08S (F51875-2), and AOGW02S (F51875-3) 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.

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%)

- All criteria were met. No qualifiers were applied.

IX-Internal Standards (IS)
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

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

- No project specific soil 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: AOGW09SMS (F51875-1MS), carbon disulfide

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 = (754523 * 50 ng/mL * 1 * 5mL) / (660839 * 1.121 * 4.90g * 0.750) =
= 69.3 µg/kg

Reported Conc. = 69.3 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: F022968.D

Form I Com

Accutest LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	A0GW09S		
Lab Sample ID:	F51875-1	Date Sampled:	08/16/07
Matrix:	SO - Soil	Date Received:	08/17/07
Method:	SW846 8260B	Percent Solids:	75.0
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	F022968.D	1	08/25/07	WJ	n/a	n/a	VF435
Run #2							

	Initial Weight
Run #1	5.31 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND UJ	63	31	ug/kg	
71-43-2	Benzene	ND	6.3	1.3	ug/kg	
75-27-4	Bromodichloromethane	ND	6.3	1.3	ug/kg	
75-25-2	Bromoform	ND	6.3	1.3	ug/kg	
108-90-7	Chlorobenzene	ND	6.3	1.3	ug/kg	
75-00-3	Chloroethane	ND	6.3	3.3	ug/kg	
67-66-3	Chloroform	ND	6.3	1.3	ug/kg	
75-15-0	Carbon disulfide	ND	6.3	1.3	ug/kg	
56-23-5	Carbon tetrachloride	ND	6.3	1.6	ug/kg	
75-34-3	1,1-Dichloroethane	ND	6.3	1.4	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	6.3	1.3	ug/kg	
107-06-2	1,2-Dichloroethane	ND	6.3	1.3	ug/kg	
78-87-5	1,2-Dichloropropane	ND	6.3	1.6	ug/kg	
124-48-1	Dibromochloromethane	ND	6.3	1.3	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	6.3	1.3	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	6.3	1.3	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	6.3	1.3	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	6.3	1.3	ug/kg	
100-41-4	Ethylbenzene	ND	6.3	1.3	ug/kg	
591-78-6	2-Hexanone	ND UL	31	13	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND UL	31	13	ug/kg	
74-83-9	Methyl bromide	ND UJ	6.3	2.3	ug/kg	
74-87-3	Methyl chloride	ND	6.3	2.5	ug/kg	
75-09-2	Methylene chloride [b]	15.6 J	13	6.3	ug/kg	J
78-93-3	Methyl ethyl ketone	ND UL	31	13	ug/kg	
100-42-5	Styrene	ND	6.3	1.3	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	6.3	1.3	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	6.3	1.6	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	6.3	1.3	ug/kg	
127-18-4	Tetrachloroethylene	ND	6.3	1.3	ug/kg	
108-88-3	Toluene	ND	6.3	1.3	ug/kg	
79-01-6	Trichloroethylene	ND	6.3	1.3	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 Cpy

Report of Analysis

Client Sample ID:	A0GW09S		
Lab Sample ID:	F51875-1	Date Sampled:	08/16/07
Matrix:	SO - Soil	Date Received:	08/17/07
Method:	SW846 8260B	Percent Solids:	75.0
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	6.3	1.8	ug/kg	
	m,p-Xylene	ND	13	1.4	ug/kg	
95-47-6	o-Xylene	ND	6.3	1.3	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		80-121%
2037-26-5	Toluene-D8	97%		71-130%
460-00-4	4-Bromofluorobenzene	97%		59-148%
17060-07-0	1,2-Dichloroethane-D4	104%		77-123%

(a) Sample was received in a bulk container but was not preserved within 48 hours of sampling.
(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

Form I Copy

Accutest LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	A0GW08S		
Lab Sample ID:	F51875-2	**Date Sampled:**	08/16/07
Matrix:	SO - Soil	**Date Received:**	08/17/07
Method:	SW846 8260B	**Percent Solids:**	62.4
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	F022975.D	1	08/25/07	WJ	n/a	n/a	VF435
Run #2							

	Initial Weight
Run #1	4.40 g
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND UJ	91	46	ug/kg	
71-43-2	Benzene	ND	9.1	1.8	ug/kg	
75-27-4	Bromodichloromethane	ND	9.1	1.8	ug/kg	
75-25-2	Bromoform	ND	9.1	1.8	ug/kg	
108-90-7	Chlorobenzene	ND	9.1	1.8	ug/kg	
75-00-3	Chloroethane	ND	9.1	4.7	ug/kg	
67-66-3	Chloroform	ND	9.1	1.8	ug/kg	
75-15-0	Carbon disulfide	ND	9.1	1.8	ug/kg	
56-23-5	Carbon tetrachloride	ND	9.1	2.4	ug/kg	
75-34-3	1,1-Dichloroethane	ND	9.1	2.0	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	9.1	1.8	ug/kg	
107-06-2	1,2-Dichloroethane	ND	9.1	1.8	ug/kg	
78-87-5	1,2-Dichloropropane	ND	9.1	2.4	ug/kg	
124-48-1	Dibromochloromethane	ND	9.1	1.8	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	9.1	1.8	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	9.1	1.8	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	9.1	1.8	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	9.1	1.8	ug/kg	
100-41-4	Ethylbenzene	ND	9.1	1.8	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 UJ	9.1	3.3	ug/kg	
74-87-3	Methyl chloride	ND	9.1	3.6	ug/kg	
75-09-2	Methylene chloride	ND UJ	18	9.1	ug/kg	
78-93-3	Methyl ethyl ketone	ND	46	18	ug/kg	
100-42-5	Styrene	ND	9.1	1.8	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	9.1	1.8	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	9.1	2.4	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	9.1	1.8	ug/kg	
127-18-4	Tetrachloroethylene	ND	9.1	1.8	ug/kg	
108-88-3	Toluene	ND	9.1	1.8	ug/kg	
79-01-6	Trichloroethylene	ND	9.1	1.8	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 Copy

Report of Analysis

Client Sample ID:	A0GW08S		
Lab Sample ID:	F51875-2	**Date Sampled:**	08/16/07
Matrix:	SO - Soil	**Date Received:**	08/17/07
Method:	SW846 8260B	**Percent Solids:**	62.4
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	9.1	2.5	ug/kg	
	m,p-Xylene	ND	18	2.0	ug/kg	
95-47-6	o-Xylene	ND	9.1	1.8	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		80-121%
2037-26-5	Toluene-D8	97%		71-130%
460-00-4	4-Bromofluorobenzene	99%		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

Form I Copy

Accutest LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	A0GW02S		
Lab Sample ID:	F51875-3	**Date Sampled:**	08/16/07
Matrix:	SO - Soil	**Date Received:**	08/17/07
Method:	SW846 8260B	**Percent Solids:**	80.6
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	F022976.D	1	08/25/07	WJ	n/a	n/a	VF435
Run #2							

	Initial Weight
Run #1	4.24 g
Run #2	

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	1.5	ug/kg	
75-27-4	Bromodichloromethane	ND	7.3	1.5	ug/kg	
75-25-2	Bromoform	ND	7.3	1.5	ug/kg	
108-90-7	Chlorobenzene	ND	7.3	1.5	ug/kg	
75-00-3	Chloroethane	ND	7.3	3.8	ug/kg	
67-66-3	Chloroform	ND	7.3	1.5	ug/kg	
75-15-0	Carbon disulfide	ND	7.3	1.5	ug/kg	
56-23-5	Carbon tetrachloride	ND	7.3	1.9	ug/kg	
75-34-3	1,1-Dichloroethane	ND	7.3	1.6	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	7.3	1.5	ug/kg	
107-06-2	1,2-Dichloroethane	ND	7.3	1.5	ug/kg	
78-87-5	1,2-Dichloropropane	ND	7.3	1.9	ug/kg	
124-48-1	Dibromochloromethane	ND	7.3	1.5	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	7.3	1.5	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	7.3	1.5	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	7.3	1.5	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	7.3	1.5	ug/kg	
100-41-4	Ethylbenzene	ND	7.3	1.5	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 UJ	7.3	2.6	ug/kg	
74-87-3	Methyl chloride	ND	7.3	2.9	ug/kg	
75-09-2	Methylene chloride	ND UJ	15	7.3	ug/kg	
78-93-3	Methyl ethyl ketone	ND	37	15	ug/kg	
100-42-5	Styrene	ND	7.3	1.5	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	7.3	1.5	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	7.3	1.9	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	7.3	1.5	ug/kg	
127-18-4	Tetrachloroethylene	ND	7.3	1.5	ug/kg	
108-88-3	Toluene	ND	7.3	1.5	ug/kg	
79-01-6	Trichloroethylene	ND	7.3	1.5	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 LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	A0GW02S		
Lab Sample ID:	F51875-3	**Date Sampled:**	08/16/07
Matrix:	SO - Soil	**Date Received:**	08/17/07
Method:	SW846 8260B	**Percent Solids:**	80.6
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	7.3	2.0	ug/kg	
	m,p-Xylene	ND	15	1.6	ug/kg	
95-47-6	o-Xylene	ND	7.3	1.5	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	107%		80-121%
2037-26-5	Toluene-D8	95%		71-130%
460-00-4	4-Bromofluorobenzene	99%		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

Form I copy

Accutest LabLink@69490 15:30 06-Oct-2007

Report of Analysis

Client Sample ID:	TB081607		
Lab Sample ID:	F51875-4	Date Sampled:	08/16/07
Matrix:	SO - Trip Blank Soil	Date Received:	08/17/07
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	F022977.D	1	08/25/07	WJ	n/a	n/a	VF435
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	1.0	ug/kg	
75-27-4	Bromodichloromethane	ND	5.0	1.0	ug/kg	
75-25-2	Bromoform	ND	5.0	1.0	ug/kg	
108-90-7	Chlorobenzene	ND	5.0	1.0	ug/kg	
75-00-3	Chloroethane	ND	5.0	2.6	ug/kg	
67-66-3	Chloroform	ND	5.0	1.0	ug/kg	
75-15-0	Carbon disulfide	ND	5.0	1.0	ug/kg	
56-23-5	Carbon tetrachloride	ND	5.0	1.3	ug/kg	
75-34-3	1,1-Dichloroethane	ND	5.0	1.1	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	5.0	1.0	ug/kg	
107-06-2	1,2-Dichloroethane	ND	5.0	1.0	ug/kg	
78-87-5	1,2-Dichloropropane	ND	5.0	1.3	ug/kg	
124-48-1	Dibromochloromethane	ND	5.0	1.0	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	5.0	1.0	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	5.0	1.0	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	5.0	1.0	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	5.0	1.0	ug/kg	
100-41-4	Ethylbenzene	ND	5.0	1.0	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	1.8	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	1.0	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	5.0	1.0	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	5.0	1.3	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	5.0	1.0	ug/kg	
127-18-4	Tetrachloroethylene	ND	5.0	1.0	ug/kg	
108-88-3	Toluene	ND	5.0	1.0	ug/kg	
79-01-6	Trichloroethylene	ND	5.0	1.0	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 Cry

Report of Analysis

Client Sample ID:	TB081607		
Lab Sample ID:	F51875-4	**Date Sampled:**	08/16/07
Matrix:	SO - Trip Blank Soil	**Date Received:**	08/17/07
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	1.4	ug/kg	
	m,p-Xylene	ND	10	1.1	ug/kg	
95-47-6	o-Xylene	ND	5.0	1.0	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	108%		80-121%
2037-26-5	Toluene-D8	95%		71-130%
460-00-4	4-Bromofluorobenzene	99%		59-148%
17060-07-0	1,2-Dichloroethane-D4	109%		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

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 F52035

DATE: November 14, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 23, 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 five aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
P-1	F52035-1	P-3	F52035-4
P-2	F52035-2	AOGW02	F52035-6
TM-2	F52035-3		

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

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
X		Laboratory Control Sample
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

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

Eric Malarek, Chemist

11/14/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F52035

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For semivolatile (SVOC) and polynuclear aromatic hydrocarbons (PAH) compounds , the samples are cooled @4°C ± 2°C for aqueous samples with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/23/07, the coolers were received by the primary laboratory (Accutest) on 08/24/07 at 1.4°C, 1.2°C, 1.2°C, 0.6°C, and 0.8°C. The receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon this outlier.

- Holding Time Review: For the groundwater samples collected 08/23/07, the SVOCs were extracted on 08/30/07 and analyzed on 09/12/07 and 09/13/07. For the PAHs by SIM, they were extracted on 08/30/07 and analyzed on 09/14/07 and 09/18/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for compounds on the semivolatile target compound list (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. The minimum relative response factor (RRF) criteria must be ≥0.05. The DoD QSM specifies that the initial calibration percent relative standard deviation (%RSD) must be ≤15% on the average for all compounds (<30% for CCCs). All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- Initial calibration for the SVOCs was performed on 09/11/07 on instrument MSBNA03. Target compounds hexachlorocyclopentadiene (21.1%), 2,4-dinitrophenol (33.1%), and 4,6-dinitro-2-methylphenol (20.1%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds hexachlorocyclopentadiene (r=0.9995), 2,4-dinitrophenol (r=0.9990), and 4,6-dinitro-2-methylphenol (r=0.9989) were quantified using linear or second order regression with correlation coefficients >0.995; therefore, no qualifiers were applied based upon the high %RSDs. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), P-3 (F52035-4), and AOGW02 (F52035-6) were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/05/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), P-3 (F52035-4), and AOGW02 (F52035-6) were analyzed using this initial calibration.

IV-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥0.05. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ±20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For SVOC initial calibration verification performed on 09/11/07 @13:31 on instrument MSBNA03, bis(2-chloroethoxy)methane (27.2%), 4-chloroaniline (24.0%), and 3-nitroaniline (25.5%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for bis(2-chloroethoxy)methane, 3-nitroaniline, and 4-chloroaniline; therefore, no qualifiers would be applied for these compounds. No samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 09/11/07 @14:07 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 09/12/07 @14:05 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), and P-3 (F52035-4) apply to this continuing calibration.

- For SVOC continuing calibration performed on 09/13/07 @11:24 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. Sample AOGW02 (F52035-6) applies to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/05/07 @12:35 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/14/07 @11:57 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), and P-3 (F52035-4) apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/18/07 @12:23 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Sample AOGW02 (F52035-6) applies to this initial calibration verification.

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. Sample AOGW02 (F52035-6) was collected with a disposable bailer; therefore, no rinse blank applies. Rinse blank 082307R (F52035-5) (low-flow pump) applies to all other groundwater 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
09/12/07	OP22129-MB	All SVOC target <½MRL	NA	NA	None
09/13/07	OP22129-MB	All SVOC target <½MRL	NA	NA	None
09/14/07	OP22128-MB	All PAH SIM target <½MRL	NA	NA	None
09/18/07	OP22128-MB	All PAH SIM target <½MRL	NA	NA	None
09/12/07	082307R	All SVOC target <½MRL	NA	NA	None
09/14/07	082307R	All PAH SIM target <½MRL	NA	NA	None

NA = Not applicable.
MRL = Method reporting limit.

VI-Surrogate Spikes
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-2 and Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:
2-Fluorophenol (14-62%) – (DoD QSM = 20-110%)
Phenol – d5 (10-40%) – (DoD QSM = 10-115%)
2,4,6-Tribromophenol (33-118%) – (DoD QSM = 40-125%)
Nitrobenzene-d5 (42-108%) – (DoD QSM = 40-110%)
2-Fluorobiphenyl (40-106%) – (DoD QSM = 50-110%)
p-Terphenyl – d14 (39-121%) – (DoD QSM = 50-135%)

- For sample AOGW02 (F52035-6), all surrogates were diluted out. The sample was diluted 20x due to matrix interferences. No qualifiers were applied based upon these outliers.

- For all other samples, all criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD LCS aqueous recovery limits are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22129-BS was used as the aqueous LCS for the SVOC analysis on 09/12/07. All criteria were met. No qualifiers were applied. All other compounds were within criteria. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), P-3 (F52035-4), and AOGW02 (F52035-6) apply to this LCS.

- Sample OP22128-BS was used as the aqueous LCS for the PAH SIM analysis on 09/14/07. Compounds 1-methylnaphthalene (56%) and 2-methylnaphthalene (57%) were below the laboratory and/or the DoD QSM criteria. Compounds 1-methylnaphthalene and 2-methylnaphthalene were qualified bias low "L" for detects and "UL" for non-detects based upon the low recoveries. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), P-3 (F52035-4), and AOGW02 (F52035-6) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample F52042-2 was used for the aqueous MS/MSD for SVOC analysis on 09/13/07. The spiked sample was not a RFAAP site sample; therefore, it was not evaluated. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), P-3 (F52035-4), and AOGW02 (F52035-6) apply to this MS/MSD.

- Sample P-3 (F52035-4) was used for the aqueous MS/MSD for PAH SIM analysis on 09/18/07. Acenaphthene (44%; RPD=35%), acenaphthylene (58%; RPD=26%), anthracene (63%, 54%), benzo(a)pyrene (73%, 61%), 1-methylnaphthalene (56%; RPD=28%), 2-methylnaphthalene (54%; RPD=28%), naphthalene (56%; RPD=28%), and pyrene (62%) were below laboratory; however, within DoD QSM accuracy criteria. All other target compounds were within criteria. The associated aqueous LCS was within criteria, except for compounds 1-methylnaphthalene and 2-methylnaphthalene (Section VIII). Acenaphthene, acenaphthylene, anthracene, benzo(a)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, and pyrene were non-detect for the spiked sample and qualified "UL" based upon the low recoveries. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), P-3 (F52035-4), and AOGW02 (F52035-6) apply to this MS/MSD.

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

- Field groundwater sample duplicate pair P-2 (F52035-2) and TM-2 (F52035-3) 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.

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: OP22129-BS, carbazole

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 = (692835 * 40 * 1000 * 1) / (539535 * 1.139 * 1000 * 1) = 45.1 ng/mL
= 45.1 µg/L

Reported Value = 45.1 µg/L
% Difference = 0.0%
Values were within 10% difference.

Sample: AOGW02 (F52035-6), 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 = (380761 * 4 * 1000 * 20) / (231317 * 1.285 * 1010 * 1) = 101 ng/mL
= 101 µg/L

Reported Value = 101 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.

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-1		
Lab Sample ID:	F52035-1	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	R10544.D	1	09/12/07	NJ	08/30/07	OP22129	SR493
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:	P-1		
Lab Sample ID:	F52035-1	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	36%		14-62%
4165-62-2	Phenol-d5	24%		10-40%
118-79-6	2,4,6-Tribromophenol	82%		33-118%
4165-60-0	Nitrobenzene-d5	69%		42-108%
321-60-8	2-Fluorobiphenyl	66%		40-106%
1718-51-0	Terphenyl-d14	92%		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: W036873.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-1		
Lab Sample ID:	F52035-1	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	W036873.D	1	09/14/07	RB	08/30/07	OP22128	SW1900
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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-2		
Lab Sample ID:	F52035-2	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	R10545.D	1	09/12/07	NJ	08/30/07	OP22129	SR493
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 Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-2		
Lab Sample ID:	F52035-2	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	39%		14-62%
4165-62-2	Phenol-d5	27%		10-40%
118-79-6	2,4,6-Tribromophenol	77%		33-118%
4165-60-0	Nitrobenzene-d5	69%		42-108%
321-60-8	2-Fluorobiphenyl	65%		40-106%
1718-51-0	Terphenyl-d14	85%		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: W036874.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-2		
Lab Sample ID:	F52035-2	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	W036874.D	1	09/14/07	RB	08/30/07	OP22128	SW1900
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 UL	1.0	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND UL	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: R10546.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TM-2		
Lab Sample ID:	F52035-3	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	R10546.D	1	09/12/07	NJ	08/30/07	OP22129	SR493
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 copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TM-2		
Lab Sample ID:	F52035-3	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	34%		14-62%
4165-62-2	Phenol-d5	24%		10-40%
118-79-6	2,4,6-Tribromophenol	71%		33-118%
4165-60-0	Nitrobenzene-d5	61%		42-108%
321-60-8	2-Fluorobiphenyl	56%		40-106%
1718-51-0	Terphenyl-d14	84%		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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TM-2		
Lab Sample ID:	F52035-3	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	W036875.D	1	09/14/07	RB	08/30/07	OP22128	SW1900
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

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-3		
Lab Sample ID:	F52035-4	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	R10547.D	1	09/12/07	NJ	08/30/07	OP22129	SR493
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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-3		
Lab Sample ID:	F52035-4	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	20%		14-62%
4165-62-2	Phenol-d5	14%		10-40%
118-79-6	2,4,6-Tribromophenol	51%		33-118%
4165-60-0	Nitrobenzene-d5	59%		42-108%
321-60-8	2-Fluorobiphenyl	56%		40-106%
1718-51-0	Terphenyl-d14	84%		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: W036876.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-3		
Lab Sample ID:	F52035-4	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	W036876.D	1	09/14/07	RB	08/30/07	OP22128	SW1900
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 UL	0.97	0.49	ug/l	
208-96-8	Acenaphthylene	ND UL	0.97	0.49	ug/l	
120-12-7	Anthracene	ND UL	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 UL	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 UL	0.97	0.24	ug/l	
91-57-6	2-Methylnaphthalene	ND UL	0.97	0.24	ug/l	
91-20-3	Naphthalene	ND UL	0.97	0.24	ug/l	
85-01-8	Phenanthrene	ND	0.97	0.49	ug/l	
129-00-0	Pyrene	ND UL	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: R10571.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	A0GW02		
Lab Sample ID:	F52035-6	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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 [a]	R10571.D	16	09/13/07	NJ	08/30/07	OP22129	SR494
Run #2							

	Initial Volume	Final Volume
Run #1	1010 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	400	160	ug/l	
95-57-8	2-Chlorophenol	ND	79	16	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	79	32	ug/l	
120-83-2	2,4-Dichlorophenol	ND	79	16	ug/l	
105-67-9	2,4-Dimethylphenol	ND	79	32	ug/l	
51-28-5	2,4-Dinitrophenol	ND	400	160	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	160	32	ug/l	
95-48-7	2-Methylphenol	ND	79	16	ug/l	
	3&4-Methylphenol	ND	79	21	ug/l	
88-75-5	2-Nitrophenol	ND	79	16	ug/l	
100-02-7	4-Nitrophenol	ND	400	160	ug/l	
87-86-5	Pentachlorophenol	ND	400	160	ug/l	
108-95-2	Phenol	ND	79	32	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	79	16	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	79	16	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	79	19	ug/l	
85-68-7	Butyl benzyl phthalate	ND	79	32	ug/l	
100-51-6	Benzyl Alcohol	ND	79	16	ug/l	
91-58-7	2-Chloronaphthalene	ND	79	21	ug/l	
106-47-8	4-Chloroaniline	ND	79	32	ug/l	
86-74-8	Carbazole	ND	79	16	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	79	16	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	79	16	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	79	16	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	79	21	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	79	24	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	79	25	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	79	24	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	79	16	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	79	16	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	160	32	ug/l	
132-64-9	Dibenzofuran	ND	79	16	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:	A0GW02		
Lab Sample ID:	F52035-6	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	79	32	ug/l	
117-84-0	Di-n-octyl phthalate	ND	79	32	ug/l	
84-66-2	Diethyl phthalate	ND	79	32	ug/l	
131-11-3	Dimethyl phthalate	ND	79	32	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	79	32	ug/l	
118-74-1	Hexachlorobenzene	ND	79	19	ug/l	
87-68-3	Hexachlorobutadiene	ND	79	27	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	79	24	ug/l	
67-72-1	Hexachloroethane	ND	79	30	ug/l	
78-59-1	Isophorone	ND	79	16	ug/l	
88-74-4	2-Nitroaniline	ND	160	32	ug/l	
99-09-2	3-Nitroaniline	ND	160	32	ug/l	
100-01-6	4-Nitroaniline	ND	160	32	ug/l	
98-95-3	Nitrobenzene	ND	79	16	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	79	16	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	79	16	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	79	24	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	0% b		14-62%
4165-62-2	Phenol-d5	0% b		10-40%
118-79-6	2,4,6-Tribromophenol	0% b		33-118%
4165-60-0	Nitrobenzene-d5	0% b		42-108%
321-60-8	2-Fluorobiphenyl	0% b		40-106%
1718-51-0	Terphenyl-d14	0% b		39-121%

(a) Dilution required due to matrix interference.
(b) 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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	A0GW02		
Lab Sample ID:	F52035-6	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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 [a]	W036919.D	20	09/18/07	RB	08/30/07	OP22128	SW1902
Run #2							

	Initial Volume	Final Volume
Run #1	1010 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	47.1	20	9.9	ug/l	
208-96-8	Acenaphthylene	18.2 J	20	9.9	ug/l	J
120-12-7	Anthracene	ND	20	9.9	ug/l	
56-55-3	Benzo(a)anthracene	ND	4.0	0.99	ug/l	
50-32-8	Benzo(a)pyrene	ND	4.0	2.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	4.0	0.99	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	4.0	2.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	4.0	2.0	ug/l	
218-01-9	Chrysene	ND	4.0	2.0	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	4.0	0.99	ug/l	
206-44-0	Fluoranthene	ND	20	5.0	ug/l	
86-73-7	Fluorene	101	20	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	4.0	0.99	ug/l	
90-12-0	1-Methylnaphthalene	414 L	20	5.0	ug/l	
91-57-6	2-Methylnaphthalene [b]	180 L	20	5.0	ug/l	
91-20-3	Naphthalene [b]	50.7	20	5.0	ug/l	
85-01-8	Phenanthrene	163	20	9.9	ug/l	
129-00-0	Pyrene	18.9 J	20	5.0	ug/l	J

(a) Dilution required due to matrix interference.
(b) Compound outside control limits in associated QC.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates 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:	082307R		
Lab Sample ID:	F52035-5	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	R10548.D	1	09/12/07	NJ	08/30/07	OP22129	SR493
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:	082307R		
Lab Sample ID:	F52035-5	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	33%		14-62%
4165-62-2	Phenol-d5	24%		10-40%
118-79-6	2,4,6-Tribromophenol	72%		33-118%
4165-60-0	Nitrobenzene-d5	66%		42-108%
321-60-8	2-Fluorobiphenyl	61%		40-106%
1718-51-0	Terphenyl-d14	84%		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: W036877.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	082307R		
Lab Sample ID:	F52035-5	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	W036877.D	1	09/14/07	RB	08/30/07	OP22128	SW1900
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

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 F52035

DATE: November 14, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 23, 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 five aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
P-1	F52035-1	P-3	F52035-4
P-2	F52035-2	AOGW02	F52035-6
TM-2	F52035-3		

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

10/14/07
Date

RFAAP VALIDATION REPORT
VOLATILES REVIEW
SDG F52035

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 08/23/07, the coolers were received by the primary laboratory (Accutest) on 08/24/07 at 1.4°C, 1.2°C, 1.2°C, 0.6°C, and 0.8°C. The receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon this outlier.

- Holding Time Review: For the aqueous samples collected 08/23/07, the VOCs were prepped and analyzed on 09/05/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, bromofluorobenzene (BFB), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent relative standard deviation (%RSD) must be ≤15% for each target compound and must be ≤30% for each calibration check compound. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration performed on 09/04/07 on instrument MSVOA7, target compounds bromomethane (15.6%), acetone (15.0%), methylene chloride (85.5%; grossly exceeding), 1,1,1-trichloroethane (15.1%), carbon tetrachloride (19.2%), ethylbenzene (15.6%), m,p-xylenes (15.2%), o-xylene (16.2%), styrene (18.2%), and bromoform (19.0%) were outside %RSD/RRF criteria. All RSDs/RRFs (RRF≥0.05) were within criteria for all other target compounds. Compounds bromomethane (r=0.9991), acetone (r=0.9973), methylene chloride (r=0.9957), 1,1,1-trichloroethane (r=0.9982), carbon tetrachloride (r=0.9975), ethylbenzene (r=0.9991), m,p-xylenes (r=0.9993), o-xylene (r=0.9995), and styrene (r=0.9995) were quantified using linear or higher order with correlations >0.995; therefore, no qualifiers were applied based upon these outliers. Bromoform was non-detect for all associated samples; therefore, no qualifiers were applied based upon this outlier. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), P-3 (F52035-4), and AOGW02 (F52035-6) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Continuing calibration establishes the 12-hour relative response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within 20% for all target compounds. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration verification performed on 09/04/07 @17:18 on instrument MSVOA7, chloromethane (27.2%), vinyl chloride (22.7%), and trans-1,3-dichloropropene (21.6%) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Chloromethane, vinyl chloride, and trans-1,3-dichloropropene 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.

- For continuing calibration performed on 09/05/07 @09:40 on instrument MSVOA7, carbon disulfide (22.5%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Carbon disulfide was non-detect for all samples; therefore, no qualifiers were applied based upon the high %D. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), P-3 (F52035-4), and AOGW02 (F52035-6) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of BFB. No contaminants should be detected in any of the associated blanks > the MDL. The DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants methylene chloride, acetone, and 2-butanone). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants methylene chloride, acetone, and 2-butanone (MEK), or 5 times (5X) the maximum amount for other volatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Sample AOGW02 (F52035-6) was collected with a disposable bailer; therefore, no rinse blank applies. Rinse blank 082307R (F52035-5) (low-flow pump) applies to all other groundwater samples in this SDG. The trip blank 082307T (F52035-7) applies to the aqueous samples collected 08/23/07 in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/05/07	VM904-MB	Chloroform	0.50J	2.50	None
09/05/07	082307R	All target <½MRL	NA	NA	None
09/05/07	082307T	Chloroform	0.56JB	1.68	None
09/05/07	082307T	Toluene	0.30J	1.50	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
B = Analyte was found in associated method blank.
NA = Not Applicable
MRL = Method Reporting Limit

VI-Laboratory Control Sample

Data for laboratory control samples (LCS) are evaluated to determine long-term accuracy of the analytical method on various matrices. Percent recoveries (%Rs) should be within the specified control limits. The DoD aqueous LCS recovery limits are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample VM904-BS was used as the aqueous LCS for the VOC analysis on 09/05/07. Chloromethane (137%) was above DoD QSM criteria and within laboratory control limits. All samples were non-detect for chloromethane; therefore, no qualifiers were applied based upon this outlier. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), P-3 (F52035-4), and AOGW02 (F52035-6) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate

Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. The DoD MS/MSD aqueous recovery limits follow the LCS criteria and are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample P-1 (F52035-1) was used for the aqueous MS/MSD analysis on 09/05/07. Chloroethane (143%), chloromethane (168%, 152%), bromomethane (146%), and vinyl chloride (158%, 153%) were above DoD QSM criteria and/or laboratory control limits. All samples were non-detect for chloroethane, chloromethane, bromomethane, and vinyl chloride; therefore, no qualifiers were applied based upon these outliers. All other percent recoveries were within criteria for all target compounds. Samples P-1 (F52035-1), P-2 (F52035-2), TM-2 (F52035-3), P-3 (F52035-4), and AOGW02 (F52035-6) apply to this MS/MSD.

VIII-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Recoveries for system monitoring compounds in volatile samples and blanks must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria: Dibromofluoromethane (87-116%) (DoD QSM = 85-115%)
1,2-Dichloroethane-d4 (76-127%) (DoD QSM = 70-120%)
Toluene-d8 (86-112%) (DoD QSM = 85-120%)
4-Bromofluorobenzene (84-120%) (DoD QSM = 75-120%)

- All criteria were met. No qualifiers were applied.

IX-Internal Standards (IS)
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

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

- Field ground water sample duplicate pair P-2 (F52035-2) and TM-2 (F52035-3) was collected for TCL VOCs. Chloroform was detected in the original sample at 10.3B µg/L and 9.9B ug/L in the duplicate pair, resulting in a RPD of 4.0%. Tetrachloroethylene was detected in the original sample at a concentration below the MRL of 0.30J µg/L and at 0.34J ug/L in the duplicate pair, resulting in a RPD of 12.5%. 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: P-1 (F52035-1), chloroform

Conc. (µg/L) = (Ax)*(Is) *(DF)/(Ais)*(RRF)

where: Ax is the compound area
Ais is the corresponding internal standard area
Is is the corresponding internal standard concentration (µg/L)
DF is the dilution factor
RRF is the relative response factor.

Conc. µg/L = (150207 * 50 µg/L * 1) / (1428984 * 0.457) = 11.5 µg/L

Reported Conc. = 11.5 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

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

Laboratory Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

D = Indicates sample was analyzed at a dilution.

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

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

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

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

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

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

Form I COPY

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-1		
Lab Sample ID:	F52035-1	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	M0022039.D	1	09/05/07	MM	n/a	n/a	VM904
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	11.5	1.0	0.21	ug/l	B
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:	P-1		
Lab Sample ID:	F52035-1	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	101%		76-127%
2037-26-5	Toluene-D8	99%		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: M0022052.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-2		
Lab Sample ID:	F52035-2	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	M0022052.D	1	09/05/07	MM	n/a	n/a	VM904
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	10.3	1.0	0.21	ug/l	B
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.30 J	1.0	0.25	ug/l	J
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-2		
Lab Sample ID:	F52035-2	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	103%		87-116%
17060-07-0	1,2-Dichloroethane-D4	103%		76-127%
2037-26-5	Toluene-D8	102%		86-112%
460-00-4	4-Bromofluorobenzene	100%		84-120%

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

Form 1 copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TM-2		
Lab Sample ID:	F52035-3	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	M0022041.D	1	09/05/07	MM	n/a	n/a	VM904
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	9.9	1.0	0.21	ug/l	B
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.34 J	1.0	0.25	ug/l	J
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TM-2		
Lab Sample ID:	F52035-3	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	103%		87-116%
17060-07-0	1,2-Dichloroethane-D4	103%		76-127%
2037-26-5	Toluene-D8	102%		86-112%
460-00-4	4-Bromofluorobenzene	100%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-3		
Lab Sample ID:	F52035-4	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	M0022044.D	1	09/05/07	MM	n/a	n/a	VM904
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:	P-3		
Lab Sample ID:	F52035-4	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	103%		76-127%
2037-26-5	Toluene-D8	102%		86-112%
460-00-4	4-Bromofluorobenzene	99%		84-120%

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

Raw Data: M0022045.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	082307R		
Lab Sample ID:	F52035-5	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	M0022045.D	1	09/05/07	MM	n/a	n/a	VM904
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:	082307R		
Lab Sample ID:	F52035-5	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	101%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	97%		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: M0022046.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	A0GW02		
Lab Sample ID:	F52035-6	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
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	M0022046.D	1	09/05/07	MM	n/a	n/a	VM904
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:	A0GW02		
Lab Sample ID:	F52035-6	**Date Sampled:**	08/23/07
Matrix:	AQ - Ground Water	**Date Received:**	08/24/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	103%		76-127%
2037-26-5	Toluene-D8	97%		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

Form I Cpy

Accutest Laboratories

Report of Analysis

Client Sample ID:	082307T		
Lab Sample ID:	F52035-7	**Date Sampled:**	08/23/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/24/07
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	M0022047.D	1	09/05/07	MM	n/a	n/a	VM904
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	0.56 J	1.0	0.21	ug/l	JB
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	0.30 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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	082307T		
Lab Sample ID:	F52035-7	**Date Sampled:**	08/23/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/24/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	102%		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 – Semi-Volatiles & Polynuclear Aromatic Hydrocarbons Accutest Laboratories, Inc., SDG F52070

DATE: October 9, 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 24, 2007. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW846 Methods 3510C/8270C for aqueous matrices. The polynuclear aromatic hydrocarbons (PAHs) were analyzed using selective ion monitoring (SIM) techniques. A total of three aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
OMW2	F52070-1	TMMW1	F52070-3
OMW1	F52070-2		

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

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
X		Laboratory Control Sample
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

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

Eric Malarek, Chemist

10/9/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F52070

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 a re 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 08/24/07, the coolers were received by the primary laboratory (Accutest) on 08/25/07 at 2.0°C, 2.4°C, and 1.8°C. One of the receipt temperatures was below criteria; however, did no impact the data quality. No qualifiers were applied based upon this outlier.

- Holding Time Review: For the groundwater samples collected 08/24/07, the SVOCs were extracted on 08/31/07 and analyzed on 09/13/07. For the PAHs by SIM, they were extracted on 08/31/07 and analyzed on 09/20/07 (two runs). Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check

GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for compounds on the semivolatile target compound list (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. The minimum relative response factor (RRF) criteria must be ≥0.05. The DoD QSM specifies that the initial calibration percent relative standard deviation (%RSD) must be ≤15% on the average for all compounds (<30% for CCCs). All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- Initial calibration for the SVOCs was performed on 08/21/07 on instrument MSBNA02. Target compounds hexachlorocyclopentadiene (29.2%) and 4,6-dinitro-2-methylphenol (16.5%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds hexachlorocyclopentadiene (r=0.9990) and 4,6-dinitro-2-methylphenol (r=0.9984) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Samples OMW2 (F52070-1), OMW1 (F52070-2), and TMMW1 (F52070-3) were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/19/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. Sample OMW2 (F52070-1) was analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/20/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. Samples OMW1 (F52070-2) and TMMW1 (F52070-3) were analyzed using this initial calibration.

IV-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥0.05. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ±20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For SVOC initial calibration verification performed on 08/21/07 @15:20 on instrument MSBNA02, 4-chloroaniline (45.7%; grossly exceeding) and 3-nitroaniline (30.2%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 3-nitroaniline and 4-chloroaniline. No qualification applies for 3-nitroaniline. 4-Chloroaniline would be qualified bias low "UL"; however no samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 08/21/07 @15:48 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 09/13/07 @16:15 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. Samples OMW2 (F52070-1), OMW1 (F52070-2), and TMMW1 (F52070-3) apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/19/07 @22:41 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/19/07 @23:23 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Sample OMW2 (F52070-1) applies to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/20/07 @16:43 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/20/07 @18:11 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples OMW1 (F52070-2), and TMMW1 (F52070-3) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank 082307R (F52035-5) (low-flow pump) applies to the groundwater 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
09/13/07	OP22139-MB	All SVOC target <½MRL	NA	NA	None
09/20/07	OP22140-MB	All PAH SIM target <½MRL	NA	NA	None
09/20/07	OP22140-MB	All PAH SIM target <½MRL	NA	NA	None
09/12/07	082307R	All SVOC target <½MRL	NA	NA	None
09/14/07	082307R	All PAH SIM target <½MRL	NA	NA	None

NA = Not applicable.
MRL = Method reporting limit.

VI-Surrogate Spikes
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-2 and Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:
2-Fluorophenol (14-62%) – (DoD QSM = 20-110%)
Phenol – d5 (10-40%) – (DoD QSM = 10-115%)
2,4,6-Tribromophenol (33-118%) – (DoD QSM = 40-125%)
Nitrobenzene-d5 (42-108%) – (DoD QSM = 40-110%)
2-Fluorobiphenyl (40-106%) – (DoD QSM = 50-110%)
p-Terphenyl – d14 (39-121%) – (DoD QSM = 50-135%)

- All criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD LCS aqueous recovery limits are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22139-BS was used as the aqueous LCS for the SVOC analysis on 09/13/07. Compounds 1,3-dichlorobenzene (35%), 1,4-dichlorobenzene (37%), hexachlorobutadiene (36%), and hexachloroethane (27%) were below the laboratory and/or the DoD QSM criteria. Compounds 1,3-dichlorobenzene, 1,4-dichlorobenzene, hexachlorobutadiene, and hexachloroethane were non-detect for all associated samples and were qualified bias low "UL" based upon the low recoveries. All other compounds were within criteria. Samples OMW2 (F52070-1), OMW1 (F52070-2), and TMMW1 (F52070-3) apply to this LCS.

- Sample OP22140-BS was used as the aqueous LCS for the PAH SIM analysis on 09/20/07. All criteria were met. No qualifiers were applied. Sample OMW2 (F52070-1) applies to this LCS.

- Sample OP22140-BS was used as the aqueous LCS for the PAH SIM analysis on 09/20/07. All criteria were met. No qualifiers were applied. Samples OMW1 (F52070-2) and TMMW1 (F52070-3) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OMW2 (F52070-1) was used for the aqueous MS/MSD for SVOC analysis on 09/13/07. 4-Nitrophenol (68%, 64%) was above the laboratory and within the DoD QSM criteria. 4-Nitrophenol was within control limits for the associated LCS (Section VIII). 4-Nitrophenol was non-detect for the spiked sample; therefore, no qualifiers were applied based upon this outlier. All other compounds were within criteria. Samples OMW2 (F52070-1), OMW1 (F52070-2), and TMMW1 (F52070-3) apply to this MS/MSD.

- Sample OMW2 (F52070-1) was used for the aqueous MS/MSD for PAH SIM analysis on 09/20/07. Acenaphthene (56%), acenaphthylene (58%), anthracene (67%), benzo(a)pyrene (72%), benzo(g,h,i)perylene (58%), dibenzo(a,h)anthracene (62%), flouranthene (68%), indeno(1,2,3-cd)pyrene (60%), 1-methylnaphthalene (56%), 2-methylnaphthalene (53%), naphthalene (53%), phenanthene (64%), and pyrene (65%) were below laboratory; however, within DoD QSM accuracy criteria. All other target compounds were within criteria. The associated aqueous LCS was within criteria (Section VIII). Acenaphthene, acenaphthylene, anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, dibenzo(a,h)anthracene, flouranthene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthene, and pyrene were non-detect for the spiked sample and qualified "UL" based upon the low recoveries. Samples OMW2 (F52070-1), OMW1 (F52070-2), and TMMW1 (F52070-3) 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.

- Field groundwater sample duplicate pair OMW1 (F52070-2) and TMMW1 (F52070-3) 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. All criteria were met. No qualifiers were applied.

Table 3 Field Precision Hits Analysis Summary for TCL SVOCs and PAHs for Duplicate Pair OMW1 (F52070-2) and TMMW1 (F52070-3)

Compound	Original Sample (µg/L)	Duplicate Pair (µg/L)	%RPD
Carbazole	1.7J	1.7J	0.0
Acenaphthylene	0.98U	0.52J	NA
Acenaphthene	2.2	2.3	4.4
Phenanthrene	1.7	1.8	5.7
Fluorene	3.7	3.6	2.7
1-Methylnaphthalene	32.4	35.9	10.3
Naphthalene	27.5	30.1	9.0
2-Methylnaphthalene	16.0	17.9	11.2

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: OMW1 (F52070-2), carbazole

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 = (19123 * 40 * 1000 * 1) / (367568 * 1.212 * 1020 * 1) = 1.7 ng/mL
= 1.7 µg/L

Reported Value = 1.7 µg/L
% Difference = 0.0%
Values were within 10% difference.

Sample: OMW1 (F52070-2), fluorene

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (296117 * 4 * 1000 * 1) / (240858 * 1.299 * 1020 * 1) = 3.7 ng/mL
= 3.7 µg/L

Reported Value = 3.7 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.

form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	OMW2		
Lab Sample ID:	F52070-1	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	L038361.D	1	09/13/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	26	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.1	1.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.1	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.1	1.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.1	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	26	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	2.0	ug/l	
95-48-7	2-Methylphenol	ND	5.1	1.0	ug/l	
	3&4-Methylphenol	ND	5.1	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	5.1	1.0	ug/l	
100-02-7	4-Nitrophenol	ND UL	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 UL	5.1	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND UL	5.1	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.1	1.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.1	1.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	2.0	ug/l	
132-64-9	Dibenzofuran	ND	5.1	1.0	ug/l	

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

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	OMW2		
Lab Sample ID:	F52070-1	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	38%		14-62%
4165-62-2	Phenol-d5	26%		10-40%
118-79-6	2,4,6-Tribromophenol	77%		33-118%
4165-60-0	Nitrobenzene-d5	72%		42-108%
321-60-8	2-Fluorobiphenyl	66%		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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	OMW2		
Lab Sample ID:	F52070-1	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	W036970.D	1	09/20/07	RB	08/31/07	OP22140	SW1904
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND VL	1.0	0.51	ug/l	
208-96-8	Acenaphthylene	ND VL	1.0	0.51	ug/l	
120-12-7	Anthracene	ND VL	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 VL	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 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 VL	0.20	0.051	ug/l	
206-44-0	Fluoranthene	ND VL	1.0	0.26	ug/l	
86-73-7	Fluorene	ND VL	1.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND VL	0.20	0.051	ug/l	
90-12-0	1-Methylnaphthalene	ND VL	1.0	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND VL	1.0	0.26	ug/l	
91-20-3	Naphthalene	ND VL	1.0	0.26	ug/l	
85-01-8	Phenanthrene	ND VL	1.0	0.51	ug/l	
129-00-0	Pyrene	ND VL	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: L038364.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	OMW1		
Lab Sample ID:	F52070-2	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	L038364.D	1	09/13/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	9.8	ug/l	
95-57-8	2-Chlorophenol	ND	4.9	0.98	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.9	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.9	0.98	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.9	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	9.8	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.8	2.0	ug/l	
95-48-7	2-Methylphenol	ND	4.9	0.98	ug/l	
	3&4-Methylphenol	ND	4.9	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	4.9	0.98	ug/l	
100-02-7	4-Nitrophenol	ND	25	9.8	ug/l	
87-86-5	Pentachlorophenol	ND	25	9.8	ug/l	
108-95-2	Phenol	ND	4.9	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.9	0.98	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.9	0.98	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.9	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.9	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	4.9	0.98	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.9	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	4.9	2.0	ug/l	
86-74-8	Carbazole	1.7 J	4.9	0.98	ug/l	J
111-91-1	bis(2-Chloroethoxy)methane	ND	4.9	0.98	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.9	0.98	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.9	0.98	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.9	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.9	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND VL	4.9	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND VL	4.9	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.9	0.98	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.9	0.98	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.8	2.0	ug/l	
132-64-9	Dibenzofuran	ND	4.9	0.98	ug/l	

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

Form 1 Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	OMW1		
Lab Sample ID:	F52070-2	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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 VL	4.9	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.9	1.5	ug/l	
67-72-1	Hexachloroethane	ND VL	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	32%		14-62%
4165-62-2	Phenol-d5	21%		10-40%
118-79-6	2,4,6-Tribromophenol	77%		33-118%
4165-60-0	Nitrobenzene-d5	61%		42-108%
321-60-8	2-Fluorobiphenyl	58%		40-106%
1718-51-0	Terphenyl-d14	75%		39-121%

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

Raw Data: W036990.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	OMW1		
Lab Sample ID:	F52070-2	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	W036990.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	2.2	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	3.7	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	32.4	0.98	0.25	ug/l	
91-57-6	2-Methylnaphthalene	16.0	0.98	0.25	ug/l	
91-20-3	Naphthalene	27.5	0.98	0.25	ug/l	
85-01-8	Phenanthrene	1.7	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: L038365.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMMW1		
Lab Sample ID:	F52070-3	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	L038365.D	1	09/13/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	9.8	ug/l	
95-57-8	2-Chlorophenol	ND	4.9	0.98	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.9	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.9	0.98	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.9	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	9.8	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.8	2.0	ug/l	
95-48-7	2-Methylphenol	ND	4.9	0.98	ug/l	
	3&4-Methylphenol	ND	4.9	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	4.9	0.98	ug/l	
100-02-7	4-Nitrophenol	ND	25	9.8	ug/l	
87-86-5	Pentachlorophenol	ND	25	9.8	ug/l	
108-95-2	Phenol	ND	4.9	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.9	0.98	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.9	0.98	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.9	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.9	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	4.9	0.98	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.9	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	4.9	2.0	ug/l	
86-74-8	Carbazole	1.7 J	4.9	0.98	ug/l	J
111-91-1	bis(2-Chloroethoxy)methane	ND	4.9	0.98	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.9	0.98	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.9	0.98	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.9	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.9	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND VL	4.9	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND VL	4.9	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.9	0.98	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.9	0.98	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.8	2.0	ug/l	
132-64-9	Dibenzofuran	ND	4.9	0.98	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMMW1		
Lab Sample ID:	F52070-3	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	38%		14-62%
4165-62-2	Phenol-d5	25%		10-40%
118-79-6	2,4,6-Tribromophenol	80%		33-118%
4165-60-0	Nitrobenzene-d5	68%		42-108%
321-60-8	2-Fluorobiphenyl	63%		40-106%
1718-51-0	Terphenyl-d14	75%		39-121%

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

Raw Data: W036991.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMMW1		
Lab Sample ID:	F52070-3	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	W036991.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	2.3	0.98	0.49	ug/l	
208-96-8	Acenaphthylene	0.52 J	0.98	0.49	ug/l	J
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	3.6	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	35.9	0.98	0.25	ug/l	
91-57-6	2-Methylnaphthalene	17.9	0.98	0.25	ug/l	
91-20-3	Naphthalene	30.1	0.98	0.25	ug/l	
85-01-8	Phenanthrene	1.8	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

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 F52070

DATE: October 9, 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 24, 2007. The samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) using USEPA SW846 Method 5030B/8260B for aqueous matrices. A total of three aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
OMW2	F52070-1	TMMW1	F52070-3
OMW1	F52070-2		

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

Table 1 Laboratory Performance Criteria

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

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

Eric Malarek, Chemist

10/9/07
Date

RFAAP VALIDATION REPORT
VOLATILES REVIEW
SDG F52070

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 08/24/07, the coolers were received by the primary laboratory (Accutest) on 08/25/07 at 2.0°C, 2.4°C, and 1.8°C. One of the receipt temperatures was below criteria; however, did no impact the data quality. No qualifiers were applied based upon this outlier.

- Holding Time Review: For the aqueous samples collected 08/24/07, the VOCs were prepped and analyzed on 09/07/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, bromofluorobenzene (BFB), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent relative standard deviation (%RSD) must be ≤15% for each target compound and must be ≤30% for each calibration check compound. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration performed on 09/04/07 on instrument MSVOA6, target compounds methylene chloride (38.2%; grossly exceeding), acetone (15.3%), and dibromochloromethane (15.5%) were outside %RSD/RRF criteria. All RSDs/RRFs (RRF≥0.05) were within criteria for all other target compounds. Compounds methylene chloride (r=0.9993), acetone (r=0.9997), and dibromochloromethane (r=0.9999) were quantified using linear or higher order with correlations >0.995; therefore, no qualifiers were applied based upon these outliers. Samples OMW2 (F52070-1), OMW1 (F52070-2), and TMMW1 (F52070-3) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Continuing calibration establishes the 12-hour relative response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within 20% for all target compounds. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration verification performed on 09/04/07 @16:01 on instrument MSVOA6, chloromethane (24.2%), vinyl chloride (21.9%), and acetone (21.3%) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Chloromethane, vinyl chloride, and acetone 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.

- For continuing calibration performed on 09/07/07 @09:56 on instrument MSVOA6, all criteria were met. No qualifiers were applied. Samples OMW2 (F52070-1), OMW1 (F52070-2), and TMMW1 (F52070-3) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of BFB. No contaminants should be detected in any of the associated blanks > the MDL. The DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants methylene chloride, acetone, and 2-butanone). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants methylene chloride, acetone, and 2-butanone (MEK), or 5 times (5X) the maximum amount for other volatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank 082307R (F52035-5) (low-flow pump) applies to the groundwater samples in this SDG. The trip blank 082407T (F52070-4) applies to the aqueous samples collected 08/24/07 in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/07/07	VJ2224-MB	Chloroform	0.47J	2.35	OMW1, TMMW1
09/05/07	082307R	All target <½MRL	NA	NA	None
09/07/07	082407T	Chloroform	0.74JB	3.70	OMW1, TMMW1

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
B = Analyte was found in associated method blank.
NA = Not Applicable
MRL = Method Reporting Limit

VI-Laboratory Control Sample
Data for laboratory control samples (LCS) are evaluated to determine long-term accuracy of the analytical method on various matrices. Percent recoveries (%Rs) should be within the specified control limits. The DoD aqueous LCS recovery limits are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample VJ2224-BS was used as the aqueous LCS for the VOC analysis on 09/07/07. Chloromethane (130%) was above DoD QSM criteria and within laboratory control limits. All samples were non-detect for chloromethane; therefore no qualifiers were applied based upon this outlier. Samples OMW2 (F52070-1), OMW1 (F52070-2), and TMMW1 (F52070-3) 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 OMW2 (F52070-1) was used for the aqueous MS/MSD analysis on 09/07/07. Chloromethane (130%, 130%) was above DoD QSM criteria and within laboratory control limits. All samples were non-detect for chloromethane; therefore no qualifiers were applied based upon this outlier. All other percent recoveries were within criteria for all target compounds. Samples OMW2 (F52070-1), OMW1 (F52070-2), and TMMW1 (F52070-3) apply to this MS/MSD.

VIII-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Recoveries for system monitoring compounds in volatile samples and blanks must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria: Dibromofluoromethane (87-116%) (DoD QSM = 85-115%)
1,2-Dichloroethane-d4 (76-127%) (DoD QSM = 70-120%)
Toluene-d8 (86-112%) (DoD QSM = 85-120%)
4-Bromofluorobenzene (84-120%) (DoD QSM = 75-120%)

- All criteria were met. No qualifiers were applied.

IX-Internal Standards (IS)
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

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

- Field ground water sample duplicate pair OMW1 (F52070-2), and TMMW1 (F52070-3) was collected for TCL VOCs. Chloroform was detected in the original sample at a concentration below the MRL of 0.42JB µg/L and of 0.48JB ug/L in the duplicate pair, resulting in a RPD of 13.3%. 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: OMW2 (F52070-1), chloroform

Conc. (µg/L) = (Ax)*(Is) *(DF)/(Ais)*(RRF)

where: Ax is the compound area
Ais is the corresponding internal standard area
Is is the corresponding internal standard concentration (µg/L)
DF is the dilution factor
RRF is the relative response factor.

Conc. µg/L = (190173 * 50 µg/L * 1) / (1436391 * 0.468) = 14.1 µg/L

Reported Conc. = 14.2 µg/L
%D = 0.7%
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: J032391.D

Form I COR

Accutest Laboratories

Report of Analysis

Client Sample ID:	OMW2		
Lab Sample ID:	F52070-1	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	J032391.D	1	09/07/07	KW	n/a	n/a	VJ2224
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	14.2	1.0	0.21	ug/l	B
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 COM

Accutest Laboratories

Report of Analysis

Client Sample ID:	OMW2		
Lab Sample ID:	F52070-1	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	103%		87-116%
17060-07-0	1,2-Dichloroethane-D4	97%		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: J032392.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	OMW1		
Lab Sample ID:	F52070-2	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	J032392.D	1	09/07/07	KW	n/a	n/a	VJ2224
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	0.42 B	1.0	0.21	ug/l	JB
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	OMW1		
Lab Sample ID:	F52070-2	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	97%		76-127%
2037-26-5	Toluene-D8	101%		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: J032397.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMMW1		
Lab Sample ID:	F52070-3	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	J032397.D	1	09/07/07	KW	n/a	n/a	VJ2224
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	0.48	1.0	0.21	ug/l	JB
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TMMW1		
Lab Sample ID:	F52070-3	**Date Sampled:**	08/24/07
Matrix:	AQ - Ground Water	**Date Received:**	08/25/07
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	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	96%		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

Raw Data: J032394.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	082407T		
Lab Sample ID:	F52070-4	**Date Sampled:**	08/24/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/25/07
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	J032394.D	1	09/07/07	KW	n/a	n/a	VJ2224
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	0.74 J	1.0	0.21	ug/l	JB
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	082407T		
Lab Sample ID:	F52070-4	**Date Sampled:**	08/24/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/25/07
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	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	97%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	105%		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 – Semi-Volatiles & Polynuclear Aromatic Hydrocarbons Accutest Laboratories, Inc., SDG F52110

DATE: November 15, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 27, 2007. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW846 Methods 3510C/8270C for aqueous matrices. The polynuclear aromatic hydrocarbons (PAHs) were analyzed using selective ion monitoring (SIM) techniques. A total of six aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
P-4	F52110-1	41MW1	F52110-4
S4W-1	F52110-2	41MW2	F52110-5
8B	F52110-3	41MW3	F52110-6

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

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
X		Laboratory Control Sample
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

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

Eric Malarek, Chemist

11/15/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F52110

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For semivolatile (SVOC) and polynuclear aromatic hydrocarbons (PAH) compounds , the samples are cooled @4°C ± 2°C for aqueous samples with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/27/07, the coolers were received by the primary laboratory (Accutest) on 08/28/07 at 0.6°C, 1.2°C, 0.8°C, 0.2°C, 0.4°C, 1.0°C, 0.6°C, 0.6°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 3.0°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 3.6°C. Some of the receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the groundwater samples collected 08/27/07, the SVOCs were extracted on 08/31/07 and analyzed on 09/14/07. For the PAHs by SIM, they were extracted on 08/31/07 and analyzed on 09/20/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for compounds on the semivolatile target compound list (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. The minimum relative response factor (RRF) criteria must be ≥0.05. The DoD QSM specifies that the initial calibration percent relative standard deviation (%RSD) must be ≤15% on the average for all compounds (<30% for CCCs). All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- Initial calibration for the SVOCs was performed on 08/21/07 on instrument MSBNA02. Target compounds hexachlorocyclopentadiene (29.2%) and 4,6-dinitro-2-methylphenol (16.5%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds hexachlorocyclopentadiene (r=0.9990) and 4,6-dinitro-2-methylphenol (r=0.9984) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/19/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. No samples reported were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/20/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥0.05. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ±20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For SVOC initial calibration verification performed on 08/21/07 @15:20 on instrument MSBNA02, 4-chloroaniline (45.7%; grossly exceeding) and 3-nitroaniline (30.2%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 3-nitroaniline and 4-chloroaniline. No qualification applies for 3-nitroaniline. 4-Chloroaniline would be qualified bias low "UL"; however no samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 08/21/07 @15:48 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 09/13/07 @16:15 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/19/07 @22:41 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/19/07 @23:23 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/20/07 @16:43 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/20/07 @18:11 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank 082307R (F52035-5) (low-flow pump) applies to groundwater samples P-4 (F52110-1), S4W-1 (F52110-2), and 8B (F52110-3) in this SDG. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/13/07	OP22139-MB	All SVOC target <½MRL	NA	NA	None
09/20/07	OP22140-MB	All PAH SIM target <½MRL	NA	NA	None
09/20/07	OP22140-MB	All PAH SIM target <½MRL	NA	NA	None
09/15/07	RB083007	All SVOC target <½MRL	NA	NA	None
09/20/07	RB083007	All PAH SIM target <½MRL	NA	NA	None
09/12/07	082307R	All SVOC target <½MRL	NA	NA	None
09/14/07	082307R	All PAH SIM target <½MRL	NA	NA	None

NA = Not applicable.
MRL = Method reporting limit.

VI-Surrogate Spikes
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-2 and Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:
2-Fluorophenol (14-62%) – (DoD QSM = 20-110%)
Phenol – d5 (10-40%) – (DoD QSM = 10-115%)
2,4,6-Tribromophenol (33-118%) – (DoD QSM = 40-125%)
Nitrobenzene-d5 (42-108%) – (DoD QSM = 40-110%)
2-Fluorobiphenyl (40-106%) – (DoD QSM = 50-110%)
p-Terphenyl – d14 (39-121%) – (DoD QSM = 50-135%)

- All criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD LCS aqueous recovery limits are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22139-BS was used as the aqueous LCS for the SVOC analysis on 09/13/07. Compounds 1,3-dichlorobenzene (35%), 1,4-dichlorobenzene (37%), hexachlorobutadiene (36%), and hexachloroethane (27%) were below the laboratory and/or the DoD QSM criteria. Compounds 1,3-dichlorobenzene, 1,4-dichlorobenzene, hexachlorobutadiene, and hexachloroethane were non-detect for all associated samples and were qualified bias low "UL" based upon the low recoveries. All other compounds were within criteria. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

- Sample OP22140-BS was used as the aqueous LCS for the PAH SIM analysis on 09/20/07. All criteria were met. No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

- Sample OP22140-BS was used as the aqueous LCS for the PAH SIM analysis on 09/20/07. All criteria were met. No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OMW2 (F52070-1) was used for the aqueous MS/MSD for SVOC analysis on 09/13/07. 4-Nitrophenol (68%, 64%) was above the laboratory and within the DoD QSM criteria. 4-Nitrophenol was within control limits for the associated LCS (Section VIII). 4-Nitrophenol was non-detect for the spiked sample; therefore, no qualifiers were applied based upon this outlier. All other compounds were within criteria. Samples OMW2 (F52070-1), OMW1 (F52070-2), and TMMW1 (F52070-3) apply to this MS/MSD.

- Sample OMW2 (F52070-1) was used for the aqueous MS/MSD for PAH SIM analysis on 09/20/07. Acenaphthene (56%), acenaphthylene (58%), anthracene (67%), benzo(a)pyrene (72%), benzo(g,h,i)perylene (58%), dibenzo(a,h)anthracene (62%), flouranthene (68%), indeno(1,2,3-cd)pyrene (60%), 1-methylnaphthalene (56%), 2-methylnaphthalene (53%), naphthalene (53%), phenanthene (64%), and pyrene (65%) were below laboratory; however, within DoD QSM accuracy criteria. All other target compounds were within criteria. The associated aqueous LCS was within criteria (Section VIII). Acenaphthene, acenaphthylene, anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, dibenzo(a,h)anthracene, flouranthene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthene, and pyrene were non-detect for the spiked sample and qualified "UL" based upon the low recoveries. Samples P -4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) apply to this MS/MSD.

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

- No field sample duplicate pair was analyzed with this SDG.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: S4W-1 (F52110-2), bis(2-ethylhexyl)phthalate

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (205491 * 40 * 1000 * 1) / (366872 * 0.958 * 1010 * 1) = 23.1 ng/mL
= 23.1 µg/L

Reported Value = 23.1 µg/L
% Difference = 0.0%
Values were within 10% difference.

Sample: S4W-1 (F52110-2), fluorene

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (223439 * 4 * 1000 * 1) / (237282 * 1.299 * 1010 * 1) = 2.9 ng/mL
= 2.9 µg/L

Reported Value = 2.9 µg/L
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

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

Laboratory Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

D = Indicates sample was analyzed at a dilution.

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

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

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

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

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

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

Raw Data: L038368.D

Form I Org

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-4		
Lab Sample ID:	F52110-1	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038368.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	9.8	ug/l	
95-57-8	2-Chlorophenol	ND	4.9	0.98	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.9	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.9	0.98	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.9	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	9.8	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.8	2.0	ug/l	
95-48-7	2-Methylphenol	ND	4.9	0.98	ug/l	
	3&4-Methylphenol	ND	4.9	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	4.9	0.98	ug/l	
100-02-7	4-Nitrophenol	ND	25	9.8	ug/l	
87-86-5	Pentachlorophenol	ND	25	9.8	ug/l	
108-95-2	Phenol	ND	4.9	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.9	0.98	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.9	0.98	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.9	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.9	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	4.9	0.98	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.9	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	4.9	2.0	ug/l	
86-74-8	Carbazole	ND	4.9	0.98	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.9	0.98	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.9	0.98	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.9	0.98	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.9	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.9	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	4.9	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	4.9	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.9	0.98	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.9	0.98	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.8	2.0	ug/l	
132-64-9	Dibenzofuran	ND	4.9	0.98	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-4		
Lab Sample ID:	F52110-1	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	4.9	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	4.9	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	4.9	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	4.9	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	4.9	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	4.9	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	4.9	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.9	1.5	ug/l	
67-72-1	Hexachloroethane	ND	4.9	1.9	ug/l	
78-59-1	Isophorone	ND	4.9	0.98	ug/l	
88-74-4	2-Nitroaniline	ND	9.8	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	9.8	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	9.8	2.0	ug/l	
98-95-3	Nitrobenzene	ND	4.9	0.98	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.9	0.98	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.9	0.98	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	4.9	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	30%		14-62%
4165-62-2	Phenol-d5	20%		10-40%
118-79-6	2,4,6-Tribromophenol	65%		33-118%
4165-60-0	Nitrobenzene-d5	58%		42-108%
321-60-8	2-Fluorobiphenyl	54%		40-106%
1718-51-0	Terphenyl-d14	74%		39-121%

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-4		
Lab Sample ID:	F52110-1	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036992.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.98	0.49	ug/l	
208-96-8	Acenaphthylene	ND	0.98	0.49	ug/l	
120-12-7	Anthracene	ND	0.98	0.49	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.049	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.098	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.049	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.098	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.098	ug/l	
218-01-9	Chrysene	ND	0.20	0.098	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.049	ug/l	
206-44-0	Fluoranthene	ND	0.98	0.25	ug/l	
86-73-7	Fluorene	ND	0.98	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.049	ug/l	
90-12-0	1-Methylnaphthalene	ND	0.98	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	0.98	0.25	ug/l	
91-20-3	Naphthalene	ND	0.98	0.25	ug/l	
85-01-8	Phenanthrene	ND	0.98	0.49	ug/l	
129-00-0	Pyrene	ND	0.98	0.25	ug/l	

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

Raw Data: L038369.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	S4W-1		
Lab Sample ID:	F52110-2	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038369.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1010 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	9.9	ug/l	
95-57-8	2-Chlorophenol	ND	5.0	0.99	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	0.99	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.0	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	9.9	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.9	2.0	ug/l	
95-48-7	2-Methylphenol	ND	5.0	0.99	ug/l	
	3&4-Methylphenol	ND	5.0	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	0.99	ug/l	
100-02-7	4-Nitrophenol	ND	25	9.9	ug/l	
87-86-5	Pentachlorophenol	ND	25	9.9	ug/l	
108-95-2	Phenol	ND	5.0	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	0.99	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	0.99	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.0	0.99	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	2.0	ug/l	
86-74-8	Carbazole	ND	5.0	0.99	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	0.99	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	0.99	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	0.99	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.0	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND VL	5.0	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND VL	5.0	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	0.99	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	0.99	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.9	2.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	0.99	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	S4W-1		
Lab Sample ID:	F52110-2	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.0	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	23.1	5.0	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND VL	5.0	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	1.5	ug/l	
67-72-1	Hexachloroethane	ND VL	5.0	1.9	ug/l	
78-59-1	Isophorone	ND	5.0	0.99	ug/l	
88-74-4	2-Nitroaniline	ND	9.9	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	9.9	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	9.9	2.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	0.99	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	0.99	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	0.99	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.0	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	33%		14-62%
4165-62-2	Phenol-d5	23%		10-40%
118-79-6	2,4,6-Tribromophenol	72%		33-118%
4165-60-0	Nitrobenzene-d5	64%		42-108%
321-60-8	2-Fluorobiphenyl	59%		40-106%
1718-51-0	Terphenyl-d14	70%		39-121%

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

Raw Data: W036993.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	S4W-1		
Lab Sample ID:	F52110-2	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036993.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	1010 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	1.5	0.99	0.50	ug/l	
208-96-8	Acenaphthylene	ND	0.99	0.50	ug/l	
120-12-7	Anthracene	ND	0.99	0.50	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.050	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.099	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.050	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.099	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.099	ug/l	
218-01-9	Chrysene	ND	0.20	0.099	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.050	ug/l	
206-44-0	Fluoranthene	ND	0.99	0.25	ug/l	
86-73-7	Fluorene	2.9	0.99	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.050	ug/l	
90-12-0	1-Methylnaphthalene	7.6	0.99	0.25	ug/l	
91-57-6	2-Methylnaphthalene	2.0	0.99	0.25	ug/l	
91-20-3	Naphthalene	1.0	0.99	0.25	ug/l	
85-01-8	Phenanthrene	1.5	0.99	0.50	ug/l	
129-00-0	Pyrene	ND	0.99	0.25	ug/l	

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

Raw Data: L038370.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	8B		
Lab Sample ID:	F52110-3	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038370.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	28	11	ug/l	
95-57-8	2-Chlorophenol	ND	5.6	1.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.6	2.2	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.6	1.1	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.6	2.2	ug/l	
51-28-5	2,4-Dinitrophenol	ND	28	11	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	11	2.2	ug/l	
95-48-7	2-Methylphenol	ND	5.6	1.1	ug/l	
	3&4-Methylphenol	ND	5.6	1.4	ug/l	
88-75-5	2-Nitrophenol	ND	5.6	1.1	ug/l	
100-02-7	4-Nitrophenol	ND	28	11	ug/l	
87-86-5	Pentachlorophenol	ND	28	11	ug/l	
108-95-2	Phenol	ND	5.6	2.2	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.6	1.1	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.6	1.1	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.6	1.3	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.6	2.2	ug/l	
100-51-6	Benzyl Alcohol	ND	5.6	1.1	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.6	1.4	ug/l	
106-47-8	4-Chloroaniline	ND	5.6	2.2	ug/l	
86-74-8	Carbazole	ND	5.6	1.1	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.6	1.1	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.6	1.1	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.6	1.1	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.6	1.4	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.6	1.7	ug/l	
541-73-1	1,3-Dichlorobenzene	ND UL	5.6	1.8	ug/l	
106-46-7	1,4-Dichlorobenzene	ND UL	5.6	1.7	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.6	1.1	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.6	1.1	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	11	2.2	ug/l	
132-64-9	Dibenzofuran	ND	5.6	1.1	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	8B		
Lab Sample ID:	F52110-3	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.6	2.2	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.6	2.2	ug/l	
84-66-2	Diethyl phthalate	ND	5.6	2.2	ug/l	
131-11-3	Dimethyl phthalate	ND	5.6	2.2	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.6	2.2	ug/l	
118-74-1	Hexachlorobenzene	ND	5.6	1.3	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.6	1.9	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.6	1.7	ug/l	
67-72-1	Hexachloroethane	ND	5.6	2.1	ug/l	
78-59-1	Isophorone	ND	5.6	1.1	ug/l	
88-74-4	2-Nitroaniline	ND	11	2.2	ug/l	
99-09-2	3-Nitroaniline	ND	11	2.2	ug/l	
100-01-6	4-Nitroaniline	ND	11	2.2	ug/l	
98-95-3	Nitrobenzene	ND	5.6	1.1	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.6	1.1	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.6	1.1	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.6	1.7	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	33%		14-62%
4165-62-2	Phenol-d5	24%		10-40%
118-79-6	2,4,6-Tribromophenol	70%		33-118%
4165-60-0	Nitrobenzene-d5	59%		42-108%
321-60-8	2-Fluorobiphenyl	52%		40-106%
1718-51-0	Terphenyl-d14	80%		39-121%

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

Raw Data: W036994.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	8B		
Lab Sample ID:	F52110-3	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036994.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.1	0.56	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.56	ug/l	
120-12-7	Anthracene	ND	1.1	0.56	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.22	0.056	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.22	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.22	0.056	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.22	0.11	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.22	0.11	ug/l	
218-01-9	Chrysene	ND	0.22	0.11	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.22	0.056	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.28	ug/l	
86-73-7	Fluorene	ND	1.1	0.28	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.22	0.056	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-20-3	Naphthalene	ND	1.1	0.28	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.56	ug/l	
129-00-0	Pyrene	ND	1.1	0.28	ug/l	

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

Raw Data: L038371.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038371.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1040 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	24	9.6	ug/l	
95-57-8	2-Chlorophenol	ND	4.8	0.96	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.8	1.9	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.8	0.96	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.8	1.9	ug/l	
51-28-5	2,4-Dinitrophenol	ND	24	9.6	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.6	1.9	ug/l	
95-48-7	2-Methylphenol	ND	4.8	0.96	ug/l	
	3&4-Methylphenol	ND	4.8	1.2	ug/l	
88-75-5	2-Nitrophenol	ND	4.8	0.96	ug/l	
100-02-7	4-Nitrophenol	ND	24	9.6	ug/l	
87-86-5	Pentachlorophenol	ND	24	9.6	ug/l	
108-95-2	Phenol	ND	4.8	1.9	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.8	0.96	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.8	0.96	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.8	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.8	1.9	ug/l	
100-51-6	Benzyl Alcohol	ND	4.8	0.96	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.8	1.2	ug/l	
106-47-8	4-Chloroaniline	ND	4.8	1.9	ug/l	
86-74-8	Carbazole	ND	4.8	0.96	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.8	0.96	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.8	0.96	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.8	0.96	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.8	1.2	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.8	1.4	ug/l	
541-73-1	1,3-Dichlorobenzene	ND VL	4.8	1.5	ug/l	
106-46-7	1,4-Dichlorobenzene	ND VL	4.8	1.4	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.8	0.96	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.8	0.96	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.6	1.9	ug/l	
132-64-9	Dibenzofuran	ND	4.8	0.96	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	4.8	1.9	ug/l	
117-84-0	Di-n-octyl phthalate	ND	4.8	1.9	ug/l	
84-66-2	Diethyl phthalate	ND	4.8	1.9	ug/l	
131-11-3	Dimethyl phthalate	ND	4.8	1.9	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	4.8	1.9	ug/l	
118-74-1	Hexachlorobenzene	ND	4.8	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	4.8	1.6	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.8	1.4	ug/l	
67-72-1	Hexachloroethane	ND	4.8	1.8	ug/l	
78-59-1	Isophorone	ND	4.8	0.96	ug/l	
88-74-4	2-Nitroaniline	ND	9.6	1.9	ug/l	
99-09-2	3-Nitroaniline	ND	9.6	1.9	ug/l	
100-01-6	4-Nitroaniline	ND	9.6	1.9	ug/l	
98-95-3	Nitrobenzene	ND	4.8	0.96	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.8	0.96	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.8	0.96	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	4.8	1.4	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	33%		14-62%
4165-62-2	Phenol-d5	22%		10-40%
118-79-6	2,4,6-Tribromophenol	72%		33-118%
4165-60-0	Nitrobenzene-d5	66%		42-108%
321-60-8	2-Fluorobiphenyl	57%		40-106%
1718-51-0	Terphenyl-d14	75%		39-121%

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

Raw Data: W036995.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036995.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	1040 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.96	0.48	ug/l	
208-96-8	Acenaphthylene	ND	0.96	0.48	ug/l	
120-12-7	Anthracene	ND	0.96	0.48	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.19	0.048	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.19	0.096	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.19	0.048	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.19	0.096	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.19	0.096	ug/l	
218-01-9	Chrysene	ND	0.19	0.096	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.19	0.048	ug/l	
206-44-0	Fluoranthene	ND	0.96	0.24	ug/l	
86-73-7	Fluorene	ND	0.96	0.24	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.19	0.048	ug/l	
90-12-0	1-Methylnaphthalene	ND	0.96	0.24	ug/l	
91-57-6	2-Methylnaphthalene	ND	0.96	0.24	ug/l	
91-20-3	Naphthalene	ND	0.96	0.24	ug/l	
85-01-8	Phenanthrene	ND	0.96	0.48	ug/l	
129-00-0	Pyrene	ND	0.96	0.24	ug/l	

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

Raw Data: L038372.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038372.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	9.8	ug/l	
95-57-8	2-Chlorophenol	ND	4.9	0.98	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.9	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.9	0.98	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.9	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	9.8	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.8	2.0	ug/l	
95-48-7	2-Methylphenol	ND	4.9	0.98	ug/l	
	3&4-Methylphenol	ND	4.9	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	4.9	0.98	ug/l	
100-02-7	4-Nitrophenol	ND	25	9.8	ug/l	
87-86-5	Pentachlorophenol	ND	25	9.8	ug/l	
108-95-2	Phenol	ND	4.9	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.9	0.98	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.9	0.98	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.9	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.9	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	4.9	0.98	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.9	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	4.9	2.0	ug/l	
86-74-8	Carbazole	ND	4.9	0.98	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.9	0.98	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.9	0.98	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.9	0.98	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.9	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.9	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND VL	4.9	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND VL	4.9	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.9	0.98	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.9	0.98	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	9.8	2.0	ug/l	
132-64-9	Dibenzofuran	ND	4.9	0.98	ug/l	

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

Form I Corp

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	4.9	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	4.9	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	4.9	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	4.9	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	4.9	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	4.9	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	4.9	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.9	1.5	ug/l	
67-72-1	Hexachloroethane	ND	4.9	1.9	ug/l	
78-59-1	Isophorone	ND	4.9	0.98	ug/l	
88-74-4	2-Nitroaniline	ND	9.8	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	9.8	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	9.8	2.0	ug/l	
98-95-3	Nitrobenzene	ND	4.9	0.98	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.9	0.98	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.9	0.98	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	4.9	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	29%		14-62%
4165-62-2	Phenol-d5	22%		10-40%
118-79-6	2,4,6-Tribromophenol	61%		33-118%
4165-60-0	Nitrobenzene-d5	52%		42-108%
321-60-8	2-Fluorobiphenyl	46%		40-106%
1718-51-0	Terphenyl-d14	68%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W036996.D

Form I GC

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036996.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	1020 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.98	0.49	ug/l	
208-96-8	Acenaphthylene	ND	0.98	0.49	ug/l	
120-12-7	Anthracene	ND	0.98	0.49	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.049	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.098	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.049	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.098	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.098	ug/l	
218-01-9	Chrysene	ND	0.20	0.098	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.049	ug/l	
206-44-0	Fluoranthene	ND	0.98	0.25	ug/l	
86-73-7	Fluorene	ND	0.98	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.049	ug/l	
90-12-0	1-Methylnaphthalene	ND	0.98	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	0.98	0.25	ug/l	
91-20-3	Naphthalene	ND	0.98	0.25	ug/l	
85-01-8	Phenanthrene	ND	0.98	0.49	ug/l	
129-00-0	Pyrene	ND	0.98	0.25	ug/l	

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

Raw Data: L038373.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038373.D	1	09/14/07	RB	08/31/07	OP22139	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	26	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.1	1.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.1	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.1	1.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.1	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	26	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	2.0	ug/l	
95-48-7	2-Methylphenol	ND	5.1	1.0	ug/l	
	3&4-Methylphenol	ND	5.1	1.3	ug/l	
88-75-5	2-Nitrophenol	ND	5.1	1.0	ug/l	
100-02-7	4-Nitrophenol	ND	26	10	ug/l	
87-86-5	Pentachlorophenol	ND	26	10	ug/l	
108-95-2	Phenol	ND	5.1	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.1	1.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.1	1.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.1	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.1	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.1	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.1	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	5.1	2.0	ug/l	
86-74-8	Carbazole	ND	5.1	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.1	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.1	1.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.1	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.1	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.1	1.5	ug/l	
541-73-1	1,3-Dichlorobenzene	ND VL	5.1	1.6	ug/l	
106-46-7	1,4-Dichlorobenzene	ND VL	5.1	1.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.1	1.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.1	1.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	2.0	ug/l	
132-64-9	Dibenzofuran	ND	5.1	1.0	ug/l	

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

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.1	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.1	2.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.1	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.1	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.1	2.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.1	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND VL	5.1	1.7	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.1	1.5	ug/l	
67-72-1	Hexachloroethane	ND VL	5.1	1.9	ug/l	
78-59-1	Isophorone	ND	5.1	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	2.0	ug/l	
99-09-2	3-Nitroaniline	ND	10	2.0	ug/l	
100-01-6	4-Nitroaniline	ND	10	2.0	ug/l	
98-95-3	Nitrobenzene	ND	5.1	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.1	1.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.1	1.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.1	1.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	31%		14-62%
4165-62-2	Phenol-d5	21%		10-40%
118-79-6	2,4,6-Tribromophenol	60%		33-118%
4165-60-0	Nitrobenzene-d5	56%		42-108%
321-60-8	2-Fluorobiphenyl	51%		40-106%
1718-51-0	Terphenyl-d14	67%		39-121%

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

Raw Data: W036997.D

Run 1 Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036997.D	1	09/20/07	RB	08/31/07	OP22140	SW1906
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.51	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.51	ug/l	
120-12-7	Anthracene	ND	1.0	0.51	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.051	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.051	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.051	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.26	ug/l	
86-73-7	Fluorene	ND	1.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.051	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-20-3	Naphthalene	ND	1.0	0.26	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.51	ug/l	
129-00-0	Pyrene	ND	1.0	0.26	ug/l	

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

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

Shaw® Shaw Environmental, Inc.

MEMORANDUM

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

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation - Volatiles
Accutest Laboratories, Inc., SDG F52110

DATE: November 15, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 27, 2007. The samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) using USEPA SW846 Method 5030B/8260B for aqueous matrices. A total of six aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
P-4	F52110-1	41MW1	F52110-4
S4W-1	F52110-2	41MW2	F52110-5
8B	F52110-3	41MW3	F52110-6

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

Table 1 Laboratory Performance Criteria

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

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

Eric Malarek, Chemist

10/15/07
Date

RFAAP VALIDATION REPORT
VOLATILES REVIEW
SDG F52110

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of analysis. Holding time criteria: For aqueous samples cooled @ 4°C±2°C; pH<2 HCl, the maximum holding time is 14 days (7 days if no HCl added) from sample collection to analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/27/07, the coolers were received by the primary laboratory (Accutest) on 08/28/07 at 0.6°C, 1.2°C, 0.8°C, 0.2°C, 0.4°C, 1.0°C, 0.6°C, 0.6°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 3.0°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 3.6°C. Some of the receipt temperatures were below criteria; however, did no impact the data quality. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/27/07, the VOCs were prepped and analyzed on 09/06/07 and 09/10/07. Samples 41MW1 (F52110-4) and 41MW2 (F52110-5) were received pH>2 and analyzed on 09/06/07 and 09/10/07 (respectively) beyond the 7 day holding time. Samples 41MW1 (F52110-4) and 41MW2 (F52110-5) were qualified "L" for detects and "UL" for non-detects based upon this outlier for all aromatic VOCs (benzene, chlorobenzene, ethylbenzene, toluene, styrene, o-xylene, and m,p-xylenes). For all other samples, all criteria were met.

II-Instrument Performance Check
The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, bromofluorobenzene (BFB), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent relative standard deviation (%RSD) must be ≤15% for each target compound and must be ≤30% for each calibration check compound. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration performed on 09/06/07 on instrument MSVOA7, target compounds vinyl chloride (19.3%), bromomethane (20.6%), chloroethane (16.4%), 1,1-dichloroethene (20.5%), carbon disulfide (17.2%), methylene chloride (83.5%; grossly exceeding), 1,1,1-trichloroethane (18.9%), carbon tetrachloride (24.8%), trichloroethene (16.2%), tetrachloroethene (16.3%), ethylbenzene (15.5%), m,p-xylenes (15.7%), o-xylene (16.4%), styrene (19.0%), and bromoform (19.0%) were outside %RSD/RRF criteria. All RSDs/RRFs (RRF≥0.05) were within criteria for all other target compounds. Compounds vinyl chloride (r=0.9995), bromomethane (r=0.9989), chloroethane (r=0.9989), 1,1-dichloroethene (r=0.9971), carbon disulfide (r=0.9994), methylene chloride (r=0.9987), 1,1,1-trichloroethane (r=0.9996), carbon tetrachloride (r=0.9981), trichloroethene (r=0.9996), tetrachloroethene (r=0.9994), ethylbenzene (r=0.9997), m,p-xylenes (r=0.9995), o-xylene (r=0.9996), and styrene (r=0.9996) were quantified using linear or higher order with correlations >0.995; therefore, no qualifiers were applied based upon these outliers. Bromoform was non-detect for all associated samples; therefore, no qualifiers were applied based upon this outlier. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), and 41MW1 (F52110-4) were analyzed using this initial calibration.

- For initial calibration performed on 09/07/07 on instrument MSVOA7, target compounds bromomethane (21.5%), 1,1-dichloroethene (15.9%), carbon disulfide (15.5%), methylene chloride (41.5%; grossly exceeding), chloroform (19.2%), 1,1,1-trichloroethane (16.1%), carbon tetrachloride (18.6%), styrene (16.9%), and bromoform (17.1%) were outside %RSD/RRF criteria. All RSDs/RRFs (RRF≥0.05) were within criteria for all other target compounds. Compounds 1,1-dichloroethene (r=0.9988), carbon disulfide (r=0.9983), methylene chloride (r=0.9998), chloroform (r=0.9998), 1,1,1-trichloroethane (r=0.9992), carbon tetrachloride (r=0.9983), and styrene (r=0.9997) were quantified using linear or higher order with correlations >0.995; therefore, no qualifiers were applied based upon these outliers. Bromomethane and bromoform were non-detect for all associated samples; therefore, no qualifiers were applied based upon this outlier. Samples 41MW2 (F52110-5) and 41MW3 (F52110-6) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Continuing calibration establishes the 12-hour relative response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within 20% for all target compounds. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration verification performed on 09/06/07 @15:19 on instrument MSVOA7, chloroethane (23.6%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Chloroethane was non-detect for all samples; therefore, no qualifiers were applied based upon the high %Ds/%Drifts. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), and 41MW1 (F52110-4) apply to this initial calibration verification.

- For initial calibration verification performed on 09/07/07 @16:58 on instrument MSVOA7, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For continuing calibration performed on 09/10/07 @10:26 on instrument MSVOA7, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No qualifiers were applied. Samples 41MW2 (F52110-5) and 41MW3 (F52110-6) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of BFB. No contaminants should be detected in any of the associated blanks > the MDL. The DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants methylene chloride, acetone, and 2-butanone). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants methylene chloride, acetone, and 2-butanone (MEK), or 5 times (5X) the maximum amount for other volatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank 082307R (F52035-5) (low-flow pump) applies to groundwater samples P-4 (F52110-1), S4W-1 (F52110-2), and 8B (F52110-3) in this SDG. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater samples 41MW1 (F52110-4), 41MW2 (F52110-5), and 41MW3 (F52110-6) in this SDG. The trip blank TB082707 (F52110-7) applies to the aqueous samples collected 08/27/07 in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/06/07	VM905-MB	Chloroform	0.53J	2.65	None
09/06/07	VM905-MB	Methylene Chloride	1.2J	12.0	None
09/10/07	VM907-MB	Chloroform	0.53J	2.65	None
09/10/07	VM907-MB	Methylene Chloride	1.6J	16.0	None
09/05/07	082307R	All target <½MRL	NA	NA	None
09/13/07	083007R	All target <½MRL	NA	NA	None
09/10/07	TB082707	Methylene Chloride	1.1JB	5.50	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
B = Analyte was found in associated method blank.
NA = Not Applicable
MRL = Method Reporting Limit

VI-Laboratory Control Sample

Data for laboratory control samples (LCS) are evaluated to determine long-term accuracy of the analytical method on various matrices. Percent recoveries (%Rs) should be within the specified control limits. The DoD aqueous LCS recovery limits are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample VM905-BS was used as the aqueous LCS for the VOC analysis on 09/06/07. Chloromethane (128%) was above DoD QSM criteria and within laboratory control limits. All samples were non-detect for chloromethane; therefore, no qualifiers were applied based upon this outlier. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), and 41MW1 (F52110-4) apply to this LCS.

- Sample VM907-BS was used as the aqueous LCS for the VOC analysis on 09/10/07. All criteria were met. No qualifiers were applied. Samples 41MW2 (F52110-5) and 41MW3 (F52110-6) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. The DoD MS/MSD aqueous recovery limits follow the LCS criteria and are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample F52139-4 was used for the aqueous MS/MSD analysis for analysis on 09/06/07. Since this sample is not a RFAAP site sample, it was not evaluated. No qualifiers were applied. Samples P-4 (F52110-1), S4W-1 (F52110-2), 8B (F52110-3), and 41MW1 (F52110-4) apply to this MS/MSD.

- Sample 41MW2 (F52110-5) was used for the aqueous MS/MSD analysis on 09/10/07. 2-Hexanone (129%, 130%), 4-methyl-2-pentanone (129%, 126%), and chloromethane (134%, 129%) were above DoD QSM criteria and/or laboratory control limits. All samples were non-detect for 2-hexanone, 4-methyl-2-pentanone, and chloromethane; therefore, no qualifiers were applied based upon these outliers. All other percent recoveries were within criteria for all target compounds. Samples 41MW2 (F52110-5) and 41MW3 (F52110-6) apply to this MS/MSD.

VIII-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Recoveries for system monitoring compounds in volatile samples and blanks must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria: Dibromofluoromethane (87-116%) (DoD QSM = 85-115%)
1,2-Dichloroethane-d4 (76-127%) (DoD QSM = 70-120%)
Toluene-d8 (86-112%) (DoD QSM = 85-120%)
4-Bromofluorobenzene (84-120%) (DoD QSM = 75-120%)

- All criteria were met. No qualifiers were applied.

IX-Internal Standards (IS)
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

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

- No field sample duplicate pair was analyzed with this SDG.

XI-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: 41MW2 (F52110-5), tetrachloroethylene

Conc. (µg/L) = (Ax)*(Is) *(DF)/(Ais)*(RRF)

where: Ax is the compound area
Ais is the corresponding internal standard area
Is is the corresponding internal standard concentration (µg/L)
DF is the dilution factor
RRF is the relative response factor.

Conc. µg/L = (17459 * 50 µg/L * 1) / (1731790 * 0.297) = 1.7 µg/L

Reported Conc. = 1.7 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

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

Laboratory Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

D = Indicates sample was analyzed at a dilution.

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

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

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

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

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

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

Raw Data: M0022076.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-4		
Lab Sample ID:	F52110-1	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M0022076.D	1	09/06/07	MM	n/a	n/a	VM905
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Ken I Carey

Accutest Laboratories

Report of Analysis

Client Sample ID:	P-4		
Lab Sample ID:	F52110-1	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	97%		87-116%
17060-07-0	1,2-Dichloroethane-D4	99%		76-127%
2037-26-5	Toluene-D8	98%		86-112%
460-00-4	4-Bromofluorobenzene	99%		84-120%

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

Run I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	S4W-1		
Lab Sample ID:	F52110-2	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M0022077.D	1	09/06/07	MM	n/a	n/a	VM905
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	S4W-1		
Lab Sample ID:	F52110-2	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	100%		76-127%
2037-26-5	Toluene-D8	99%		86-112%
460-00-4	4-Bromofluorobenzene	96%		84-120%

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

Raw Data: M0022078.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	8B		
Lab Sample ID:	F52110-3	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M0022078.D	1	09/06/07	MM	n/a	n/a	VM905
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.61	1.0	0.25	ug/l	J
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	8B		
Lab Sample ID:	F52110-3	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	100%		84-120%

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

Raw Data: M0022079.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	M0022079.D	1	09/06/07	MM	n/a	n/a	VM905
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND VL	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND VL	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND VL	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND VL	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.35 J	1.0	0.25	ug/l	J
108-88-3	Toluene	ND VL	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW1		
Lab Sample ID:	F52110-4	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		87-116%
17060-07-0	1,2-Dichloroethane-D4	100%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	98%		84-120%

(a) Sample was not preserved to a pH < 2; reported results are considered minimum values.

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

Raw Data: M0022096.D

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	M0022096.D	1	09/10/07	MM	n/a	n/a	VM907
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	17	1.0	0.25	ug/l	
108-88-3	Toluene	0.30	1.0	0.27	ug/l	J
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW2		
Lab Sample ID:	F52110-5	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	103%		84-120%

(a) Sample was not preserved to a pH < 2; reported results are considered minimum values.

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M0022097.D	1	09/10/07	MM	n/a	n/a	VM907
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	0.80 J	1.0	0.25	ug/l	J
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41MW3		
Lab Sample ID:	F52110-6	**Date Sampled:**	08/27/07
Matrix:	AQ - Ground Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		87-116%
17060-07-0	1,2-Dichloroethane-D4	101%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	104%		84-120%

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

Raw Data: M0022098.D

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB082707		
Lab Sample ID:	F52110-7	**Date Sampled:**	08/27/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M0022098.D	1	09/10/07	MM	n/a	n/a	VM907
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	1.1 J	5.0	1.0	ug/l	JB
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB082707		
Lab Sample ID:	F52110-7	**Date Sampled:**	08/27/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/28/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	103%		84-120%

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

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

Shaw® Shaw Environmental, Inc.

MEMORANDUM

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

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Semi-Volatiles & Polynuclear Aromatic Hydrocarbons Accutest Laboratories, Inc., SDG F52137

DATE: November 20, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 28, 2007. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW846 Methods 3510C/8270C for aqueous matrices. The polynuclear aromatic hydrocarbons (PAHs) were analyzed using selective ion monitoring (SIM) techniques. A total of three aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41GW01	F52137-1	WC1-2	F52137-6
41GW02	F52137-2		

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

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
X		Laboratory Control Sample
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

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

Eric Malarek, Chemist

11/20/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F52137

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For semivolatile (SVOC) and polynuclear aromatic hydrocarbons (PAH) compounds , the samples are cooled @4°C ± 2°C for aqueous samples with a maximum holding time of 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/28/07, the coolers were received by the primary laboratory (Accutest) on 08/29/07 at 2.4°C, 2.0°C, and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.4°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.6°C. All criteria were met. No qualifiers were applied. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the groundwater samples collected 08/28/07, the SVOCs were extracted on 09/04/07 and analyzed on 09/13/07. For the PAHs by SIM, they were extracted on 09/04/07 and analyzed on 09/18/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for compounds on the semivolatile target compound list (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. The minimum relative response factor (RRF) criteria must be ≥0.05. The DoD QSM specifies that the initial calibration percent relative standard deviation (%RSD) must be ≤15% on the average for all compounds (<30% for CCCs). All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- Initial calibration for the SVOCs was performed on 08/21/07 on instrument MSBNA02. Target compounds hexachlorocyclopentadiene (29.2%) and 4,6-dinitro-2-methylphenol (16.5%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds hexachlorocyclopentadiene (r=0.9990) and 4,6-dinitro-2-methylphenol (r=0.9984) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/05/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/19/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. No samples reported were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 09/20/07 on instrument MSBNA01, all target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). No qualifiers were applied. No samples reported were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥0.05. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ±20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For SVOC initial calibration verification performed on 08/21/07 @15:20 on instrument MSBNA02, 4-chloroaniline (45.7%; grossly exceeding) and 3-nitroaniline (30.2%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 3-nitroaniline and 4-chloroaniline. No qualification applies for 3-nitroaniline. 4-Chloroaniline would be qualified bias low "UL"; however no samples reported apply to this initial calibration verification. No qualifiers were applied.

- For SVOC initial calibration verification performed on 08/21/07 @15:48 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 09/13/07 @16:15 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/05/07 @12:35 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/18/07 @12:23 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/19/07 @22:41 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/19/07 @23:23 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 09/20/07 @16:43 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 09/20/07 @18:11 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were sampled with disposable bailers; therefore, no rinse blank applies to these samples. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater sample WC1-2 (F52137-6) in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/13/07	OP22181-MB	All SVOC target <½MRL	NA	NA	None
09/18/07	OP22182-MB	All PAH SIM target <½MRL	NA	NA	None
09/20/07	OP22182-MB	All PAH SIM target <½MRL	NA	NA	None
09/15/07	RB083007	All SVOC target <½MRL	NA	NA	None
09/20/07	RB083007	All PAH SIM target <½MRL	NA	NA	None

NA = Not applicable.
MRL = Method reporting limit.

VI-Surrogate Spikes
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-2 and Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:
2-Fluorophenol (14-62%) – (DoD QSM = 20-110%)
Phenol – d5 (10-40%) – (DoD QSM = 10-115%)
2,4,6-Tribromophenol (33-118%) – (DoD QSM = 40-125%)
Nitrobenzene-d5 (42-108%) – (DoD QSM = 40-110%)
2-Fluorobiphenyl (40-106%) – (DoD QSM = 50-110%)
p-Terphenyl – d14 (39-121%) – (DoD QSM = 50-135%)

- All criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD LCS aqueous recovery limits are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP22181-BS was used as the aqueous LCS for the SVOC analysis on 09/13/07. All target compounds were within criteria. No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this LCS.

- Sample OP22182-BS2 was used as the aqueous LCS for the PAH SIM analysis on 09/20/07. Benzo(a)pyrene (68%), benzo(b)flouranthene (68%), benzo(k)flouranthene (68%), chrysene (68%), flouranthene (68%), naphthalene (57%), phenanthene (66%), and pyrene (62%) were below laboratory; however, within DoD QSM accuracy criteria. All other target compounds were within criteria. Benzo(a)pyrene, benzo(b)flouranthene, benzo(k)flouranthene, chrysene, flouranthene, naphthalene, phenanthene, and pyrene were non-detect for all associated samples and were qualified "UL" based upon the low recoveries. All other PAHs were within criteria. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this LCS.

- Sample OP22182-BS2 was used as the aqueous LCS for the PAH SIM analysis on 09/20/07. All target compounds were within criteria. No qualifiers were applied. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD aqueous MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample WC1-2 (F52137-6) was used for the aqueous MS/MSD for SVOC analysis on 09/13/07. 4-Nitrophenol (61%, 61%) was above the laboratory criteria and within the DoD QSM criteria. 3,3'-Dichlorobenzidine (55%) was below the laboratory criteria and within the DoD QSM criteria. 4-Nitrophenol and 3,3'-dichlorobenzidine were within control limits for the associated LCS (Section VIII). 4-Nitrophenol was non-detect for the spiked sample; therefore, no qualifiers were applied based upon this outlier. All other compounds were within criteria. 3,3'-Dichlorobenzidine was non-detect for the spiked sample and qualified "UL" based upon the low recovery. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this MS/MSD.

- Sample F52188-3 was used for the MS/MSD for the aqueous PAH SIM analysis on 09/20/07. The spiked sample was not a RFAAP site sample; therefore, it was not evaluated. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) apply to this MS/MSD.

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

- No field sample duplicate pair was analyzed with this SDG.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: 41GW01 (F52137-1), diethylphthalate

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (14655 * 40 * 1000 * 1) / (196694 * 1.328 * 900 * 1) = 2.5 ng/mL
= 2.5 µg/L

Reported Value = 2.5 µg/L
% Difference = 0.0%
Values were within 10% difference.

Sample: OP22182-BS2, fluorene

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (1546371 * 4 * 1000 * 1) / (301990 * 1.254 * 1000 * 1) = 16.3 ng/mL
= 16.3 µg/L

Reported Value = 16.3 µg/L
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

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

Laboratory Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

D = Indicates sample was analyzed at a dilution.

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

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

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

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

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

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038354.D	1	09/13/07	RB	09/04/07	OP22181	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	28	11	ug/l	
95-57-8	2-Chlorophenol	ND	5.6	1.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.6	2.2	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.6	1.1	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.6	2.2	ug/l	
51-28-5	2,4-Dinitrophenol	ND	28	11	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	11	2.2	ug/l	
95-48-7	2-Methylphenol	ND	5.6	1.1	ug/l	
	3&4-Methylphenol	ND	5.6	1.4	ug/l	
88-75-5	2-Nitrophenol	ND	5.6	1.1	ug/l	
100-02-7	4-Nitrophenol	ND	28	11	ug/l	
87-86-5	Pentachlorophenol	ND	28	11	ug/l	
108-95-2	Phenol	ND	5.6	2.2	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.6	1.1	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.6	1.1	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.6	1.3	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.6	2.2	ug/l	
100-51-6	Benzyl Alcohol	ND	5.6	1.1	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.6	1.4	ug/l	
106-47-8	4-Chloroaniline	ND	5.6	2.2	ug/l	
86-74-8	Carbazole	ND	5.6	1.1	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.6	1.1	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.6	1.1	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.6	1.1	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.6	1.4	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.6	1.7	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.6	1.8	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.6	1.7	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.6	1.1	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.6	1.1	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	11	2.2	ug/l	
132-64-9	Dibenzofuran	ND	5.6	1.1	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.6	2.2	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.6	2.2	ug/l	
84-66-2	Diethyl phthalate	2.5 J	5.6	2.2	ug/l	J
131-11-3	Dimethyl phthalate	ND	5.6	2.2	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.6	2.2	ug/l	
118-74-1	Hexachlorobenzene	ND	5.6	1.3	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.6	1.9	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.6	1.7	ug/l	
67-72-1	Hexachloroethane	ND	5.6	2.1	ug/l	
78-59-1	Isophorone	ND	5.6	1.1	ug/l	
88-74-4	2-Nitroaniline	ND	11	2.2	ug/l	
99-09-2	3-Nitroaniline	ND	11	2.2	ug/l	
100-01-6	4-Nitroaniline	ND	11	2.2	ug/l	
98-95-3	Nitrobenzene	ND	5.6	1.1	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.6	1.1	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.6	1.1	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.6	1.7	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	31%		14-62%
4165-62-2	Phenol-d5	22%		10-40%
118-79-6	2,4,6-Tribromophenol	75%		33-118%
4165-60-0	Nitrobenzene-d5	61%		42-108%
321-60-8	2-Fluorobiphenyl	60%		40-106%
1718-51-0	Terphenyl-d14	61%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036925.D	1	09/18/07	RB	09/04/07	OP22182	SW1902
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.1	0.56	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.56	ug/l	
120-12-7	Anthracene	ND	1.1	0.56	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.22	0.056	ug/l	
50-32-8	Benzo(a)pyrene	ND VL	0.22	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND VL	0.22	0.056	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.22	0.11	ug/l	
207-08-9	Benzo(k)fluoranthene	ND VL	0.22	0.11	ug/l	
218-01-9	Chrysene	ND VL	0.22	0.11	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.22	0.056	ug/l	
206-44-0	Fluoranthene	ND VL	1.1	0.28	ug/l	
86-73-7	Fluorene	ND	1.1	0.28	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.22	0.056	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.1	0.28	ug/l	
91-20-3	Naphthalene	ND VL	1.1	0.28	ug/l	
85-01-8	Phenanthrene	ND VL	1.1	0.56	ug/l	
129-00-0	Pyrene	ND VL	1.1	0.28	ug/l	

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

Raw Data: L038355.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038355.D	1	09/13/07	RB	09/04/07	OP22181	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	800 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	31	13	ug/l	
95-57-8	2-Chlorophenol	ND	6.3	1.3	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	6.3	2.5	ug/l	
120-83-2	2,4-Dichlorophenol	ND	6.3	1.3	ug/l	
105-67-9	2,4-Dimethylphenol	ND	6.3	2.5	ug/l	
51-28-5	2,4-Dinitrophenol	ND	31	13	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	13	2.5	ug/l	
95-48-7	2-Methylphenol	ND	6.3	1.3	ug/l	
	3&4-Methylphenol	ND	6.3	1.6	ug/l	
88-75-5	2-Nitrophenol	ND	6.3	1.3	ug/l	
100-02-7	4-Nitrophenol	ND	31	13	ug/l	
87-86-5	Pentachlorophenol	ND	31	13	ug/l	
108-95-2	Phenol	ND	6.3	2.5	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	6.3	1.3	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	6.3	1.3	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	6.3	1.5	ug/l	
85-68-7	Butyl benzyl phthalate	ND	6.3	2.5	ug/l	
100-51-6	Benzyl Alcohol	ND	6.3	1.3	ug/l	
91-58-7	2-Chloronaphthalene	ND	6.3	1.6	ug/l	
106-47-8	4-Chloroaniline	ND	6.3	2.5	ug/l	
86-74-8	Carbazole	ND	6.3	1.3	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	6.3	1.3	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	6.3	1.3	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	6.3	1.3	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	6.3	1.6	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	6.3	1.9	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	6.3	2.0	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	6.3	1.9	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	6.3	1.3	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	6.3	1.3	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	13	2.5	ug/l	
132-64-9	Dibenzofuran	ND	6.3	1.3	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	6.3	2.5	ug/l	
117-84-0	Di-n-octyl phthalate	ND	6.3	2.5	ug/l	
84-66-2	Diethyl phthalate	ND	6.3	2.5	ug/l	
131-11-3	Dimethyl phthalate	ND	6.3	2.5	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	6.3	2.5	ug/l	
118-74-1	Hexachlorobenzene	ND	6.3	1.5	ug/l	
87-68-3	Hexachlorobutadiene	ND	6.3	2.1	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	6.3	1.9	ug/l	
67-72-1	Hexachloroethane	ND	6.3	2.4	ug/l	
78-59-1	Isophorone	ND	6.3	1.3	ug/l	
88-74-4	2-Nitroaniline	ND	13	2.5	ug/l	
99-09-2	3-Nitroaniline	ND	13	2.5	ug/l	
100-01-6	4-Nitroaniline	ND	13	2.5	ug/l	
98-95-3	Nitrobenzene	ND	6.3	1.3	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	6.3	1.3	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	6.3	1.3	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	6.3	1.9	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	38%		14-62%
4165-62-2	Phenol-d5	28%		10-40%
118-79-6	2,4,6-Tribromophenol	68%		33-118%
4165-60-0	Nitrobenzene-d5	72%		42-108%
321-60-8	2-Fluorobiphenyl	68%		40-106%
1718-51-0	Terphenyl-d14	57%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W036926.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036926.D	1	09/18/07	RB	09/04/07	OP22182	SW1902
Run #2							

	Initial Volume	Final Volume
Run #1	800 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.3	0.63	ug/l	
208-96-8	Acenaphthylene	ND	1.3	0.63	ug/l	
120-12-7	Anthracene	ND	1.3	0.63	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.25	0.063	ug/l	
50-32-8	Benzo(a)pyrene	ND VL	0.25	0.13	ug/l	
205-99-2	Benzo(b)fluoranthene	ND VL	0.25	0.063	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.25	0.13	ug/l	
207-08-9	Benzo(k)fluoranthene	ND VL	0.25	0.13	ug/l	
218-01-9	Chrysene	ND VL	0.25	0.13	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.25	0.063	ug/l	
206-44-0	Fluoranthene	ND VL	1.3	0.31	ug/l	
86-73-7	Fluorene	ND	1.3	0.31	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.25	0.063	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.3	0.31	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.3	0.31	ug/l	
91-20-3	Naphthalene	ND VL	1.3	0.31	ug/l	
85-01-8	Phenanthrene	ND VL	1.3	0.63	ug/l	
129-00-0	Pyrene	ND VL	1.3	0.31	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	WC1-2		
Lab Sample ID:	F52137-6	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L038356.D	1	09/13/07	RB	09/04/07	OP22181	SL1954
Run #2							

	Initial Volume	Final Volume
Run #1	1100 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	23	9.1	ug/l	
95-57-8	2-Chlorophenol	ND	4.5	0.91	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	4.5	1.8	ug/l	
120-83-2	2,4-Dichlorophenol	ND	4.5	0.91	ug/l	
105-67-9	2,4-Dimethylphenol	ND	4.5	1.8	ug/l	
51-28-5	2,4-Dinitrophenol	ND	23	9.1	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	9.1	1.8	ug/l	
95-48-7	2-Methylphenol	ND	4.5	0.91	ug/l	
	3&4-Methylphenol	ND	4.5	1.2	ug/l	
88-75-5	2-Nitrophenol	ND	4.5	0.91	ug/l	
100-02-7	4-Nitrophenol	ND	23	9.1	ug/l	
87-86-5	Pentachlorophenol	ND	23	9.1	ug/l	
108-95-2	Phenol	ND	4.5	1.8	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	4.5	0.91	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	4.5	0.91	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	4.5	1.1	ug/l	
85-68-7	Butyl benzyl phthalate	ND	4.5	1.8	ug/l	
100-51-6	Benzyl Alcohol	ND	4.5	0.91	ug/l	
91-58-7	2-Chloronaphthalene	ND	4.5	1.2	ug/l	
106-47-8	4-Chloroaniline	ND	4.5	1.8	ug/l	
86-74-8	Carbazole	ND	4.5	0.91	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	4.5	0.91	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	4.5	0.91	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	4.5	0.91	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	4.5	1.2	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	4.5	1.4	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	4.5	1.5	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	4.5	1.4	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	4.5	0.91	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	4.5	0.91	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND UL	9.1	1.8	ug/l	
132-64-9	Dibenzofuran	ND	4.5	0.91	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	WC1-2		
Lab Sample ID:	F52137-6	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	4.5	1.8	ug/l	
117-84-0	Di-n-octyl phthalate	ND	4.5	1.8	ug/l	
84-66-2	Diethyl phthalate	ND	4.5	1.8	ug/l	
131-11-3	Dimethyl phthalate	ND	4.5	1.8	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	4.5	1.8	ug/l	
118-74-1	Hexachlorobenzene	ND	4.5	1.1	ug/l	
87-68-3	Hexachlorobutadiene	ND	4.5	1.5	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	4.5	1.4	ug/l	
67-72-1	Hexachloroethane	ND	4.5	1.7	ug/l	
78-59-1	Isophorone	ND	4.5	0.91	ug/l	
88-74-4	2-Nitroaniline	ND	9.1	1.8	ug/l	
99-09-2	3-Nitroaniline	ND	9.1	1.8	ug/l	
100-01-6	4-Nitroaniline	ND	9.1	1.8	ug/l	
98-95-3	Nitrobenzene	ND	4.5	0.91	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	4.5	0.91	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	4.5	0.91	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	4.5	1.4	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	30%		14-62%
4165-62-2	Phenol-d5	20%		10-40%
118-79-6	2,4,6-Tribromophenol	78%		33-118%
4165-60-0	Nitrobenzene-d5	60%		42-108%
321-60-8	2-Fluorobiphenyl	59%		40-106%
1718-51-0	Terphenyl-d14	73%		39-121%

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	WC1-2		
Lab Sample ID:	F52137-6	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W036927.D	1	09/18/07	RB	09/04/07	OP22182	SW1902
Run #2							

	Initial Volume	Final Volume
Run #1	1100 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.91	0.45	ug/l	
208-96-8	Acenaphthylene	ND	0.91	0.45	ug/l	
120-12-7	Anthracene	ND	0.91	0.45	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.18	0.045	ug/l	
50-32-8	Benzo(a)pyrene	ND VL	0.18	0.091	ug/l	
205-99-2	Benzo(b)fluoranthene	ND VL	0.18	0.045	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.18	0.091	ug/l	
207-08-9	Benzo(k)fluoranthene	ND VL	0.18	0.091	ug/l	
218-01-9	Chrysene	ND VL	0.18	0.091	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.18	0.045	ug/l	
206-44-0	Fluoranthene	ND VL	0.91	0.23	ug/l	
86-73-7	Fluorene	ND	0.91	0.23	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.18	0.045	ug/l	
90-12-0	1-Methylnaphthalene	ND	0.91	0.23	ug/l	
91-57-6	2-Methylnaphthalene	ND	0.91	0.23	ug/l	
91-20-3	Naphthalene	ND VL	0.91	0.23	ug/l	
85-01-8	Phenanthrene	ND VL	0.91	0.45	ug/l	
129-00-0	Pyrene	ND VL	0.91	0.23	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
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 F52137

DATE: November 19, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at Main Manufacturing Area at RFAAP for a RFI/CMS Nine Sites on August 28, 2007. The samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) using USEPA SW846 Method 5030B/8260B for aqueous matrices. A total of three aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
41GW01	F52137-1	WC1-2	F52137-6
41GW02	F52137-2		

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

Table 1 Laboratory Performance Criteria

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

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

Eric Malarek, Chemist

11/19/07
Date

RFAAP VALIDATION REPORT
VOLATILES REVIEW
SDG F52137

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of analysis. Holding time criteria: For aqueous samples cooled @ 4°C±2°C; pH<2 HCl, the maximum holding time is 14 days (7 days if no HCl added) from sample collection to analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 08/28/07, the coolers were received by the primary laboratory (Accutest) on 08/29/07 at 2.4°C, 2.0°C, and 2.8°C. The herbicides were subcontracted to Accutest TX and were received the samples at 4.4°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the aqueous samples at 4.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 2.6°C. All criteria were met. No qualifiers were applied. No qualifiers were applied based upon these outliers.

- Holding Time Review: For the aqueous samples collected 08/28/07, the VOCs were prepped and analyzed on 09/10/07 and 09/11/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, bromofluorobenzene (BFB), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent relative standard deviation (%RSD) must be ≤15% for each target compound and must be ≤30% for each calibration check compound. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration performed on 09/07/07 on instrument MSVOA4, target compounds bromomethane (22.6%), chloroethane (15.6%), acetone (15.1%), methylene chloride (33.2%; grossly exceeding), 2-butanone (17.3%), 4-methyl-2-pentanone (24.7%), 2-hexanone (20.4%), and styrene (17.2%) were outside %RSD/RRF criteria. All RSDs/RRFs (RRF≥0.05) were within criteria for all other target compounds. Compounds bromomethane (r=0.9989), chloroethane (r=0.9983), acetone (r=0.9975), methylene chloride (r=0.9994), 2-butanone (r=0.9992), 4-methyl-2-pentanone (r=0.9992), 2-hexanone (r=0.9994), and styrene (r=0.9995) were quantified using linear or higher order with correlations >0.995; therefore, no qualifiers were applied based upon these outliers. Samples 41GW01 (F52137-1), 41GW02 (F52137-2), and WC1-2 (F52137-6) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Continuing calibration establishes the 12-hour relative response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within 20% for all target compounds. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration verification performed on 09/07/07 @13:07 on instrument MSVOA4, acetone (31.6%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Acetone was non-detect for all samples; therefore, no qualifiers were applied based upon the high %Drift. No samples reported apply to this initial calibration verification.

- For initial calibration verification performed on 09/10/07 @11:58 on instrument MSVOA4, acetone (28.8%) and methylene chloride (33.7%) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Acetone and methylene chloride were non-detect for all samples; therefore, no qualifiers were applied based upon the high %Drifts. Samples 41GW02 (F52137-2) and WC1-2 (F52137-6) apply to this initial calibration verification.

- For continuing calibration performed on 09/11/07 @11:01 on instrument MSVOA4, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No qualifiers were applied. Sample 41GW01 (F52137-1) applies to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of BFB. No contaminants should be detected in any of the associated blanks > the MDL. The DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants methylene chloride, acetone, and 2-butanone). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants methylene chloride, acetone, and 2-butanone (MEK), or 5 times (5X) the maximum amount for other volatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Samples 41GW01 (F52137-1) and 41GW02 (F52137-2) were sampled with disposable bailer; therefore, no rinse blank applies to these samples. Rinse blank RB083007 (F52208-1) (low-flow pump) applies to groundwater sample WC1-2 (F52137-6) in this SDG. The trip blank TB082807 (F52137-7) applies to the aqueous samples collected on 08/27/07 in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
09/10/07	VB2032-MB	All target <½MRL	NA	NA	None
09/11/07	VB2033-MB	All target <½MRL	NA	NA	None
09/13/07	083007R	All target <½MRL	NA	NA	None
09/10/07	TB082807	Methylene Chloride	1.3JB	6.50	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
B = Analyte was found in associated method blank.
NA = Not Applicable
MRL = Method Reporting Limit

VI-Laboratory Control Sample

Data for laboratory control samples (LCS) are evaluated to determine long-term accuracy of the analytical method on various matrices. Percent recoveries (%Rs) should be within the specified control limits. The DoD aqueous LCS recovery limits are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample VB2032-BS was used as the aqueous LCS for the VOC analysis on 09/10/07. All criteria were met. No qualifiers were applied. Samples 41GW02 (F52137-2) and WC1-2 (F52137-6) apply to this LCS.

- Sample VB2033-BS was used as the aqueous LCS for the VOC analysis on 09/11/07. Chloromethane (126%) was above DoD QSM criteria and within laboratory control limits. All samples were non-detect for chloromethane; therefore, no qualifiers were applied based upon this outlier. Sample 41GW01 (F52137-1) applies to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. The DoD MS/MSD aqueous recovery limits follow the LCS criteria and are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample F52274-1 was used for the aqueous MS/MSD analysis for analysis on 09/10/07. Since this sample is not a RFAAP site sample, it was not evaluated. No qualifiers were applied. Samples 41GW02 (F52137-2) and WC1-2 (F52137-6) apply to this MS/MSD.

- Sample F52182-1 was used for the aqueous MS/MSD analysis for analysis on 09/11/07. Since this sample is not a RFAAP site sample, it was not evaluated. No qualifiers were applied. Sample 41GW01 (F52137-1) applies to this MS/MSD.

VIII-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Recoveries for system monitoring compounds in volatile samples and blanks must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Aqueous Criteria:
Dibromofluoromethane (87-116%) (DoD QSM = 85-115%)
1,2-Dichloroethane-d4 (76-127%) (DoD QSM = 70-120%)
Toluene-d8 (86-112%) (DoD QSM = 85-120%)
4-Bromofluorobenzene (84-120%) (DoD QSM = 75-120%)

- All criteria were met. No qualifiers were applied.

IX-Internal Standards (IS)
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

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

- No field sample duplicate pair was analyzed with this SDG.

XI-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: WC1-2 (F52137-6), chloroform

Conc. (µg/L) = (Ax)*(Is) *(DF)/(Ais)*(RRF)

where: Ax is the compound area
Ais is the corresponding internal standard area
Is is the corresponding internal standard concentration (µg/L)
DF is the dilution factor
RRF is the relative response factor.

Conc. µg/L = (36773 * 50 µg/L * 1) / (1966202 * 0.561) = 1.7 µg/L

Reported Conc. = 1.7 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

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

Laboratory Qualifiers

(No Code) = Confirmed identification.

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

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

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

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

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

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

D = Indicates sample was analyzed at a dilution.

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

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

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

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

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

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B048394.D	1	09/11/07	LD	n/a	n/a	VB2033
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW01		
Lab Sample ID:	F52137-1	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	105%		76-127%
2037-26-5	Toluene-D8	103%		86-112%
460-00-4	4-Bromofluorobenzene	112%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B048356.D	1	09/10/07	LD	n/a	n/a	VB2032
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	41GW02		
Lab Sample ID:	F52137-2	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		87-116%
17060-07-0	1,2-Dichloroethane-D4	106%		76-127%
2037-26-5	Toluene-D8	102%		86-112%
460-00-4	4-Bromofluorobenzene	112%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: B048357.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	WC1-2		
Lab Sample ID:	F52137-6	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B048357.D	1	09/10/07	LD	n/a	n/a	VB2032
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	1.7	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	WC1-2		
Lab Sample ID:	F52137-6	**Date Sampled:**	08/28/07
Matrix:	AQ - Ground Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	106%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	110%		84-120%

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

Raw Data: B048358.D

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB082807		
Lab Sample ID:	F52137-7	**Date Sampled:**	08/28/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B048358.D	1	09/10/07	LD	n/a	n/a	VB2032
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.29	ug/l	
75-25-2	Bromoform	ND	1.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.46	ug/l	
67-66-3	Chloroform	ND	1.0	0.21	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.20	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.29	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.25	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.23	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.25	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.28	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.24	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
591-78-6	2-Hexanone	ND	10	2.9	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.2	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.54	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.38	ug/l	
75-09-2	Methylene chloride [a]	1.3 J	5.0	1.0	ug/l	J
78-93-3	Methyl ethyl ketone	ND	5.0	2.0	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.29	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.37	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.30	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	1.0	0.27	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.38	ug/l	

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

Form I Copy

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB082807		
Lab Sample ID:	F52137-7	**Date Sampled:**	08/28/07
Matrix:	AQ - Trip Blank Water	**Date Received:**	08/29/07
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.34	ug/l	
	m,p-Xylene	ND	2.0	0.36	ug/l	
95-47-6	o-Xylene	ND	1.0	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		87-116%
17060-07-0	1,2-Dichloroethane-D4	106%		76-127%
2037-26-5	Toluene-D8	103%		86-112%
460-00-4	4-Bromofluorobenzene	112%		84-120%

(a) CCV outside of control limits; results may be biased high.

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

Report of Analysis

Client Sample ID:	OMW1		
Lab Sample ID:	F52209-1	**Date Sampled:**	08/30/07
Matrix:	AQ - Ground Water	**Date Received:**	08/31/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Sulfide	2.0	1.0	1.0	mg/l	1	09/03/07	LE	EPA 376.1

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	TMMW1		
Lab Sample ID:	F52209-2	**Date Sampled:**	08/30/07
Matrix:	AQ - Ground Water	**Date Received:**	08/31/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Sulfide	1.0 U	1.0	1.0	mg/l	1	09/03/07	LE	EPA 376.1

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	OMW2		
Lab Sample ID:	F52209-3	**Date Sampled:**	08/30/07
Matrix:	AQ - Ground Water	**Date Received:**	08/31/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Sulfide	1.0 U	1.0	1.0	mg/l	1	09/03/07	LE	EPA 376.1

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	P-1		
Lab Sample ID:	F52209-4	**Date Sampled:**	08/30/07
Matrix:	AQ - Ground Water	**Date Received:**	08/31/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Sulfide	1.0 U	1.0	1.0	mg/l	1	09/03/07	LE	EPA 376.1

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	P-2		
Lab Sample ID:	F52209-5	**Date Sampled:**	08/30/07
Matrix:	AQ - Ground Water	**Date Received:**	08/31/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Sulfide	2.7	1.0	1.0	mg/l	1	09/03/07	LE	EPA 376.1

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	TM-2		
Lab Sample ID:	F52209-6	**Date Sampled:**	08/30/07
Matrix:	AQ - Ground Water	**Date Received:**	08/31/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Sulfide	1.0 U	1.0	1.0	mg/l	1	09/03/07	LE	EPA 376.1

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	P-3		
Lab Sample ID:	F52209-7	**Date Sampled:**	08/30/07
Matrix:	AQ - Ground Water	**Date Received:**	08/31/07
		Percent Solids:	n/a
Project:	WPA 019 Field Investigation; Radford AAP, VA		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Sulfide	2.3	1.0	1.0	mg/l	1	09/03/07	LE	EPA 376.1

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Certification Exceptions
- Chain of Custody

ACCUTEST Laboratories

CHAIN OF CUSTODY

4405 VINELAND ROAD • SUITE C-15
ORLANDO, FL 32811
TEL: 407-425-6700 • FAX: 407-425-0707

ACCUTEST JOB #: F52209
ACCUTEST QUOTE #:

CLIENT INFORMATION

NAME: SHAW
ADDRESS:
CITY, STATE, ZIP:
SEND REPORT TO:
PHONE #:

FACILITY INFORMATION

PROJECT NAME: Red Ford Field
LOCATION:
PROJECT NO.:
FAX #:

ANALYTICAL INFORMATION

Solvents

MATRIX CODES

DW - DRINKING WATER
GW - GROUND WATER
WW - WASTE WATER
SO - SOIL
SL - SLUDGE
OI - OIL
LIQ - OTHER LIQUID
SOL - OTHER SOLID

LAB USE ONLY

ACCUTEST SAMPLE #	FIELD ID / POINT OF COLLECTION	COLLECTION DATE	COLLECTION TIME	SAMPLED BY:	MATRIX	# OF BOTTLES	PRESERVATION HCl	PRESERVATION NaOH	PRESERVATION HNO3	PRESERVATION H2SO4	PRESERVATION NONE	Solvents
1	OMW1	8-30	520	CS							X	✓
2	TMMW1	8-30	520	CS							X	✓
3	OMW2	8-30	540	CS							X	✓
4	P-1	8-30	555	CS							X	✓
5	P-2	8-30	610	CS							X	✓
6	TM-2	8-30	610	CS							X	✓
7	P-3	8-30	620	CS							X	✓

DATA TURNAROUND INFORMATION

- ☐ STANDARD
- ☐ 48 HOUR RUSH
- ☐ 24 HOUR EMERGENCY
- ☐ OTHER

APPROVED BY:

EMERGENCY OR RUSH IS FAX DATA UNLESS PREVIOUSLY APPROVED

DATA DELIVERABLE INFORMATION

- ☐ STANDARD
- ☐ COMMERCIAL "B"
- ☐ DISK DELIVERABLE
- ☐ STATE FORMS
- ☐ OTHER (SPECIFY)

COMMENTS/REMARKS

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESION, INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:	RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:
1. Christopher Quinn	8/30 1700	1. FX	2. FX	8-31-07	2. Copal 09:00
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:
3.		3.	4.		4.
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	SEAL #	PRESERVE WHERE APPLICABLE ☐	ON ICE ☐ TEMPERATURE C
5.		5.			

F52209: Chain of Custody
Page 1 of 2

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F52209 CLIENT: Shaw PROJECT: Radford Field Inv.

DATE/TIME RECEIVED: 8.31.07 # OF COOLERS RECEIVED: 1 COOLER TEMPS: 1.0

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 7955 0245 7034

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [ ] TRIP BLANK NOT PROVIDED
- [ ] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? 0

NUMBER OF 5035 FIELD KITS ? 0

NUMBER OR LAB FILTERED METALS ? 0

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE: [illegible] 8.31.07

TECHNICIAN SIGNATURE/DATE: 8-31-07 JC

ASBD 10/03/06

F52209: Chain of Custody
Page 2 of 2

Appendix B

Lithologic Boring Logs and Soil Gas Survey

Appendix B-1

Lithologic Boring Logs

BORING OMW1

Surface Elevation: 1777.6 Feet, MSL
Location: Radford AAP, Virginia
Start: 8:30 on 11-11-91
Finish: 11:30 on 11-11-91

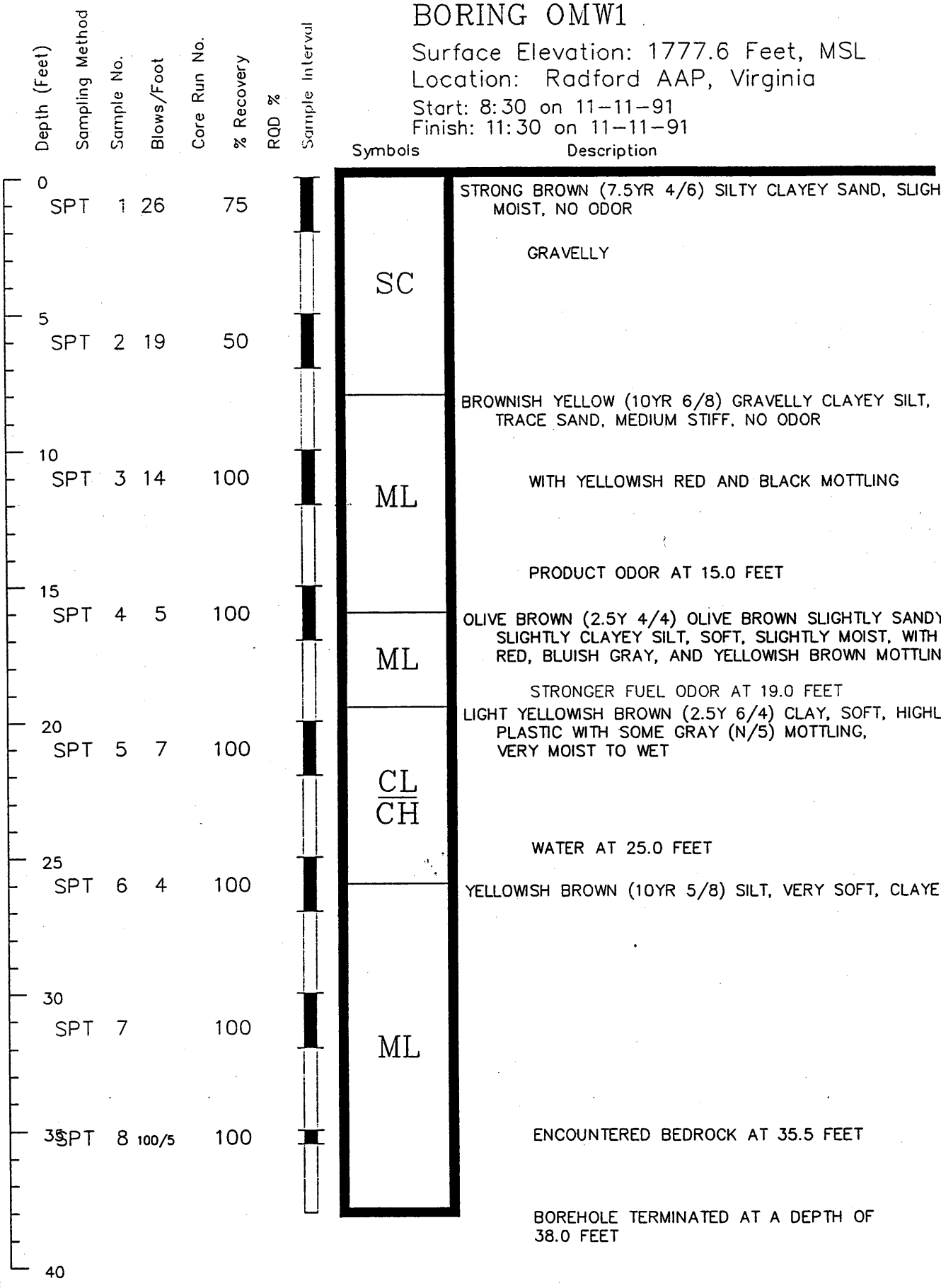


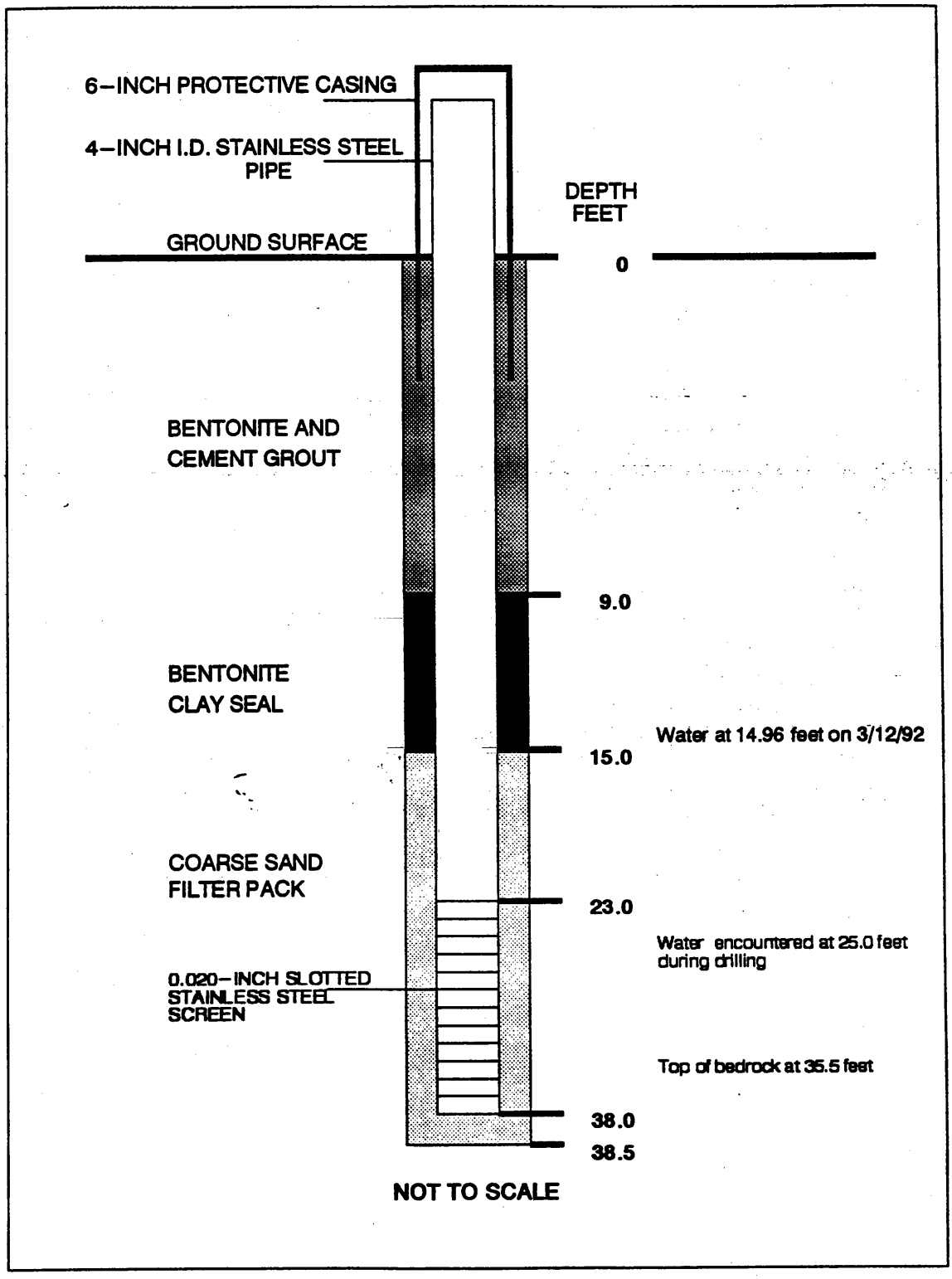
PLATE
LOG OF BORING

Dames & Moore

FILE

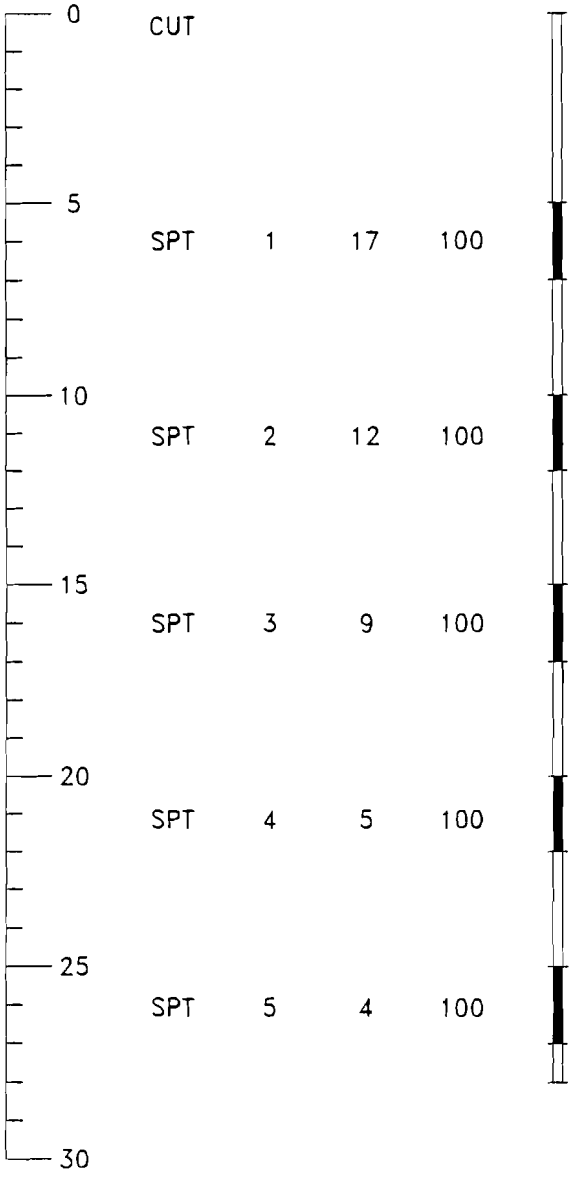
WELL INSTALLATION DIAGRAM
FOR RCRA FACILITY INVESTIGATION
RADFORD AAP, VIRGINIA

Location: OMW1
Installation Date: 11/11/91
Surface Elevation: 1777.6 Feet
Top of SS Elevation: 1780.04 Feet



Dames & Moore

BORING	OMW2
SURFACE ELEVATION:	1776.1 FEET, MSL
LOCATION:	RADFORD AAP, VIRGINIA
START:	16:50 ON 6/4/93
FINISH:	11:40 ON 6/5/93



SYMBOLS	DESCRIPTION
—	STRONG BROWN SANDY SILT SLIGHTLY CLAYEY, SLIGHTLY MOIST, NO ODOR
CL	REDDISH YELLOW (7.5 YR 6/8) SLIGHTLY STIFF SILTY CLAY, TRACE SAND, HIGHLY PLASTIC, SLIGHTLY STICKY, MOIST, NO ODOR
	GRADING YELLOWISH BROWN (10 YR 5/8) W/ PALE BROWN (10 YR 6/3) MOTTLING
CL/ML	YELLOWISH BROWN (10 YR 5/8) SOFT TO MEDIUM STIFF VERY CLAYEY SL. SANDY SILT, STICKY, VERY MOIST TO WET, NO STAINING OR ODORS. TRACE YELLOW MOTTLING. TRACE MUDSTONE FRAGMENTS
	PROBABLE WATER TABLE DEPTH AT 17 FEET
	SAND INCREASING W/ DEPTH
CL	STRONG BROWN (7.5 YR 5/8) SANDY SILTY CLAY, VERY SOFT, TRACE FINE GRAVELS, NO ODORS OR STAINS
	GRADING YELLOWISH RED (5 YR 5/6)
	W/ INCREASING SAND, COARSE
ML	BROWN (10 YR 5/3) BROWN SANDY SILT
	ROCK AT 28 FEET

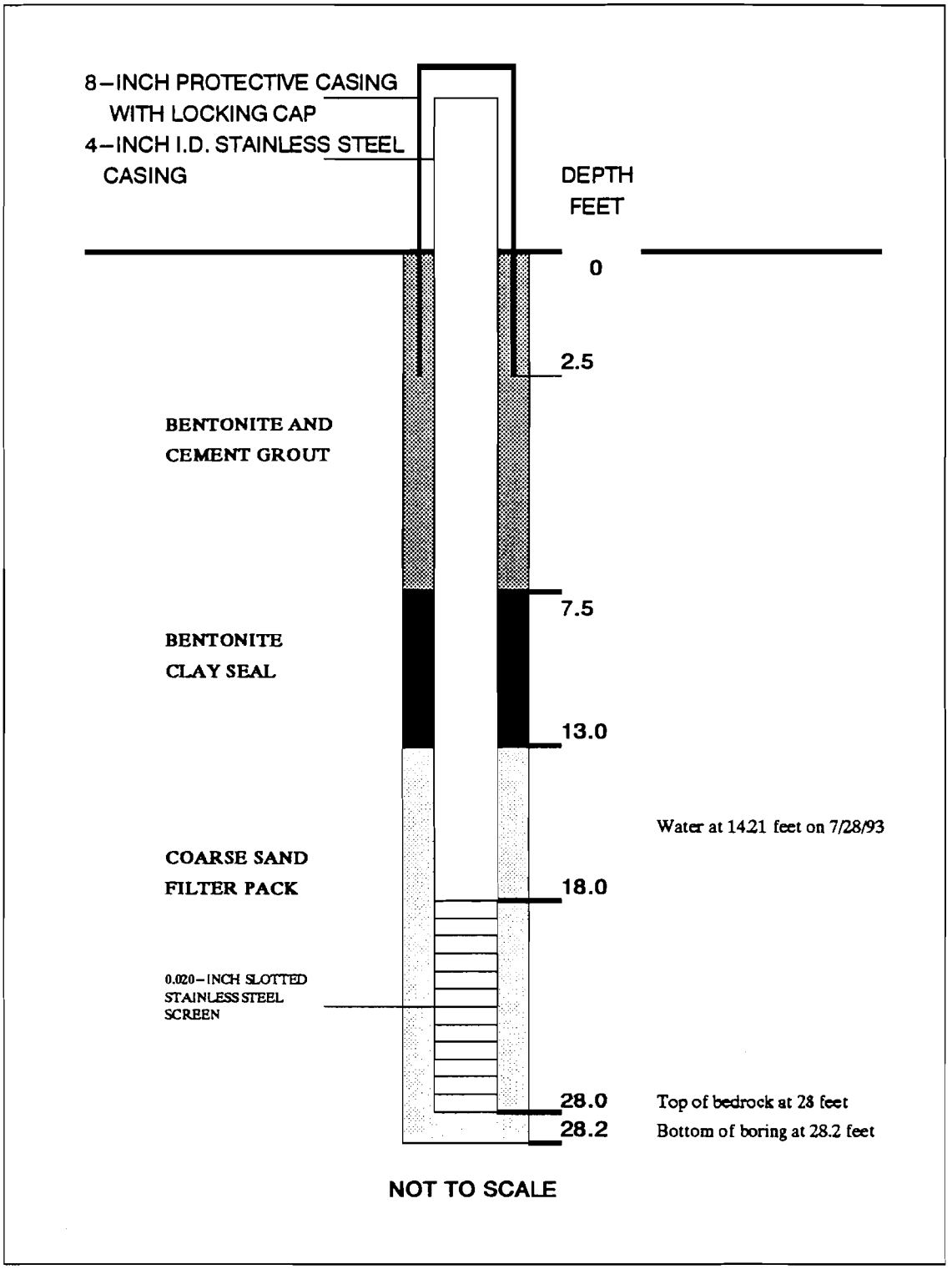
BOREHOLE TERMINATED AT A DEPTH OF 28 FEET

LOG OF BORING

Dames & Moore

WELL INSTALLATION DIAGRAM FOR VERIFICATION INVESTIGATION RADFORD AAP, VIRGINIA

Location: OMW2
Installation Date: 6/5/93
Surface Elevation: 1776.1 Feet
Top of St. Elevation: 1778.60 Feet



Betz·Converse·Murdoch·Inc. BCM

Drilling Log

Well Number P-1

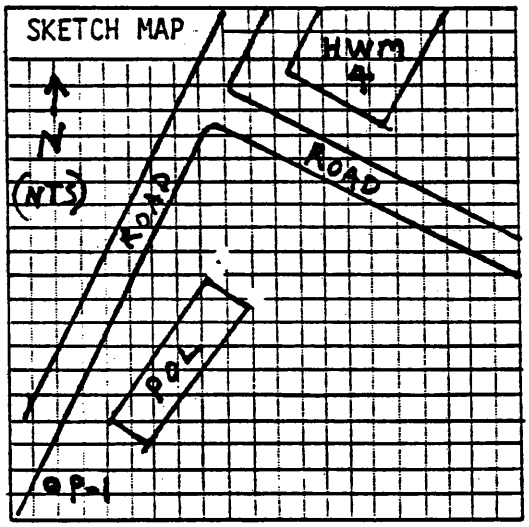
Client Corps of Engineers/Radford AAP
Project No. 00-0008-01
Well Location upslope from tank farm - POL area
Driller/Company Dean/Cunningham
Drilling Method NX core Hole Diameter Nominal 4" Date(s) Drilled 2/4 - 7/83
Sample Type split spoon/core Sample Interval spoon 5'* No. Samples Retained 6
Surface Elevation 1777.02' Casing Top Elevation 1779.77' Total Well Depth 33
Casing Material and Size 2" ID PVC ** Cased Interval(s) 0-18' (+2' stickup)
Grouting Type a sand/cement Grouted Interval 0 - 17
Screening Material and Size 2" ID PVC; 0.010" slots ** Screened Interval(s) 18 - 33
Packing Material and Size No. 1 sand Packed Interval 17 - 33
Depth to Static Water 12.58' *** Date 2/24/83 Approx Well Yield 3 - 4 gpm
Development Method air Development Time 1.5 hours
Logged by: Peter R. Jacobson

Comments

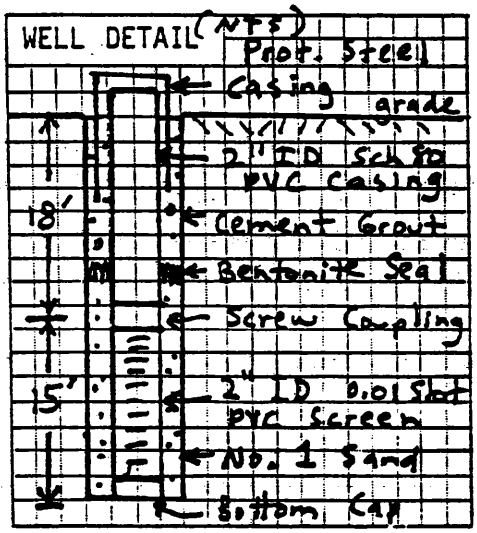
* continuous core sampling
** threaded couples

*** Measured from top of PVC casing

SKETCH MAP



WELL DETAIL (NTS)



Depth Scale	Sample	Spoon Blows	Description of Materials
0 - 1.5	spoon	5-12-6	medium to dark brown, dry, silty clay; very thin sand lenses
5 - 6.5	spoon	5-12-15	orange brown sandy clay, black/brown specks; some fine gravel
10 - 11.5	spoon	3-7-9	mottled grey-green and orange-brown sandy clay; occasional pebbles
13			coarse gravel
15 - 16.5	spoon	1-1-3	moist orange-brown to yellow-brown clay; thin silt and sand stringers
20 - 21.5	spoon	1-1-1	soft, moist, mottled orange-brown/yellow-brown sandy clay
25 - 26.5	spoon	1-10-7	weathered blue-grey sandy dolomite; clay seams; grades to top of rock at 26'; noticeable water above rock
26 - 33	core		grey conglomeratic dolomite, angular to subangular clasts; clasts coarse sand to cobble gravel; clay seam from 31.5 to 32.5
end of hole @ 33'			

Betz·Converse·Murdoch·Inc. BCM

Drilling Log

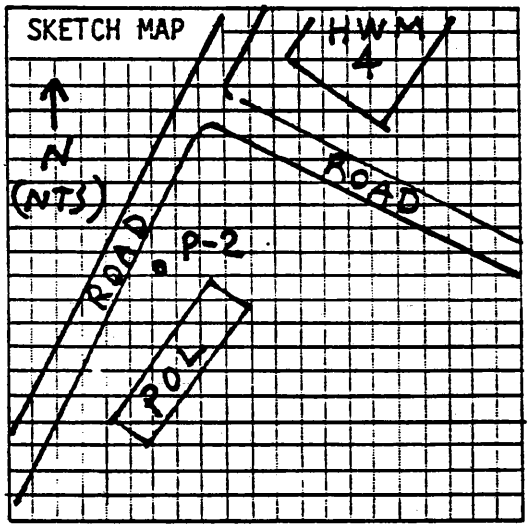
Well Number P-2

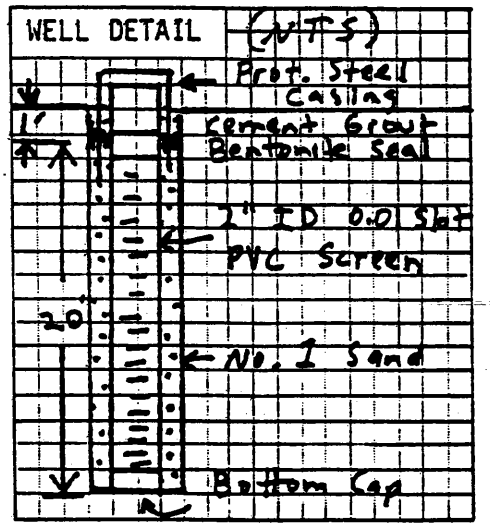
Client Corps of Engineers/Radford AAP
Project No. 00-0008-01
Well Location west of northernmost tank - POL area
Driller/Company Dean/Cunningham
Drilling Method NX core Hole Diameter nominal 4" Date(s) Drilled 2/3 - 4/83
Sample Type split spoon/core Sample Interval spoons 5'* No. Samples Retained 3
Surface Elevation 1756.20' Casing Top Elevation 1758.61' Total Well Depth 21
Casing Material and Size 2" ID PVC ** Cased Interval(s) 0-1 (+2' stickup)
Grouting Type sand cement; bentonite seal Grouted Interval 0-1 (0.5' bentonite
Screening Material and Size 2" ID; 0.010 slots Screened Interval(s) 1 - 21
Packing Material and Size No. 1 sand Packed Interval 1 - 21
Depth to Static Water 4.21' *** Date 2/24/83 Approx Well Yield 4 - 5 gpm
Development Method air Development Time 4 hours
Logged by: Peter R. Jacobson

Comments

* continuous core sampling
** all joints threaded

*** measured from top of PVC casing





Depth Scale	Sample	Spoon Blows	Description of Materials
0 - 1.5	spoon	2-4-3	damp silty clay, minor sand, occasional pebbles; medium
			brown occasional orange/brown streaks; friable in zones
5 - 6.5	spoon	3-4-9	damp medium brown to orange brown silty clay with thin
			coarse sandy zones, minor pebbles
10 - 11.5	spoon	50/3"	wet clayey sand, yellow brown, gravel at 11'
13 - 14	core		top of rock at 13'; vuggy, grey, thinly laminated dolomite
14 - 15	core		orange brown/greenish grey dolomite, thin veins of quartz;
			irregular fracturing, small vugs
15 - 16	core		crumbly grey dolomite; small vugs; slightly brecciated
16 - 21	core		grey/white/buff thinly laminated dolomite; small quartz
			veins
end of hole @ 21'			

Betz·Converse·Murdoch·Inc. BCM

Drilling Log

Well Number P-3

Client Corps of Engineers/Radford AAP
Project No. 00-0008-01
Well Location POL site
Driller/Company Dean/Cunningham
Drilling Method NX core Hole Diameter 4" nominal Date(s) Drilled 2/2 - 3/83
Sample Type split spoon/core Sample Interval 5' spoon * No. Samples Retained 4 spoon *
Surface Elevation 1752.54' Casing Top Elevation 1754.57' Total Well Depth 25'
Casing Material and Size 2" ID PVC Cased Interval(s) 0 - 10 **
Grouting Type sand/cement grout Grouted Interval 0 - 8
Screening Material and Size 2" ID PVC; 0.010 slots Screened Interval(s) 10 - 25
Packing Material and Size No. 1 sand Packed Interval 9 - 25
Depth to Static Water 7.94' *** Date 2/24/83 Approx Well Yield 1 - 2 gpm
Development Method air Development Time 4 hours
Logged by: Peter R. Jacobson

Comments

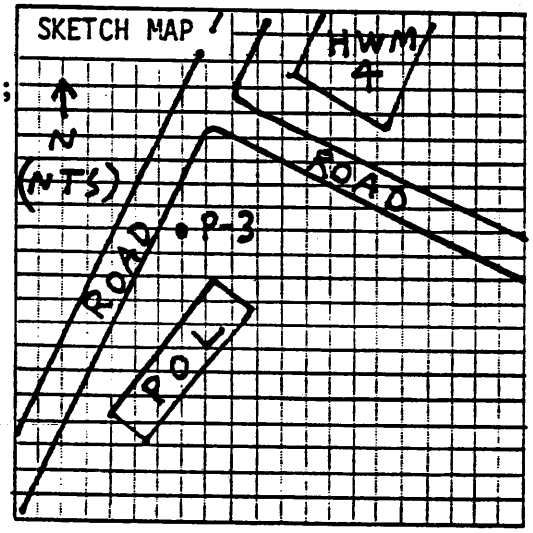
* continuous core samples; all core recovered retained

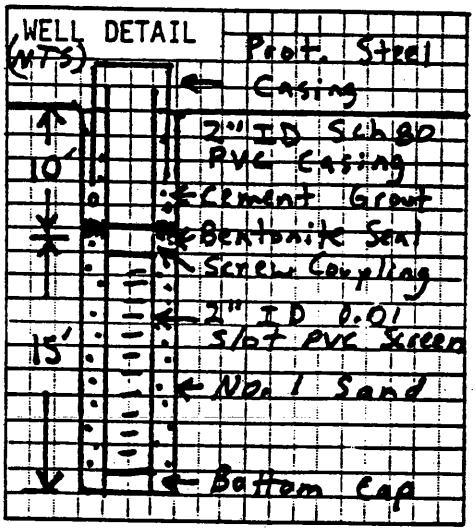
** plus 2' stickup

Note: all screen and casing joints by threaded couples

No petroleum odors noted

*** Measured from top of PVC casing





Depth Scale	Sample	Spoon Blows	Description of Materials
0 - 1.5	spoon	2-4-3	dark grey to brown silty clay, minor sand
5 - 6.5	spoon	18-28-38	medium brown clay, silty sandy lenses, occasional gravel; soil is damp, not saturated
6.5 - 10	core		cobble gravel, mostly white/buff sandstone
10 - 10'3.5"	spoon	5-/3.5"	brown/buff clay and silt grading to decomposed dark grey limestone
10'3.5" -	15 core		brecciated dolomite; matrix is silt and clay, clasts are sand to coarse gravel; most clasts are buff/grey dolomite subangular to rounded
15 - 20	core		same as above to 18'; at 18' sharp contact from brown matrix to grey, clasts more angular coarse
20 - 25	core		same as above becoming coarser and more angular with depth; 6" - 8" zones of vuggy dolomite separated by brecciated angular grey dolomite
end of hole at 25'			

Betz·Converse·Murdoch·Inc. BCM

Drilling Log

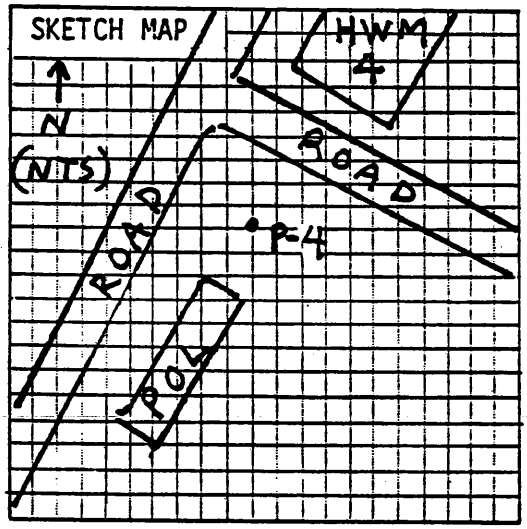
Well Number P-4

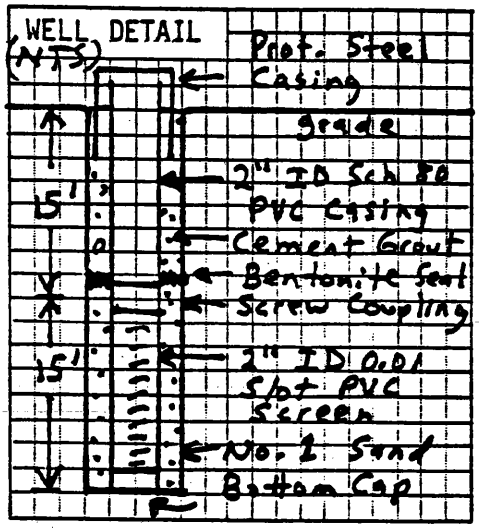
Client Corps of Engineer/Radford AAP
Project No. 00-0008-01
Well Location POL site
Driller/Company Dean/Cunningham
Drilling Method NX core
Hole Diameter nominal 4"
Date(s) Drilled 2/17/83
Sample Type split spoon/core
Sample Interval 5' spoon *
No. Samples Retained 5
Surface Elevation 1771.12'
Casing Top Elevation 1773.16'
Total Well Depth 30'
Casing Material and Size 2" ID PVC sched. 80 threaded joints
Cased Interval(s) 0-15 (+2' stickup)
Grouting Type sand/cement
Grouted Interval 0 - 14
Screening Material and Size 2" PVC 0.010" slots
Screened Interval(s) 15 - 30
Packing Material and Size No. 1 sand
Packed Interval 14 - 30
Depth to Static Water 25.75'*** Date 2/24/83
Approx Well Yield **
Development Method air
Development Time 1 hour
Logged by: Peter R. Jacobson

Comments
* continuous core sampling
** very poor yield during development, 0.1 gpm, but water cleared up

Note: slight ether odor detected

*** measured from top of PVC casing





Depth Scale	Sample	Spoon Blows	Description of Materials
0 - 1.5	spoon	1-1-2	moist brown silty clay
5 - 6.5	spoon	16-16-18	medium brown, fissile, hard silt and clay
10 - 11.5	spoon	1-2-4	soft moist brown clay, minor fine sand and silt
15 - 16.5	spoon	1-1-2	same as above with occasional medium to coarse sand
			lost water at 15'
20 - 21.5	spoon	31-50/1.5"	blue grey weathered bedrock - wet, pebbly, sandy, silty
			clay
22			top of solid rock
22 - 30			thinly laminated grey-buff dolomite; thin brecciated
			zones, many white quartz veins; lost water at 26'
end of hole at 30'			

Army Pollution Abatement Program Study, Installation of Monitoring Wells, Radford Army Ammunition Plant, Radford, VA, 3-9 April 1981, (USAEHA Control No. 81-26-8251-81)

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

PROJECT RAAP 81-26-8251-81 DATE 6 April 81

LOCATION Background well southwest of site 4. May be contaminated from old POC spill.

DRILLERS Smithson, Hoddinott, Craig, Gates (Logger)

DRILL RIG Acker II w/4 in. continuous flight auger

BORE HOLE MW-1
TD - 13 ft
water level initial - 10 ft
24 hr - 10' 9"

DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS	
		Reddish brown gravely clay (¼ - ½ in) wet	3.75 ft of concrete grout	8 ft of 2 in ID, Schedule 40, PVC Casing
			1.5 ft of Bentonite	
5 ft			7.5 ft of sand pack	
		Brown gravely clay - POL smell - No. 2 fuel oil very strong		5 ft of slotted 2 in ID PVC screen
10 ft	▼			
		Gravel layer (¼-1¼ in) Large cobbles at 12 ft very difficult drilling		
15 ft		Refusal TD 13 ft (Riverjack)		Depth of well 13 ft

HSE-ES Form 78, 1 Jun 80

Replaces USAEHA Form 95, 12 Aug 74, which will be used.

Form No 500

BORING LOG

SINCE 1881

FROEHLING & ROBERTSON, INC.
FULL SERVICE LABORATORIES • ENGINEERING/CHEMICAL
"ONE HUNDRED YEARS OF SERVICE"

Report No. O-62084 DATE May 1987

Client: Hercules Inc.

Project: Radford Army Ammunition Plant Radford, Virginia

Boring No.: WCI-2 | Total Depth: 50.0 ft. | Elevation: -------- | Location: See Location Plan

Type of Boring: Hollow Stem Auger | Started: 3/18/87 | Completed: 3/18/87 | Driller: D. Fralin

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	Sample Blows	Sample Depth (Feet)	% Core Recovery	REMARKS
	0.0	Stiff yellow brown clayey SILT, trace medium to fine sand (ML) manganese stains		1.5		GROUNDWATER DATA
			5 5 6			
		to		3.0		
				4.5		
		Very loose mottled to gray medium to fine to fine sandy SILT, trace clay (ML)	2 4 8			
				6.0		
		Increased fine gravel content at depth				
				8.5		
			2*			*12 inch spoon penetration on 1 hammer blow
				10.0		
				13.5		
			*1 1			*weight of hammer
				15.0		
		-RESIDUUM-		18.5		
			1 1 3			
				20.0		
				23.5		
	24.0		4*	24.4		*30/4"
		Medium hard to hard light gray to light brown limestone, with dolomitic and shaley intervals vuggy, fractured: occasional intervals of dolomite and shale clasts in a calcareous matrix: moderately well developed calcium crystals in vugs: possible flow structure		25.0		
					65.0	RQD = 22
				30.0		
					90.0	RQD = 47
				35.0		
					100.0	RQD = 55
				40.0		

*No. of blows req'd. for a 140 lb. hammer dropping 30 in. to drive 2 in O.D., 1.375 in. I.D. sampler a total of 18 inches in three 6 in increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

Scale 1"=5' unless otherwise noted

Form No. 500

BORING LOG

SINCE F&R 1881

FROEHLING & ROBERTSON, INC.
FULL SERVICE LABORATORIES • ENGINEERING/CHEMICAL
"ONE HUNDRED YEARS OF SERVICE"

Report No. O-62084 DATE May 1987

Client: Hercules Inc.

Project: Radford Army Ammunition Plant Radford, Virginia

Boring No.: WCI-2 | Total Depth: 50.0 ft. | Elevation: -------- | Location: See Location Plan

Type of Boring: Hollow Stem Auger | Started: 3/18/87 | Completed: 3/18/87 | Driller: D. Fralin

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	Sample Blows	Sample Depth (Feet)	% Core Recovery	REMARKS
	40.0			40.0		GROUNDWATER DATA
					81.7	RQD = 42
		WCI-2 Continued		45.0		
					81.7	RQD = 8
	50.0			50.0		
		Boring terminated at 50.0 ft.				

*No. of blows req'd. for a 140 lb. hammer dropping 30 in. to drive 2 in O.D., 1.375 in. I.D. sampler a total of 18 inches in three 6 in. increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

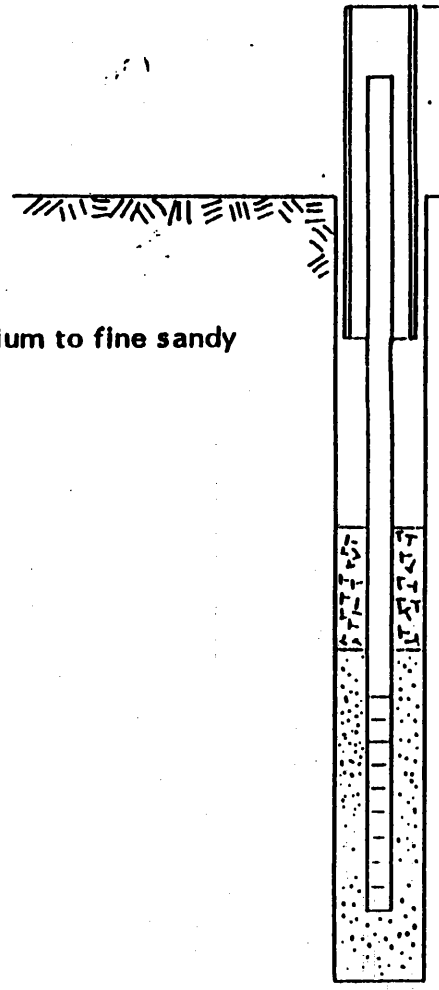
Scale 1"=5' unless otherwise noted

Project: Radford Army Ammunition Plant	Driller: Fralin	WELL No. WC1-2
Location: Radford, Virginia	Inspector: Smith	
Client: Hercules Inc.	Date Installed: 3/18/87	
Screen Description: 0.010" slot, 2.0" I.D. Teflon Screen	Sand Size: D(10)= 0.45-0.55 mm	
Riser Description: 2.0" I.D. Teflon Riser and PVC Riser	Bore/ Core Size: 6 inch/ NX	

Subsurface Conditions Summary

Yellow Brown to Gray medium to fine sandy SILT , trace clay (SM)

Auger refusal at 24.0 ft.



Casing Stickup (ft.)= 2.6 ft.

Elev. =

Riser Stickup (ft.) = 2.0 ft.

Elev. =

Ground Elev.=

Depth to Bentonite (ft.)= 16.75 ft.

Elev. =

Depth to Sand Filter(ft.)= ------

Elev. =

Depth to Well Bottom(ft.)= 45.75 ft.

Elev. =

Depth of Hole (ft.) = 48.75 ft.

Elev. =

Appendix B-2

Soil Gas Survey Procedure and Results

TARGET ENVIRONMENTAL SERVICES, INC.

October 10, 1991

Ms. Grace Wood
DAMES & MOORE
2807 Parham Road
Suite 114
Richmond, VA 23229

Dear Ms. Wood:

Enclosed please find one (1) copy of the field and analytical procedures, and tables for the Soil Gas Survey performed by **TARGET** at the Radford Army Ammunition Plant in Radford, Virginia.

If you have any questions or comments about the above, please give me or Ken Ranlet a call at (301) 992-6622. We appreciate the opportunity to provide our services to you on this project.

Sincerely,

TARGET ENVIRONMENTAL SERVICES, INC.

Connie Thorne

Connie Thorne
Project Manager\Engineer

9180 RUMSEY ROAD, COLUMBIA, MARYLAND 21045 (301) 992-6622 Fax: (301) 992-0347

Field Procedures

Soil gas samples were collected at a total of 35 locations at the site, 27 from SWMU "O" and 8 from SWMU 48. To collect the samples a 1/2 inch hole was produced to a depth of approximately 4 feet by using a drive rod. Several samples (Samples 13, 27, 32) were collected at 3' due either to refusal or suction. The entire sampling system was purged with ambient air drawn through an organic vapor filter cartridge, and a stainless steel probe was inserted to the full depth of the hole and sealed off from the atmosphere. A sample of in-situ soil gas was then withdrawn through the probe and used to purge atmospheric air from the sampling system. A second sample of soil gas was withdrawn through the probe and encapsulated in a pre-evacuated glass vial at two atmospheres of pressure (15 psig). The self-sealing vial was detached from the sampling system, packaged, labeled, and taken to **TARGET**'s mobile laboratory for analysis.

At the request of the client, two test samples were collected and analyzed. The first sample was a headspace collected from a sealed jar which contained a sample of contaminated soil. The second sample was the headspace of monitoring well S4W1 in SWMU "O".

Prior to the day's field activities all sampling equipment, slide hammer rods, and probes were decontaminated by washing with soapy water and rinsing thoroughly. Internal surfaces were flushed dry using pre-purified nitrogen or filtered ambient air, and external surfaces were wiped clean using clean paper towels.

Field control samples were collected at the beginning and end

TABLE 1

ANALYTE CONCENTRATIONS (µg/l) VIA GC/FID IN SAMPLES TAKEN AT SWMU "O"

SAMPLE	PENTANE/ MTBE[1]	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENES	TOTAL FID VOLATILES[2]
11	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
13	<1.0	<1.0	<1.0	<1.0	<1.0	1.1
14	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
15	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
16	<1.0	<1.0	<1.0	<1.0	<1.0	3.8
17	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
18	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
19	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
21	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
22	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
23	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
24	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
25	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
26	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
27	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
28	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
29	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
31	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
32	<1.0	<1.0	<1.0	<1.0	<1.0	4.3
33	<1.0	<1.0	<1.0	<1.0	<1.0	33
34	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
35	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
36	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
37	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
FIELD CONTROL SAMPLES						
1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
LABORATORY DUPLICATE ANALYSES						
18	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
18R	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
28	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
28R	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
32	<1.0	<1.0	<1.0	<1.0	<1.0	4.3
32R	<1.0	<1.0	<1.0	<1.0	<1.0	4.2
36	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
36R	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
LABORATORY BLANKS						
18B	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
28B	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
36B	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
TESTB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

[1] CONCENTRATIONS BASED ON RESPONSE FACTOR OF MTBE

[2] CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAKS AND THE INSTRUMENT RESPONSE FACTOR FOR TOLUENE

TABLE 3

ANALYTE CONCENTRATIONS µg/l) VIA GC/FID IN TEST SAMPLES

SAMPLE	PENTANE/ MTBE[1]	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENES	TOTAL FID VOLATILES[2]
TEST SAMPLE 1	<1.0	<1.0	<1.0	<1.0	<1.0	115
TEST SAMPLE 2	<1.0	<1.0	<1.0	<1.0	<1.0	9.9

[1]CONCENTRATIONS BASED ON RESPONSE FACTOR OF MTBE

[2]CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAKS AND THE INSTRUMENT RESPONSE FACTOR FOR TOLUENE

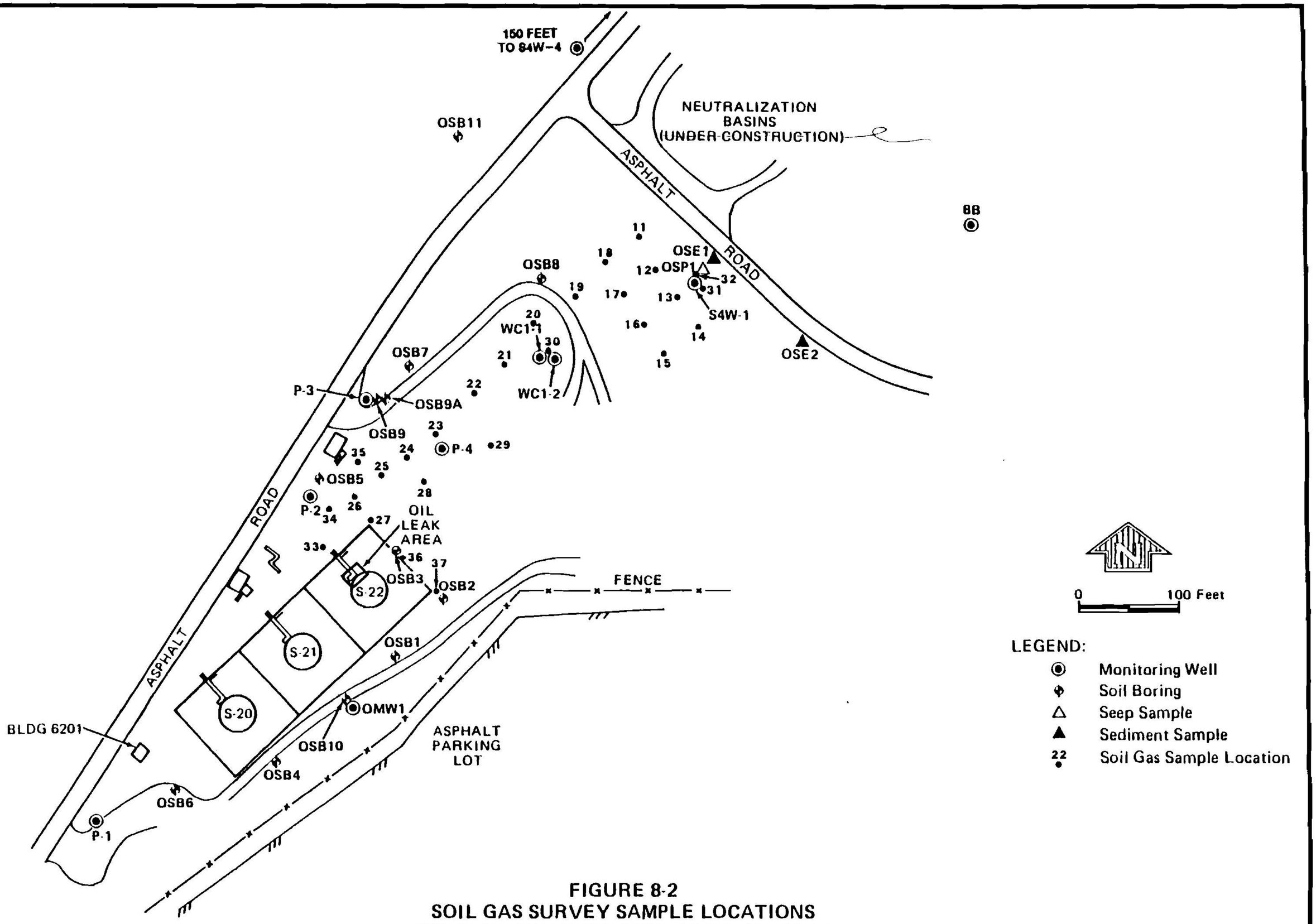


FIGURE 8-2
SOIL GAS SURVEY SAMPLE LOCATIONS
SWMU O – UNDERGROUND FUEL OIL SPILL
RADFORD ARMY AMMUNITION PLANT, VIRGINIA

Dames & Moore

Appendix B-3

2007 RFI Well Purge Forms

Well Purging-Field Water Quality Measurements Form

Location (Site / Facility Name) RFAAP
Well Number P-1 Date 8.23.07
Field Personnel BS
Sample Organization Shaw Environmental
Identify MP TOC

Depth to 18 / 33 of screen (below MP)
top bottom
Pump Intake at (ft. below MP)
Purging Device (e.g., Redi Flo2) RFS
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
	14.46										
1400	14.50	82.7	300		6.92	0.500	328	5.99	18.41	82	
1405	14.50	82.7	300		6.85	0.503	132	4.65	18.63	81	
1410	14.50	82.7	300		6.80	0.502	59	4.29	18.34	83	$Fe^{2+} = 0$
1415	14.50	82.7	300		6.77	0.504	36	4.08	18.23	87	
1420	14.50	82.7	300		6.77	0.505	15	3.90	18.24	90	
1425	14.50	82.7	300		6.77	0.505	12	3.82	18.16	92	
1430	14.50	82.7	300		6.77	0.505	11	3.78	18.15	93	

[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 P-2 (Area O) Date 8-23-07
Field Personnel CT / BS
Sample Organization Shaw Environmental
Identify MP

Depth to 1 (top) / 21 (bottom) of screen (below MP)
Pump Intake at (ft. below MP) 20 Ft
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
1220	3.49										
1235	3.60	60.2	300		6.45	.600	999	1.81	16.69	152	
1240	3.60	60.2	300		6.72	.569	999	1.60	16.45	128	
1245		60.2	300		6.82	.564	999	1.50	16.47	120	$Fe^{2+} = 0$
1250		60.2	300		6.87	.561	999	1.42	16.57	116	
1255		60.2	300		6.89	.560	999	1.41	16.62	114	
1300		60.2	300		6.93	.555	999	1.41	16.61	115	
1305	3.82	70.2	600		6.91	.554	454	1.21	14.97	114	-Increase flow to clear sediments from line/well.
1310		70.2	600		6.91	.554	334	1.18	14.90	112	
1315		70.2	600		6.93	.554	262	1.52	14.82	110	
1320		70.2	600		6.92	.554	253	1.24	14.87	110	
1325		70.2	600		6.92	.554	241	1.19	14.88	109	
1330	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 P-3 Date 8.23.07
Field Personnel BS
Sample Organization Shaw Environmental
Identify MP TOC
Depth to 10 (top) / 25 (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
	6.40						~~50~~				
1235	8.10	69.5	300		6.73	0.473	-5.0	3.21	18.20	155	cloudy black
1240	7.04	61.0	300		6.91	0.465	323	2.08	18.19	140	
1245	7.04	61.0	300		6.92	0.464	276	1.92	18.94	137	
1250	7.00	59.5	300		6.93	0.465	162	1.76	19.92	133	$Fe^{2+} = 0$
1255	7.00	59.5	300		6.97	0.464	157	1.64	20.78	125	
1300	7.00	59.5	300		6.98	0.464	146	1.57	20.78	121	

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

800-622-1394 x212

Well Purging-Field Water Quality Measurements Form

Location (Site / Facility Name) RFAAP
Well Number P-4 Date 8-24-07
Field Personnel Jones, Squire
Sample Organization Shaw Environmental
Identify MP TOC

Depth to 15 (top) / 30 (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
	26.45										
0905	26.98	117.6	300		6.79	0.496	-5.0	12.34	14.93	175	cloudy brown-gray
0910	26.98	117.6	300		7.01	0.490	535	11.27	14.99	160	
0915	26.98	115.3	300		7.07	0.483	68	10.12	15.71	147	
0920	26.98	115.3	300		7.09	0.478	0	9.79	16.97	145	
0925	26.98	115.3	300		7.09	0.478	0	9.59	17.41	144	
0930	26.98	115.3	300		7.10	0.478	0	9.61	17.49	144	0.0 Ferrous iron

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

TMMW1

Well Purging-Field Water Quality Measurements Form

Location (Site / Facility Name) RFAAP
Well Number [redacted] OMW1 Date 8-24-07
Field Personnel RS
Sample Organization Shaw Environmental
Identify MP TOC

Depth to 23 (top) / 38 (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
	21.20										
0835	21.50	101.0	300		6.76	0.438	51	2.86	16.87	-115	
0840	21.50	101.0	300		6.83	0.432	27	2.44	16.83	-127	
0845	21.50	101.0	300		6.95	0.429	6	1.89	17.36	-159	Fe^{2+} = 3.4
0850	21.50	101.0	300		7.00	0.431	0	1.81	17.49	-169	
0855	21.50	101.0	300		7.03	0.433	0	1.73	17.55	-178	
0900	21.50	101.0	300		7.05	0.435	0	1.60	17.64	-183	

[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 OMW2 Date 8-24-07
Field Personnel
Sample Organization Shaw Environmental
Identify MP

Depth to 18 (top) / 28 (bottom) of screen (below MP)
Pump Intake at (ft. below MP) 26
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
800	18.3										
810	18.42	104.5	250		5.91	.735	794	3.43	16.24	187	
815		104.5	250		6.33	.726	766	2.54	16.25	169	
820	18.45	104.5	250		6.54	.724	619	2.31	16.71	145	
825		106.7	300		6.65	.728	446	2.12	16.39	110	
830		106.7	300		6.69	.729	345	2.05	16.35	96	
835	18.62	106.7	300		6.72	.728	270	2.03	16.34	90	$Fe2^+ = 0$
840		106.7	300		6.73	.728	212	2.05	16.39	87	
845	18.65	106.7	300		6.72	.728	175	2.06	16.33	86	
850		106.7	300		6.75	.728	149	2.08	16.25	86	
855		106.7	300		6.75	.725	122	2.07	16.34	85	
900		106.7	300		6.75	.723	97	2.10	16.36	84	
905		106.7	300		6.75	.723	89	2.10	16.40	84	
910		106.7	300		6.76	.722	81	2.11	16.41	83	
915		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 S4W-1 Date 8-27-07
Field Personnel CS / BS
Sample Organization Shaw Environmental
Identify MP

Depth to 8 / 13 of screen (below MP)
top bottom
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
0850	11.00										
0905	11.29	96.8	300		5.88	.401	181	0	15.94	-141	Fe^{2+} = 4.2
0910		96.8	300		6.14	.384	50	0	16.37	-154	
0915		96.8	300		6.33	.405	46	0	16.47	-171	
0920		96.8	300		6.42	.415	41	0	16.50	-180	
0925		96.8	300		6.50	.423	41	0	16.51	-187	
0930		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 8B Date 8-27-07
Field Personnel CS / BS
Sample Organization Shaw Environmental
Identify MP

Depth to ? / 30 of screen (below MP)
top bottom
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
0955	11.70										
1005	12.55	89.8	200		6.86	.695	81	4.58	15.59	31	$Fe^{2+} = 0$
1010		89.8	200		6.92	.691	75	1.33	15.94	19	
1015		89.8	200		6.97	.689	73	0	16.69	2	
1020		89.8			6.99	.699	112	0	15.87	-20	
1025	13.15	92.1			7.00	.693	93	0	16.43	-32	
1030		92.1			7.00	.694	76	0	16.61	-38	
1035					7.01	.699	51	0	16.36	-45	
1040					7.02	.699	44	0	16.42	-51	
1045					7.03	.700	42	0	16.43	-52	
1050	Sample Taken										

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

Appendix C

Sample Location Coordinates and Elevations

Appendix C
Area O Sample Location Coordinates and Elevations

Site ID	Northing*	Easting*	Elevation**
AREA O			
AOSW/SD01	3596957.08	10890952.20	1736.92
AOSW/SD02	3597022.77	10890888.35	1742.92
AOGW02	3596801.97	10890792.02	1784.81
AOGW08	3596871.48	10890827.11	1779.11
AOGW09	3596905.30	10890817.39	1779.59

* 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.

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

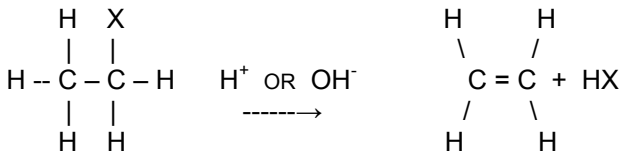
These reactions are catalyzed mainly by hydronium (H_3O^+) and/or hydroxyl ions (OH^-). Therefore, as mentioned above, hydrolysis reactions are pH dependent. Selected metals may also catalyze a hydrolysis reaction (Olsen and Davis, 1990).

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

HHRA Tables and Statistical Comparison Results

Appendix E-1

HHRA Tables

Table E.1-1
Selection of Exposure Pathways - Area O

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	Area O	Maintenance Worker	Adult	Ingestion	On-site	None	The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
						Dermal	On-site	None	The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
				Industrial Worker	Adult	Ingestion	On-site	None	There are no workers currently working at Area O on a daily basis. The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
						Dermal	On-site	None	There are no workers currently working at Area O on a daily basis. The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. In addition, the AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. In addition, the AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
		Air	Area O	Maintenance Worker	Adult	Inhalation	On-site	None	The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
				Industrial Worker	Adult	Inhalation	On-site	None	There are no workers currently working at Area O on a daily basis. The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
				Trespasser	Adolescent	Inhalation	On-site	None	Due to security at the installation, trespasser exposures are unlikely. In addition, the AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
	Subsurface Soil	Subsurface Soil	Area O	None	None	None	On-site	None	Current excavation or construction activities are not occurring at Area O.
	Sediment	Sediment	Area O	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact sediment at Area O and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact sediment at Area O and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	None	There are no workers currently exposed to sediment at Area O on a daily basis.
						Dermal	On-site	None	There are no workers currently exposed to sediment at Area O on a daily basis.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Surface Water	Surface Water	Area O	Maintenance Worker	Adult	Ingestion	On-site	None	Maintenance workers could contact surface water at Area O while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Maintenance workers could contact surface water at Area O and be exposed to COPCs via dermal absorption while wading.
				Industrial Worker	Adult	Ingestion	On-site	None	There are no workers currently exposed to surface water at Area O on a daily basis.
						Dermal	On-site	None	There are no workers currently exposed to surface water at Area O on a daily basis.

Table E.1-1
Selection of Exposure Pathways - Area O

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current (cont.)	Surface Water	Surface Water	Area O	Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Groundwater	Groundwater	Area O	None	None	None	On-site	None	Groundwater is not currently being used at Area O. Therefore, there is currently no direct exposure to groundwater.
		Air	Volatile groundwater COPCs released to ambient air	Maintenance Worker	Adult	Inhalation	On-site	None	Volatiles could not be released from groundwater into ambient air because site is covered by concrete containment area.
Future	Surface Soil	Surface Soil	Area O	Maintenance Worker	Adult	Ingestion	On-site	None	The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
						Dermal	On-site	None	The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
				Industrial Worker	Adult	Ingestion	On-site	None	The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
						Dermal	On-site	None	The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. In addition, the AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. In addition, the AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
		Air	Area O	Maintenance Worker	Adult	Inhalation	On-site	None	The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
				Industrial Worker	Adult	Inhalation	On-site	None	The AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
				Trespasser	Adolescent	Inhalation	On-site	None	Due to security at the installation, trespasser exposures are unlikely. In addition, the AST is contained within a concrete berm. There is no exposed surface soil because the area within the berm is covered by concrete.
	Subsurface Soil	Subsurface Soil	Area O	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact soil at Area O and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Maintenance workers could contact soil at Area O and be exposed to COPCs via dermal absorption.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial workers could contact soil at Area O and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Industrial workers could contact soil at Area O and be exposed to COPCs via dermal absorption.
				Excavation Worker	Adult	Ingestion	On-site	Quant	Excavation workers could contact soil at Area O and be exposed to COPCs via incidental ingestion.
						Dermal	On-site	Quant	Excavation workers could contact soil at Area O and be exposed to COPCs via dermal absorption.

Table E.1-1
Selection of Exposure Pathways - Area O

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.)	Subsurface Soil	Subsurface Soil	Area O	Resident	Adult	Ingestion	On-site	Quant	If Area O were to be further developed for residential purposes, residents could be exposed to COPCs in 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 Area O were to be further developed for residential purposes, residents could be exposed to COPCs in soil via dermal absorption.
					Child	Ingestion	On-site	Quant	If Area O were to be further developed for residential purposes, residents could be exposed to COPCs in 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 Area O were to be further developed for residential purposes, residents could be exposed to COPCs in 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	Area O	Maintenance Worker	Adult	Inhalation	On-site	Quant	Maintenance workers could be exposed to airborne volatiles or particulate matter released from soils at Area O.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Industrial workers could be exposed to airborne volatiles or particulate matter released from soils at Area O.
				Excavation Worker	Adult	Inhalation	On-site	Quant	Excavation workers could be exposed to airborne volatiles or particulate matter released from soils at Area O.
				Resident	Adult	Inhalation	On-site	Quant	If Area O were to be further developed for residential purposes, residents could be exposed to airborne volatiles or particulate matter released from soil.
					Child	Inhalation	On-site	Quant	If Area O were to be further developed for residential purposes, residents could be exposed to airborne volatiles or particulate matter released from soil.
				Trespasser	Adolescent	Inhalation	On-site	None	Given the industrial nature of the site, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Sediment	Sediment	Area O	Maintenance Worker	Adult	Ingestion	On-site	Quant	Maintenance workers could contact sediment at Area O and be exposed to COPCs via incidental ingestion during wading.
						Dermal	On-site	Quant	Maintenance workers could contact sediment at Area O and be exposed to COPCs via dermal absorption during wading.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial workers could contact sediment at Area O and be exposed to COPCs via incidental ingestion during wading.
						Dermal	On-site	Quant	Industrial workers could contact sediment at Area O and be exposed to COPCs via dermal absorption during wading.
				Excavation Worker	Adult	Ingestion	On-site	Quant	Excavation workers could contact sediment at Area O and be exposed to COPCs via incidental ingestion during wading.
						Dermal	On-site	Quant	Excavation workers could contact sediment at Area O and be exposed to COPCs via dermal absorption during wading.
				Resident	Adult	Ingestion	On-site	Quant	Adult residents could contact sediment at Area O and be exposed to COPCs via incidental ingestion during wading.

Table E.1-1
Selection of Exposure Pathways - Area O

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.)	Sediment	Sediment	Area O	Resident	Adult	Dermal	On-site	Quant	Adult residents could contact sediment at Area O and be exposed to COPCs via dermal absorption during wading.
					Child	Ingestion	On-site	Quant	Child residents could contact sediment at Area O and be exposed to COPCs via incidental ingestion during wading.
						Dermal	On-site	Quant	Child residents could contact sediment at Area O and be exposed to COPCs via dermal absorption during wading.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
	Surface Water	Surface Water	Area O	Maintenance Worker	Adult	Ingestion	On-site	None	Maintenance workers could contact surface water at Area O while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Maintenance workers could contact surface water at Area O and be exposed to COPCs via dermal absorption while wading.
				Industrial Worker	Adult	Ingestion	On-site	None	Industrial workers could contact surface water at Area O while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Industrial workers could contact surface water at Area O and be exposed to COPCs via dermal absorption while wading.
				Excavation Worker	Adult	Ingestion	On-site	None	Excavation workers could contact surface water at Area O while wading. However, surface water ingestion is unlikely.
						Dermal	On-site	Quant	Excavation workers could contact surface water at Area O and be exposed to COPCs via dermal absorption while wading.
				Resident	Adult	Ingestion	On-site	Quant	Residents could contact surface water at Area O while wading. Surface water ingestion while wading is considered unlikely.
						Dermal	On-site	Quant	Adult residents could contact surface water at Area O and be exposed to COPCs via dermal absorption while wading.
					Child	Ingestion	On-site	Quant	Residents could contact surface water at Area O while wading. Surface water ingestion while wading is considered unlikely.
						Dermal	On-site	Quant	Child residents could contact surface water at Area O and be exposed to COPCs via dermal absorption while wading.
				Trespasser	Adolescent	Ingestion	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.

Table E.1-1
Selection of Exposure Pathways - Area O

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	Groundwater	Area O	Maintenance Worker	Adult	Ingestion	On-site	None	Maintenance workers would not contact groundwater at Area O.
						Dermal	On-site	None	Maintenance workers would not contact groundwater at Area O.
				Industrial Worker	Adult	Ingestion	On-site	Quant	If Area O 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 Area O.
						Dermal	On-site	None	Based on the depth to groundwater, excavation workers would not contact groundwater at Area O.
				Resident	Adult	Ingestion	On-site	Quant	If Area O 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 Area O 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 Area O 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 Area O 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	Area O	Resident	Adult	Ingestion	On-site	Quant	Residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables. No COPCs were identified for uptake.
					Child	Ingestion	On-site	Quant	Residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables. No COPCs were identified for uptake.
		Air	Volatile groundwater COPCs released to ambient air	Maintenance Worker	Adult	Inhalation	On-site	Quant	Volatiles could be released from groundwater into ambient air. Maintenance workers could be exposed via inhalation.
			Indoor Vapors	Industrial Worker	Adult	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into buildings via vapor intrusion.
			Trench Vapors	Excavation Worker	Adult	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into a construction or utility trench via vapor intrusion.
			Volatiles at Showerhead	Resident	Adult	Inhalation	On-site	Quant	If groundwater wells were installed for residential purposes, adult residents could contact volatiles in groundwater via showering.
					Child	Inhalation	On-site	None	Children are assumed to bathe rather than shower. Therefore, inhalation exposure is assessed using only indoor air.

Table E.1-1
Selection of Exposure Pathways - Area O

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	Indoor Vapors	Resident	Adult	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into residences via vapor intrusion.
					Child	Inhalation	On-site	Quant	Volatiles in groundwater could potentially migrate into residences via vapor intrusion.
			Volatile groundwater COPCs released to ambient air	Trespasser	Adolescent	Inhalation	On-site	None	Due to security at the installation, trespasser exposures are unlikely. However, the maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.
		Groundwater	Off-site	Resident	Adult	Ingestion	Off-site	Quant	If COPCs from Area O 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 Area O 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 Area O 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 Area O groundwater were to migrate off-site in the future, off-site residents could be exposed to COPCs in groundwater via dermal absorption.
				Trespasser	Adolescent	Ingestion	Off-site	None	The residential scenario would be protective of the limited exposures that would be experienced by a trespasser.
						Dermal	Off-site	None	The residential scenario would be protective of the limited exposures that would be experienced by a trespasser.
		Homegrown fruits and vegetables	Off-site	Resident	Adult	Ingestion	Off-site	Quant	COPCs from Area O groundwater could migrate off-site in the future, and off-site residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables. No COPCs were identified for uptake.
					Child	Ingestion	Off-site	Quant	COPCs from Area O groundwater could migrate off-site in the future, and off-site residents could ingest COPCs in groundwater that had been taken up by homegrown fruits and vegetables. No COPCs were identified for uptake.
		Air	Volatile groundwater COPCs released to ambient air	Maintenance Worker	Adult	Inhalation	Off-site	Quant	If COPCs from Area O groundwater were to migrate off-site in the future, volatiles could be released from groundwater into ambient air. Off-site maintenance workers could be exposed via inhalation.
			Indoor Vapors	Industrial Worker	Adult	Inhalation	Off-site	Quant	If COPCs from Area O groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into off-site buildings via vapor intrusion.
			Trench Vapors	Excavation Worker	Adult	Inhalation	Off-site	Quant	If COPCs from Area O groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into an off-site construction or utility trench via vapor intrusion.
			Volatiles at Showerhead	Resident	Adult	Inhalation	Off-site	Quant	If COPCs from Area O 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 Area O 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 Area O groundwater were to migrate off-site in the future, volatiles in groundwater could potentially migrate into off-site residences via vapor intrusion.
			Volatile groundwater COPCs released to ambient air	Trespasser	Adolescent	Inhalation	Off-site	None	The maintenance worker scenario would be protective of the limited exposures that would be experienced by a trespasser.

Table E.1-2
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Future - Subsurface Soil - Area O

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface 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)
Subsurface Soil	91-57-6	2-Methylnaphthalene	1.00E+01	1.00E+01	mg/kg	OSB10 (RFIS-104)	1/8	4.90E-02 - 4.90E-02	1.00E+01	N/A	3.1E+01 N	N/A	N/A	No	BSL
	208-96-8	Acenaphthylene	1.80E-01	1.80E-01	mg/kg	OSB10 (RFIS-104)	1/8	3.30E-02 - 3.30E-02	1.80E-01	N/A	2.3E+02 N	N/A	N/A	No	BSL
	67-66-3	Chloroform	2.40E-03	2.40E-03	mg/kg	OSB2 (RFIS-88)	1/6	8.70E-04 - 8.70E-04	2.40E-03	N/A	7.8E+01 N	N/A	N/A	No	BSL
	132-64-9	Dibenzofuran	4.20E-01	4.20E-01	mg/kg	OSB10 (RFIS-104)	1/8	3.50E-02 - 3.50E-02	4.20E-01	N/A	7.8E+00 N	N/A	N/A	No	BSL
	84-74-2	Di-n-butyl phthalate	1.30E-01	1.30E-01	mg/kg	OSB17 (RDSX-48)	1/8	6.10E-02 - 6.10E-02	1.30E-01	N/A	7.8E+02 N	N/A	N/A	No	BSL
	100-41-4	Ethylbenzene	3.30E-03	3.30E-03	mg/kg	OSB10 (RFIS-104)	1/6	1.70E-03 - 1.70E-03	3.30E-03	N/A	7.8E+02 N	N/A	N/A	No	BSL
	86-73-7	Fluorene	1.00E+00	1.00E+00	mg/kg	OSB10 (RFIS-104)	1/8	3.30E-02 - 3.30E-02	1.00E+00	N/A	3.1E+02 N	N/A	N/A	No	BSL
	91-20-3	Naphthalene	1.90E+00	1.90E+00	mg/kg	OSB10 (RFIS-104	1/8	3.70E-02 - 3.70E-02	1.90E+00	N/A	1.6E+02 N	N/A	N/A	No	BSL
	85-01-8	Phenanthrene	2.00E+00	2.00E+00	mg/kg	OSB10 (RFIS-104)	1/8	3.30E-02 - 3.30E-02	2.00E+00	N/A	2.3E+02 N	N/A	N/A	No	BSL
	129-00-0	Pyrene	1.20E-01	1.20E-01	mg/kg	OSB10 (RFIS-104)	1/8	3.30E-02 - 3.30E-02	1.20E-01	N/A	2.3E+02 N	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening toxicity values from USEPA Region 3 RBC Table (October 2007) for residential soil. Criteria are based on a risk level of 1.0E-06 and HQ = 1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes:
Selection Reason: Above Screening Levels (ASL)
No Toxicity Information (NTX)

Deletion Reason: 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.1-3
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Future - Subsurface Soil - Area O

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface 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	Above Screening Value (Y/N)
Subsurface Soil	71-55-6	1,1,1-Trichloroethane			mg/kg		0/6	4.40E-03 - 4.40E-03	4.40E-03	N/A	1.6E+04 N	N/A	N/A	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/6	2.40E-03 - 2.40E-03	2.40E-03	N/A	3.2E+00 C	N/A	N/A	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/6	5.40E-03 - 5.40E-03	5.40E-03	N/A	1.1E+01 C	N/A	N/A	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/6	2.30E-03 - 2.30E-03	2.30E-03	N/A	1.6E+03 N	N/A	N/A	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/6	3.90E-03 - 3.90E-03	3.90E-03	N/A	3.9E+02 N	N/A	N/A	No
	120-82-1	1,2,4-Trichlorobenzene			mg/kg		0/8	4.00E-02 - 4.00E-02	4.00E-02	N/A	7.8E+01 N	N/A	N/A	No
	95-50-1	1,2-Dichlorobenzene			mg/kg		0/8	1.10E-01 - 1.10E-01	1.10E-01	N/A	7.0E+02 N	N/A	N/A	No
	107-06-2	1,2-Dichloroethane			mg/kg		0/6	1.70E-03 - 1.70E-03	1.70E-03	N/A	7.0E+00 C	N/A	N/A	No
	540-59-0	1,2-Dichloroethene (total)			mg/kg		0/6	3.00E-03 - 3.00E-03	3.00E-03	N/A	7.0E+01 N	N/A	N/A	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/6	2.90E-03 - 2.90E-03	2.90E-03	N/A	9.4E+00 C	N/A	N/A	No
	122-66-7	1,2-Diphenylhydrazine			mg/kg		0/8	1.40E-01 - 1.40E-01	1.40E-01	N/A	8.0E-01 C	N/A	N/A	No
	541-73-1	1,3-Dichlorobenzene			mg/kg		0/8	1.30E-01 - 1.30E-01	1.30E-01	N/A	2.3E+01 N	N/A	N/A	No
	106-46-7	1,4-Dichlorobenzene			mg/kg		0/8	9.80E-02 - 9.80E-02	9.80E-02	N/A	2.7E+01 C	N/A	N/A	No
	95-95-4	2,4,5-Trichlorophenol			mg/kg		0/8	1.00E-01 - 1.00E-01	1.00E-01	N/A	7.8E+02 N	N/A	N/A	No
	88-06-2	2,4,6-Trichlorophenol			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	7.8E+00 N	N/A	N/A	No
	120-83-2	2,4-Dichlorophenol			mg/kg		0/8	1.80E-01 - 1.80E-01	1.80E-01	N/A	2.3E+01 N	N/A	N/A	No
	105-67-9	2,4-Dimethylphenol			mg/kg		0/8	6.90E-01 - 6.90E-01	6.90E-01	N/A	1.6E+02 N	N/A	N/A	No
	51-28-5	2,4-Dinitrophenol			mg/kg		0/8	1.20E+00 - 1.20E+00	1.20E+00	N/A	1.6E+01 N	N/A	N/A	No
	121-14-2	2,4-Dinitrotoluene			mg/kg		0/8	1.40E-01 - 1.40E-01	1.40E-01	N/A	9.4E-01 C	N/A	N/A	No
	606-20-2	2,6-Dinitrotoluene			mg/kg		0/8	8.50E-02 - 8.50E-02	8.50E-02	N/A	9.4E-01 C	N/A	N/A	No
	78-93-3	2-Butanone			mg/kg		0/6	7.00E-02 - 7.00E-02	7.00E-02	N/A	4.7E+03 N	N/A	N/A	No
	110-75-8	2-Chloroethyl vinyl ether			mg/kg		0/6	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	N/A	N/A	NTX
	91-58-7	2-Chloronaphthalene			mg/kg		0/8	3.60E-02 - 3.60E-02	3.60E-02	N/A	6.3E+02 N	N/A	N/A	No
	95-57-8	2-Chlorophenol			mg/kg		0/8	6.00E-02 - 6.00E-02	6.00E-02	N/A	3.9E+01 N	N/A	N/A	No
	591-78-6	2-Hexanone			mg/kg		0/6	3.20E-02 - 3.20E-02	3.20E-02	N/A	N/A	N/A	N/A	NTX
	88-74-4	2-Nitroaniline			mg/kg		0/8	6.20E-02 - 6.20E-02	6.20E-02	N/A	N/A	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/kg		0/8	1.40E-01 - 1.40E-01	1.40E-01	N/A	N/A	N/A	N/A	NTX
	91-94-1	3,3-Dichlorobenzidine			mg/kg		0/8	6.30E+00 - 6.30E+00	6.30E+00	N/A	1.4E+00 C	N/A	N/A	Yes
	99-09-2	3-Nitroaniline			mg/kg		0/8	4.50E-01 - 4.50E-01	4.50E-01	N/A	N/A	N/A	N/A	NTX
	72-54-8	4,4'-DDD			mg/kg		0/9	2.70E-01 - 2.70E-01	2.70E-01	N/A	2.7E+00 C	N/A	N/A	No
	72-55-9	4,4'-DDE			mg/kg		0/8	3.10E-01 - 3.10E-01	3.10E-01	N/A	1.9E+00 C	N/A	N/A	No
	50-29-3	4,4'-DDT			mg/kg		0/18	3.10E-01 - 3.30E-01	3.30E-01	N/A	1.9E+00 C	N/A	N/A	No
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/8	5.50E-01 - 5.50E-01	5.50E-01	N/A	N/A	N/A	N/A	NTX
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/8	3.30E-02 - 3.30E-02	3.30E-02	N/A	N/A	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/8	3.30E-02 - 3.30E-02	3.30E-02	N/A	N/A	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/6	2.70E-02 - 2.70E-02	2.70E-02	N/A	N/A	N/A	N/A	NTX
	100-01-6	4-Nitroaniline			mg/kg		0/8	4.10E-01 - 4.10E-01	4.10E-01	N/A	N/A	N/A	N/A	NTX
	100-02-7	4-Nitrophenol			mg/kg		0/8	1.40E+00 - 1.40E+00	1.40E+00	N/A	N/A	N/A	N/A	NTX
	83-32-9	Acenaphthene			mg/kg		0/8	3.60E-02 - 3.60E-02	3.60E-02	N/A	4.7E+02 N	N/A	N/A	No
	67-64-1	Acetone			mg/kg		0/6	1.70E-02 - 1.70E-02	1.70E-02	N/A	7.0E+03 N	N/A	N/A	No
	107-02-8	Acraldehyde			mg/kg		0/6	1.00E-01 - 1.00E-01	1.00E-01	N/A	3.9E+00 N	N/A	N/A	No
	107-13-1	Acrylonitrile			mg/kg		0/6	1.00E-01 - 1.00E-01	1.00E-01	N/A	1.2E+00 C	N/A	N/A	No
	309-00-2	Aldrin			mg/kg		0/8	3.30E-01 - 3.30E-01	3.30E-01	N/A	3.8E-02 C	N/A	N/A	Yes

Table E.1-3
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Future - Subsurface Soil - Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	319-84-6	alpha-BHC			mg/kg		0/8	2.70E-01 - 2.70E-01	2.70E-01	N/A	1.0E-01 C	N/A	N/A	Yes
	5103-71-9	alpha-Chlordane			mg/kg		0/8	3.30E-01 - 3.30E-01	3.30E-01	N/A	1.8E+00 C	N/A	N/A	No
	120-12-7	Anthracene			mg/kg		0/8	3.30E-02 - 3.30E-02	3.30E-02	N/A	2.3E+03 N	N/A	N/A	No
	12674-11-2	Aroclor 1016			mg/kg		0/8	1.40E+00 - 1.40E+00	1.40E+00	N/A	5.5E-01 N	N/A	N/A	Yes
	11104-28-2	Aroclor 1221			mg/kg		0/8	1.40E+00 - 1.40E+00	1.40E+00	N/A	3.2E-01 C	N/A	N/A	Yes
	11141-16-5	Aroclor 1232			mg/kg		0/8	1.40E+00 - 1.40E+00	1.40E+00	N/A	3.2E-01 C	N/A	N/A	Yes
	53469-21-9	Aroclor 1242			mg/kg		0/8	1.40E+00 - 1.40E+00	1.40E+00	N/A	3.2E-01 C	N/A	N/A	Yes
	12672-29-6	Aroclor 1248			mg/kg		0/8	2.00E+00 - 2.00E+00	2.00E+00	N/A	3.2E-01 C	N/A	N/A	Yes
	11097-69-1	Aroclor 1254			mg/kg		0/8	2.30E+00 - 2.30E+00	2.30E+00	N/A	1.6E-01 N	N/A	N/A	Yes
	11096-82-5	Aroclor 1260			mg/kg		0/8	2.60E+00 - 2.60E+00	2.60E+00	N/A	3.2E-01 C	N/A	N/A	Yes
	71-43-2	Benzene			mg/kg		0/6	1.50E-03 - 1.50E-03	1.50E-03	N/A	1.2E+01 C	N/A	N/A	No
	92-87-5	Benzidine			mg/kg		0/8	8.50E-01 - 8.50E-01	8.50E-01	N/A	7.0E-04 C	N/A	N/A	Yes
	56-55-3	Benzo(a)anthracene			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	2.2E-01 C	N/A	N/A	No
	50-32-8	Benzo(a)pyrene			mg/kg		0/8	2.50E-01 - 2.50E-01	2.50E-01	N/A	2.2E-02 C	N/A	N/A	Yes
	205-99-2	Benzo(b)fluoranthene			mg/kg		0/8	2.10E-01 - 2.10E-01	2.10E-01	N/A	2.2E-01 C	N/A	N/A	No
	191-24-2	Benzo(g,h,i)perylene			mg/kg		0/8	2.50E-01 - 2.50E-01	2.50E-01	N/A	2.3E+02 N	N/A	N/A	No
	207-08-9	Benzo(k)fluoranthene			mg/kg		0/8	6.60E-02 - 6.60E-02	6.60E-02	N/A	2.2E+00 C	N/A	N/A	No
	65-85-0	Benzoic Acid			mg/kg		0/8	6.10E+00 - 6.10E+00	6.10E+00	N/A	3.1E+04 N	N/A	N/A	No
	100-51-6	Benzyl alcohol			mg/kg		0/8	1.90E-01 - 1.90E-01	1.90E-01	N/A	3.9E+03 N	N/A	N/A	No
	319-85-7	beta-BHC			mg/kg		0/8	2.70E-01 - 2.70E-01	2.70E-01	N/A	3.5E-01 C	N/A	N/A	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/8	5.90E-02 - 5.90E-02	5.90E-02	N/A	N/A	N/A	N/A	NTX
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/8	3.30E-02 - 3.30E-02	3.30E-02	N/A	5.8E-01 C	N/A	N/A	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/8	2.00E-01 - 2.00E-01	2.00E-01	N/A	9.1E+00 C	N/A	N/A	No
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/kg		0/8	6.20E-01 - 6.20E-01	6.20E-01	N/A	4.6E+01 C	N/A	N/A	No
	75-27-4	Bromodichloromethane			mg/kg		0/6	2.90E-03 - 2.90E-03	2.90E-03	N/A	1.0E+01 C	N/A	N/A	No
	74-83-9	Bromomethane			mg/kg		0/6	5.70E-03 - 5.70E-03	5.70E-03	N/A	1.1E+01 N	N/A	N/A	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	1.6E+03 N	N/A	N/A	No
	75-15-0	Carbon disulfide			mg/kg		0/6	4.40E-03 - 4.40E-03	4.40E-03	N/A	7.8E+02 N	N/A	N/A	No
	56-23-5	Carbon tetrachloride			mg/kg		0/6	7.00E-03 - 7.00E-03	7.00E-03	N/A	4.9E+00 C	N/A	N/A	No
	108-90-7	Chlorobenzene			mg/kg		0/6	8.60E-04 - 8.60E-04	8.60E-04	N/A	1.6E+02 N	N/A	N/A	No
	75-00-3	Chloroethane			mg/kg		0/6	1.20E-02 - 1.20E-02	1.20E-02	N/A	2.2E+02 C	N/A	N/A	No
	74-87-3	Chloromethane			mg/kg		0/6	8.80E-03 - 8.80E-03	8.80E-03	N/A	N/A	N/A	N/A	NTX
	218-01-9	Chrysene			mg/kg		0/8	1.20E-01 - 1.20E-01	1.20E-01	N/A	2.2E+01 C	N/A	N/A	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/kg		0/6	3.20E-03 - 3.20E-03	3.20E-03	N/A	N/A	N/A	N/A	NTX
	319-86-8	delta-BHC			mg/kg		0/8	2.70E-01 - 2.70E-01	2.70E-01	N/A	N/A	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/kg		0/8	2.10E-01 - 2.10E-01	2.10E-01	N/A	2.2E-02 C	N/A	N/A	Yes
	124-48-1	Dibromochloromethane			mg/kg		0/6	3.10E-03 - 3.10E-03	3.10E-03	N/A	7.6E+00 C	N/A	N/A	No
	60-57-1	Dieldrin			mg/kg		0/8	3.10E-01 - 3.10E-01	3.10E-01	N/A	4.0E-02 C	N/A	N/A	Yes
	84-66-2	Diethyl phthalate			mg/kg		0/8	2.40E-01 - 2.40E-01	2.40E-01	N/A	6.3E+03 N	N/A	N/A	No
	131-11-3	Dimethylphthalate			mg/kg		0/8	1.70E-01 - 1.70E-01	1.70E-01	N/A	N/A	N/A	N/A	NTX
	117-84-0	Di-n-octyl phthalate			mg/kg		0/8	1.90E-01 - 1.90E-01	1.90E-01	N/A	N/A	N/A	N/A	NTX
	959-98-8	Endosulfan I			mg/kg		0/8	6.20E-01 - 6.20E-01	6.20E-01	N/A	4.7E+01 N	N/A	N/A	No
	33213-65-9	Endosulfan II			mg/kg		0/8	6.20E-01 - 6.20E-01	6.20E-01	N/A	4.7E+01 N	N/A	N/A	No
	1031-07-8	Endosulfan sulfate			mg/kg		0/8	6.20E-01 - 6.20E-01	6.20E-01	N/A	4.7E+01 N	N/A	N/A	No
	72-20-8	Endrin			mg/kg		0/8	4.50E-01 - 4.50E-01	4.50E-01	N/A	2.3E+00 N	N/A	N/A	No
	7421-93-4	Endrin aldehyde			mg/kg		0/8	5.30E-01 - 5.30E-01	5.30E-01	N/A	2.3E+00 N	N/A	N/A	No
	53494-70-5	Endrin ketone			mg/kg		0/8	5.30E-01 - 5.30E-01	5.30E-01	N/A	2.3E+00 N	N/A	N/A	No
	206-44-0	Fluoranthene			mg/kg		0/8	6.80E-02 - 6.80E-02	6.80E-02	N/A	3.1E+02 N	N/A	N/A	No
	58-89-9	gamma-BHC (Lindane)			mg/kg		0/8	2.70E-01 - 2.70E-01	2.70E-01	N/A	4.9E-01 C	N/A	N/A	No

Table E.1-3
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Future - Subsurface Soil - Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	5103-74-2	gamma-Chlordane			mg/kg		0/8	3.30E-01 - 3.30E-01	3.30E-01	N/A	1.8E+00 C	N/A	N/A	No
	76-44-8	Heptachlor			mg/kg		0/8	1.30E-01 - 1.30E-01	1.30E-01	N/A	1.4E-01 C	N/A	N/A	No
	1024-57-3	Heptachlor epoxide			mg/kg		0/8	3.30E-01 - 3.30E-01	3.30E-01	N/A	7.0E-02 C	N/A	N/A	Yes
	118-74-1	Hexachlorobenzene			mg/kg		0/8	3.30E-02 - 3.30E-02	3.30E-02	N/A	4.0E-01 C	N/A	N/A	No
	87-68-3	Hexachlorobutadiene			mg/kg		0/8	2.30E-01 - 2.30E-01	2.30E-01	N/A	7.8E+00 N	N/A	N/A	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/8	6.20E+00 - 6.20E+00	6.20E+00	N/A	4.7E+01 N	N/A	N/A	No
	67-72-1	Hexachloroethane			mg/kg		0/8	1.50E-01 - 1.50E-01	1.50E-01	N/A	7.8E+00 N	N/A	N/A	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/kg		0/8	2.90E-01 - 2.90E-01	2.90E-01	N/A	2.2E-01 C	N/A	N/A	Yes
	78-59-1	Isophorone			mg/kg		0/8	3.30E-02 - 3.30E-02	3.30E-02	N/A	6.7E+02 C	N/A	N/A	No
	75-09-2	Methylene chloride			mg/kg		0/6	1.20E-02 - 1.20E-02	1.20E-02	N/A	8.5E+01 C	N/A	N/A	No
	98-95-3	Nitrobenzene			mg/kg		0/8	4.50E-02 - 4.50E-02	4.50E-02	N/A	3.9E+00 N	N/A	N/A	No
	62-75-9	N-Nitrosodimethylamine			mg/kg		0/8	1.40E-01 - 1.40E-01	1.40E-01	N/A	3.0E-03 C	N/A	N/A	Yes
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/8	2.00E-01 - 2.00E-01	2.00E-01	N/A	9.1E-02 C	N/A	N/A	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/8	1.90E-01 - 1.90E-01	1.90E-01	N/A	1.3E+02 C	N/A	N/A	No
	95-48-7	o-Cresol			mg/kg		0/8	2.90E-02 - 2.90E-02	2.90E-02	N/A	3.9E+02 N	N/A	N/A	No
	106-47-8	p-Chloroaniline			mg/kg		0/8	8.10E-01 - 8.10E-01	8.10E-01	N/A	3.1E+01 N	N/A	N/A	No
	59-50-7	p-Chloro-m-cresol			mg/kg		0/8	9.50E-02 - 9.50E-02	9.50E-02	N/A	N/A	N/A	N/A	NTX
	106-44-5	p-Cresol			mg/kg		0/8	2.40E-01 - 2.40E-01	2.40E-01	N/A	3.9E+01 N	N/A	N/A	No
	87-86-5	Pentachlorophenol			mg/kg		0/8	1.30E+00 - 1.30E+00	1.30E+00	N/A	5.3E+00 C	N/A	N/A	No
	108-95-2	Phenol			mg/kg		0/8	1.10E-01 - 1.10E-01	1.10E-01	N/A	2.3E+03 N	N/A	N/A	No
	100-42-5	Styrene			mg/kg		0/6	2.60E-03 - 2.60E-03	2.60E-03	N/A	1.6E+03 N	N/A	N/A	No
	127-18-4	Tetrachloroethene			mg/kg		0/6	8.10E-04 - 8.10E-04	8.10E-04	N/A	1.2E+00 C	N/A	N/A	No
	108-88-3	Toluene			mg/kg		0/6	7.80E-04 - 7.80E-04	7.80E-04	N/A	6.3E+02 N	N/A	N/A	No
	8001-35-2	Toxaphene			mg/kg		0/8	2.60E+00 - 2.60E+00	2.60E+00	N/A	5.8E-01 C	N/A	N/A	Yes
	10061-02-6	trans-1,3-Dichloropropene			mg/kg		0/6	2.80E-03 - 2.80E-03	2.80E-03	N/A	N/A	N/A	N/A	NTX
	75-25-2	Tribromomethane			mg/kg		0/6	6.90E-03 - 6.90E-03	6.90E-03	N/A	8.1E+01 C	N/A	N/A	No
	79-01-6	Trichloroethene			mg/kg		0/6	2.80E-03 - 2.80E-03	2.80E-03	N/A	1.6E+00 C	N/A	N/A	No
	75-69-4	Trichlorofluoromethane			mg/kg		0/6	5.90E-03 - 5.90E-03	5.90E-03	N/A	2.3E+03 N	N/A	N/A	No
	108-05-4	Vinyl acetate			mg/kg		0/6	3.20E-03 - 3.20E-03	3.20E-03	N/A	7.8E+03 N	N/A	N/A	No
	75-01-4	Vinyl Chloride			mg/kg		0/6	6.20E-03 - 6.20E-03	6.20E-03	N/A	9.0E-02 C	N/A	N/A	No
	1330-20-7	Xylenes (total)			mg/kg		0/6	1.50E-03 - 1.50E-03	1.50E-03	N/A	1.6E+03 N	N/A	N/A	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) for residential soil.
Criteria 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
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
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

Table Table E.1-4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Current/Future - Sediment - Area O

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
Sediment	67-64-1	Acetone	8.77E-02 J	8.77E-02 J	mg/kg	AOSD02	1/2	1.10E-01 - 1.10E-01	8.77E-02	N/A	7.0E+04 N	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening toxicity values from USEPA Region 3 RBC Table (October 2007) for residential soil.
Criteria are based on a risk level of 1.0E-06 and HQ = 0.1, and then adjusted by a factor of 10 for sediment exposures.
See text for derivation of Nutrient RDAs.

(4) Rationale Codes:
Selection Reason: Above Screening Levels (ASL)
No Toxicity Information (NTX)

Deletion Reason: 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.1-5
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Current/Future - Sediment - Area O

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
Sediment	71-55-6	1,1,1-Trichloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.6E+05 N	N/A	N/A	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	3.2E+01 C	N/A	N/A	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.1E+02 C	N/A	N/A	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.6E+04 N	N/A	N/A	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	3.9E+03 N	N/A	N/A	No
	120-82-1	1,2,4-Trichlorobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	7.8E+02 N	N/A	N/A	No
	95-50-1	1,2-Dichlorobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	7.0E+03 N	N/A	N/A	No
	107-06-2	1,2-Dichloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	7.0E+01 C	N/A	N/A	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	9.4E+01 C	N/A	N/A	No
	541-73-1	1,3-Dichlorobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	2.3E+02 N	N/A	N/A	No
	106-46-7	1,4-Dichlorobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	2.7E+02 C	N/A	N/A	No
	90-12-0	1-Methylnaphthalene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	N/A	N/A	N/A	N/A	NTX
	95-95-4	2,4,5-Trichlorophenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	7.8E+03 N	N/A	N/A	No
	88-06-2	2,4,6-Trichlorophenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	7.8E+01 N	N/A	N/A	No
	120-83-2	2,4-Dichlorophenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	2.3E+02 N	N/A	N/A	No
	105-67-9	2,4-Dimethylphenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	1.6E+03 N	N/A	N/A	No
	51-28-5	2,4-Dinitrophenol			mg/kg		0/2	1.30E+00 - 1.40E+00	1.40E+00	N/A	1.6E+02 N	N/A	N/A	No
	121-14-2	2,4-Dinitrotoluene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	9.4E+00 C	N/A	N/A	No
	606-20-2	2,6-Dinitrotoluene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	9.4E+00 C	N/A	N/A	No
	78-93-3	2-Butanone			mg/kg		0/2	4.80E-02 - 5.30E-02	5.30E-02	N/A	4.7E+04 N	N/A	N/A	No
	91-58-7	2-Chloronaphthalene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	6.3E+03 N	N/A	N/A	No
	95-57-8	2-Chlorophenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	3.9E+02 N	N/A	N/A	No
	591-78-6	2-Hexanone			mg/kg		0/2	4.80E-02 - 5.30E-02	5.30E-02	N/A	N/A	N/A	N/A	NTX
	91-57-6	2-Methylnaphthalene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	N/A	3.1E+02 N	N/A	N/A	No
	88-74-4	2-Nitroaniline			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	N/A	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	N/A	N/A	N/A	NTX
	N/A	3&4-Methylphenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	3.9E+03 N	N/A	N/A	No
	91-94-1	3,3'-Dichlorobenzidine			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	1.4E+01 C	N/A	N/A	No
	99-09-2	3-Nitroaniline			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	N/A	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	N/A	N/A	N/A	NTX
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	N/A	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	N/A	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/2	4.80E-02 - 5.30E-02	5.30E-02	N/A	N/A	N/A	N/A	NTX
	100-01-6	4-Nitroaniline			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	N/A	N/A	N/A	NTX
	100-02-7	4-Nitrophenol			mg/kg		0/2	1.30E+00 - 1.40E+00	1.40E+00	N/A	N/A	N/A	N/A	NTX
	83-32-9	Acenaphthene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	N/A	4.7E+03 N	N/A	N/A	No

Table E.1-5
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Current/Future - Sediment - Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	208-96-8	Acenaphthylene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	N/A	2.3E+03 N	N/A	N/A	No
	120-12-7	Anthracene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	N/A	2.3E+04 N	N/A	N/A	No
	71-43-2	Benzene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.2E+02 C	N/A	N/A	No
	56-55-3	Benzo(a)anthracene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	N/A	2.2E+00 C	N/A	N/A	No
	50-32-8	Benzo(a)pyrene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	N/A	2.2E-01 C	N/A	N/A	No
	205-99-2	Benzo(b)fluoranthene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	N/A	2.2E+00 C	N/A	N/A	No
	191-24-2	Benzo(g,h,i)perylene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	N/A	2.3E+03 N	N/A	N/A	No
	207-08-9	Benzo(k)fluoranthene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	N/A	2.2E+01 C	N/A	N/A	No
	65-85-0	Benzoic Acid			mg/kg		0/2	1.30E+00 - 1.40E+00	1.40E+00	N/A	3.1E+05 N	N/A	N/A	No
	100-51-6	Benzyl alcohol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	3.9E+04 N	N/A	N/A	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	N/A	N/A	N/A	NTX
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	5.8E+00 C	N/A	N/A	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	9.1E+01 C	N/A	N/A	No
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	4.6E+02 C	N/A	N/A	No
	75-27-4	Bromodichloromethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.0E+02 C	N/A	N/A	No
	74-83-9	Bromomethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.1E+02 N	N/A	N/A	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	1.6E+04 N	N/A	N/A	No
	86-74-8	Carbazole			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	3.2E+02 C	N/A	N/A	No
	75-15-0	Carbon disulfide			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	7.8E+03 N	N/A	N/A	No
	56-23-5	Carbon tetrachloride			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	4.9E+01 C	N/A	N/A	No
	108-90-7	Chlorobenzene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.6E+03 N	N/A	N/A	No
	75-00-3	Chloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	2.2E+03 C	N/A	N/A	No
	67-66-3	Chloroform			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	7.8E+02 N	N/A	N/A	No
	74-87-3	Chloromethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	N/A	N/A	N/A	NTX
	218-01-9	Chrysene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	N/A	2.2E+02 C	N/A	N/A	No
	156-59-2	cis-1,2-Dichloroethene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	7.8E+02 N	N/A	N/A	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	N/A	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	N/A	2.2E-01 C	N/A	N/A	No
	132-64-9	Dibenzofuran			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	7.8E+01 N	N/A	N/A	No
	124-48-1	Dibromochloromethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	7.6E+01 C	N/A	N/A	No
	84-66-2	Diethyl phthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	6.3E+04 N	N/A	N/A	No
	131-11-3	Dimethylphthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	N/A	N/A	N/A	NTX
	84-74-2	Di-n-butyl phthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	7.8E+03 N	N/A	N/A	No
	117-84-0	Di-n-octyl phthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	N/A	N/A	N/A	NTX
	100-41-4	Ethylbenzene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	7.8E+03 N	N/A	N/A	No
	206-44-0	Fluoranthene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	N/A	3.1E+03 N	N/A	N/A	No
	86-73-7	Fluorene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	N/A	3.1E+03 N	N/A	N/A	No
	118-74-1	Hexachlorobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	4.0E+00 C	N/A	N/A	No
	87-68-3	Hexachlorobutadiene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	7.8E+01 N	N/A	N/A	No
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	4.7E+02 N	N/A	N/A	No
	67-72-1	Hexachloroethane			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	7.8E+01 N	N/A	N/A	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	N/A	2.2E+00 C	N/A	N/A	No

Table E.1-5
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Current/Future - Sediment - Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	78-59-1	Isophorone			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	6.7E+03 C	N/A	N/A	No
	ICF87	m+p-Xylenes			mg/kg		0/2	1.90E-02 - 2.10E-02	2.10E-02	N/A	1.6E+04 N	N/A	N/A	No
	75-09-2	Methylene chloride			mg/kg		0/2	1.90E-02 - 2.10E-02	2.10E-02	N/A	8.5E+02 C	N/A	N/A	No
	91-20-3	Naphthalene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	N/A	1.6E+03 N	N/A	N/A	No
	98-95-3	Nitrobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	3.9E+01 N	N/A	N/A	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	9.1E-01 C	N/A	N/A	No
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	1.3E+03 C	N/A	N/A	No
	95-48-7	o-Cresol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	3.9E+03 N	N/A	N/A	No
	95-47-6	o-Xylene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.6E+04 N	N/A	N/A	No
	106-47-8	p-Chloroaniline			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	N/A	3.1E+02 N	N/A	N/A	No
	59-50-7	p-Chloro-m-cresol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	N/A	N/A	N/A	NTX
	87-86-5	Pentachlorophenol			mg/kg		0/2	1.30E+00 - 1.40E+00	1.40E+00	N/A	5.3E+01 C	N/A	N/A	No
	85-01-8	Phenanthrene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	N/A	2.3E+03 N	N/A	N/A	No
	108-95-2	Phenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	N/A	2.3E+04 N	N/A	N/A	No
	129-00-0	Pyrene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	N/A	2.3E+03 N	N/A	N/A	No
	100-42-5	Styrene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.6E+04 N	N/A	N/A	No
	127-18-4	Tetrachloroethene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.2E+01 C	N/A	N/A	No
	108-88-3	Toluene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	6.3E+03 N	N/A	N/A	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.6E+03 N	N/A	N/A	No
	10061-02-6	trans-1,3-Dichloropropene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	N/A	N/A	N/A	NTX
	75-25-2	Tribromomethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	8.1E+02 C	N/A	N/A	No
	79-01-6	Trichloroethene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	1.6E+01 C	N/A	N/A	No
	75-01-4	Vinyl Chloride			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	N/A	9.0E-01 C	N/A	N/A	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) for residential soil.

Criteria are based on a risk level of 1.0E-06 and an HQ = 0.1, and then adjusted by a factor of 10 for sediment exposures. 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
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

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

Table E.1-6
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Current/Future - Surface Water - Area O

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
Surface Water	90-12-0	1-Methylnaphthalene	4.10E-03	4.10E-03	mg/l	AOSW01	1/2	1.10E-03 - 1.10E-03	4.10E-03	N/A	2.4E-02 N	N/A	N/A	No	BSL
	83-32-9	Acenaphthene	8.30E-04 J	8.30E-04 J	mg/l	AOSW01	1/2	1.10E-03 - 1.10E-03	8.30E-04	N/A	3.7E-01 N	N/A	N/A	No	BSL
	67-64-1	Acetone	7.00E-03 J	7.00E-03 J	mg/l	AOSW02	1/2	2.50E-02 - 2.50E-02	7.00E-03	N/A	5.5E+00 N	N/A	N/A	No	BSL
	86-73-7	Fluorene	1.50E-03	1.50E-03	mg/l	AOSW01	1/2	1.10E-03 - 1.10E-03	1.50E-03	N/A	2.4E-01 N	N/A	N/A	No	BSL
	85-01-8	Phenanthrene	7.35E-04 J	7.35E-04 J	mg/l	AOSW01	1/2	1.10E-03 - 1.10E-03	7.35E-04	N/A	1.8E-01 N	N/A	N/A	No	BSL

(1) Maximum concentration used for screening.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from site-specific statistical analysis. See text for supporting information.

(3) Screening toxicity values from USEPA Region 3 RBC Table (October 2007) for tap water. See text for derivation of Nutrient RDAs.
Criteria are based on a risk level of 1.0E-06 and HQ = 0.1, and then adjusted by a factor of 10 for surface water exposures.

(4) Rationale Codes

Selection Reason: Above Screening Levels (ASL)
No Toxicity Information (NTX)

Deletion Reason: 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
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Current/Future - Surface Water- Area O

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	71-55-6	1,1,1-Trichloroethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.1E+00 N	N/A	N/A	No
Surface Water	79-34-5	1,1,2,2-Tetrachloroethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	5.3E-04 C	N/A	N/A	Yes
	79-00-5	1,1,2-Trichloroethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.9E-03 C	N/A	N/A	No
	75-34-3	1,1-Dichloroethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.0E-01 N	N/A	N/A	No
	75-35-4	1,1-Dichloroethene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.5E-01 N	N/A	N/A	No
	120-82-1	1,2,4-Trichlorobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	6.1E-02 N	N/A	N/A	No
	95-50-1	1,2-Dichlorobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	2.7E-01 N	N/A	N/A	No
	107-06-2	1,2-Dichloroethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.2E-03 C	N/A	N/A	No
	78-87-5	1,2-Dichloropropane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.6E-03 C	N/A	N/A	No
	541-73-1	1,3-Dichlorobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	1.8E-02 N	N/A	N/A	No
	106-46-7	1,4-Dichlorobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	2.8E-03 C	N/A	N/A	Yes
	95-95-4	2,4,5-Trichlorophenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	3.7E+00 N	N/A	N/A	No
	88-06-2	2,4,6-Trichlorophenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	3.7E-02 N	N/A	N/A	No
	120-83-2	2,4-Dichlorophenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	1.1E-01 N	N/A	N/A	No
	105-67-9	2,4-Dimethylphenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	7.3E-01 N	N/A	N/A	No
	51-28-5	2,4-Dinitrophenol			mg/l		0/2	2.50E-02 - 2.60E-02	2.60E-02	N/A	7.3E-02 N	N/A	N/A	No
	121-14-2	2,4-Dinitrotoluene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	9.8E-04 C	N/A	N/A	Yes
	606-20-2	2,6-Dinitrotoluene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	9.8E-04 C	N/A	N/A	Yes
	78-93-3	2-Butanone			mg/l		0/2	5.00E-03 - 5.00E-03	5.00E-03	N/A	7.0E+00 N	N/A	N/A	No
	91-58-7	2-Chloronaphthalene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	4.9E-01 N	N/A	N/A	No
	95-57-8	2-Chlorophenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	3.0E-02 N	N/A	N/A	No
	591-78-6	2-Hexanone			mg/l		0/2	5.00E-03 - 5.00E-03	5.00E-03	N/A	N/A	N/A	N/A	NTX
	91-57-6	2-Methylnaphthalene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	N/A	2.4E-02 N	N/A	N/A	No
	88-74-4	2-Nitroaniline			mg/l		0/2	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	N/A	N/A	N/A	NTX
	ICF14A-AA-I	3&4-Methylphenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	1.8E-01 N	N/A	N/A	No
	91-94-1	3,3'-Dichlorobenzidine			mg/l		0/2	1.00E-02 - 1.00E-02	1.00E-02	N/A	1.5E-03 C	N/A	N/A	Yes
	99-09-2	3-Nitroaniline			mg/l		0/2	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/l		0/2	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	N/A	N/A	NTX
	101-55-3	4-Bromophenyl phenylether			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	N/A	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	N/A	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/l		0/2	5.00E-03 - 5.00E-03	5.00E-03	N/A	6.3E+00 N	N/A	N/A	No
	100-01-6	4-Nitroaniline			mg/l		0/2	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	N/A	N/A	NTX
	100-02-7	4-Nitrophenol			mg/l		0/2	2.50E-02 - 2.60E-02	2.60E-02	N/A	N/A	N/A	N/A	NTX
	208-96-8	Acenaphthylene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	N/A	1.8E-01 N	N/A	N/A	No

Table E.1-7
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Current/Future - Surface Water- Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	120-12-7	Anthracene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	N/A	1.8E+00 N	N/A	N/A	No
	71-43-2	Benzene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.4E-03 C	N/A	N/A	No
	56-55-3	Benzo(a)anthracene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	N/A	3.0E-04 C	N/A	N/A	No
	50-32-8	Benzo(a)pyrene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	N/A	3.0E-05 C	N/A	N/A	Yes
	205-99-2	Benzo(b)fluoranthene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	N/A	3.0E-04 C	N/A	N/A	No
	191-24-2	Benzo(g,h,i)perylene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	N/A	1.8E-01 N	N/A	N/A	No
	207-08-9	Benzo(k)fluoranthene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	N/A	3.0E-03 C	N/A	N/A	No
	100-51-6	Benzyl alcohol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	1.8E+01 N	N/A	N/A	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	N/A	N/A	N/A	NTX
	111-44-4	bis(2-Chloroethyl)ether			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	9.6E-05 C	N/A	N/A	Yes
	108-60-1	bis(2-Chloroisopropyl)ether			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	2.6E-03 C	N/A	N/A	Yes
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	4.8E-02 C	N/A	N/A	No
	75-27-4	Bromodichloromethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.7E-03 C	N/A	N/A	No
	74-83-9	Bromomethane			mg/l		0/2	2.00E-03 - 2.00E-03	2.00E-03	N/A	8.5E-03 N	N/A	N/A	No
	85-68-7	Butyl benzyl phthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	7.3E+00 N	N/A	N/A	No
	86-74-8	Carbazole			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	3.3E-02 C	N/A	N/A	No
	75-15-0	Carbon disulfide			mg/l		0/2	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.0E+00 N	N/A	N/A	No
	56-23-5	Carbon tetrachloride			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.6E-03 C	N/A	N/A	No
	108-90-7	Chlorobenzene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.0E-02 N	N/A	N/A	No
	75-00-3	Chloroethane			mg/l		0/2	2.00E-03 - 2.00E-03	2.00E-03	N/A	3.6E-02 C	N/A	N/A	No
	67-66-3	Chloroform			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.5E-03 C	N/A	N/A	No
	74-87-3	Chloromethane			mg/l		0/2	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.9E-01 N	N/A	N/A	No
	218-01-9	Chrysene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	N/A	3.0E-02 C	N/A	N/A	No
	156-59-2	cis-1,2-Dichloroethene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	6.1E-02 N	N/A	N/A	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	N/A	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	N/A	3.0E-05 C	N/A	N/A	Yes
	132-64-9	Dibenzofuran			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	3.7E-02 N	N/A	N/A	No
	124-48-1	Dibromochloromethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.3E-03 C	N/A	N/A	No
	84-66-2	Diethyl phthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	2.9E+01 N	N/A	N/A	No
	131-11-3	Dimethylphthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	N/A	N/A	N/A	NTX
	84-74-2	Di-n-butyl phthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	3.7E+00 N	N/A	N/A	No
	117-84-0	Di-n-octyl phthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	N/A	N/A	N/A	NTX
	100-41-4	Ethylbenzene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.3E+00 N	N/A	N/A	No
	206-44-0	Fluoranthene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	N/A	1.5E+00 N	N/A	N/A	No
	118-74-1	Hexachlorobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	4.2E-04 C	N/A	N/A	Yes
	87-68-3	Hexachlorobutadiene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	8.6E-03 C	N/A	N/A	No
	77-47-4	Hexachlorocyclopentadiene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	2.2E-01 N	N/A	N/A	No
	67-72-1	Hexachloroethane			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	3.7E-02 N	N/A	N/A	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	N/A	3.0E-04 C	N/A	N/A	No
	78-59-1	Isophorone			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	7.0E-01 C	N/A	N/A	No
	ICF87	m+p-Xylenes			mg/l		0/2	2.00E-03 - 2.00E-03	2.00E-03	N/A	2.1E-01 N	N/A	N/A	No

Table E.1-7
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Current/Future - Surface Water- Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	75-09-2	Methylene chloride			mg/l		0/2	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.1E-02 C	N/A	N/A	No
	91-20-3	Naphthalene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	N/A	6.5E-03 N	N/A	N/A	No
	98-95-3	Nitrobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	3.5E-03 N	N/A	N/A	Yes
	621-64-7	n-Nitroso-di-n-propylamine			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	9.6E-05 C	N/A	N/A	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	1.4E-01 C	N/A	N/A	No
	95-48-7	o-Cresol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	1.8E+00 N	N/A	N/A	No
	95-47-6	o-Xylene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.1E-01 N	N/A	N/A	No
	106-47-8	p-Chloroaniline			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	1.5E-01 N	N/A	N/A	No
	59-50-7	p-Chloro-m-cresol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	N/A	N/A	N/A	NTX
	87-86-5	Pentachlorophenol			mg/l		0/2	2.50E-02 - 2.60E-02	2.60E-02	N/A	5.6E-03 C	N/A	N/A	Yes
	108-95-2	Phenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	N/A	1.1E+01 N	N/A	N/A	No
	129-00-0	Pyrene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	N/A	1.8E-01 N	N/A	N/A	No
	100-42-5	Styrene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.6E+00 N	N/A	N/A	No
	127-18-4	Tetrachloroethene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.0E-03 C	N/A	N/A	No
	108-88-3	Toluene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.3E+00 N	N/A	N/A	No
	156-60-5	trans-1,2-Dichloroethene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.1E-01 N	N/A	N/A	No
	10061-02-6	trans-1,3-Dichloropropene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	N/A	N/A	N/A	NTX
	75-25-2	Tribromomethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	8.5E-02 C	N/A	N/A	No
	79-01-6	Trichloroethene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.6E-04 C	N/A	N/A	Yes
	75-01-4	Vinyl Chloride			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.5E-04 C	N/A	N/A	Yes

(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) for tap water.
Criteria are based on a risk level of 1.0E-06 and an HQ = 0.1, and then adjusted by a factor of 10 for surface water exposures. 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
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

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

Table E.1-8
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Current/Future - Groundwater - Area O

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
Groundwater	90-12-0	1-Methylnaphthalene	7.60E-03	4.14E-01 L	mg/L	AOGW02	3/10	9.10E-04 - 1.10E-03	4.14E-01	N/A	2.4E-03 N	N/A	N/A	Yes	ASL
	91-57-6	2-Methylnaphthalene	2.00E-03	1.80E-01 L	mg/L	AOGW02	3/10	9.10E-04 - 1.10E-03	1.80E-01	N/A	2.4E-03 N	N/A	N/A	Yes	ASL
	83-32-9	Acenaphthene	1.50E-03	4.71E-02	mg/L	AOGW02	3/10	9.10E-04 - 1.10E-03	4.71E-02	N/A	3.7E-02 N	N/A	N/A	Yes	ASL
	208-96-8	Acenaphthylene	5.05E-04 J	1.82E-02 J	mg/L	AOGW02	2/10	9.10E-04 - 1.10E-03	1.82E-02	N/A	1.8E-02 N	N/A	N/A	Yes	ASL
	117-81-7	bis(2-Ethylhexyl) phthalate	2.31E-02	2.31E-02	mg/L	S4W-1	1/10	4.50E-03 - 7.90E-02	2.31E-02	N/A	4.8E-03 C	N/A	N/A	Yes	ASL
	86-74-8	Carbazole	1.70E-03 J	1.70E-03 J	mg/L	OMW1	1/10	4.50E-03 - 7.90E-02	1.70E-03	N/A	3.3E-03 C	N/A	N/A	No	BSL
	67-66-3	Chloroform	1.70E-03	1.42E-02	mg/L	OMW2	4/9	1.00E-03 - 1.00E-03	1.42E-02	N/A	1.5E-04 C	N/A	N/A	Yes	ASL
	86-73-7	Fluorene	2.90E-03	1.01E-01	mg/L	AOGW02	3/10	9.10E-04 - 1.10E-03	1.01E-01	N/A	2.4E-02 N	N/A	N/A	Yes	ASL
	91-20-3	Naphthalene	1.00E-03	5.07E-02	mg/L	AOGW02	3/10	9.10E-04 - 1.10E-03	5.07E-02	N/A	6.5E-04 N	N/A	N/A	Yes	ASL
	85-01-8	Phenanthrene	1.50E-03	1.63E-01	mg/L	AOGW02	3/10	9.10E-04 - 1.10E-03	1.63E-01	N/A	1.8E-02 N	N/A	N/A	Yes	ASL
	129-00-0	Pyrene	1.89E-02 J	1.89E-02 J	mg/L	AOGW02	1/10	9.10E-04 - 1.10E-03	1.89E-02	N/A	1.8E-02 N	N/A	N/A	Yes	ASL
	127-18-4	Tetrachloroethene	3.20E-04 J	6.10E-04 J	mg/L	8B	2/10	1.00E-03 - 1.00E-03	6.10E-04	N/A	1.0E-04 C	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) for tap water.
Criteria are based on a risk level of 1.0E-06 and HQ = 0.1. See text for derivation of Nutrient RDAs.

(4) Rationale Codes:
Selection Reason: Above Screening Levels (ASL)
No Toxicity Information (NTX)

Deletion Reason: 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.1-9
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Current/Future - Groundwater - Area O

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	71-55-6	1,1,1-Trichloroethane			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.1E-01 N	N/A	N/A	No
Groundwater	79-34-5	1,1,2,2-Tetrachloroethane			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	5.3E-05 C	N/A	N/A	Yes
	79-00-5	1,1,2-Trichloroethane			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.9E-04 C	N/A	N/A	Yes
	75-34-3	1,1-Dichloroethane			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.0E-02 N	N/A	N/A	No
	75-35-4	1,1-Dichloroethene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.5E-02 N	N/A	N/A	No
	120-82-1	1,2,4-Trichlorobenzene			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	6.1E-03 N	N/A	N/A	Yes
	95-50-1	1,2-Dichlorobenzene			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	2.7E-02 N	N/A	N/A	Yes
	107-06-2	1,2-Dichloroethane			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.2E-04 C	N/A	N/A	Yes
	78-87-5	1,2-Dichloropropane			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.6E-04 C	N/A	N/A	Yes
	541-73-1	1,3-Dichlorobenzene			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	1.8E-03 N	N/A	N/A	Yes
	106-46-7	1,4-Dichlorobenzene			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	2.8E-04 C	N/A	N/A	Yes
	95-95-4	2,4,5-Trichlorophenol			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	3.7E-01 N	N/A	N/A	No
	88-06-2	2,4,6-Trichlorophenol			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	3.7E-02 N	N/A	N/A	Yes
	120-83-2	2,4-Dichlorophenol			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	1.1E-02 N	N/A	N/A	Yes
	105-67-9	2,4-Dimethylphenol			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	7.3E-02 N	N/A	N/A	Yes
	51-28-5	2,4-Dinitrophenol			mg/l		0/10	2.30E-02 - 4.00E-01	4.00E-01	N/A	7.3E-03 N	N/A	N/A	Yes
	121-14-2	2,4-Dinitrotoluene			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	9.8E-05 C	N/A	N/A	Yes
	606-20-2	2,6-Dinitrotoluene			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	9.8E-05 C	N/A	N/A	Yes
	78-93-3	2-Butanone			mg/l		0/10	5.00E-03 - 5.00E-03	5.00E-03	N/A	7.0E-01 N	N/A	N/A	No
	91-58-7	2-Chloronaphthalene			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	4.9E-02 N	N/A	N/A	Yes
	95-57-8	2-Chlorophenol			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	3.0E-03 N	N/A	N/A	Yes
	591-78-6	2-Hexanone			mg/l		0/10	1.00E-02 - 1.00E-02	1.00E-02	N/A	N/A	N/A	N/A	NTX
	88-74-4	2-Nitroaniline			mg/l		0/10	9.10E-03 - 1.60E-01	1.60E-01	N/A	N/A	N/A	N/A	NTX
	88-75-5	2-Nitrophenol			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	N/A	N/A	N/A	NTX
	ICF14A-AA-I	3&4-Methylphenol			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	1.8E-02 N	N/A	N/A	Yes
	91-94-1	3,3'-Dichlorobenzidine			mg/l		0/10	9.10E-03 - 1.60E-01	1.60E-01	N/A	1.5E-04 C	N/A	N/A	Yes
	99-09-2	3-Nitroaniline			mg/l		0/10	9.10E-03 - 1.60E-01	1.60E-01	N/A	N/A	N/A	N/A	NTX
	534-52-1	4,6-Dinitro-o-cresol			mg/l		0/10	9.10E-03 - 1.60E-01	1.60E-01	N/A	N/A	N/A	N/A	NTX
	101-55-3	4-Bromophenyl phenylether			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	N/A	N/A	N/A	NTX
	7005-72-3	4-Chlorophenyl phenylether			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	N/A	N/A	N/A	NTX
	108-10-1	4-Methyl-2-pentanone			mg/l		0/10	5.00E-03 - 5.00E-03	5.00E-03	N/A	6.3E-01 N	N/A	N/A	No
	100-01-6	4-Nitroaniline			mg/l		0/10	9.10E-03 - 1.60E-01	1.60E-01	N/A	N/A	N/A	N/A	NTX
	100-02-7	4-Nitrophenol			mg/l		0/10	2.30E-02 - 4.00E-01	4.00E-01	N/A	N/A	N/A	N/A	NTX
	67-64-1	Acetone			mg/l		0/10	2.50E-02 - 2.50E-02	2.50E-02	N/A	5.5E-01 N	N/A	N/A	No

Table E.1-9
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Current/Future - Groundwater - Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	120-12-7	Anthracene			mg/l		0/10	9.10E-04 - 2.00E-02	2.00E-02	N/A	1.8E-01 N	N/A	N/A	No
	71-43-2	Benzene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	3.4E-04 C	N/A	N/A	Yes
	56-55-3	Benzo(a)anthracene			mg/l		0/10	1.80E-04 - 4.00E-03	4.00E-03	N/A	3.0E-05 C	N/A	N/A	Yes
	50-32-8	Benzo(a)pyrene			mg/l		0/10	1.80E-04 - 4.00E-03	4.00E-03	N/A	3.0E-06 C	N/A	N/A	Yes
	205-99-2	Benzo(b)fluoranthene			mg/l		0/10	1.80E-04 - 4.00E-03	4.00E-03	N/A	3.0E-05 C	N/A	N/A	Yes
	191-24-2	Benzo(g,h,i)perylene			mg/l		0/10	1.80E-04 - 4.00E-03	4.00E-03	N/A	1.8E-02 N	N/A	N/A	No
	207-08-9	Benzo(k)fluoranthene			mg/l		0/10	1.80E-04 - 4.00E-03	4.00E-03	N/A	3.0E-04 C	N/A	N/A	Yes
	65-85-0	Benzoic Acid			mg/l		0/10	2.30E-02 - 4.00E-01	4.00E-01	N/A	1.5E+01 N	N/A	N/A	No
	100-51-6	Benzyl alcohol			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	1.8E+00 N	N/A	N/A	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	N/A	N/A	N/A	NTX
	111-44-4	bis(2-Chloroethyl)ether			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	9.6E-06 C	N/A	N/A	Yes
	108-60-1	bis(2-Chloroisopropyl)ether			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	2.6E-04 C	N/A	N/A	Yes
	75-27-4	Bromodichloromethane			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.7E-04 C	N/A	N/A	Yes
	74-83-9	Bromomethane			mg/l		0/10	2.00E-03 - 2.00E-03	2.00E-03	N/A	8.5E-04 N	N/A	N/A	Yes
	85-68-7	Butyl benzyl phthalate			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	7.3E-01 N	N/A	N/A	No
	75-15-0	Carbon disulfide			mg/l		0/10	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.0E-01 N	N/A	N/A	No
	56-23-5	Carbon tetrachloride			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.6E-04 C	N/A	N/A	Yes
	108-90-7	Chlorobenzene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	9.0E-03 N	N/A	N/A	No
	75-00-3	Chloroethane			mg/l		0/10	2.00E-03 - 2.00E-03	2.00E-03	N/A	3.6E-03 C	N/A	N/A	No
	74-87-3	Chloromethane			mg/l		0/10	2.00E-03 - 2.00E-03	2.00E-03	N/A	1.9E-02 N	N/A	N/A	No
	218-01-9	Chrysene			mg/l		0/10	1.80E-04 - 4.00E-03	4.00E-03	N/A	3.0E-03 C	N/A	N/A	Yes
	156-59-2	cis-1,2-Dichloroethene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	6.1E-03 N	N/A	N/A	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	N/A	N/A	N/A	NTX
	53-70-3	Dibenz(a,h)anthracene			mg/l		0/10	1.80E-04 - 4.00E-03	4.00E-03	N/A	3.0E-06 C	N/A	N/A	Yes
	132-64-9	Dibenzofuran			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	3.7E-03 N	N/A	N/A	Yes
	124-48-1	Dibromochloromethane			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.3E-04 C	N/A	N/A	Yes
	84-66-2	Diethyl phthalate			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	2.9E+00 N	N/A	N/A	No
	131-11-3	Dimethylphthalate			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	N/A	N/A	N/A	NTX
	84-74-2	Di-n-butyl phthalate			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	3.7E-01 N	N/A	N/A	No
	117-84-0	Di-n-octyl phthalate			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	N/A	N/A	N/A	NTX
	100-41-4	Ethylbenzene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.3E-01 N	N/A	N/A	No
	206-44-0	Fluoranthene			mg/l		0/10	9.10E-04 - 2.00E-02	2.00E-02	N/A	1.5E-01 N	N/A	N/A	No
	118-74-1	Hexachlorobenzene			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	4.2E-05 C	N/A	N/A	Yes
	87-68-3	Hexachlorobutadiene			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	8.6E-04 C	N/A	N/A	Yes
	77-47-4	Hexachlorocyclopentadiene			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	2.2E-02 N	N/A	N/A	Yes
	67-72-1	Hexachloroethane			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	3.7E-03 N	N/A	N/A	Yes
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/l		0/10	1.80E-04 - 4.00E-03	4.00E-03	N/A	3.0E-05 C	N/A	N/A	Yes
	78-59-1	Isophorone			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	7.0E-02 C	N/A	N/A	Yes
	ICF87	m+p-Xylenes			mg/l		0/10	2.00E-03 - 2.00E-03	2.00E-03	N/A	2.1E-02 N	N/A	N/A	No

Table E.1-9
Comparison of Maximum Detection Limits of Non-Detected Compounds to Screening Criteria
Current/Future - Groundwater - Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3) (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	Above Screening Value (Y/N)
	75-09-2	Methylene chloride			mg/l		0/10	5.00E-03 - 5.00E-03	5.00E-03	N/A	4.1E-03 C	N/A	N/A	Yes
	98-95-3	Nitrobenzene			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	3.5E-04 N	N/A	N/A	Yes
	621-64-7	n-Nitroso-di-n-propylamine			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	9.6E-06 C	N/A	N/A	Yes
	86-30-6	n-Nitrosodiphenylamine			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	1.4E-02 C	N/A	N/A	Yes
	95-48-7	o-Cresol			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	1.8E-01 N	N/A	N/A	No
	95-47-6	o-Xylene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.1E-02 N	N/A	N/A	No
	106-47-8	p-Chloroaniline			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	1.5E-02 N	N/A	N/A	Yes
	59-50-7	p-Chloro-m-cresol			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	N/A	N/A	N/A	NTX
	87-86-5	Pentachlorophenol			mg/l		0/10	2.30E-02 - 4.00E-01	4.00E-01	N/A	5.6E-04 C	N/A	N/A	Yes
	108-95-2	Phenol			mg/l		0/10	4.50E-03 - 7.90E-02	7.90E-02	N/A	1.1E+00 N	N/A	N/A	No
	100-42-5	Styrene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.6E-01 N	N/A	N/A	No
	108-88-3	Toluene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.3E-01 N	N/A	N/A	No
	156-60-5	trans-1,2-Dichloroethene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.1E-02 N	N/A	N/A	No
	10061-02-6	trans-1,3-Dichloropropene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	N/A	N/A	N/A	NTX
	75-25-2	Tribromomethane			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	8.5E-03 C	N/A	N/A	No
	79-01-6	Trichloroethene			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	2.6E-05 C	N/A	N/A	Yes
	75-01-4	Vinyl Chloride			mg/l		0/10	1.00E-03 - 1.00E-03	1.00E-03	N/A	1.5E-05 C	N/A	N/A	Yes

(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) for tap water.
Criteria 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
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
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

Table E.1-10
Medium-Specific Exposure Point Concentration Summary - Area O

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)	95% UCL (Distribution)	Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Groundwater	1-Methylnaphthalene	mg/L	4.59E-02	Yes	---	4.14E-01	4.14E-01	mg/L	Max	(1)
	2-Methylnaphthalene	mg/L	2.02E-02	Yes	---	1.80E-01	1.80E-01	mg/L	Max	(1)
	Acenaphthene	mg/L	5.43E-03	Yes	---	4.71E-02	4.71E-02	mg/L	Max	(1)
	Acenaphthylene	mg/L	2.27E-03	Yes	---	1.82E-02	1.82E-02	mg/L	Max	(1)
	bis(2-Ethylhexyl)phthalate	mg/L	8.25E-03	Yes	---	2.31E-02	2.31E-02	mg/L	Max	(1)
	Chloroform	mg/L	6.68E-03	No	---	1.42E-02	1.42E-02	mg/L	Max	(1)
	Fluorene	mg/L	1.11E-02	Yes	---	1.01E-01	1.01E-01	mg/L	Max	(1)
	Naphthalene	mg/L	8.40E-03	Yes	---	5.07E-02	5.07E-02	mg/L	Max	(1)
	Phenanthrene	mg/L	1.70E-02	Yes	---	1.63E-01	1.63E-01	mg/L	Max	(1)
	Pyrene	mg/L	2.34E-03	Yes	---	1.89E-02	1.89E-02	mg/L	Max	(1)
	Tetrachloroethylene	mg/L	4.93E-04	No	---	6.10E-04	6.10E-04	mg/L	Max	(1)

(1) The exposure point concentrations for groundwater exposures were based on the maximum values of the COPCs identified in 10 groundwater samples.

Table E.1-11
Values Used for Daily Intake Calculations - Future Exposures to Groundwater

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 (On-site and Off-site)	Adult	Area O	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	---	CW x IR-W x EF x ED x CF1
				BW	Body Weight	70	kg	USEPA, 2002	BW x AT x CF2
				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	Area O	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	---	CW x IR-W x EF x ED x CF1
				BW	Body Weight	70	kg	USEPA, 1991a, 2003	BW x AT x CF2
				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	---	
	Resident (On-site and Off-site)	Child	Area O	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	---	CW x IR-W x EF x ED x CF1
				BW	Body Weight	15	kg	USEPA, 1991a, 2003	BW x AT x CF2
				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	Area O	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	DA x SA x EV x EF x ED
				EDc	Exposure Duration (Cancer)	24	years	USEPA, 1991b, 2003	DA x SA x EV x EF x ED
				BW	Body Weight	70	kg	USEPA, 1991a, 2003	BW x AT x CF1
				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	---	
	Resident (On-site and Off-site)	Child	Area O	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	DA x SA x EV x EF x ED
				BW	Body Weight	15	kg	USEPA, 1991a, 2003	BW x AT x CF1
				AT-C	Averaging Time (Cancer)	70	years	USEPA, 1991a, 2003	
				AT-N	Averaging Time (Non-Cancer)	6	years	USEPA, 1991a, 2003	
				CF1	Conversion Factor 1	365	days/year	---	

(1) Value is calculated assuming an exposure time of 30 minutes (ET = 0.50 hr; USEPA, 2004).
(2) Value is calculated assuming an exposure time of 60 minutes (ET = 1.0 hr; USEPA, 2004).

USEPA, 1991a: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER 9285.6-03.
USEPA, 1991b: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). OSWER 9285.7-01B.
USEPA, 2003: EPA Region 3 Risk-Based Concentration Table: Technical Background Information, Region 3, Philadelphia, PA
USEPA, 2004: Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final.

Table E.1-12
Values Used for Daily Intake Calculations - Future Exposures to Groundwater, Inhalation - Area O

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	Maintenance Worker (On-site and Off-site)	Adult	Area O	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	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	---	
	Industrial Worker (On-site and Off-site)	Adult	Area O	CA	Modeled Ambient Air Concentration or Indoor Air Concentration	(1, 4)	mg/m^3	(1, 4)	
				IN	Inhalation Rate	2.5	m^3/hr	(2)	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 (On-site and Off-site)	Adult	Area O	CA	Modeled Trench Air Concentration	(5)	mg/m^3	(5)	
				IN	Inhalation Rate	2.5	m^3/hr	(6)	Potential (Lifetime) Average Daily Dose
				EF	Exposure Frequency	125	days/year	(7)	$[(L)ADD_{pot}]$ (mg/kg-day) =
				ED	Exposure Duration	1	years	(7)	
				ET	Exposure Time (Trench Air)	4	hr/day	(7)	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	Area O	CA	Indoor Air Concentration or Modeled Shower Room Air Concentration	(4, 8)	mg/m^3	(4, 8)	
				IN	Inhalation Rate	0.83	m^3/hr	(9)	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)	1.0/24	hr/day	(10); 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	---	
	Resident (On-site and Off-site)	Child	Area O	CA	Modeled Indoor Air Concentration	(4)	mg/m^3	(4)	
				IN	Inhalation Rate	1	m^3/hr	(11)	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	---	

Table E.1-12
Values Used for Daily Intake Calculations - Future Exposures to Groundwater, Inhalation - Area O

(1) Ambient air concentrations were modeled by a volatilization model (ASTM, 1995). The equations and parameters for the model are provided in **Table E.1-13**
(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.
(4) Indoor air concentrations were modeled using the Johnson and Ettinger (1991) model. The equations and parameters for the model are provided in **Table E.1-15.**
(5) Trench air concentrations were modeled by the Trench Model (VDEQ, 2004). The equations and parameters for the model are provided in **Table E.1-16**.
(6) The construction 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).
(7) The default construction scenario is based on a worker working on a construction project for 125 days per year for 1 year. The construction worker is assumed to be exposed to groundwater for 4 hrs a day (VDEQ, 2007).
(8) Shower room air concentrations were modeled using the Foster and Chrostowski (1987) Shower Inhalation Model. The equations and parameters are provided in **Table E.1-17**.
(9) 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.
(10) An exposure time of 60 minutes (ET = 1.0 hr) is assumed - 30 minutes spent showering with an additional 30 minutes in the shower room (USEPA, 2004).
The exposure time for indoor air exposure to COCs via vapor intrusion is 24 hours/day.
(11) 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.
VDEQ, 2007: Voluntary Remediation Program Risk Assessment Guidance, Virginia Department of Environmental Quality.

Table E.1-13
Parameter Values Used for Groundwater - Area O

Dermal Absorption - Chemicals of Potential Concern in Groundwater

Analyte	CAS No.	FA	Kp (cm/hr)	tau_{event}	B	t* (hr)
Organics						
1-Methylnaphthalene (1)	90-12-0	1.0	1.1E-01	0.67	0.50	1.60
2-Methylnaphthalene (1)	91-57-6	1.0	9.2E-02	0.67	0.40	1.60
Acenaphthene (1)	83-32-9	1.0	8.6E-02	0.78	0.40	1.87
Acenaphthylene (1)	208-96-8	1.0	1.1E-01	0.76	0.50	1.82
Bis(2-ethylhexyl)phthalate	117-81-7	0.8	2.5E-02	16.64	0.20	39.93
Chloroform (2, 3)	67-66-3	1.0	6.8E-03	0.50	0.00	1.19
Fluorene (1)	86-73-7	1.0	1.1E-01	0.91	0.50	2.19
Naphthalene	91-20-3	1.0	4.7E-02	0.56	0.20	1.34
Phenanthrene (4)	85-01-8	1.0	1.4E-01	1.06	0.70	4.11
Pyrene (1)	129-00-0	1.0	2.0E-01	1.45	1.10	5.63
Tetrachloroethene (2)	127-18-4	1.0	3.3E-02	0.91	0.20	2.18

(1) COPC was added to the USEPA spreadsheet. The molecular weight and log K_{ow} were used to predict the K_p value. A fraction absorbed (FA) of 1.0 was conservatively assumed for these COPCs.

(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 (USEPA, 2004).

(3) Dermal exposure is less than 10% of drinking water exposure. COPC is not included in the dermal risk assessment based on Exhibits B-2 and B-3 (USEPA, 2004).

(4) COPC is outside the effective predictive domain (Exhibits B-2 and B-3; USEPA, 2004).

USEPA, 2001. Organic parameter values are taken from Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media; version dated April, 2001. (http://ww.epa.gov/oswer/riskassessment/ragse/index.htm)

USEPA, 2004. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final.

Table E.1-14
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - Area O

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

Where:

VF_{wamb} (mg/m^3 air per mg/L water) =	calculated	Volatilization factor
H (cm^3-water per cm^3-air) =	chemical-specific	Henry's Law Constant
U_a (cm/sec) =	353	Wind speed above ground surface (NOAA, 2007)
d_{air} (cm) =	200	Ambient air mixing zone height (ASTM, 1995)
L_{GW} (cm) =	610	Depth to groundwater - site specific
W (cm) =	4,498	Width of source area parallel to wind flow direction (site-specific)
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) =	457	Thickness of capillary fringe (site specific)
h_v (cm) =	259	Thickness of vadose zone (site specific)
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.1-14
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - Area O

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

Where:

D_{effcap} (cm^2/sec) =	calculated	Effective diffusion coefficient through capillary fringe
D_{air} (cm^2/sec) =	chemical-specific	Diffusion coefficient in air
D_{wat} (cm^2/sec) =	chemical-specific	Diffusion coefficient in water
θ_{acap} (cm^3-air/cm^3-soil)	0.0481	Volumetric air content in capillary fringe soils
θ_{wcap} (cm^3-water/cm^3-soil)	0.4329	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
D_{wat} (cm^2/sec) =	chemical-specific	Diffusion coefficient in water
θ_{as} (cm^3-air/cm^3-soil)	0.265	Volumetric air content in vadose zone soils
θ_{ws} (cm^3-water/cm^3-soil)	0.216	Volumetric water content in vadose zone soils
H (cm^3-water per cm^3-air) =	chemical-specific	Henry's Law Constant
θ_T (cm^3/cm^3-soil)	0.481	Total soil porosity

Table E.1-14
Calculation of Ambient Air Concentration from Groundwater
Radford Army Ammunition Plant - Area O

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	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.1-14
Calculation of Ambient Air Concentration from Groundwater - Area O

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
1-Methylnaphthalene	NV	353	200	457	259	610	NV	4,498	NV	NV	0.481	0.0481	0.4329	0.265	0.216	NV	NV	NV
2-Methylnaphthalene	NV	353	200	457	259	610	NV	4,498	NV	NV	0.481	0.0481	0.4329	0.265	0.216	NV	NV	NV
Acenaphthene	6.40E-03	353	200	457	259	610	4.73E-04	4,498	3.27E-04	2.21E-03	0.481	0.0481	0.4329	0.265	0.216	4.20E-02	7.70E-06	3.16E-07
Acenaphthylene	NV	353	200	457	259	610	NV	4,498	NV	NV	0.481	0.0481	0.4329	0.265	0.216	NV	NV	NV
Chloroform	0.15	353	200	457	259	610	5.53E-05	4,498	3.54E-05	5.19E-03	0.481	0.0481	0.4329	0.265	0.216	1.00E-01	1.00E-05	8.66E-07
Fluorene	0.0032	353	200	457	259	610	9.36E-04	4,498	6.67E-04	3.23E-03	0.481	0.0481	0.4329	0.265	0.216	6.10E-02	7.90E-06	3.13E-07
Naphthalene	0.02	353	200	457	259	610	1.69E-04	4,498	1.10E-04	3.07E-03	0.481	0.0481	0.4329	0.265	0.216	5.90E-02	7.50E-06	3.53E-07
Phenanthrene	NV	353	200	457	259	610	NV	4,498	NV	NV	0.481	0.0481	0.4329	0.265	0.216	NV	NV	NV
Pyrene	0.00045	353	200	457	259	610	2.87E-03	4,498	4.26E-03	1.82E-03	0.481	0.0481	0.4329	0.265	0.216	2.70E-02	7.20E-06	1.35E-07
Tetrachloroethene	0.754	353	200	457	259	610	2.44E-05	4,498	1.56E-05	3.74E-03	0.481	0.0481	0.4329	0.265	0.216	7.20E-02	8.20E-06	1.92E-06

Source: ASTM, 1994

Constituents	Groundwater Concentration (mg/L)	VFamb	**"Ca"** Concentration (mg/m^3)
1-Methylnaphthalene	4.14E-01	NV	NV
2-Methylnaphthalene	1.80E-01	NV	NV
Acenaphthene	4.71E-02	3.16E-07	1.49E-08
Acenaphthylene	1.82E-02	NV	NV
Chloroform	0.0142	8.66E-07	1.23E-08
Fluorene	0.101	3.13E-07	3.16E-08
Naphthalene	0.0507	3.53E-07	1.79E-08
Phenanthrene	0.163	NV	NV
Pyrene	0.0189	1.35E-07	2.55E-09
Tetrachloroethene	0.00061	1.92E-06	1.17E-09

Table E.1-15
Groundwater Inhalation Indoor Air Concentration Summary - Area O
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			
1-Methylnaphthalene	90-12-0	4.14E+02	NV
2-Methylnaphthalene	91-57-6	1.80E+02	1.23E-04
Acenaphthene	83-32-9	4.71E+01	2.36E-05
Acenaphthylene	208-96-8	1.82E+01	NV
Bis(2-ethylhexyl)phthalate	117-81-7	2.31E+01	NA
Chloroform	67-66-3	1.42E+01	3.04E-05
Fluorene	86-73-7	1.01E+02	3.42E-05
Naphthalene	91-20-3	5.07E+01	3.50E-05
Phenanthrene	85-01-8	1.63E+02	NV
Pyrene	129-00-0	1.89E+01	1.73E-06
Tetrachloroethene	127-18-4	6.10E-01	2.84E-06

Notes:
Indoor air concentrations modeled using Johnson and Ettinger Model
Model output provided in **Appendix E.2**

Non-default model inputs (based on site-specific data):

Average Groundwater Temperature (16º C)

Depth to Groundwater (610 cm)

Soil Type (Silty Clay)

Soil Properties ("Lookup" values from model; see **Appendix E.2**.)

Table E.1-16
Groundwater Inhalation - Excavation Worker - Trench Gas Concentration Calculations - Area O

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
1-Methylnaphthalene	90-12-0	4.14E+02	NV	NV	NV	NV
2-Methylnaphthalene	91-57-6	1.80E+02	5.18E-04	5.24E-02	1.53E-03	2.75E-04
Acenaphthene	83-32-9	4.71E+01	1.55E-04	4.67E-02	4.08E-04	1.92E-05
Acenaphthylene	208-96-8	1.82E+01	1.13E-04	4.50E-02	2.86E-04	5.21E-06
Bis(2-ethylhexyl)phthalate	117-81-7	2.31E+01	NA	NA	NA	NA
Chloroform	67-66-3	1.42E+01	3.67E-03	1.04E-01	2.15E-02	3.05E-04
Fluorene	86-73-7	1.01E+02	6.36E-05	4.40E-02	1.58E-04	1.59E-05
Naphthalene	91-20-3	5.07E+01	4.83E-04	5.90E-02	1.60E-03	8.14E-05
Phenanthrene	85-01-8	1.63E+02	2.33E-05	3.45E-02	4.53E-05	7.38E-06
Pyrene	129-00-0	1.89E+01	1.10E-05	2.78E-02	1.72E-05	3.25E-07
Tetrachloroethene	127-18-4	6.10E-01	1.84E-02	7.20E-02	7.46E-02	4.55E-05

NA = Not Applicable.
NV = No Value.

Exposure point calculations calculated using trench model for construction worker/ utility worker in a trench where average depth to groundwater is greater than 15 feet (VDEQ,2007).

$$VF = \frac{(H_i \times D_{air} \times AC_{vad}^{3.33} \times A \times F \times 10^{-3} \times 10^4 \times 3600)}{(R \times T \times L_d \times ACH \times V \times Por_{vad}^{2})}$$

where:

Parameters	Value	
H_i (atm-m^3/mol) =	chemical-specific	Henry's Law constant for contaminant
D_{air} (cm^2/s) =	chemical-specific	Diffusion coefficient in air
AC_{vad} (cm^3/cm^3) =	0.265	Volumetric air content in vadose zone soil
A (m^2) =	2.22	Area of trench (default)
F (unitless) =	1	Fraction of floor through which contaminant can enter
R (atm-m^3/mole-°K) =	$8.2x10^{-5}$	ideal gas constant
T (°K) =	289	Average system absolute temperature
L_d (cm) =	152	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	

$$C_a = C_w \times VF \times 0.001$$

C_a (µg/m^3) =	chemical-specific	Concentration in trench air
C_w (µg/L) =	chemical-specific	Concentration in groundwater
VF (L/min^3) =	chemical-specific	Volatilization factor
Conversion Factor (mg/µg) =	0.001	

Table E.1-17
Groundwater Inhalation Shower Air Concentration Calculations - Area O

Analyte	CAS No.	Cw ug/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} ug/L	S ug/m^3-min	Ca mg/m^3
Organics											
1-Methylnaphthalene	90-12-0	4.14E+02	1.42E+02	5.14E-04	1.11E+01	1.07E+03	7.49E+00	1.01E+01	1.18E-01	2.57E-01	4.02E+00
2-Methylnaphthalene	91-57-6	1.80E+02	1.42E+02	5.18E-04	1.11E+01	1.07E+03	7.50E+00	1.01E+01	5.16E-02	1.12E-01	1.75E+00
Acenaphthene	83-32-9	4.71E+01	1.54E+02	1.60E-04	1.07E+01	1.03E+03	4.17E+00	5.63E+00	8.06E-03	1.75E-02	2.74E-01
Acenaphthylene	208-96-8	1.82E+01	1.52E+02	1.13E-05	1.08E+01	1.03E+03	4.65E-01	6.28E-01	3.77E-04	8.16E-04	1.28E-02
Bis(2-ethylhexyl)phthalate	117-81-7	2.31E+01	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	67-66-3	1.42E+01	1.19E+02	3.66E-03	1.21E+01	1.16E+03	1.14E+01	1.53E+01	5.69E-03	1.23E-02	1.93E-01
Fluorene	86-73-7	1.01E+02	1.66E+02	7.70E-05	1.03E+01	9.88E+02	2.42E+00	3.27E+00	1.04E-02	2.26E-02	3.54E-01
Naphthalene	91-20-3	5.07E+01	1.28E+02	4.80E-04	1.17E+01	1.13E+03	7.71E+00	1.04E+01	1.49E-02	3.22E-02	5.05E-01
Phenanthrene	85-01-8	1.63E+02	1.78E+02	1.24E-04	9.94E+00	9.54E+02	3.29E+00	4.45E+00	2.25E-02	4.87E-02	7.63E-01
Pyrene	129-00-0	1.89E+01	2.00E+02	1.10E-05	9.38E+00	9.00E+02	3.95E-01	5.33E-01	3.33E-04	7.21E-04	1.13E-02
Tetrachloroethene	127-18-4	6.10E-01	1.66E+02	1.84E-02	1.03E+01	9.88E+02	1.02E+01	1.37E+01	2.24E-04	4.85E-04	7.61E-03

NA = Not Applicable.

Variable	Equations:	
k_l (cm/hr) =	$20 \times (44/MW)^{0.5}$	Liquid-film transfer coefficient
k_g (cm/hr) =	$3000 \times (18/MW)^{0.5}$	Gas-film transfer coefficient
K_L (cm/hr) =	$(1/k_l + (R \times t/H^* k_g))^{-1}$	overall mass transfer coefficient
K_{aL} (cm/hr) =	$K_L \times ((T \times \mu_s/T_s \times \mu_l)^{-0.5}$	overall mass transfer coefficient adjusted to shower water temperature
C_{wd} (µg/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) =	$\left[\frac{S}{R_a x t x CF}\right] x \left[D_s + \frac{e^{(-Ra x t)}}{R_a} - \frac{e^{R_a(D_s - t)}}{R_a}\right]$	VOC concentration in shower air

Table E.1-17
Groundwater Inhalation Shower Air Concentration Calculations - Area O

Constants:	Value	
R (atm-m^3/mole-K) =	$8.2x10^{-5}$	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
CF (µg/mg) =	1,000	Conversion factor

Table E.1-18
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								
Acenaphthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2/18/08:5/1/93
Acenaphthylene	N/A	N/A	N/A	N/A	N/A	D	IRIS	2/18/08:1/1/91
Bis(2-Ethylhexyl)phthalate	1.4E-02	$(mg/kg\text{-}day)^{-1}$	100%	1.4E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	2/15/08: 2/01/93
Chloroform	N/A	N/A	N/A	N/A	N/A	B2	IRIS	2/18/08:10/19/01
Fluorene	N/A	N/A	N/A	N/A	N/A	D	N/A	2/18/08:12/1/90
1-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2/18/08
2-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2/18/08:12/22/03
Naphthalene	N/A	N/A	N/A	N/A	N/A	C	N/A	2/18/08:9/17/98
Phenanthrene	N/A	N/A	N/A	N/A	N/A	D	IRIS	2/18/08:12/1/90
Pyrene	N/A	N/A	N/A	N/A	N/A	D	IRIS	2/18/08:1/1/91
Tetrachloroethene	5.4E-01	$(mg/kg\text{-}day)^{-1}$	100%	5.4E-01	$(mg/kg\text{-}day)^{-1}$	C	EPA, 2007; VDEQ, 2007	10/11/07
Inorganics								
No COPCs								

(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.
VDEQ, 2007 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.2, Cancer Toxicity Data. May 3, 2007.

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.1-19
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										
Acenaphthene	Chronic	6.E-02	mg/kg-day	100%	6.0E-02	mg/kg-day	Liver	3,000	IRIS	2/15/08:4/1/94
Acenaphthylene (4)	Chronic	3.E-02	mg/kg-day	100%	3.0E-02	mg/kg-day	Kidney	3,000	N/A	2/18/08
Bis(2-Ehtylhexyl)phthalate	Chronic	2.E-02	mg/kg-day	100%	2.0E-02	mg/kg-day	Liver	1,000	IRIS	2/15/08:5/01/91
Chloroform	Chronic	1E-02	mg/kg-day	100%	1.0E-02	mg/kg-day	Liver	100	IRIS	2/18/08:10/19/01
Fluorene	Chronic	4E-02	mg/kg-day	100%	4.0E-02	mg/kg-day	Blood	3,000	IRIS	2/15/08:11/1/90
1-Methylnaphthalene (5)	Chronic	4E-03	mg/kg-day	100%	4.0E-03	mg/kg-day	Lungs	1,000	N/A	2/18/08
2-Methylnaphthalene	Chronic	4E-03	mg/kg-day	100%	4.0E-03	mg/kg-day	Lungs	1,000	IRIS	2/15/08: 12/22/03
Naphthalene	Chronic	2E-02	mg/kg-day	100%	2.0E-02	mg/kg-day	Whole Body (decreased weight)	3,000	IRIS	2/15/08: 9/17/98
Phenanthrene (4)	Chronic	3E-02	mg/kg-day	100%	3.0E-02	mg/kg-day	Kidney	3,000	N/A	2/18/08
Pyrene	Chronic	3E-02	mg/kg-day	100%	3.0E-02	mg/kg-day	Kidney	3,000	IRIS	2/15/08:7/01/93
Tetrachloroethene	Chronic	1E-02	mg/kg-day	100%	1.0E-02	mg/kg-day	Liver	1,000	IRIS	2/18/08: 3/1/88
Inorganics										
No COPCs										

(1) Source: Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Section 4.2 and Exhibit 4-1.
(2) The equation used to derive the adjusted dermal RfD is presented in the text.
(3) For IRIS values, the date IRIS was searched and the date of the most recent review are provided. For HEAST values, the date of HEAST is provided.
(4) The toxicity values for Pyrene were used for this COPC.
(5) The toxicity values for 2-Methylnaphthalene were used for this COPC.

Definitions:
N/A = Not Available
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment
PPRTV = Provisional Peer-Reviewed Toxicity Values
EPA, 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.1-20
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							
Acenaphthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Acenaphthylene	N/A	N/A	N/A	N/A	D	IRIS	2/18/08:1/1/91
Bis(2-Ethylhexyl)phthalate	N/A	N/A	N/A	N/A	N/A	N/A	2/18/08:2/1/93
Chloroform	2.30E-05	$(ug/m^3)^{-1}$	8.1E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	2/18/08:10/19/01
Fluorene	N/A	N/A	N/A	N/A	D	N/A	2/18/08:12/1/90
1-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	N/A	2/18/08
2-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	N/A	2/18/08:12/22/03
Naphthalene	N/A	N/A	N/A	N/A	C	N/A	2/18/08:9/17/98
Phenanthrene	N/A	N/A	N/A	N/A	D	IRIS	2/18/08:12/1/90
Pyrene	N/A	N/A	N/A	N/A	D	IRIS	2/18/08:1/1/91
Tetrachloroethene	5.70E-03	$(ug/m^3)^{-1}$	2.00E-02	$(mg/kg\text{-}day)^{-1}$	C	EPA, 2007; VDEQ, 2007	10/11/2007
Inorganics							
No COPCs							

(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.
VDEQ, 2007 = Virginia Department of Environmental Quality, Voluntary Remediation Program, Table 4.2, Cancer Toxicity Data, May 3, 2007.

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.1-21
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									
Acenaphthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2/18/08:4/1/94
Acenaphthylene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bis(2-Ethylhexyl)phthalate	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	N/A	EPA 2007;NCEA	2/18/08:10/11/07
Fluorene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2/18/08
2-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2/18/08:12/22/03
Naphthalene	Chronic	3.0E-03	mg/m^3	9.0E-04	mg/kg-day	Respiratory tract	3000	IRIS	2/15/08:9/17/98
Phenanthrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2/18/08:9/1/94
Pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2/18/08:9/1/94
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									
No COPCs									

(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.

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.1-22
Calculation of Cancer Risks
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Sediment	Sediment	Area O	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Sediment Total											0.0E+00
Surface Water	Surface Water	Area O	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00
										Total of Receptor Risks Across All Media	0.0E+00

N/A = Not Applicable.

Table E.1-23
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Current/Future - Maintenance Worker

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Sediment	Sediment	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Sediment Total											0.0E+00
Surface Water	Surface Water	Area O	**Dermal Absorption**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00
										Total of Receptor Hazards Across All Media	0.0E+00

N/A = Not Applicable.

Table E.1-24
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
Subsurface Soil	Subsurface Soil	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Particulates)	Area O	**Inhalation**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Volatiles)	Area O	**Inhalation**	**Organics** No COPCs							0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Subsurface Soil Total											0.0E+00
Sediment	Sediment	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Sediment Total											0.0E+00

Table E.1-24
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 Water	Surface Water	Area O	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00
Groundwater	Air	Area O	**Inhalation**	**Organics**							
			(Ambient Air)	Acenaphthene	1.49E-08	mg/m^3	2.1E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chloroform	1.23E-08	mg/m^3	1.7E-10	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	1.4E-11
				Fluorene	3.16E-08	mg/m^3	4.4E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Naphthalene	1.79E-08	mg/m^3	2.5E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Pyrene	2.55E-09	mg/m^3	3.6E-11	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	1.17E-09	mg/m^3	1.6E-11	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	3.3E-13
			Exp. Route Total								1.4E-11
		Exposure Point Total									1.4E-11
	Exposure Media Total										1.4E-11
Groundwater Total											1.4E-11
										Total of Receptor Risks Across All Media	1.4E-11

N/A = Not Applicable.

Table E.1-25
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Particulates)	Area O	**Inhalation**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Volatiles)	Area O	**Inhalation**	**Organics** No COPCs							0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Subsurface Soil Total											0.0E+00
Sediment	Sediment	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Sediment Total											0.0E+00

Table E.1-25
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 Water	Surface Water	Area O	**Dermal Absorption**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00
Groundwater	Air	Area O	**Inhalation** (Ambient Air)	**Organics**							
				Acenaphthene	1.49E-08	mg/m³	5.8E-10	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	1.23E-08	mg/m³	4.8E-10	mg/kg-day	1.4E-02	mg/kg-day	3.4E-08
				Fluorene	3.16E-08	mg/m³	1.2E-09	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	1.79E-08	mg/m³	7.0E-10	mg/kg-day	9.0E-04	mg/kg-day	7.8E-07
				Pyrene	2.55E-09	mg/m³	1.0E-10	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	1.17E-09	mg/m³	4.6E-11	mg/kg-day	8.0E-02	mg/kg-day	5.7E-10
			Exp. Route Total								8.1E-07
		Exposure Point Total									8.1E-07
	Exposure Media Total										8.1E-07
Groundwater Total											8.1E-07
										Total of Receptor Hazards Across All Media	8.1E-07

N/A = Not Applicable.

Table E.1-26
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
Subsurface Soil	Subsurface Soil	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Particulates)	Area O	**Inhalation**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Volatiles)	Area O	**Inhalation**	**Organics** No COPCs							0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Subsurface Soil Total											0.0E+00
Sediment	Sediment	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Sediment Total											0.0E+00

Table E.1-26
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 Water	Surface Water	Area O	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00
Groundwater	Groundwater	Area O	**Ingestion**	**Organics**							
				1-Methlynaphthalene	4.14E+02	µg/L	1.3E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Methlynaphthalene	1.80E+02	µg/L	5.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthene	4.71E+01	µg/L	1.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthylene	1.82E+01	µg/L	5.7E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	7.3E-05	mg/kg-day	1.4E-02	$(mg/kg\text{-}day)^{-1}$	1.0E-06
				Chloroform	1.42E+01	µg/L	4.5E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Fluorene	1.01E+02	µg/L	3.2E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	5.07E+01	µg/L	1.6E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Phenanthrene	1.63E+02	µg/L	5.1E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	1.89E+01	µg/L	5.9E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	6.10E-01	µg/L	1.9E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								2.1E-06
		Exposure Point Total									2.1E-06
	Exposure Media Total										2.1E-06
	Air	Area O	**Inhalation** (Ambient Air)	**Organics**							
				Acenaphthene	1.49E-08	mg/m^3	9.4E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chloroform	1.23E-08	mg/m^3	7.7E-10	mg/kg-day	8.1E-02	$(mg/kg\text{-}day)^{-1}$	6.3E-11
				Fluorene	3.16E-08	mg/m^3	2.0E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	1.79E-08	mg/m^3	1.1E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	2.55E-09	mg/m^3	1.6E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	1.17E-09	mg/m^3	7.4E-11	mg/kg-day	2.0E-02	$(mg/kg\text{-}day)^{-1}$	1.5E-12
			Exp. Route Total								6.4E-11
		Exposure Point Total									6.4E-11
	Exposure Media Total										6.4E-11
	Air	Area O	**Inhalation** (Indoor Air)	**Organics**							
				2-Methylnaphthalene	1.23E-04	mg/m^3	7.7E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthene	2.36E-05	mg/m^3	1.5E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chloroform	3.04E-05	mg/m^3	1.9E-06	mg/kg-day	8.1E-02	$(mg/kg\text{-}day)^{-1}$	1.5E-07
				Fluorene	3.42E-05	mg/m^3	2.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	3.50E-05	mg/m^3	2.2E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	1.73E-06	mg/m^3	1.1E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	2.84E-06	mg/m^3	1.8E-07	mg/kg-day	2.0E-02	$(mg/kg\text{-}day)^{-1}$	3.6E-09
			Exp. Route Total								1.6E-07
		Exposure Point Total									1.6E-07
	Exposure Media Total										1.6E-07
Groundwater Total											2.2E-06
										Total of Receptor Risks Across All Media	2.2E-06

N/A = Not Applicable.

Since indoor air represents the more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-27
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		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Subsurface Soil	Subsurface Soil	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								#REF!
		Exposure Point Total									#REF!
	Exposure Media Total										#REF!
	Air (Particulates)	Area O	**Inhalation**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Volatiles)	Area O	**Inhalation**	**Organics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Subsurface Soil Total											#REF!
Sediment	Sediment	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								#REF!
		Exposure Point Total									#REF!
	Exposure Media Total										#REF!
Sediment Total											#REF!
Surface Water	Surface Water	Area O	**Dermal Absorption**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00

Table E.1-27
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		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Groundwater	Groundwater	Area O	**Ingestion**	**Organics**							
				1-Methylnaphthalene	4.14E+02	µg/L	3.6E-03	mg/kg-day	4.0E-03	mg/kg-day	9.1E-01
				2-Methylnaphthalene	1.80E+02	µg/L	1.6E-03	mg/kg-day	4.0E-03	mg/kg-day	4.0E-01
				Acenaphthene	4.71E+01	µg/L	4.1E-04	mg/kg-day	6.0E-02	mg/kg-day	6.9E-03
				Acenaphthylene	1.82E+01	µg/L	1.6E-04	mg/kg-day	3.0E-02	mg/kg-day	5.3E-03
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	2.0E-04	mg/kg-day	2.0E-02	mg/kg-day	1.0E-02
				Chloroform	1.42E+01	µg/L	1.3E-04	mg/kg-day	1.0E-02	mg/kg-day	1.3E-02
				Fluorene	1.01E+02	µg/L	8.9E-04	mg/kg-day	4.0E-02	mg/kg-day	2.2E-02
				Naphthalene	5.07E+01	µg/L	4.5E-04	mg/kg-day	2.0E-02	mg/kg-day	2.2E-02
				Phenanthrene	1.63E+02	µg/L	1.4E-03	mg/kg-day	3.0E-02	mg/kg-day	4.8E-02
				Pyrene	1.89E+01	µg/L	1.7E-04	mg/kg-day	3.0E-02	mg/kg-day	5.5E-03
				Tetrachloroethene	6.10E-01	µg/L	5.4E-06	mg/kg-day	1.0E-02	mg/kg-day	5.4E-04
				Inorganics							
				No COPCs							
			Exp. Route Total								1.4E+00
		Exposure Point Total									1.4E+00
	Exposure Media Total										1.4E+00
	Air	Area O	**Inhalation**	**Organics**							
			(Ambient Air)	Acenaphthene	1.49E-08	mg/m^3	2.6E-09	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	1.23E-08	mg/m^3	2.2E-09	mg/kg-day	1.4E-02	mg/kg-day	1.5E-07
				Fluorene	3.16E-08	mg/m^3	5.6E-09	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	1.79E-08	mg/m^3	3.2E-09	mg/kg-day	9.0E-04	mg/kg-day	3.5E-06
				Pyrene	2.55E-09	mg/m^3	4.5E-10	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	1.17E-09	mg/m^3	2.1E-10	mg/kg-day	8.0E-02	mg/kg-day	2.6E-09
			Exp. Route Total								3.7E-06
		Exposure Point Total									3.7E-06
	Exposure Media Total										3.7E-06
	Air	Area O	**Inhalation**	**Organics**							
			(Indoor Air)	2-Methylnaphthalene	1.23E-04	mg/m^3	2.2E-05	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthene	2.36E-05	mg/m^3	4.2E-06	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	3.04E-05	mg/m^3	5.4E-06	mg/kg-day	1.4E-02	mg/kg-day	3.8E-04
				Fluorene	3.42E-05	mg/m^3	6.0E-06	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	3.50E-05	mg/m^3	6.2E-06	mg/kg-day	9.0E-04	mg/kg-day	6.8E-03
				Pyrene	1.73E-06	mg/m^3	3.0E-07	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	2.84E-06	mg/m^3	5.0E-07	mg/kg-day	8.0E-02	mg/kg-day	6.3E-06
			Exp. Route Total								7.2E-03
		Exposure Point Total									7.2E-03
	Exposure Media Total										7.2E-03
Groundwater Total											1.4E+00
										Total of Receptor Hazards Across All Media	#REF!

N/A = Not Applicable.

Since indoor air represents the more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-28
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
Subsurface Soil	Subsurface Soil	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Particulates)	Area O	**Inhalation**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Volatiles)	Area O	**Inhalation**	**Organics** No COPCs							0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Subsurface Soil Total											0.0E+00
Sediment	Sediment	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Sediment Total											0.0E+00

Table E.1-28
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
Surface Water	Surface Water	Area O	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00
Groundwater	Air	Area O	**Inhalation**	**Organics**							
			(Trench Air)	2-Methylnaphthalene	2.75E-04	mg/m^3	1.9E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	---
				Acenaphthene	1.92E-05	mg/m^3	1.3E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	---
				Acenaphthylene	5.21E-06	mg/m^3	3.6E-09	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	---
				Chloroform	3.05E-04	mg/m^3	2.1E-07	mg/kg-day	8.1E-02	(mg/kg-day)$^{-1}$	1.7E-08
				Fluorene	1.59E-05	mg/m^3	1.1E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	---
				Naphthalene	8.14E-05	mg/m^3	5.7E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	---
				Phenanthrene	7.38E-06	mg/m^3	5.2E-09	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	---
				Pyrene	3.25E-07	mg/m^3	2.3E-10	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	---
				Tetrachloroethene	4.55E-05	mg/m^3	3.2E-08	mg/kg-day	2.0E-02	(mg/kg-day)$^{-1}$	6.4E-10
			Exp. Route Total								1.8E-08
		Exposure Point Total									1.8E-08
	Exposure Media Total										1.8E-08
Groundwater Total											1.8E-08
										Total of Receptor Risks Across All Media	1.8E-08

N/A = Not Applicable.

Table E.1-29
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		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Particulates)	Area O	**Inhalation**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Volatiles)	Area O	**Inhalation**	**Organics** No COPCs							0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Subsurface Soil Total											0.0E+00
Sediment	Sediment	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Sediment Total											0.0E+00

Table E.1-29
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		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Surface Water	Surface Water	Area O	**Dermal Absorption**	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00
Groundwater	Air	Area O	**Inhalation**	**Organics**							
			(Trench Air)	2-Methylnaphthalene	2.75E-04	mg/m^3	1.3E-05	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthene	1.92E-05	mg/m^3	9.4E-07	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthylene	5.21E-06	mg/m^3	2.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	3.05E-04	mg/m^3	1.5E-05	mg/kg-day	1.4E-02	mg/kg-day	1.1E-03
				Fluorene	1.59E-05	mg/m^3	7.8E-07	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	8.14E-05	mg/m^3	4.0E-06	mg/kg-day	9.0E-04	mg/kg-day	4.4E-03
				Phenanthrene	7.38E-06	mg/m^3	3.6E-07	mg/kg-day	N/A	mg/kg-day	---
				Pyrene	3.25E-07	mg/m^3	1.6E-08	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	4.55E-05	mg/m^3	2.2E-06	mg/kg-day	8.0E-02	mg/kg-day	2.8E-05
			Exp. Route Total								5.5E-03
		Exposure Point Total									5.5E-03
	Exposure Media Total										5.5E-03
Groundwater Total											5.5E-03
										Total of Receptor Hazards Across All Media	5.5E-03

N/A = Not Applicable.

Table E.1-30
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
Subsurface Soil	Subsurface Soil	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Particulates)	Area O	**Inhalation**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Volatiles)	Area O	**Inhalation**	**Organics** No COPCs							0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Subsurface Soil Total											0.0E+00
Sediment	Sediment	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Sediment Total											0.0E+00

Table E.1-30
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
Surface Water	Surface Water	Area O	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
			Dermal	**Organics**							
			Absorption	No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00
Groundwater	Groundwater	Area O	**Ingestion**	**Organics**							
				1-Methlynaphthalene	4.14E+02	µg/L	6.2E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Methlynaphthalene	1.80E+02	µg/L	2.7E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthene	4.71E+01	µg/L	7.0E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthylene	1.82E+01	µg/L	2.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	3.4E-04	mg/kg-day	1.4E-02	$(mg/kg\text{-}day)^{-1}$	4.8E-06
				Chloroform	1.42E+01	µg/L	2.1E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Fluorene	1.01E+02	µg/L	1.5E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	5.07E+01	µg/L	7.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Phenanthrene	1.63E+02	µg/L	2.4E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	1.89E+01	µg/L	2.8E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	6.10E-01	µg/L	9.1E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	4.9E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								9.7E-06
			Dermal	**Organics**							
			Absorption	1-Methlynaphthalene	4.14E+02	µg/L	9.7E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Methlynaphthalene	1.80E+02	µg/L	3.5E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthene	4.71E+01	µg/L	9.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthylene	1.82E+01	µg/L	4.6E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	5.0E-04	mg/kg-day	1.4E-02	$(mg/kg\text{-}day)^{-1}$	7.0E-06
				Chloroform	1.42E+01	µg/L	N/A	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Fluorene	1.01E+02	µg/L	2.8E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	5.07E+01	µg/L	4.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Phenanthrene	1.63E+02	µg/L	6.4E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	1.89E+01	µg/L	1.2E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	6.10E-01	µg/L	5.2E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								9.8E-06
		Exposure Point Total									2.0E-05
	Exposure Media Total										2.0E-05

Table E.1-30
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
	Air	Area O	**Inhalation**	**Organics**							
			(Indoor Air)	2-Methylnaphthalene	1.23E-04	mg/m^3	2.8E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthene	2.36E-05	mg/m^3	5.3E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chloroform	3.04E-05	mg/m^3	6.9E-06	mg/kg-day	8.1E-02	$(mg/kg\text{-}day)^{-1}$	5.5E-07
				Fluorene	3.42E-05	mg/m^3	7.7E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	3.50E-05	mg/m^3	7.9E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	1.73E-06	mg/m^3	3.9E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	2.84E-06	mg/m^3	6.4E-07	mg/kg-day	2.0E-02	$(mg/kg\text{-}day)^{-1}$	1.3E-08
			Exp. Route Total								5.7E-07
			Inhalation	**Organics**							
			(Shower Room)	1-Methylnaphthalene	4.02E+00	mg/m^3	1.6E-02	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Methylnaphthalene	1.75E+00	mg/m^3	6.8E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthene	2.74E-01	mg/m^3	1.1E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthylene	1.28E-02	mg/m^3	5.0E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chloroform	1.93E-01	mg/m^3	7.5E-04	mg/kg-day	8.1E-02	$(mg/kg\text{-}day)^{-1}$	6.1E-05
				Fluorene	3.54E-01	mg/m^3	1.4E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	5.05E-01	mg/m^3	2.0E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Phenanthrene	7.63E-01	mg/m^3	3.0E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	1.13E-02	mg/m^3	4.4E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	7.61E-03	mg/m^3	3.0E-05	mg/kg-day	2.0E-02	$(mg/kg\text{-}day)^{-1}$	5.9E-07
			Exp. Route Total								6.2E-05
		Exposure Point Total									6.2E-05
	Exposure Media Total										6.2E-05
	Home Grown Produce	Area O	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											8.2E-05
										Total of Receptor Risks Across All Media	8.2E-05

N/A = Not Applicable.

Table E.1-31
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
Subsurface Soil	Subsurface Soil	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Particulates)	Area O	**Inhalation**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Volatiles)	Area O	**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
Subsurface Soil Total											0.0E+00
Sediment	Sediment	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Sediment Total											0.0E+00

Table E.1-31
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
Surface Water	Surface Water	Area O	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00
Groundwater	Groundwater	Area O	**Ingestion**	**Organics**							
				1-Methlynaphthalene	4.14E+02	µg/L	2.3E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Methlynaphthalene	1.80E+02	µg/L	9.9E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthene	4.71E+01	µg/L	2.6E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthylene	1.82E+01	µg/L	1.0E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	1.3E-04	mg/kg-day	1.4E-02	$(mg/kg\text{-}day)^{-1}$	1.8E-06
				Chloroform	1.42E+01	µg/L	7.8E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Fluorene	1.01E+02	µg/L	5.5E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	5.07E+01	µg/L	2.8E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Phenanthrene	1.63E+02	µg/L	8.9E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	1.89E+01	µg/L	1.0E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	6.10E-01	µg/L	3.3E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								3.6E-06
			Dermal Absorption	**Organics**							
				1-Methlynaphthalene	4.14E+02	µg/L	3.6E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				2-Methlynaphthalene	1.80E+02	µg/L	1.3E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthene	4.71E+01	µg/L	3.6E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthylene	1.82E+01	µg/L	1.8E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	1.9E-04	mg/kg-day	1.4E-02	$(mg/kg\text{-}day)^{-1}$	2.6E-06
				Chloroform	1.42E+01	µg/L	N/A	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Fluorene	1.01E+02	µg/L	1.0E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	5.07E+01	µg/L	1.8E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Phenanthrene	1.63E+02	µg/L	2.4E-03	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	1.89E+01	µg/L	4.7E-04	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	6.10E-01	µg/L	2.0E-06	mg/kg-day	5.4E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								3.7E-06
		Exposure Point Total									7.3E-06
	Exposure Media Total										7.3E-06

Table E.1-31
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
	Air	Area O	**Inhalation**	**Organics**							
			(Indoor Air)	2-Methylnaphthalene	1.23E-04	mg/m^3	1.6E-05	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthene	2.36E-05	mg/m^3	3.1E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chloroform	3.04E-05	mg/m^3	4.0E-06	mg/kg-day	8.1E-02	$(mg/kg\text{-}day)^{-1}$	3.2E-07
				Fluorene	3.42E-05	mg/m^3	4.5E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	3.50E-05	mg/m^3	4.6E-06	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	1.73E-06	mg/m^3	2.3E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	2.84E-06	mg/m^3	3.7E-07	mg/kg-day	2.0E-02	$(mg/kg\text{-}day)^{-1}$	7.5E-09
			Exp. Route Total								3.3E-07
		Exposure Point Total									3.3E-07
	Exposure Media Total										3.3E-07
	Home Grown Produce	Area O	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											7.6E-06
										Total of Receptor Risks Across All Media	7.6E-06

N/A = Not Applicable.

Table E.1-32
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Adult Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Subsurface Soil	Subsurface Soil	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Particulates)	Area O	**Inhalation**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Volatiles)	Area O	**Inhalation**	**Organics** No COPCs							0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Total Soil Total											0.0E+00
Sediment	Sediment	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Sediment Total											0.0E+00

Table E.1-32
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Adult Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Surface Water	Surface Water	Area O (wading)	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00
Groundwater	Groundwater	Area O	**Ingestion**	**Organics**							
				1-Methylnaphthalene	4.14E+02	µg/L	1.1E-02	mg/kg-day	4.0E-03	mg/kg-day	2.8E+00
				2-Methylnaphthalene	1.80E+02	µg/L	4.9E-03	mg/kg-day	4.0E-03	mg/kg-day	1.2E+00
				Acenaphthene	4.71E+01	µg/L	1.3E-03	mg/kg-day	6.0E-02	mg/kg-day	2.2E-02
				Acenaphthylene	1.82E+01	µg/L	5.0E-04	mg/kg-day	3.0E-02	mg/kg-day	1.7E-02
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	6.3E-04	mg/kg-day	2.0E-02	mg/kg-day	3.2E-02
				Chloroform	1.42E+01	µg/L	3.9E-04	mg/kg-day	1.0E-02	mg/kg-day	3.9E-02
				Fluorene	1.01E+02	µg/L	2.8E-03	mg/kg-day	4.0E-02	mg/kg-day	6.9E-02
				Naphthalene	5.07E+01	µg/L	1.4E-03	mg/kg-day	2.0E-02	mg/kg-day	6.9E-02
				Phenanthrene	1.63E+02	µg/L	4.5E-03	mg/kg-day	3.0E-02	mg/kg-day	1.5E-01
				Pyrene	1.89E+01	µg/L	5.2E-04	mg/kg-day	3.0E-02	mg/kg-day	1.7E-02
				Tetrachloroethene	6.10E-01	µg/L	1.7E-05	mg/kg-day	1.0E-02	mg/kg-day	1.7E-03
				Inorganics							
				No COPCs							
			Exp. Route Total								4.5E+00
			Dermal Absorption	**Organics**							
				1-Methylnaphthalene	4.14E+02	µg/L	1.8E-02	mg/kg-day	4.0E-03	mg/kg-day	4.4E+00
				2-Methylnaphthalene	1.80E+02	µg/L	6.4E-03	mg/kg-day	4.0E-03	mg/kg-day	1.6E+00
				Acenaphthene	4.71E+01	µg/L	1.7E-03	mg/kg-day	6.0E-02	mg/kg-day	2.9E-02
				Acenaphthylene	1.82E+01	µg/L	8.4E-04	mg/kg-day	3.0E-02	mg/kg-day	2.8E-02
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	9.1E-04	mg/kg-day	2.0E-02	mg/kg-day	4.6E-02
				Chloroform	1.42E+01	µg/L	N/A	mg/kg-day	1.0E-02	mg/kg-day	--
				Fluorene	1.01E+02	µg/L	5.2E-03	mg/kg-day	4.0E-02	mg/kg-day	1.3E-01
				Naphthalene	5.07E+01	µg/L	8.6E-04	mg/kg-day	2.0E-02	mg/kg-day	4.3E-02
				Phenanthrene	1.63E+02	µg/L	1.2E-02	mg/kg-day	3.0E-02	mg/kg-day	3.9E-01
				Pyrene	1.89E+01	µg/L	2.2E-03	mg/kg-day	3.0E-02	mg/kg-day	7.3E-02
				Tetrachloroethene	6.10E-01	µg/L	9.4E-06	mg/kg-day	1.0E-02	mg/kg-day	9.4E-04
				Inorganics							
				No COPCs							
			Exp. Route Total								6.8E+00
		Exposure Point Total									1.1E+01
	Exposure Media Total										1.1E+01

Table E.1-32
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Adult Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
	Air	Area O	**Inhalation**	**Organics**							
			(Indoor Air)	2-Methylnaphthalene	1.23E-04	mg/m^3	3.4E-05	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthene	2.36E-05	mg/m^3	6.4E-06	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	3.04E-05	mg/m^3	8.3E-06	mg/kg-day	1.4E-02	mg/kg-day	5.9E-04
				Fluorene	3.42E-05	mg/m^3	9.3E-06	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	3.50E-05	mg/m^3	9.6E-06	mg/kg-day	9.0E-04	mg/kg-day	1.1E-02
				Pyrene	1.73E-06	mg/m^3	4.7E-07	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	2.84E-06	mg/m^3	7.7E-07	mg/kg-day	8.0E-02	mg/kg-day	9.7E-06
			Exp. Route Total								1.1E-02
			Inhalation	**Organics**							
			(Shower Room)	1-Methylnaphthalene	4.02E+00	mg/m^3	4.6E-02	mg/kg-day	N/A	mg/kg-day	---
				2-Methylnaphthalene	1.75E+00	mg/m^3	2.0E-02	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthene	2.74E-01	mg/m^3	3.1E-03	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthylene	1.28E-02	mg/m^3	1.5E-04	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	1.93E-01	mg/m^3	2.2E-03	mg/kg-day	1.4E-02	mg/kg-day	1.6E-01
				Fluorene	3.54E-01	mg/m^3	4.0E-03	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	5.05E-01	mg/m^3	5.7E-03	mg/kg-day	9.0E-04	mg/kg-day	6.4E+00
				Phenanthrene	7.63E-01	mg/m^3	8.7E-03	mg/kg-day	N/A	mg/kg-day	---
				Pyrene	1.13E-02	mg/m^3	1.3E-04	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	7.61E-03	mg/m^3	8.7E-05	mg/kg-day	8.0E-02	mg/kg-day	1.1E-03
			Exp. Route Total								6.5E+00
		Exposure Point Total									6.5E+00
	Exposure Media Total										6.5E+00
	Home Grown Produce	Area O	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											1.8E+01
										Total of Receptor Hazards Across All Media	1.8E+01

N/A = Not Applicable.

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.1-33
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Particulates)	Area O	**Inhalation**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
	Air (Volatiles)	Area O	**Inhalation**	**Organics** No COPCs							0.0E+00
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Subsurface Soil Total											0.0E+00
Sediment	Sediment	Area O	**Ingestion**	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics** No COPCs **Inorganics** No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Sediment Total											0.0E+00

Table E.1-33
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
Surface Water	Surface Water	Area O	**Ingestion**	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
			Dermal Absorption	**Organics**							
				No COPCs							
				Inorganics							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Surface Water Total											0.0E+00
Groundwater	Groundwater	Area O	**Ingestion**	**Organics**							
				1-Methylnaphthalene	4.14E+02	µg/L	2.6E-02	mg/kg-day	4.0E-03	mg/kg-day	6.6E+00
				2-Methylnaphthalene	1.80E+02	µg/L	1.2E-02	mg/kg-day	4.0E-03	mg/kg-day	2.9E+00
				Acenaphthene	4.71E+01	µg/L	3.0E-03	mg/kg-day	6.0E-02	mg/kg-day	5.0E-02
				Acenaphthylene	1.82E+01	µg/L	1.2E-03	mg/kg-day	3.0E-02	mg/kg-day	3.9E-02
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	1.5E-03	mg/kg-day	2.0E-02	mg/kg-day	7.4E-02
				Chloroform	1.42E+01	µg/L	9.1E-04	mg/kg-day	1.0E-02	mg/kg-day	9.1E-02
				Fluorene	1.01E+02	µg/L	6.5E-03	mg/kg-day	4.0E-02	mg/kg-day	1.6E-01
				Naphthalene	5.07E+01	µg/L	3.2E-03	mg/kg-day	2.0E-02	mg/kg-day	1.6E-01
				Phenanthrene	1.63E+02	µg/L	1.0E-02	mg/kg-day	3.0E-02	mg/kg-day	3.5E-01
				Pyrene	1.89E+01	µg/L	1.2E-03	mg/kg-day	3.0E-02	mg/kg-day	4.0E-02
				Tetrachloroethene	6.10E-01	µg/L	3.9E-05	mg/kg-day	1.0E-02	mg/kg-day	3.9E-03
				Inorganics							
				No COPCs							
			Exp. Route Total								1.0E+01
			Dermal	**Organics**							
			Absorption	1-Methylnaphthalene	4.14E+02	µg/L	4.2E-02	mg/kg-day	4.0E-03	mg/kg-day	1.1E+01
				2-Methylnaphthalene	1.80E+02	µg/L	1.6E-02	mg/kg-day	4.0E-03	mg/kg-day	3.9E+00
				Acenaphthene	4.71E+01	µg/L	4.2E-03	mg/kg-day	6.0E-02	mg/kg-day	7.0E-02
				Acenaphthylene	1.82E+01	µg/L	2.1E-03	mg/kg-day	3.0E-02	mg/kg-day	6.9E-02
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	2.2E-03	mg/kg-day	2.0E-02	mg/kg-day	1.1E-01
				Chloroform	1.42E+01	µg/L	N/A	mg/kg-day	1.0E-02	mg/kg-day	---
				Fluorene	1.01E+02	µg/L	1.2E-02	mg/kg-day	4.0E-02	mg/kg-day	3.1E-01
				Naphthalene	5.07E+01	µg/L	2.1E-03	mg/kg-day	2.0E-02	mg/kg-day	1.0E-01
				Phenanthrene	1.63E+02	µg/L	2.8E-02	mg/kg-day	3.0E-02	mg/kg-day	9.4E-01
				Pyrene	1.89E+01	µg/L	5.5E-03	mg/kg-day	3.0E-02	mg/kg-day	1.8E-01
				Tetrachloroethene	6.10E-01	µg/L	2.3E-05	mg/kg-day	1.0E-02	mg/kg-day	2.3E-03
				Inorganics							
				No COPCs							
			Exp. Route Total								1.6E+01
		Exposure Point Total									2.7E+01
	Exposure Media Total										2.7E+01

Table E.1-33
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
	Air	Area O	**Inhalation**	**Organics**							
			(Indoor Air)	2-Methylnaphthalene	1.23E-04	mg/m^3	1.9E-04	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthene	2.36E-05	mg/m^3	3.6E-05	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	3.04E-05	mg/m^3	4.7E-05	mg/kg-day	1.4E-02	mg/kg-day	3.3E-03
				Fluorene	3.42E-05	mg/m^3	5.2E-05	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	3.50E-05	mg/m^3	5.4E-05	mg/kg-day	9.0E-04	mg/kg-day	6.0E-02
				Pyrene	1.73E-06	mg/m^3	2.7E-06	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	2.84E-06	mg/m^3	4.4E-06	mg/kg-day	8.0E-02	mg/kg-day	5.4E-05
			Exp. Route Total								6.3E-02
		Exposure Point Total									6.3E-02
	Exposure Media Total										6.3E-02
	Home Grown Produce	Area O	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											2.7E+01
										Total of Receptor Hazards Across All Media	2.7E+01

N/A = Not Applicable.

Table E.1-34
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	Area O	**Ingestion**	**Organics**							
				1-Methlynaphthalene	4.14E+02	µg/L	6.2E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Methlynaphthalene	1.80E+02	µg/L	2.7E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthene	4.71E+01	µg/L	7.0E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthylene	1.82E+01	µg/L	2.7E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	3.4E-04	mg/kg-day	1.4E-02	$(mg/kg-day)^{-1}$	4.8E-06
				Chloroform	1.42E+01	µg/L	2.1E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Fluorene	1.01E+02	µg/L	1.5E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Naphthalene	5.07E+01	µg/L	7.5E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Phenanthrene	1.63E+02	µg/L	2.4E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Pyrene	1.89E+01	µg/L	2.8E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	6.10E-01	µg/L	9.1E-06	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	4.9E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								9.7E-06
			Dermal Absorption	**Organics**							
				1-Methlynaphthalene	4.14E+02	µg/L	9.7E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Methlynaphthalene	1.80E+02	µg/L	3.5E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthene	4.71E+01	µg/L	9.5E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthylene	1.82E+01	µg/L	4.6E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	5.0E-04	mg/kg-day	1.4E-02	$(mg/kg-day)^{-1}$	7.0E-06
				Chloroform	1.42E+01	µg/L	N/A	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Fluorene	1.01E+02	µg/L	2.8E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Naphthalene	5.07E+01	µg/L	4.7E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Phenanthrene	1.63E+02	µg/L	6.4E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Pyrene	1.89E+01	µg/L	1.2E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	6.10E-01	µg/L	5.2E-06	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	2.8E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								9.8E-06
		Exposure Point Total									2.0E-05
	Exposure Media Total										2.0E-05

Table E.1-34
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
	Air	Area O	**Inhalation**	**Organics**							
			(Indoor Air)	2-Methylnaphthalene	1.23E-04	mg/m^3	2.8E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthene	2.36E-05	mg/m^3	5.3E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chloroform	3.04E-05	mg/m^3	6.8E-06	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	5.5E-07
				Fluorene	3.42E-05	mg/m^3	7.7E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Naphthalene	3.50E-05	mg/m^3	7.9E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Pyrene	1.73E-06	mg/m^3	3.9E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	2.84E-06	mg/m^3	6.4E-07	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	1.3E-08
			Exp. Route Total								5.7E-07
			Inhalation	**Organics**							
			(Shower Room)	1-Methylnaphthalene	4.02E+00	mg/m^3	1.6E-02	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Methylnaphthalene	1.75E+00	mg/m^3	6.8E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthene	2.74E-01	mg/m^3	1.1E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthylene	1.28E-02	mg/m^3	5.0E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chloroform	1.93E-01	mg/m^3	7.5E-04	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	6.1E-05
				Fluorene	3.54E-01	mg/m^3	1.4E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Naphthalene	5.05E-01	mg/m^3	2.0E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Phenanthrene	7.63E-01	mg/m^3	3.0E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Pyrene	1.13E-02	mg/m^3	4.4E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	7.61E-03	mg/m^3	3.0E-05	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	5.9E-07
			Exp. Route Total								6.2E-05
		Exposure Point Total									6.2E-05
	Exposure Media Total										6.2E-05
	Home Grown Produce	Area O	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											8.2E-05
										Total of Receptor Risks Across All Media	8.2E-05

N/A = Not Applicable.

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.1-35
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	Area O	**Ingestion**	**Organics**							
				1-Methlynaphthalene	4.14E+02	µg/L	2.3E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Methlynaphthalene	1.80E+02	µg/L	9.9E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthene	4.71E+01	µg/L	2.6E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthylene	1.82E+01	µg/L	1.0E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	1.3E-04	mg/kg-day	1.4E-02	$(mg/kg-day)^{-1}$	1.8E-06
				Chloroform	1.42E+01	µg/L	7.8E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Fluorene	1.01E+02	µg/L	5.5E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Naphthalene	5.07E+01	µg/L	2.8E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Phenanthrene	1.63E+02	µg/L	8.9E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Pyrene	1.89E+01	µg/L	1.0E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	6.10E-01	µg/L	3.3E-06	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	1.8E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								3.6E-06
			Dermal	**Organics**							
			Absorption	1-Methlynaphthalene	4.14E+02	µg/L	3.6E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Methlynaphthalene	1.80E+02	µg/L	1.3E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthene	4.71E+01	µg/L	3.6E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthylene	1.82E+01	µg/L	1.8E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	1.9E-04	mg/kg-day	1.4E-02	$(mg/kg-day)^{-1}$	2.6E-06
				Chloroform	1.42E+01	µg/L	N/A	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Fluorene	1.01E+02	µg/L	1.0E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Naphthalene	5.07E+01	µg/L	1.8E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Phenanthrene	1.63E+02	µg/L	2.4E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Pyrene	1.89E+01	µg/L	4.7E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	6.10E-01	µg/L	2.0E-06	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	1.1E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								3.7E-06
		Exposure Point Total									7.3E-06
	Exposure Media Total										7.3E-06

Table E.1-35
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
	Air	Area O	**Inhalation**	**Organics**							
			(Indoor Air)	2-Methylnaphthalene	1.23E-04	mg/m^3	1.6E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthene	2.36E-05	mg/m^3	3.1E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chloroform	3.04E-05	mg/m^3	4.0E-06	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	3.2E-07
				Fluorene	3.42E-05	mg/m^3	4.5E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Naphthalene	3.50E-05	mg/m^3	4.6E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Pyrene	1.73E-06	mg/m^3	2.3E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	2.84E-06	mg/m^3	3.7E-07	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	7.5E-09
			Exp. Route Total								3.3E-07
		Exposure Point Total									3.3E-07
	Exposure Media Total										3.3E-07
	Home Grown Produce	Area O	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											7.6E-06
										Total of Receptor Risks Across All Media	7.6E-06

N/A = Not Applicable.

Table E.1-36
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	Area O	**Ingestion**	**Organics**							
				1-Methylnaphthalene	4.14E+02	µg/L	1.1E-02	mg/kg-day	4.0E-03	mg/kg-day	2.8E+00
				2-Methylnaphthalene	1.80E+02	µg/L	4.9E-03	mg/kg-day	4.0E-03	mg/kg-day	1.2E+00
				Acenaphthene	4.71E+01	µg/L	1.3E-03	mg/kg-day	6.0E-02	mg/kg-day	2.2E-02
				Acenaphthylene	1.82E+01	µg/L	5.0E-04	mg/kg-day	3.0E-02	mg/kg-day	1.7E-02
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	6.3E-04	mg/kg-day	2.0E-02	mg/kg-day	3.2E-02
				Chloroform	1.42E+01	µg/L	3.9E-04	mg/kg-day	1.0E-02	mg/kg-day	3.9E-02
				Fluorene	1.01E+02	µg/L	2.8E-03	mg/kg-day	4.0E-02	mg/kg-day	6.9E-02
				Naphthalene	5.07E+01	µg/L	1.4E-03	mg/kg-day	2.0E-02	mg/kg-day	6.9E-02
				Phenanthrene	1.63E+02	µg/L	4.5E-03	mg/kg-day	3.0E-02	mg/kg-day	1.5E-01
				Pyrene	1.89E+01	µg/L	5.2E-04	mg/kg-day	3.0E-02	mg/kg-day	1.7E-02
				Tetrachloroethene	6.10E-01	µg/L	1.7E-05	mg/kg-day	1.0E-02	mg/kg-day	1.7E-03
				Inorganics							
				No COPCs							
			Exp. Route Total								4.5E+00
			Dermal	**Organics**							
			Absorption	1-Methylnaphthalene	4.14E+02	µg/L	1.8E-02	mg/kg-day	4.0E-03	mg/kg-day	4.4E+00
				2-Methylnaphthalene	1.80E+02	µg/L	6.4E-03	mg/kg-day	4.0E-03	mg/kg-day	1.6E+00
				Acenaphthene	4.71E+01	µg/L	1.7E-03	mg/kg-day	6.0E-02	mg/kg-day	2.9E-02
				Acenaphthylene	1.82E+01	µg/L	8.4E-04	mg/kg-day	3.0E-02	mg/kg-day	2.8E-02
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	9.1E-04	mg/kg-day	2.0E-02	mg/kg-day	4.6E-02
				Chloroform	1.42E+01	µg/L	N/A	mg/kg-day	1.0E-02	mg/kg-day	---
				Fluorene	1.01E+02	µg/L	5.2E-03	mg/kg-day	4.0E-02	mg/kg-day	1.3E-01
				Naphthalene	5.07E+01	µg/L	8.6E-04	mg/kg-day	2.0E-02	mg/kg-day	4.3E-02
				Phenanthrene	1.63E+02	µg/L	1.2E-02	mg/kg-day	3.0E-02	mg/kg-day	3.9E-01
				Pyrene	1.89E+01	µg/L	2.2E-03	mg/kg-day	3.0E-02	mg/kg-day	7.3E-02
				Tetrachloroethene	6.10E-01	µg/L	9.4E-06	mg/kg-day	1.0E-02	mg/kg-day	9.4E-04
				Inorganics							
				No COPCs							
			Exp. Route Total								6.8E+00
		Exposure Point Total									1.1E+01
	Exposure Media Total										1.1E+01

Table E.1-36
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
	Air	Area O	**Inhalation**	**Organics**							
			(Indoor Air)	2-Methylnaphthalene	1.23E-04	mg/m^3	3.4E-05	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthene	2.36E-05	mg/m^3	6.4E-06	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	3.04E-05	mg/m^3	8.3E-06	mg/kg-day	1.4E-02	mg/kg-day	5.9E-04
				Fluorene	3.42E-05	mg/m^3	9.3E-06	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	3.50E-05	mg/m^3	9.6E-06	mg/kg-day	9.0E-04	mg/kg-day	1.1E-02
				Pyrene	1.73E-06	mg/m^3	4.7E-07	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	2.84E-06	mg/m^3	7.7E-07	mg/kg-day	8.0E-02	mg/kg-day	9.7E-06
			Exp. Route Total								1.1E-02
			Inhalation	**Organics**							
			(Shower Room)	1-Methylnaphthalene	4.02E+00	mg/m^3	4.6E-02	mg/kg-day	N/A	mg/kg-day	---
				2-Methylnaphthalene	1.75E+00	mg/m^3	2.0E-02	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthene	2.74E-01	mg/m^3	3.1E-03	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthylene	1.28E-02	mg/m^3	1.5E-04	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	1.93E-01	mg/m^3	2.2E-03	mg/kg-day	1.4E-02	mg/kg-day	1.6E-01
				Fluorene	3.54E-01	mg/m^3	4.0E-03	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	5.05E-01	mg/m^3	5.7E-03	mg/kg-day	9.0E-04	mg/kg-day	6.4E+00
				Phenanthrene	7.63E-01	mg/m^3	8.7E-03	mg/kg-day	N/A	mg/kg-day	---
				Pyrene	1.13E-02	mg/m^3	1.3E-04	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	7.61E-03	mg/m^3	8.7E-05	mg/kg-day	8.0E-02	mg/kg-day	1.1E-03
			Exp. Route Total								6.5E+00
		Exposure Point Total									6.5E+00
	Exposure Media Total										6.5E+00
	Home Grown Produce	Area O	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											1.8E+01
										Total of Receptor Hazards Across All Media	1.8E+01

N/A = Not Applicable.

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.1-37
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	Area O	**Ingestion**	**Organics**							
				1-Methylnaphthalene	4.14E+02	µg/L	2.6E-02	mg/kg-day	4.0E-03	mg/kg-day	6.6E+00
				2-Methylnaphthalene	1.80E+02	µg/L	1.2E-02	mg/kg-day	4.0E-03	mg/kg-day	2.9E+00
				Acenaphthene	4.71E+01	µg/L	3.0E-03	mg/kg-day	6.0E-02	mg/kg-day	5.0E-02
				Acenaphthylene	1.82E+01	µg/L	1.2E-03	mg/kg-day	3.0E-02	mg/kg-day	3.9E-02
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	1.5E-03	mg/kg-day	2.0E-02	mg/kg-day	7.4E-02
				Chloroform	1.42E+01	µg/L	9.1E-04	mg/kg-day	1.0E-02	mg/kg-day	9.1E-02
				Fluorene	1.01E+02	µg/L	6.5E-03	mg/kg-day	4.0E-02	mg/kg-day	1.6E-01
				Naphthalene	5.07E+01	µg/L	3.2E-03	mg/kg-day	2.0E-02	mg/kg-day	1.6E-01
				Phenanthrene	1.63E+02	µg/L	1.0E-02	mg/kg-day	3.0E-02	mg/kg-day	3.5E-01
				Pyrene	1.89E+01	µg/L	1.2E-03	mg/kg-day	3.0E-02	mg/kg-day	4.0E-02
				Tetrachloroethene	6.10E-01	µg/L	3.9E-05	mg/kg-day	1.0E-02	mg/kg-day	3.9E-03
				Inorganics							
				No COPCs							
			Exp. Route Total								1.0E+01
			Dermal	**Organics**							
			Absorption	1-Methylnaphthalene	4.14E+02	µg/L	4.2E-02	mg/kg-day	4.0E-03	mg/kg-day	1.1E+01
				2-Methylnaphthalene	1.80E+02	µg/L	1.6E-02	mg/kg-day	4.0E-03	mg/kg-day	3.9E+00
				Acenaphthene	4.71E+01	µg/L	4.2E-03	mg/kg-day	6.0E-02	mg/kg-day	7.0E-02
				Acenaphthylene	1.82E+01	µg/L	2.1E-03	mg/kg-day	3.0E-02	mg/kg-day	6.9E-02
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	2.2E-03	mg/kg-day	2.0E-02	mg/kg-day	1.1E-01
				Chloroform	1.42E+01	µg/L	N/A	mg/kg-day	1.0E-02	mg/kg-day	---
				Fluorene	1.01E+02	µg/L	1.2E-02	mg/kg-day	4.0E-02	mg/kg-day	3.1E-01
				Naphthalene	5.07E+01	µg/L	2.1E-03	mg/kg-day	2.0E-02	mg/kg-day	1.0E-01
				Phenanthrene	1.63E+02	µg/L	2.8E-02	mg/kg-day	3.0E-02	mg/kg-day	9.4E-01
				Pyrene	1.89E+01	µg/L	5.5E-03	mg/kg-day	3.0E-02	mg/kg-day	1.8E-01
				Tetrachloroethene	6.10E-01	µg/L	2.3E-05	mg/kg-day	1.0E-02	mg/kg-day	2.3E-03
				Inorganics							
				No COPCs							
			Exp. Route Total								1.6E+01
		Exposure Point Total									2.7E+01
	Exposure Media Total										2.7E+01

Table E.1-37
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-site Child Resident

Scenario Timeframe: Future
Receptor Population: Off-site Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
	Air	Area O	**Inhalation**	**Organics**							
			(Indoor Air)	2-Methylnaphthalene	1.23E-04	mg/m^3	1.9E-04	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthene	2.36E-05	mg/m^3	3.6E-05	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	3.04E-05	mg/m^3	4.7E-05	mg/kg-day	1.4E-02	mg/kg-day	3.3E-03
				Fluorene	3.42E-05	mg/m^3	5.2E-05	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	3.50E-05	mg/m^3	5.4E-05	mg/kg-day	9.0E-04	mg/kg-day	6.0E-02
				Pyrene	1.73E-06	mg/m^3	2.7E-06	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	2.84E-06	mg/m^3	4.4E-06	mg/kg-day	8.0E-02	mg/kg-day	5.4E-05
			Exp. Route Total								6.3E-02
		Exposure Point Total									6.3E-02
	Exposure Media Total										6.3E-02
	Home Grown Produce	Area O	**Ingestion**	**Inorganics**							
				No COPCs							
			Exp. Route Total								0.0E+00
		Exposure Point Total									0.0E+00
	Exposure Media Total										0.0E+00
Groundwater Total											2.7E+01
										Total of Receptor Hazards Across All Media	2.7E+01

N/A = Not Applicable.

Table E.1-38
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Air	Area O	**Inhalation**	**Organics**							
			(Ambient Air)	Acenaphthene	1.49E-08	mg/m^3	2.1E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chloroform	1.23E-08	mg/m^3	1.7E-10	mg/kg-day	8.1E-02	$(mg/kg\text{-}day)^{-1}$	1.4E-11
				Fluorene	3.16E-08	mg/m^3	4.4E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	1.79E-08	mg/m^3	2.5E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	2.55E-09	mg/m^3	3.6E-11	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	1.17E-09	mg/m^3	1.6E-11	mg/kg-day	2.0E-02	$(mg/kg\text{-}day)^{-1}$	3.3E-13
			Exp. Route Total								1.4E-11
		Exposure Point Total									1.4E-11
	Exposure Media Total										1.4E-11
Groundwater Total											1.4E-11
										Total of Receptor Risks Across All Media	1.4E-11

N/A = Not Applicable.

Table E.1-39
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Groundwater	Air	Area O	**Inhalation**	**Organics**							
			(Ambient Air)	Acenaphthene	1.49E-08	mg/m^3	5.8E-10	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	1.23E-08	mg/m^3	4.8E-10	mg/kg-day	1.4E-02	mg/kg-day	3.4E-08
				Fluorene	3.16E-08	mg/m^3	1.2E-09	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	1.79E-08	mg/m^3	7.0E-10	mg/kg-day	9.0E-04	mg/kg-day	7.8E-07
				Pyrene	2.55E-09	mg/m^3	1.0E-10	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	1.17E-09	mg/m^3	4.6E-11	mg/kg-day	8.0E-02	mg/kg-day	5.7E-10
			Exp. Route Total								8.1E-07
		Exposure Point Total									8.1E-07
	Exposure Media Total										8.1E-07
Groundwater Total											8.1E-07
Total of Receptor Hazards Across All Media											8.1E-07

N/A = Not Applicable.

Table E.1-40
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Groundwater	Area O	**Ingestion**	**Organics**							
				1-Methlynaphthalene	4.14E+02	µg/L	1.3E-03	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				2-Methlynaphthalene	1.80E+02	µg/L	5.7E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthene	4.71E+01	µg/L	1.5E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthylene	1.82E+01	µg/L	5.7E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	7.3E-05	mg/kg-day	1.4E-02	$(mg/kg-day)^{-1}$	1.0E-06
				Chloroform	1.42E+01	µg/L	4.5E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Fluorene	1.01E+02	µg/L	3.2E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Naphthalene	5.07E+01	µg/L	1.6E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Phenanthrene	1.63E+02	µg/L	5.1E-04	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Pyrene	1.89E+01	µg/L	5.9E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	6.10E-01	µg/L	1.9E-06	mg/kg-day	5.4E-01	$(mg/kg-day)^{-1}$	1.0E-06
				Inorganics							
				No COPCs							
			Exp. Route Total								2.1E-06
		Exposure Point Total									2.1E-06
	Exposure Media Total										2.1E-06
	Air	Area O	**Inhalation**	**Organics**							
			(Ambient Air)	Acenaphthene	1.49E-08	mg/m^3	9.4E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chloroform	1.23E-08	mg/m^3	7.7E-10	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	6.3E-11
				Fluorene	3.16E-08	mg/m^3	2.0E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Naphthalene	1.79E-08	mg/m^3	1.1E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Pyrene	2.55E-09	mg/m^3	1.6E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	1.17E-09	mg/m^3	7.4E-11	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	1.5E-12
			Exp. Route Total								6.4E-11
		Exposure Point Total									6.4E-11
	Exposure Media Total										6.4E-11
	Air	Area O	**Inhalation**	**Organics**							
			(Indoor Air)	2-Methylnaphthalene	1.23E-04	mg/m^3	7.7E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Acenaphthene	2.36E-05	mg/m^3	1.5E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Chloroform	3.04E-05	mg/m^3	1.9E-06	mg/kg-day	8.1E-02	$(mg/kg-day)^{-1}$	1.5E-07
				Fluorene	3.42E-05	mg/m^3	2.2E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Naphthalene	3.50E-05	mg/m^3	2.2E-06	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Pyrene	1.73E-06	mg/m^3	1.1E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	---
				Tetrachloroethene	2.84E-06	mg/m^3	1.8E-07	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	3.6E-09
			Exp. Route Total								1.6E-07
		Exposure Point Total									1.6E-07
	Exposure Media Total										1.6E-07
Groundwater Total											2.2E-06
										Total of Receptor Risks Across All Media	2.2E-06

N/A = Not Applicable.

Since indoor air represents the more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-41
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units	
Groundwater	Groundwater	Area O	**Ingestion**	**Organics**							
				Benzo(a)pyrene		µg/L	0.0E+00	mg/kg-day	N/A	mg/kg-day	---
				Carbon tetrachloride		µg/L	0.0E+00	mg/kg-day	7.0E-04	mg/kg-day	0.0E+00
				Chloroform		µg/L	0.0E+00	mg/kg-day	1.0E-02	mg/kg-day	0.0E+00
				cis-1,2-Dichloroethene		µg/L	0.0E+00	mg/kg-day	1.0E-02	mg/kg-day	0.0E+00
				1-Methylnaphthalene	4.14E+02	µg/L	3.6E-03	mg/kg-day	4.0E-03	mg/kg-day	9.1E-01
				2-Methylnaphthalene	1.80E+02	µg/L	1.6E-03	mg/kg-day	4.0E-03	mg/kg-day	4.0E-01
				Acenaphthene	4.71E+01	µg/L	4.1E-04	mg/kg-day	6.0E-02	mg/kg-day	6.9E-03
				Acenaphthylene	1.82E+01	µg/L	1.6E-04	mg/kg-day	3.0E-02	mg/kg-day	5.3E-03
				bis(2-ethylhexyl)phthalate	2.31E+01	µg/L	2.0E-04	mg/kg-day	2.0E-02	mg/kg-day	1.0E-02
				Chloroform	1.42E+01	µg/L	1.3E-04	mg/kg-day	1.0E-02	mg/kg-day	1.3E-02
				Fluorene	1.01E+02	µg/L	8.9E-04	mg/kg-day	4.0E-02	mg/kg-day	2.2E-02
				Naphthalene	5.07E+01	µg/L	4.5E-04	mg/kg-day	2.0E-02	mg/kg-day	2.2E-02
				Phenanthrene	1.63E+02	µg/L	1.4E-03	mg/kg-day	3.0E-02	mg/kg-day	4.8E-02
				Pyrene	1.89E+01	µg/L	1.7E-04	mg/kg-day	3.0E-02	mg/kg-day	5.5E-03
				Tetrachloroethene	6.10E-01	µg/L	5.4E-06	mg/kg-day	1.0E-02	mg/kg-day	5.4E-04
				Inorganics							
				No COPCs							
			Exp. Route Total								1.4E+00
		Exposure Point Total									1.4E+00
	Exposure Media Total										1.4E+00
	Air	Area O	**Inhalation**	**Organics**							
			(Ambient Air)	Acenaphthene	1.49E-08	mg/m^3	2.6E-09	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	1.23E-08	mg/m^3	2.2E-09	mg/kg-day	1.4E-02	mg/kg-day	1.5E-07
				Fluorene	3.16E-08	mg/m^3	5.6E-09	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	1.79E-08	mg/m^3	3.2E-09	mg/kg-day	9.0E-04	mg/kg-day	3.5E-06
				Pyrene	2.55E-09	mg/m^3	4.5E-10	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	1.17E-09	mg/m^3	2.1E-10	mg/kg-day	8.0E-02	mg/kg-day	2.6E-09
			Exp. Route Total								3.7E-06
		Exposure Point Total									3.7E-06
	Exposure Media Total										3.7E-06
	Air	Area O	**Inhalation**	**Organics**							
			(Indoor Air)	2-Methylnaphthalene	1.23E-04	mg/m^3	2.2E-05	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthene	2.36E-05	mg/m^3	4.2E-06	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	3.04E-05	mg/m^3	5.4E-06	mg/kg-day	1.4E-02	mg/kg-day	3.8E-04
				Fluorene	3.42E-05	mg/m^3	6.0E-06	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	3.50E-05	mg/m^3	6.2E-06	mg/kg-day	9.0E-04	mg/kg-day	6.8E-03
				Pyrene	1.73E-06	mg/m^3	3.0E-07	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	2.8E-06	mg/m^3	5.0E-07	mg/kg-day	8.0E-02	mg/kg-day	6.3E-06
			Exp. Route Total								7.2E-03
		Exposure Point Total									7.2E-03
	Exposure Media Total										7.2E-03
Groundwater Total											1.4E+00
										Total of Receptor Hazards Across All Media	1.4E+00

N/A = Not Applicable.

Since indoor air represents the more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.

Table E.1-42
Calculation of Cancer Risks
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		
					Value	Units	Value	Units	Value	Units	Cancer Risk
Groundwater	Air	Area O	**Inhalation**	**Organics**							
			(Trench Air)	2-Methylnaphthalene	2.75E-04	mg/m^3	1.9E-07	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthene	1.92E-05	mg/m^3	1.3E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Acenaphthylene	5.21E-06	mg/m^3	3.6E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Chloroform	3.05E-04	mg/m^3	2.1E-07	mg/kg-day	8.1E-02	$(mg/kg\text{-}day)^{-1}$	1.7E-08
				Fluorene	1.59E-05	mg/m^3	1.1E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Naphthalene	8.14E-05	mg/m^3	5.7E-08	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Phenanthrene	7.38E-06	mg/m^3	5.2E-09	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Pyrene	3.25E-07	mg/m^3	2.3E-10	mg/kg-day	N/A	$(mg/kg\text{-}day)^{-1}$	---
				Tetrachloroethene	4.55E-05	mg/m^3	3.2E-08	mg/kg-day	2.0E-02	$(mg/kg\text{-}day)^{-1}$	6.4E-10
			Exp. Route Total								1.8E-08
		Exposure Point Total									1.8E-08
	Exposure Media Total										1.8E-08
Groundwater Total											1.8E-08
										Total of Receptor Risks Across All Media	1.8E-08

N/A = Not Applicable.

Table E.1-43
Calculation of Non-cancer Hazards
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Quotient
Groundwater	Air	Area O	**Inhalation**	**Organics**							
			(Trench Air)	2-Methylnaphthalene	2.75E-04	mg/m^3	1.3E-05	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthene	1.92E-05	mg/m^3	9.4E-07	mg/kg-day	N/A	mg/kg-day	---
				Acenaphthylene	5.21E-06	mg/m^3	2.5E-07	mg/kg-day	N/A	mg/kg-day	---
				Chloroform	3.05E-04	mg/m^3	1.5E-05	mg/kg-day	1.4E-02	mg/kg-day	1.1E-03
				Fluorene	1.59E-05	mg/m^3	7.8E-07	mg/kg-day	N/A	mg/kg-day	---
				Naphthalene	8.14E-05	mg/m^3	4.0E-06	mg/kg-day	9.0E-04	mg/kg-day	4.4E-03
				Phenanthrene	7.38E-06	mg/m^3	3.6E-07	mg/kg-day	N/A	mg/kg-day	---
				Pyrene	3.25E-07	mg/m^3	1.6E-08	mg/kg-day	N/A	mg/kg-day	---
				Tetrachloroethene	4.55E-05	mg/m^3	2.2E-06	mg/kg-day	8.0E-02	mg/kg-day	2.8E-05
			Exp. Route Total								5.5E-03
		Exposure Point Total									5.5E-03
	Exposure Media Total										5.5E-03
Groundwater Total											5.5E-03
										Total of Receptor Hazards Across All Media	5.5E-03

N/A = Not Applicable.

Table E.1-44
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)	Area O	Acenaphthene		---		---	N/A		---		---
			Chloroform		1.4E-11		1.4E-11	N/A		3.4E-08		3.4E-08
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		7.8E-07		7.8E-07
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		3.3E-13		3.3E-13	CNS		5.7E-10		5.7E-10
			Chemical Total		1.4E-11		1.4E-11			8.1E-07		8.1.E-07
		Exposure Point Total					1.4E-11					8.1.E-07
	Exposure Media Total						1.4E-11					8.1.E-07
Groundwater Total							1.4E-11					8.1E-07
Receptor Total[b]							1.4E-11					8.1E-07

Total Risk Across All Media = 1.4E-11

Total Hazard Across All Media = 8.1E-07

CNS = Central nervous system.
N/A = Not Available.

Total Respiratory Tract HI Across All Media = 7.8E-07
Total CNS HI Across All Media = 5.7E-10

Table E.1-45
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	Area O										
			1-Methlynaphthalene	---			---	Lungs	9.1E-01			9.1E-01
			2-Methlynaphthalene	---			---	Lungs	4.0E-01			4.0E-01
			Acenaphthene	---			---	Liver	6.9E-03			6.9E-03
			Acenaphthylene	---			---	Kidney	5.3E-03			5.3E-03
			bis(2-ethylhexyl)phthalate	1.0E-06			1.0E-06	Liver	1.0E-02			1.0E-02
			Chloroform	---			---	Liver	1.3E-02			1.3E-02
			Fluorene	---			---	Blood	2.2E-02			2.2E-02
			Naphthalene	---			---	Whole Body (decreased weight)	2.2E-02			2.2E-02
			Phenanthrene	---			---	Kidney	4.8E-02			4.8E-02
			Pyrene	---			---	Kidney	5.5E-03			5.5E-03
			Tetrachloroethene	1.0E-06			1.0E-06	Liver	5.4E-04			5.4E-04
			Chemical Total	2.1E-06			2.1E-06		1.4			1.4
		Exposure Point Total					2.1E-06					1.4
	Exposure Media Total						2.1E-06					1.4
	Air (Ambient Air)	Area O										
			Acenaphthene		---		---	N/A		---		---
			Chloroform		6.3E-11		6.3E-11	N/A		1.5E-07		1.5E-07
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		3.5E-06		3.5E-06
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		1.5E-12		1.5E-12	CNS		2.6E-09		2.6E-09
			Chemical Total		6.4E-11		6.4E-11			3.7E-06		3.7E-06
		Exposure Point Total					6.4E-11					3.7E-06
	Air (Indoor Air)	Area O										
			2-Methylnaphthalene		---		---	N/A		---		---
			Acenaphthene		---		---	N/A		---		---
			Chloroform		1.5E-07		1.5E-07	N/A		3.8E-04		3.8E-04
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		6.8E-03		6.8E-03
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		3.6E-09		3.6E-09	CNS		6.3E-06		6.3E-06
			Chemical Total		1.6E-07		1.6E-07			0.0072		0.0072
		Exposure Point Total					1.6E-07					0.0072
	Exposure Media Total						1.6E-07					0.0072
Groundwater Total							2.2E-06					1.4
Receptor Total[b]							2.2E-06					1.4

Total Risk Across All Media[a] = 2.2E-06

Total Hazard Across All Media[a] = 1.4

Total Liver HI Across All Media = 0.0301
Total Kidney HI Across All Media = 0.059
Total Blood HI Across All Media = 0.022
Total Body Weight HI Across All Media = 0.022
Total Respiratory Tract HI Across All Media = 1.3
Total CNS HI Across All Media = 6.3E-06

[a] Since indoor air represents the more highly contaminated portion of groundwater, total risk and hazard estimates are conservatively based on this data grouping.

CNS = Central nervous system.
N/A = Not Available.

Table E.1-46
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)	Area O										
			2-Methylnaphthalene		---		---	N/A		---		---
			Acenaphthene		---		---	N/A		---		---
			Acenaphthylene		---		---	N/A		---		---
			Chloroform		1.7E-08		1.7E-08	N/A		1.1E-03		1.1.E-03
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		4.4E-03		4.4.E-03
			Phenanthrene		---		---	N/A		---		---
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		6.4E-10		6.4E-10	CNS		2.8E-05		2.8.E-05
			Chemical Total		1.8E-08		1.8E-08			0.0055		0.0055
		Exposure Point Total					1.8E-08					0.0055
	Exposure Media Total						1.8E-08					0.0055
Groundwater Total							1.8E-08					0.0055
Receptor Total							1.8E-08					0.0055

Total Risk Across All Media = 1.8E-08

Total Hazard Across All Media = 0.0055

CNS = Central nervous system.
N/A = Not Available.

Total Respiratory Tract HI Across All Media = 0.0044
Total CNS HI Across All Media = 0.000028

Table E.1-47
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	Area O										
			1-Methlynaphthalene	---		---	---	Lungs	2.8E+00		4.4E+00	7.3E+00
			2-Methlynaphthalene	---		---	---	Lungs	1.2E+00		1.6E+00	2.8E+00
			Acenaphthene	---		---	---	Liver	2.2E-02		2.9E-02	5.0E-02
			Acenaphthylene	---		---	---	Kidney	1.7E-02		2.8E-02	4.5E-02
			bis(2-ethylhexyl)phthalate	4.8E-06		7.0E-06	1.2E-05	Liver	3.2E-02		4.6E-02	7.7E-02
			Chloroform	---		---	---	Liver	3.9E-02		--	3.9E-02
			Fluorene	---		---	---	Blood	6.9E-02		1.3E-01	2.0E-01
			Naphthalene	---		---	---	Whole Body (decreased weight)	6.9E-02		4.3E-02	1.1E-01
			Phenanthrene	---		---	---	Kidney	1.5E-01		3.9E-01	5.4E-01
			Pyrene	---		---	---	Kidney	1.7E-02		7.3E-02	9.0E-02
			Tetrachloroethene	4.9E-06		2.8E-06	7.7E-06	Liver	1.7E-03		9.4E-04	2.6E-03
			Chemical Total	9.7E-06		9.8E-06	2.0E-05		4.5		6.8	11.3
		Exposure Point Total					2.0E-05					11.3
	Exposure Media Total						2.0E-05					11.3
	Air (Indoor Air)	Area O										
			2-Methylnaphthalene		---		---	N/A		---		---
			Acenaphthene		---		---	N/A		---		---
			Chloroform		5.5E-07		5.5E-07	N/A		5.9E-04		5.9.E-04
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		1.1E-02		1.1.E-02
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		1.3E-08		1.3E-08	CNS		9.7E-06		9.7.E-06
			Chemical Total		5.7E-07		5.7E-07			0.011		0.011
		Exposure Point Total					5.7E-07					0.011
	Exposure Media Total						5.7E-07					0.011
	Air (Shower Room)	Area O										
			1-Methylnaphthalene		---		---	N/A		---		---
			2-Methylnaphthalene		---		---	N/A		---		---
			Acenaphthene		---		---	N/A		---		---
			Acenaphthylene		---		---	N/A		---		---
			Chloroform		6.1E-05		6.1E-05	N/A		1.6E-01		1.6E-01
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		6.4E+00		6.4E+00
			Phenanthrene		---		---	N/A		---		---
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		5.9E-07		5.9E-07	CNS		1.1E-03		1.1E-03
			Chemical Total		6.2E-05		6.2E-05			6.5		6.5
		Exposure Point Total					6.2E-05					6.5
	Exposure Media Total						6.2E-05					6.5
Groundwater Total							8.2E-05					17.8
Receptor Total							8.2E-05					17.8

Total Risk Across All Media = 8.2E-05

Total Hazard Across All Media = 17.8

Total Liver HI Across All Media = 0.17
Total Kidney HI Across All Media = 0.67
Total Blood HI Across All Media = 0.199
Total Body Weight HI Across All Media = 0.11
Total Respiratory Tract HI Across All Media = 16.5
Total CNS HI Across All Media = 0.0011

CNS = Central nervous system.
N/A = Not Available.

Table E.1-48
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	Area O										
			1-Methlynaphthalene	---		---	---	Lungs	6.6E+00		1.1E+01	1.7E+01
			2-Methlynaphthalene	---		---	---	Lungs	2.9E+00		3.9E+00	6.8E+00
			Acenaphthene	---		---		Liver	5.0E-02		7.0E-02	1.2E-01
			Acenaphthylene	---		---	---	Kidney	3.9E-02		6.9E-02	1.1E-01
			bis(2-ethylhexyl)phthalate	1.8E-06		2.6E-06	4.4E-06	Liver	7.4E-02		1.1E-01	1.8E-01
			Chloroform	---		---	---	Liver	9.1E-02		---	9.1E-02
			Fluorene	---		---	---	Blood	1.6E-01		3.1E-01	4.7E-01
			Naphthalene	---		---	---	Whole Body (decreased weight)	1.6E-01		1.0E-01	2.7E-01
			Phenanthrene	---		---	---	Kidney	3.5E-01		9.4E-01	1.3E+00
			Pyrene	---		---	---	Kidney	4.0E-02		1.8E-01	2.2E-01
			Tetrachloroethene	1.8E-06		1.1E-06	2.9E-06	Liver	3.9E-03		2.3E-03	6.2E-03
			Chemical Total	3.6E-06		3.7E-06	7.3E-06		10.5		16.2	26.7
		Exposure Point Total					7.3E-06					26.7
	Exposure Media Total						7.3E-06					26.7
	Air (Indoor Air)	Area O										
			2-Methylnaphthalene		---		---	N/A		---		---
			Acenaphthene		---		---	N/A		---		---
			Chloroform		3.2E-07		3.2E-07	N/A		3.3E-03		3.3.E-03
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		6.0E-02		6.0.E-02
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		7.5E-09		7.5E-09	CNS		5.4E-05		5.4.E-05
			Chemical Total		3.3E-07		3.3E-07			0.063		0.063
		Exposure Point Total					3.3E-07					0.063
	Exposure Media Total						3.3E-07					0.063
Groundwater Total							7.6E-06					26.8
Receptor Total							7.6E-06					26.8

Total Risk Across All Media = 7.6E-06

Total Hazard Across All Media = 26.8

CNS = Central nervous system.
N/A = Not Available.

Total Liver HI Across All Media =	0.40
Total Kidney HI Across All Media =	1.6
Total Blood HI Across All Media =	0.47
Total Body Weight HI Across All Media =	0.27
Total Respiratory Tract HI Across All Media =	24.0
Total CNS HI Across All Media =	0.000054

Table E.1-49
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	Area O										
			1-Methlynaphthalene	---		---	---	Lungs	2.8E+00		4.4E+00	7.3E+00
			2-Methlynaphthalene	---		---	---	Lungs	1.2E+00		1.6E+00	2.8E+00
			Acenaphthene	---		---	---	Liver	2.2E-02		2.9E-02	5.0E-02
			Acenaphthylene	---		---	---	Kidney	1.7E-02		2.8E-02	4.5E-02
			bis(2-ethylhexyl)phthalate	4.8E-06		7.0E-06	1.2E-05	Liver	3.2E-02		4.6E-02	7.7E-02
			Chloroform	---		---	---	Liver	3.9E-02		---	3.9E-02
			Fluorene	---		---	---	Blood	6.9E-02		1.3E-01	2.0E-01
			Naphthalene	---		---	---	Whole Body (decreased weight)	6.9E-02		4.3E-02	1.1E-01
			Phenanthrene	---		---	---	Kidney	1.5E-01		3.9E-01	5.4E-01
			Pyrene	---		---	---	Kidney	1.7E-02		7.3E-02	9.0E-02
			Tetrachloroethene	4.9E-06		2.8E-06	7.7E-06	Liver	1.7E-03		9.4E-04	2.6E-03
			Chemical Total	9.7E-06		9.8E-06	2.0E-05		4.5		6.8	11.3
		Exposure Point Total					2.0E-05					11.3
	Exposure Media Total						2.0E-05					11.3
	Air (Indoor Air)	Area O										
			2-Methylnaphthalene		---		---	N/A		---		---
			Acenaphthene		---		---	N/A		---		---
			Chloroform		5.5E-07		5.5E-07	N/A		5.9E-04		5.9.E-04
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		1.1E-02		1.1.E-02
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		1.3E-08		1.3E-08	CNS		9.7E-06		9.7.E-06
			Chemical Total		5.7E-07		5.7E-07			0.011		0.011
		Exposure Point Total					5.7E-07					0.011
	Exposure Media Total						5.7E-07					0.011
	Air (Shower Room)	Area O										
			1-Methylnaphthalene		---		---	N/A		---		---
			2-Methylnaphthalene		---		---	N/A		---		---
			Acenaphthene		---		---	N/A		---		---
			Acenaphthylene		---		---	N/A		---		---
			Chloroform		6.1E-05		6.1E-05	N/A		1.6E-01		1.6E-01
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		6.4E+00		6.4E+00
			Phenanthrene		---		---	N/A		---		---
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		5.9E-07		5.9E-07	CNS		1.1E-03		1.1E-03
			Chemical Total		6.2E-05		6.2E-05			6.5		6.5
		Exposure Point Total					6.2E-05					6.5
	Exposure Media Total						6.2E-05					6.5
Groundwater Total							8.2E-05					17.8
Receptor Total							8.2E-05					17.8

Total Risk Across All Media = 8.2E-05

Total Hazard Across All Media = 17.8

CNS = Central nervous system.
N/A = Not Available.

Total Liver HI Across All Media = 0.17
Total Kidney HI Across All Media = 0.67
Total Blood HI Across All Media = 0.199
Total Body Weight HI Across All Media = 0.11
Total Respiratory Tract HI Across All Media = 16.5
Total CNS HI Across All Media = 0.0011

Table E.1-50
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	Area O	1-Methlynaphthalene	---		---	---	Lungs	6.6E+00		1.1E+01	1.7E+01
			2-Methlynaphthalene	---		---	---	Lungs	2.9E+00		3.9E+00	6.8E+00
			Acenaphthene	---		---		Liver	5.0E-02		7.0E-02	1.2E-01
			Acenaphthylene	---		---	---	Kidney	3.9E-02		6.9E-02	1.1E-01
			bis(2-ethylhexyl)phthalate	1.8E-06		2.6E-06	4.4E-06	Liver	7.4E-02		1.1E-01	1.8E-01
			Chloroform	---		---	---	Liver	9.1E-02		---	9.1E-02
			Fluorene	---		---	---	Blood	1.6E-01		3.1E-01	4.7E-01
			Naphthalene	---		---	---	Whole Body (decreased weight)	1.6E-01		1.0E-01	2.7E-01
			Phenanthrene	---		---	---	Kidney	3.5E-01		9.4E-01	1.3E+00
			Pyrene	---		---	---	Kidney	4.0E-02		1.8E-01	2.2E-01
			Tetrachloroethene	1.8E-06		1.1E-06	2.9E-06	Liver	3.9E-03		2.3E-03	6.2E-03
			Chemical Total	3.6E-06		3.7E-06	7.3E-06		10.5		16.24	26.7
		Exposure Point Total					7.3E-06					26.7
	Exposure Media Total						7.3E-06					26.7
	Air (Indoor Air)	Area O	2-Methylnaphthalene		---		---	N/A		---		---
			Acenaphthene		---		---	N/A		---		---
			Chloroform		3.2E-07		3.2E-07	N/A		3.3E-03		3.3.E-03
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		6.0E-02		6.0.E-02
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		7.5E-09		7.5E-09	CNS		5.4E-05		5.4.E-05
			Chemical Total		3.3E-07		3.3E-07			0.063		0.063
		Exposure Point Total					3.3E-07					0.063
	Exposure Media Total						3.3E-07					0.063
Groundwater Total							7.6E-06					26.8
Receptor Total							7.6E-06					26.8

Total Risk Across All Media = 7.6E-06

Total Hazard Across All Media = 26.8

CNS = Central nervous system.
N/A = Not Available.

Total Liver HI Across All Media = 0.40
Total Kidney HI Across All Media = 1.6
Total Blood HI Across All Media = 0.47
Total Body Weight HI Across All Media = 0.27
Total Respiratory Tract HI Across All Media = 24.0
Total CNS HI Across All Media = 0.000054

Table E.1-51
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air (Ambient Air)	Area O	Acenaphthene		---		---	N/A		---		---
			Chloroform		1.4E-11		1.4E-11	N/A		3.4E-08		3.4E-08
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		7.8E-07		7.8E-07
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		3.3E-13		3.3E-13	CNS		5.7E-10		5.7E-10
			Chemical Total		1.4E-11		1.4E-11			8.1E-07		8.1.E-07
		Exposure Point Total					1.4E-11					8.1.E-07
	Exposure Media Total						1.4E-11					8.1.E-07
Groundwater Total							1.4E-11					8.1E-07
Receptor Total[b]							1.4E-11					8.1E-07

Total Risk Across All Media = 1.4E-11

Total Hazard Across All Media = 8.1E-07

CNS = Central nervous system.
N/A = Not Available.

Total Respiratory Tract HI Across All Media = 7.8E-07
Total CNS HI Across All Media = 5.7E-10

Table E.1-52
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Area O										
			1-Methlynaphthalene	---			---	Lungs	9.1E-01			9.1E-01
			2-Methlynaphthalene	---			---	Lungs	4.0E-01			4.0E-01
			Acenaphthene	---			---	Liver	6.9E-03			6.9E-03
			Acenaphthylene	---			---	Kidney	5.3E-03			5.3E-03
			bis(2-ethylhexyl)phthalate	1.0E-06			1.0E-06	Liver	1.0E-02			1.0E-02
			Chloroform	---			---	Liver	1.3E-02			1.3E-02
			Fluorene	---			---	Blood	2.2E-02			2.2E-02
			Naphthalene	---			---	Whole Body (decreased weight)	2.2E-02			2.2E-02
			Phenanthrene	---			---	Kidney	4.8E-02			4.8E-02
			Pyrene	---			---	Kidney	5.5E-03			5.5E-03
			Tetrachloroethene	1.0E-06			1.0E-06	Liver	5.4E-04			5.4E-04
			Chemical Total	2.1E-06			2.1E-06		1.4			1.4
		Exposure Point Total					2.1E-06					1.4
	Exposure Media Total						2.1E-06					1.4
	Air (Ambient Air)	Area O										
			Acenaphthene		---		---	N/A		---		---
			Chloroform		6.3E-11		6.3E-11	N/A		1.5E-07		1.5E-07
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		3.5E-06		3.5E-06
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		1.5E-12		1.5E-12	CNS		2.6E-09		2.6E-09
			Chemical Total		6.4E-11		6.4E-11			3.7E-06		3.7.E-06
		Exposure Point Total					6.4E-11					3.7.E-06
	Exposure Media Total						6.4E-11					3.7.E-06
	Air (Indoor Air)	Area O										
			2-Methylnaphthalene		---		---	N/A		---		---
			Acenaphthene		---		---	N/A		---		---
			Chloroform		1.5E-07		1.5E-07	N/A		3.8E-04		3.8E-04
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		6.8E-03		6.8E-03
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		3.6E-09		3.6E-09	CNS		6.3E-06		6.3E-06
			Chemical Total		1.6E-07		1.6E-07			0.0072		0.0072
		Exposure Point Total					1.6E-07					0.0072
	Exposure Media Total						1.6E-07					0.0072
Groundwater Total							2.2E-06					1.4
Receptor Total[b]							2.2E-06					1.4

Total Risk Across All Media[a] = 2.2E-06

Total Hazard Across All Media[a] = 1.4

CNS = Central nervous system.
N/A = Not Available.

Total Liver HI Across All Media =	0.030
Total Kidney HI Across All Media =	0.059
Total Blood HI Across All Media =	0.022
Total Body Weight HI Across All Media =	0.022
Total Respiratory Tract HI Across All Media =	1.3
Total CNS HI Across All Media =	0.0000063

Table E.1-53
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air (Trench Air)	Area O	2-Methylnaphthalene		---		---	N/A		---		---
			Acenaphthene		---		---	N/A		---		---
			Acenaphthylene		---		---	N/A		---		---
			Chloroform		1.7E-08		1.7E-08	N/A		1.1E-03		1.1.E-03
			Fluorene		---		---	N/A		---		---
			Naphthalene		---		---	Respiratory Tract		4.4E-03		4.4.E-03
			Phenanthrene		---		---	N/A		---		---
			Pyrene		---		---	N/A		---		---
			Tetrachloroethene		6.4E-10		6.4E-10	CNS		2.8E-05		2.8.E-05
			Chemical Total		1.8E-08		1.8E-08			0.0055		0.0055
		Exposure Point Total					1.8E-08					0.0055
	Exposure Media Total						1.8E-08					0.0055
Groundwater Total							1.8E-08					0.0055
Receptor Total							1.8E-08					0.0055

Total Risk Across All Media = 1.8E-08

Total Hazard Across All Media = 0.0055

CNS = Central nervous system.
N/A = Not Available.

Total Respiratory Tract HI Across All Media = 0.0044
Total CNS HI Across All Media = 0.000028

Table E.1-54
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
Groundwater	Air (Ambient Air)	Area O										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total												
Receptor Total[a]							<1.0E-06					<1

Total Risk Across All Media = <1.0E-06

Total Hazard Across All Media = <1

Table E.1-55
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	Area O										
			1-Methlynaphthalene	---			---	Lungs	9.1E-01			0.91
			2-Methlynaphthalene	---			---	Lungs	4.0E-01			0.40
			bis(2-ethylhexyl)phthalate	1.0E-06			1.0E-06	---	---			---
			Tetrachloroethene	1.0E-06			1.0E-06	---	---			---
			Chemical Total	2.1E-06			2.1E-06		1.3			1.3 (a)
		Exposure Point Total					2.1E-06					1.3 (a)
	Exposure Media Total						2.1E-06					1.3 (a)
	Air (Ambient Air)	Area O										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Air (Indoor Air)	Area O										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							2.1E-06					<1
Receptor Total[a]							2.1E-06					1.3 (a)

Total Risk Across All Media = 2.1E-06

Total Hazard Across All Media[a] = 1.3 (a)

(a) No individual chemical HI is equal to or greater than 1, however, target organ total is greater than 1.

Total Lung HI Across All Media = 1.3

Table E.1-56
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
Groundwater	Air (Trench Air)	Area O										
			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							<1.0E-06					<1

Total Risk Across All Media = <1.0E-06

Total Hazard Across All Media = <1

Table E.1-57
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Lifetime Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Area O										
			1-Methlynaphthalene	---		---	---	Lungs	2.8E+00		4.4E+00	7.3
			2-Methlynaphthalene	---		---	---	Lungs	1.2E+00		1.6E+00	2.8
			Bis(2-ethylhexyl) phthtalate	4.8E-06		7.0E-06	1.2E-05		---		---	---
			Tetrachloroethene	4.9E-06		2.8E-06	7.7E-06		---		---	---
			Chemical Total	9.7E-06		9.8E-06	2.0E-05		4.1		6.0	10.1
		Exposure Point Total					2.0E-05					10.1
	Exposure Media Total						2.0E-05					10.1
	Air (Indoor Air)	Area O										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Air (Shower Room)	Area O										
			Chloroform		6.1E-05		6.1E-05			---		---
			Naphthalene		---		---	Respiratory Tract		6.4E+00		6.4
			Chemical Total		6.1E-05		6.1E-05			6.4		6.4
		Exposure Point Total					6.1E-05					6.4
	Exposure Media Total						6.1E-05					6.4
Groundwater Total							8.0E-05					16.5
Receptor Total							8.0E-05					16.5

Total Risk Across All Media = 8.0E-05

Total Hazard Across All Media = 16.5

Total Respiratory Tract HI Across All Media = 16.5

Table E.1-58
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Child Resident

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Area O										
			1-Methlynaphthalene	---		---	---	Lungs	6.6E+00		1.1E+01	17.2
			2-Methlynaphthalene	---		---	---	Lungs	2.9E+00		3.9E+00	6.8
			bis(2-ethylhexyl)phthalate	1.8E-06		2.6E-06	4.4E-06		---		---	---
			Phenanthrene	---		---	---	Kidney	3.5E-01		9.4E-01	1.3
			Tetrachloroethene	1.8E-06		1.1E-06	2.9E-06		---		---	---
			Chemical Total	3.6E-06		3.7E-06	7.3E-06		9.8		15.4	25.2
		Exposure Point Total					7.3E-06					25.2
	Exposure Media Total						7.3E-06					25.2
	Air (Indoor Air)	Area O										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							7.3E-06					25.2
Receptor Total							7.3E-06					25.2

Total Risk Across All Media = 7.3E-06

Total Hazard Across All Media = 25.2

Total Lung HI Across All Media = 24
Total Kidney HI Across All Media = 1.3

Table E.1-59
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-site Adult/ Lifetime Resident

Scenario Timeframe: Future
Receptor Population: Off-site Lifetime Resident
Receptor Age: Adult/ Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Area O										
			1-Methlynaphthalene	---		---	---	Lungs	2.8E+00		4.4E+00	7.3
			2-Methlynaphthalene	---		---	---	Lungs	1.2E+00		1.6E+00	2.8
			Bis(2-ethylhexyl) phthtalate	4.8E-06		7.0E-06	1.2E-05	---	---		---	---
			Tetrachloroethene	4.9E-06		2.8E-06	7.7E-06	---	---		---	---
			Chemical Total	9.7E-06		9.8E-06	2.0E-05		4.1		6.0	10.1
		Exposure Point Total					2.0E-05					10.1
	Exposure Media Total						2.0E-05					10.1
	Air (Indoor Air)	Area O										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Air (Shower Room)	Area O										
			Chloroform		6.1E-05		6.1E-05	---		---		---
			Naphthalene		---		---	Respiratory Tract		6.4		6.4
			Chemical Total		6.1E-05		6.1E-05			6.4		6.4
		Exposure Point Total					6.1E-05					6.4
	Exposure Media Total						6.1E-05					6.4
Groundwater Total							8.0E-05					16.5
Receptor Total							8.0E-05					16.5

Total Risk Across All Media = 8.0E-05

Total Hazard Across All Media = 16.5

Total Respiratory Tract HI Across All Media = 16.5

Table E.1-60
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	Area O										
			1-Methlynaphthalene	---		---	---	Lungs	6.6E+00		1.1E+01	17.2
			2-Methlynaphthalene	---		---	---	Lungs	2.9E+00		3.9E+00	6.8
			bis(2-ethylhexyl)phthalate	1.8E-06		2.6E-06	4.4E-06	---	---		---	
			Phenanthrene	---		---	---	Kidney	3.5E-01		9.4E-01	1.3
			Tetrachloroethene	1.8E-06		1.1E-06	2.9E-06	---	---		---	---
			Chemical Total	3.6E-06		3.7E-06	7.3E-06		9.8		15.4	25.2
		Exposure Point Total					7.3E-06					25.2
	Exposure Media Total						7.3E-06					25.2
	Air (Indoor Air)	Area O										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							7.3E-06					25.2
Receptor Total							7.3E-06					25.2

Total Risk Across All Media = 7.3E-06

Total Hazard Across All Media = 25.2

Total Lungs HI Across All Media = 23.9
Total Kidney HI Across All Media = 1.3

Table E.1-61
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-Site Maintenance Worker

Scenario Timeframe: Future
Receptor Population: Off-site Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air (Ambient Air)	Area O										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total												
Receptor Total[a]							<1.0E-06					<1

Total Risk Across All Media = <1.0E-06

Total Hazard Across All Media = <1

Table E.1-62
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-Site Industrial Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Area O										
			1-Methlynaphthalene	---			---	Lungs	9.1E-01			0.91
			2-Methlynaphthalene	---			---	Lungs	4.0E-01			0.40
			bis(2-ethylhexyl)phthalate	1.0E-06			1.0E-06	---	---			---
			Tetrachloroethene	1.0E-06			1.0E-06	---	---			---
			Chemical Total	2.1E-06			2.1E-06		1.3			1.3 (a)
		Exposure Point Total					2.1E-06					1.3 (a)
	Exposure Media Total						2.1E-06					1.3 (a)
	Air (Ambient Air)	Area O										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
	Air (Indoor Air)	Area O										
			Chemical Total				<1.0E-06					<1
		Exposure Point Total					<1.0E-06					<1
	Exposure Media Total						<1.0E-06					<1
Groundwater Total							<1.0E-06					<1
Receptor Total							<1.0E-06					

Total Risk Across All Media = <1.0E-06

Total Hazard Across All Media = 1.3 (a)

(a) No individual chemical HI is equal to or greater than 1, however, target organ total is greater than 1.

Total Lung HI Across All Media = 1.3

Table E.1-63
Risk Assessment Summary
Reasonable Maximum Exposure
Future - Off-Site Excavation Worker

Scenario Timeframe: Future
Receptor Population: Off-Site Excavation Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air (Trench Air)	Area O										
			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							<1.0E-06					<1

Total Risk Across All Media = <1.0E-06

Total Hazard Across All Media = <1

Appendix E-2

Statistical Comparison Results

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
91576	1.80E+02	2-Methylnaphthalene

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	610	SIC	16	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)
5.22E-02	7.75E-06	5.17E-04	25	12,600	514.26	761.00	2.81E+03	2.46E+01	0.0E+00	7.0E-02

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)
410	0.265	0.284	1.50E-09	0.844	1.26E-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	16,163	2.21E-04	9.32E-03	1.77E-04	2.73E-03	2.22E-04	4.34E-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)
410	200	1.68E+03	0.10	8.33E+01	2.73E-03	4.00E+02	#NUM!	7.33E-05	1.23E-01	NA	7.0E-02

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	2.46E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.7E-03

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

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
83329	4.71E+01	Acenaphthene

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	610	SIC	16	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)
4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	3.57E+00	0.0E+00	2.1E-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)
410	0.265	0.284	1.50E-09	0.844	1.26E-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	16,049	6.65E-05	2.80E-03	1.77E-04	2.26E-03	6.92E-04	1.10E-03

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
410	200	1.32E+02	0.10	8.33E+01	2.26E-03	4.00E+02	#NUM!	1.79E-04	2.36E-02	NA	2.1E-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	3.57E+03	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.1E-04

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

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
67663	1.42E+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	610	SIC	16	5

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	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)
410	0.265	0.284	1.50E-09	0.844	1.26E-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	7,492	2.47E-03	1.04E-01	1.77E-04	5.40E-03	5.68E-05	1.20E-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)
410	200	1.48E+03	0.10	8.33E+01	5.40E-03	4.00E+02	3.69E+167	2.05E-05	3.04E-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)
2.9E-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
86737	1.01E+02	Fluorene

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	610	SIC	16	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)
3.63E-02	7.88E-06	6.34E-05	25	12,666	570.44	870.00	1.38E+04	1.98E+00	0.0E+00	1.4E-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)
410	0.265	0.284	1.50E-09	0.844	1.26E-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	16,174	2.71E-05	1.14E-03	1.77E-04	2.06E-03	1.72E-03	1.89E-03

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
410	200	1.15E+02	0.10	8.33E+01	2.06E-03	4.00E+02	#NUM!	2.96E-04	3.42E-02	NA	1.4E-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	1.98E+03	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.3E-04

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

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
91203	5.07E+01	Naphthalene

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	610	SIC	16	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)
5.90E-02	7.50E-06	4.82E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	0.0E+00	3.0E-03

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)
410	0.265	0.284	1.50E-09	0.844	1.26E-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	12,851	2.45E-04	1.03E-02	1.77E-04	3.08E-03	1.98E-04	3.94E-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)
410	200	5.24E+02	0.10	8.33E+01	3.08E-03	4.00E+02	4.81E+293	6.67E-05	3.50E-02	NA	3.0E-03

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	3.10E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.1E-02

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
129000	1.89E+01	Pyrene

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	610	SIC	16	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)
2.72E-02	7.24E-06	1.10E-05	25	14,370	667.95	936.00	1.05E+05	1.35E+00	0.0E+00	1.1E-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)
410	0.265	0.284	1.50E-09	0.844	1.26E-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	20,621	3.71E-06	1.57E-04	1.77E-04	2.63E-03	1.15E-02	4.11E-03

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
410	200	2.96E+00	0.10	8.33E+01	2.63E-03	4.00E+02	#NUM!	5.84E-04	1.73E-03	NA	1.1E-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	1.35E+03	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.6E-05

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

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	6.10E-01	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	610	SIC	16	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)
410	0.265	0.284	1.50E-09	0.844	1.26E-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	9,492	1.11E-02	4.70E-01	1.77E-04	3.74E-03	2.72E-05	5.75E-05

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)
410	200	2.87E+02	0.10	8.33E+01	3.74E-03	4.00E+02	1.33E+242	9.90E-06	2.84E-03	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)
6.9E-09	4.5E-06

MESSAGE SUMMARY BELOW:

END

Appendix F

SLERA Risk Characterization Tables

Table F-1
Comparison of Maximum Detection Limits in Surface Water with Ecological Screening Values at Area O

Scenario Timeframe: Current/Future
Medium: Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value? (Y/N)
Surface Water	71-55-6	1,1,1-Trichloroethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	1.10E-02	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	6.10E-01	No
	79-00-5	1,1,2-Trichloroethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	1.20E+00	No
	75-34-3	1,1-Dichloroethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	4.70E-02	No
	75-35-4	1,1-Dichloroethene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	2.50E-02	No
	120-82-1	1,2,4-Trichlorobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	2.40E-02	No
	95-50-1	1,2-Dichlorobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	7.00E-04	Yes
	107-06-2	1,2-Dichloroethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	1.00E-01	No
	78-87-5	1,2-Dichloropropane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	541-73-1	1,3-Dichlorobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	1.50E-01	No
	106-46-7	1,4-Dichlorobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	2.60E-02	No
	95-95-4	2,4,5-Trichlorophenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	88-06-2	2,4,6-Trichlorophenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	4.90E-03	Yes
	120-83-2	2,4-Dichlorophenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	1.10E-02	No
	105-67-9	2,4-Dimethylphenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	51-28-5	2,4-Dinitrophenol			mg/l		0/2	2.50E-02 - 2.60E-02	2.60E-02	NVA	No
	121-14-2	2,4-Dinitrotoluene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	4.40E-02	No
	606-20-2	2,6-Dinitrotoluene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	8.10E-02	No
	78-93-3	2-Butanone			mg/l		0/2	5.00E-03 - 5.00E-03	5.00E-03	1.40E+01	No
	91-58-7	2-Chloronaphthalene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	95-57-8	2-Chlorophenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	2.40E-02	No
	591-78-6	2-Hexanone			mg/l		0/2	5.00E-03 - 5.00E-03	5.00E-03	9.90E-02	No
	91-57-6	2-Methylnaphthalene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	4.70E-03	No
	88-74-4	2-Nitroaniline			mg/l		0/2	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	88-75-5	2-Nitrophenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	1.92E+00	No
	N/A	3&4-Methylphenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	91-94-1	3,3'-Dichlorobenzidine			mg/l		0/2	1.00E-02 - 1.00E-02	1.00E-02	4.50E-03	Yes
	99-09-2	3-Nitroaniline			mg/l		0/2	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	534-52-1	4,6-Dinitro-o-cresol			mg/l		0/2	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	101-55-3	4-Bromophenyl phenylether			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	1.50E-03	Yes

Table F-1
Comparison of Maximum Detection Limits in Surface Water with Ecological Screening Values at Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value? (Y/N)
Surface Water	7005-72-3	4-Chlorophenyl phenylether			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	108-10-1	4-Methyl-2-pentanone			mg/l		0/2	5.00E-03 - 5.00E-03	5.00E-03	1.70E-01	No
	100-01-6	4-Nitroaniline			mg/l		0/2	1.00E-02 - 1.00E-02	1.00E-02	NVA	No
	100-02-7	4-Nitrophenol			mg/l		0/2	2.50E-02 - 2.60E-02	2.60E-02	6.00E-02	No
	208-96-8	Acenaphthylene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	NVA	No
	120-12-7	Anthracene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	1.20E-05	Yes
	71-43-2	Benzene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	3.70E-01	No
	56-55-3	Benzo(a)anthracene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	1.80E-05	Yes
	50-32-8	Benzo(a)pyrene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	1.50E-05	Yes
	205-99-2	Benzo(b)fluoranthene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	NVA	No
	191-24-2	Benzo(g,h,i)perylene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	NVA	No
	207-08-9	Benzo(k)fluoranthene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	NVA	No
	100-51-6	Benzyl alcohol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	8.60E-03	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	111-44-4	bis(2-Chloroethyl)ether			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	1.60E-02	No
	75-27-4	Bromodichloromethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	74-83-9	Bromomethane			mg/l		0/2	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	85-68-7	Butyl benzyl phthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	1.90E-02	No
	86-74-8	Carbazole			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	75-15-0	Carbon disulfide			mg/l		0/2	2.00E-03 - 2.00E-03	2.00E-03	9.20E-04	Yes
	56-23-5	Carbon tetrachloride			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	1.33E-02	No
	108-90-7	Chlorobenzene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	1.30E-03	No
	75-00-3	Chloroethane			mg/l		0/2	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	67-66-3	Chloroform			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	1.80E-03	No
	74-87-3	Chloromethane			mg/l		0/2	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	218-01-9	Chrysene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	NVA	No
	156-59-2	cis-1,2-Dichloroethene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	53-70-3	Dibenz(a,h)anthracene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	NVA	No
	132-64-9	Dibenzofuran			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	3.70E-03	Yes
	124-48-1	Dibromochloromethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	84-66-2	Diethyl phthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	2.10E-01	No
	131-11-3	Dimethylphthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	84-74-2	Di-n-butyl phthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	1.90E-02	No

Table F-1
Comparison of Maximum Detection Limits in Surface Water with Ecological Screening Values at Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value? (Y/N)
Surface Water	117-84-0	Di-n-octyl phthalate			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	2.20E-02	No
	100-41-4	Ethylbenzene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	9.00E-02	No
	206-44-0	Fluoranthene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	4.00E-05	Yes
	118-74-1	Hexachlorobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	3.00E-07	Yes
	87-68-3	Hexachlorobutadiene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	1.30E-03	Yes
	77-47-4	Hexachlorocyclopentadiene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	67-72-1	Hexachloroethane			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	1.20E-02	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/l		0/2	2.00E-04 - 2.10E-04	2.10E-04	NVA	No
	78-59-1	Isophorone			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	N/A	m+p-Xylenes			mg/l		0/2	2.00E-03 - 2.00E-03	2.00E-03	NVA	No
	75-09-2	Methylene chloride			mg/l		0/2	5.00E-03 - 5.00E-03	5.00E-03	9.81E-02	No
	91-20-3	Naphthalene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	1.10E-03	Yes
	98-95-3	Nitrobenzene			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	86-30-6	n-Nitrosodiphenylamine			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	2.10E-01	No
	95-48-7	o-Cresol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	1.30E-02	No
	95-47-6	o-Xylene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	106-47-8	p-Chloroaniline			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	2.32E-01	No
	59-50-7	p-Chloro-m-cresol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	NVA	No
	87-86-5	Pentachlorophenol			mg/l		0/2	2.50E-02 - 2.60E-02	2.60E-02	5.00E-04	Yes
	108-95-2	Phenol			mg/l		0/2	5.10E-03 - 5.10E-03	5.10E-03	4.00E-03	Yes
	129-00-0	Pyrene			mg/l		0/2	1.00E-03 - 1.10E-03	1.10E-03	2.50E-05	Yes
	100-42-5	Styrene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	7.20E-02	No
	127-18-4	Tetrachloroethene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	1.11E-01	No
	108-88-3	Toluene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	2.00E-03	No
	156-60-5	trans-1,2-Dichloroethene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	9.70E-01	No
	10061-02-6	trans-1,3-Dichloropropene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	NVA	No
	75-25-2	Tribromomethane			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	3.20E-01	No
	79-01-6	Trichloroethene			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	2.10E-02	No
	75-01-4	Vinyl Chloride			mg/l		0/2	1.00E-03 - 1.00E-03	1.00E-03	9.30E-01	No

(1) Maximum non-detect limit used for screening.
(2) Screening toxicity values from USEPA Region III BTAG Screening Table (July, 2006).

Definitions: N/A = Not Applicable or Not Available
NVA = No Value Available

Table F-2
Comparison of Maximum Detection Limits in Sediment with Ecological Screening Values at Area O

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value? (Y/N)
Sediment	71-55-6	1,1,1-Trichloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	3.02E-02	No
	79-34-5	1,1,2,2-Tetrachloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	1.36E+00	No
	79-00-5	1,1,2-Trichloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	1.24E+00	No
	75-34-3	1,1-Dichloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	75-35-4	1,1-Dichloroethene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	3.10E-02	No
	120-82-1	1,2,4-Trichlorobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	2.10E+00	No
	95-50-1	1,2-Dichlorobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	1.65E-02	Yes
	107-06-2	1,2-Dichloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	78-87-5	1,2-Dichloropropane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	541-73-1	1,3-Dichlorobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	4.43E+00	No
	106-46-7	1,4-Dichlorobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	5.99E-01	No
	90-12-0	1-Methylnaphthalene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	NVA	No
	95-95-4	2,4,5-Trichlorophenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	88-06-2	2,4,6-Trichlorophenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	2.13E-01	Yes
	120-83-2	2,4-Dichlorophenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	1.17E-01	Yes
	105-67-9	2,4-Dimethylphenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	2.90E-02	Yes
	51-28-5	2,4-Dinitrophenol			mg/kg		0/2	1.30E+00 - 1.40E+00	1.40E+00	NVA	No
	121-14-2	2,4-Dinitrotoluene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	4.16E-02	Yes
	606-20-2	2,6-Dinitrotoluene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	78-93-3	2-Butanone			mg/kg		0/2	4.80E-02 - 5.30E-02	5.30E-02	NVA	No
	91-58-7	2-Chloronaphthalene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	95-57-8	2-Chlorophenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	3.12E-02	Yes
	591-78-6	2-Hexanone			mg/kg		0/2	4.80E-02 - 5.30E-02	5.30E-02	NVA	No
	91-57-6	2-Methylnaphthalene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	2.02E-02	Yes
	88-74-4	2-Nitroaniline			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	NVA	No
	88-75-5	2-Nitrophenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	N/A	3&4-Methylphenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	91-94-1	3,3'-Dichlorobenzidine			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	1.27E-01	Yes
	99-09-2	3-Nitroaniline			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	NVA	No
	534-52-1	4,6-Dinitro-o-cresol			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	NVA	No
	101-55-3	4-Bromophenyl phenylether			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	1.23E+00	No
	7005-72-3	4-Chlorophenyl phenylether			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	0.00E+00	Yes

Table F-2
Comparison of Maximum Detection Limits in Sediment with Ecological Screening Values at Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value? (Y/N)
	108-10-1	4-Methyl-2-pentanone			mg/kg		0/2	4.80E-02 - 5.30E-02	5.30E-02	NVA	No
Sediment	100-01-6	4-Nitroaniline			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	NVA	No
	100-02-7	4-Nitrophenol			mg/kg		0/2	1.30E+00 - 1.40E+00	1.40E+00	NVA	No
	83-32-9	Acenaphthene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	6.70E-03	Yes
	208-96-8	Acenaphthylene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	5.90E-03	Yes
	120-12-7	Anthracene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	5.72E-02	Yes
	71-43-2	Benzene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	56-55-3	Benzo(a)anthracene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	1.08E-01	No
	50-32-8	Benzo(a)pyrene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	1.50E-01	No
	205-99-2	Benzo(b)fluoranthene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	2.72E-02	Yes
	191-24-2	Benzo(g,h,i)perylene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	1.70E-01	No
	207-08-9	Benzo(k)fluoranthene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	2.72E-02	Yes
	65-85-0	Benzoic Acid			mg/kg		0/2	1.30E+00 - 1.40E+00	1.40E+00	6.50E-01	Yes
	100-51-6	Benzyl alcohol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	111-91-1	bis(2-Chloroethoxy)methane			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	111-44-4	bis(2-Chloroethyl)ether			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	108-60-1	bis(2-Chloroisopropyl)ether			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	117-81-7	bis(2-Ethylhexyl) phthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	1.80E-01	Yes
	75-27-4	Bromodichloromethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	74-83-9	Bromomethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	85-68-7	Butyl benzyl phthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	1.09E+01	No
	86-74-8	Carbazole			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	75-15-0	Carbon disulfide			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	8.51E-04	Yes
	56-23-5	Carbon tetrachloride			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	6.42E-02	No
	108-90-7	Chlorobenzene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	8.42E-03	Yes
	75-00-3	Chloroethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	67-66-3	Chloroform			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	74-87-3	Chloromethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	218-01-9	Chrysene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	1.66E-01	No
	156-59-2	cis-1,2-Dichloroethene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	0.00E+00	Yes
	10061-01-5	cis-1,3-Dichloro-1-propene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	53-70-3	Dibenz(a,h)anthracene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	3.30E-02	Yes
	132-64-9	Dibenzofuran			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	4.15E-01	No
	124-48-1	Dibromochloromethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	84-66-2	Diethyl phthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	6.03E-01	No
	131-11-3	Dimethylphthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	NVA	No
	84-74-2	Di-n-butyl phthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	6.47E+00	No

Table F-2
Comparison of Maximum Detection Limits in Sediment with Ecological Screening Values at Area O

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Region III BTAG Screening Levels (2)	Above Screening Value? (Y/N)
Sediment	117-84-0	Di-n-octyl phthalate			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	NVA	No
	100-41-4	Ethylbenzene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	1.10E+00	No
	206-44-0	Fluoranthene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	4.23E-01	Yes
	86-73-7	Fluorene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	7.74E-02	Yes
	118-74-1	Hexachlorobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	2.00E-02	Yes
	87-68-3	Hexachlorobutadiene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	0.00E+00	Yes
	77-47-4	Hexachlorocyclopentadiene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	0.00E+00	Yes
	67-72-1	Hexachloroethane			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	1.03E+00	No
	193-39-5	Indeno(1,2,3-cd)pyrene			mg/kg		0/2	8.00E-02 - 9.00E-02	9.00E-02	1.70E-02	Yes
	78-59-1	Isophorone			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	N/A	m and p-Xylenes			mg/kg		0/2	1.90E-02 - 2.10E-02	2.10E-02	NVA	No
	75-09-2	Methylene chloride			mg/kg		0/2	1.90E-02 - 2.10E-02	2.10E-02	NVA	No
	91-20-3	Naphthalene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	1.76E-01	Yes
	98-95-3	Nitrobenzene			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	621-64-7	n-Nitroso-di-n-propylamine			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	86-30-6	n-Nitrosodiphenylamine			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	2.68E+00	No
	95-48-7	o-Cresol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	95-47-6	o-Xylene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	106-47-8	p-Chloroaniline			mg/kg		0/2	5.00E-01 - 5.60E-01	5.60E-01	NVA	No
	59-50-7	p-Chloro-m-cresol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	NVA	No
	87-86-5	Pentachlorophenol			mg/kg		0/2	1.30E+00 - 1.40E+00	1.40E+00	5.04E-01	Yes
	85-01-8	Phenanthrene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	2.04E-01	Yes
	108-95-2	Phenol			mg/kg		0/2	2.50E-01 - 2.80E-01	2.80E-01	4.20E-01	No
	129-00-0	Pyrene			mg/kg		0/2	4.00E-01 - 4.50E-01	4.50E-01	1.95E-01	Yes
	100-42-5	Styrene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	5.59E-01	No
	127-18-4	Tetrachloroethene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	4.68E-01	No
	108-88-3	Toluene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	156-60-5	trans-1,2-Dichloroethene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	1.05E+00	No
	10061-02-6	trans-1,3-Dichloropropene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No
	75-25-2	Tribromomethane			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	6.54E-01	No
	79-01-6	Trichloroethene			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	9.69E-02	No
	75-01-4	Vinyl Chloride			mg/kg		0/2	9.70E-03 - 1.10E-02	1.10E-02	NVA	No

(1) Maximum non-detect limit used for screening.
(2) Screening toxicity values from USEPA Region III BTAG Screening Table (August, 2006).

Definitions: N/A = Not Applicable or Not Available
NVA = No Value Available

Appendix G

National Environmental Policy Act Compliance Evaluation

Appendix G

Compliance With NEPA Requirements
Area O

Environmental Consideration **(i.e., Attributes)**	**Alternative One:** No Further Action	**Alternative Two:** Monitored Natural Attenuation and LTM	**Alternative Three:** In-Situ Enhanced Bioremediation (ISEB) and MNA
Ecology – Impact on Wetlands	No wetlands identified at Area O. No impact to wetlands.	No wetlands identified at Area O. No impact to wetlands.	No wetlands identified at Area O. 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 drilling activities in the drilling 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 drilling activities. No impact otherwise.
Archeological	None present in Area O.	None present in Area O.	None present in Area O.
Noise	None.	None.	Slight increase in noise levels (dB) due to drilling activities. Increases will not be significant.
Water – surface water, groundwater	No impact to surface water or groundwater.	No impact to surface water or groundwater.	Contaminants would be removed from groundwater. Therefore, groundwater contaminants will eventually get under screening limits.
Human Aspects	No human impact.	No human impact.	There will be minimal increase in traffic due to drilling activities.
Land – Soil erosion, land use	No effect.	No effect.	No impacts on current land use.

Appendix G

Compliance With NEPA Requirements
Area O

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 from drilling activities 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.
Air	Essentially no effect. Bis(2-ethylhexyl)phthalate, PCE, chloroform, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthrene, and/or pyrene are not likely to be carried on water particles through air or volatilized into atmosphere.	Essentially no effect. Bis(2-ethylhexyl)phthalate, PCE, chloroform, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthrene, and/or pyrene are not likely to be carried on water particles through air or volatilized into atmosphere.	Slight increase in dust during drilling 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