TECHNICAL MEMORANDUM

FIRST QUARTERLY GROUNDWATER SAMPLING - SEPTEMBER/OCTOBER 2001

OPERABLE UNIT 6

DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA

DEFENSE LOGISTICS AGENCY

PREPARED FOR

U.S. ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE

PREPARED BY

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

CONTRACT No. DACA87-94-D-0016, T.O. 0032
PROJECT No. 12001-1-1632

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LAWGIBB GROUP

February 6, 2002

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Subject: **Technical Memorandum**
First Quarterly Groundwater Sampling – September/October 2001
Operable Unit 6
Defense Supply Center Richmond
Contract No. DACA87-94-D-0016
Task Order 0032

Dear Mr. Shirley:

Law Engineering and Environmental Services, Inc. (LAW) is pleased to submit the Technical Memorandum of the First Quarterly Groundwater Sampling event conducted at Operable Unit 6 (Open Storage Area/Area 50/National Guard Area Groundwater) of the Defense Supply Center Richmond located in Richmond, Virginia. Groundwater sampling activities were conducted during September/October 2001.

The purpose of this Technical Memorandum is to describe the field sampling activities, summarize the laboratory analytical data, and discuss the results. As agreed upon during the DSCR Planning Team Meeting held on December 18, 2001 in Richmond, Virginia, this Technical Memorandum is being provided only for information purposes and no review comments are expected.

LAW appreciates the opportunity to assist you on this important project. If you have any questions regarding this submittal, please do not hesitate to call us at 770-421-3400.

Sincerely,

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

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RICHMOND, VIRGINIA

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PREFACE

Law Engineering and Environmental Services, Inc. has prepared this Technical Memorandum of the First Quarterly Groundwater Sampling under Contract DACA87-94-D-0016, Task Order 0032, to the U.S. Army Engineering and Support Center, Huntsville (CEHNC). This Technical Memorandum documents the groundwater sampling activities conducted during September/October 2001 at Operable Unit 6 of the Defense Supply Center Richmond (DSCR), located in Richmond, Virginia.

Ms. Angela L. McMath is the Project Manager for DSCR. Mr. Jim DeLano is the Project Coordinator for Task Order 0032. Ms. Erica McCray is the primary author of this document. Mr. Tushar Talele is the Project Principal.

The efforts of Mr. T.E. Shirley (Project Manager) from CEHNC and Mr. Frank DiPofi from DSCR are greatly appreciated.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY **ES-1**

1.0 INTRODUCTION **1-1**

1.1 PURPOSE AND OBJECTIVES 1-1
1.2 REPORT ORGANIZATION 1-1
1.3 SITE DESCRIPTION 1-2
1.4 PREVIOUS INVESTIGATIONS 1-2

2.0 FIELD ACTIVITIES **2-1**

2.1 WATER LEVEL ELEVATIONS 2-1
2.2 MONITORING WELL EVALUATION 2-1
2.3 DEDICATED PUMPS INSTALLATION 2-2
2.4 MONITORING WELL SAMPLING 2-2
2.5 ANALYTICAL PROGRAM 2-3
2.5.1 Field Analytical Parameters 2-3
2.5.2 Chemical Analysis 2-4
2.5.3 Field Quality Control 2-4
2.5.4 Laboratory Quality Control 2-4
2.5.5 Data Quality Evaluation 2-5
2.5.6 Data Quality Objectives 2-5

3.0 DISCUSSION OF RESULTS **3-1**

3.1 GROUNDWATER EVALUATION DATA 3-1
3.2 FIELD ANALYTICAL PARAMETERS 3-1
3.2.1 Upper Aquifer 3-1
3.2.2 Lower Aquifer 3-2
3.3 LABORATORY ANALYTICAL PARAMETERS 3-2
3.3.1 Upper Aquifer Detection Summary 3-2
3.3.2 VOCs 3-3
3.3.3 MNA Parameters 3-4
3.3.4 Metals 3-5
3.3.5 Lower Aquifer Detection Summary 3-6
3.3.6 VOCs 3-6
3.3.7 MNA Parameters 3-7
3.3.8 Metals 3-8
3.3.9 Results Summary 3-9

4.0 SUMMARY **4-1**

5.0 REFERENCES **5-1**

LIST OF APPENDICES

Appendix A Summary of Previous Investigations
Appendix B Field Sampling Reports
Appendix C Data Quality Evaluation and Data Summary

LIST OF TABLES

Table

2-1 Summary of Upper Aquifer Wells Sampled

2-2 Summary of Lower Aquifer Wells Sampled

2-3 Summary of Laboratory Analytical Parameters

3-1 Summary of Static Water Level Measurements

3-2 Results of Field Analyses – Upper Aquifer

3-3 Results of Field Analyses – Lower Aquifer

3-4 Positive Results Table for Groundwater – Upper Aquifer

3-5 Positive Results Table for Groundwater – Lower Aquifer

LIST OF FIGURES

Figure

1-1 Defense Supply Center Richmond and Surrounding Area

2-1 Locations of Monitoring Wells in Area 50 and the NGA

3-1 Potentiometric Surface Map - Upper Aquifer October 2001

3-2 Potentiometric Surface Map - Lower Aquifer – October 2001

3-3 Total Volatile Organic Compounds in Upper Aquifer Groundwater – October 2001

3-4 Total Volatile Organic Compounds in Lower Aquifer Groundwater – October 2001

3-5 Chlorinated Solvents Detected in Groundwater – Upper Aquifer – October 2001

3-6 Chlorinated Solvents Detected in Groundwater – Upper Aquifer – October 2000

3-7 Chlorinated Solvents Detected in Groundwater – Lower Aquifer – October 2001

3-8 Chlorinated Solvents Detected in Groundwater – Lower Aquifer – October 2000

LIST OF ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
CCBs	continuing calibration blanks
CCV	continuing calibration verification
CEHNC	United States Army Engineering and Support Center Huntsville
CEMRD	Corps of Engineers Missouri River Division
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COCs	chemicals of concern
CSL	Chemical Systems Laboratory
CO_2	carbon dioxide
DCE	dichloroethene
DLA	Defense Logistics Agency
DO	dissolved oxygen
DQE	Data Quality Evaluation
DQOs	Data Quality Objectives
DSCR	Defense Supply Center Richmond
EM	Engineering Manual
ESD	Explanation of Significant Differences
Fe^{+2}	ferrous iron
Fe^{+3}	ferric iron
FFA	Federal Facilities Agreement
GC/MS	gas chromatograph/mass spectrometer
LAW	Law Engineering and Environmental Services, Inc.
LCS	Laboratory Control Samples
LPH	liquid petroleum hydrocarbons
µg/L	micrograms per liter
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL/min	milliliters per minute
MNA	monitored natural attenuation
mS/cm	milliSiemens per centimeter
msl	mean sea level

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

MS/MSD	matrix spike/matrix spike duplicate
mV	millivolts
NGA	National Guard Area
nM	nanomolar
NPL	National Priorities List
ORP	oxidation-reduction potential
OSA	Open Storage Area
OU	Operable Unit
%D	percent difference
%R	percent recovery
PCE	tetrachloroethylene
PCBs	polychlorinated biphenyls
PQL	practical quantitation limits
QA	quality assurance
QC	quality control
RBCs	Risk-Based Concentrations
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SDG	sample delivery group
SC	Specific Conductivity
SOPs	Standard Operating Procedures
STL	Severn Trent Laboratories
TCE	trichloroethylene
TOC	total organic carbon
TPP	Technical Project Planning
USACE	United States Army Corps of Engineers
USAEHA	United States Army Environmental Hygiene Agency
USATHMA	United States Army Toxic and Hazardous Materials Agency

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
VC	vinyl chloride
VDEQ	Virginia Department of Environmental Quality
VOCs	volatile organic compounds

EXECUTIVE SUMMARY

Law Engineering and Environmental Services, Inc. has prepared this Technical Memorandum of the first quarterly groundwater sampling event conducted under Contract No. DACA87-94-D-0016, Task Order 0032 to the United States Army Engineering and Support Center Huntsville. This Technical Memorandum documents the first quarterly groundwater sampling activities conducted during September/October 2001 at Operable Unit (OU) 6 of the Defense Supply Center Richmond (DSCR) located in Chesterfield County, Virginia and presents the results of the sampling activities.

OU 6 addresses contaminated groundwater associated with the Open Storage Area (OSA), Area 50 landfill, and the National Guard Area (NGA), individually referred to as OU 1, OU 2, and OU 3, respectively. Area 50, a former landfill, is suspected to be the primary source of groundwater contamination identified as OU 6.

Field activities for the first quarterly sampling event were performed in October 2001 in general accordance with procedures outlined in the "Final Sampling and Analysis Plan for Expanded Site Investigation" (LAW, 1992) and the Quarterly Groundwater Sampling Plan for DSCR (LAW, 2001). To facilitate the ongoing quarterly groundwater sampling program, dedicated pumps were installed.

Results of water level measurements indicate that groundwater in the upper aquifer generally flows to the southeast, groundwater flow in the lower aquifer generally flows to the east. These results are consistent with previous observations.

A total of 46 monitoring wells at OU 6 were sampled during the first quarterly groundwater sampling event. The groundwater samples were analyzed for volatile organic compounds, metals and monitored natural attenuation (MNA) parameters. Analytical results indicate that detected levels of volatile organic compounds are consistent with previously detected concentrations and continue to generally exhibit a decreasing trend in both upper and lower aquifers. Furthermore, results of analyses of natural attenuation parameters indicate that conditions in both aquifers are generally favorable for reductive dechlorination, although to a lesser extent in the lower aquifer.

1.0 INTRODUCTION

1.0.0.1 Law Engineering and Environmental Services, Inc. (LAW) conducted the first quarterly groundwater sampling activities during September/October 2001 at Defense Supply Center Richmond (DSCR) located in Chesterfield County, Virginia. Groundwater monitoring wells located at Operable Units (OUs) 6, 7, 8 and the Post Exchange Gasoline Station were sampled as part of the Quarterly Groundwater Sampling Plan (LAW, 2001). This Technical Memorandum addresses the groundwater sampling activities conducted at OU 6. LAW conducted these sampling activities under Contract No. DACA87-94-D-0016, Task Order 0032 to the United States Army Engineering and Support Center Huntsville (CEHNC).

1.1 PURPOSE AND OBJECTIVES

1.1.0.1 This technical memorandum has been prepared to document results of groundwater elevation measurements in September 2001 and sampling conducted at OU 6 in October 2001. The quarterly sampling is being performed to monitor the nature and extent of the groundwater contaminant plume and to collect additional data to support monitored natural attenuation (MNA) as a potential component of the final remedy for the site. Additionally, previously collected metals data require further evaluation to assess whether detected concentrations represent a potential risk to human health. The metals data collected as part of this sampling event will be used to support a future risk evaluation.

1.1.0.2 The objectives of the groundwater sampling at OU 6 are as follows:

- Collect analytical data to support the MNA program as a component of an effective remedy.
- Monitor the current nature and extent of the groundwater contaminant plume.
- Collect groundwater elevation data for the preparation of potentiometric surface maps.

1.2 REPORT ORGANIZATION

1.2.0.1 This Technical Memorandum is organized as follows: Section 1.0 describes the purpose and objectives, history and the environmental impact at the OU 6; Section 2.0 describes the field activities conducted during groundwater sampling; Section 3.0 describes laboratory analytical results of the

groundwater samples; Section 4.0 provides a summary of the results; and Section 5.0 lists the references cited. Tables, Figures and Appendices immediately follow Section 5.0.

1.3 SITE DESCRIPTION

1.3.0.1 OU 6 collectively addresses the contaminated groundwater that occurs at the Open Storage Area (OSA), Area 50, and the National Guard Area (NGA). The individual contaminant-source areas of the OSA, Area 50 and the NGA are referred to as OU 1, OU 2, and OU 3, respectively, and are shown in Figure 1-1. Area 50 is the location of a former landfill and is suspected to be the primary contributing source of groundwater contamination at OU 6.

1.3.0.2 Area 50 consisted of a ravine of about 800 feet long, 200 feet wide and about 10 feet deep. This ravine was used from the early 1960s until the early 1970s as a landfill to dispose of wastes such as construction debris, damaged containers and stock chemicals. Potentially hazardous materials that were disposed in the landfill included toxic and reactive chemicals used in photographic development processes, organic solvents, pesticides, herbicides, polychlorinated biphenyls (PCBs) and petroleum derivatives. Electrical transformers containing PCBs were stored in the southwestern portion of Area 50 during 1982 and 1983.

1.4 PREVIOUS INVESTIGATIONS

1.4.0.1 Previous environmental studies conducted at OU 6 have identified groundwater contaminant plumes, primarily consisting of chlorinated volatile organic compounds (VOCs) and metals, in both the upper and the lower aquifers. An interim remedial action consisting of a groundwater pump-and-treat system has been in operation since September 1996 to address the impacted groundwater associated with OU 6. This treatment system is identified as OU 9 and consists of a network of groundwater recovery wells screened in both the upper and lower aquifers. Effluent from OU 9 is discharged to Falling Creek.

1.4.0.2 Multiple organizations have conducted studies at OU 6. These agencies include the Chemical Systems Laboratory (CSL) of the United States Army Toxic and Hazardous Materials Agency (USATHMA), the United States Army Environmental Hygiene Agency (USAEHA), the United States Geological Survey (USGS), Dames & Moore, LAW, and Hydrogeologic, Inc. The studies conducted and their findings are summarized in Appendix A.

2.0 FIELD ACTIVITIES

2.0.0.1 Field activities consisting of static water level measurements, visual inspection of wells, installation of dedicated pumps, measurement of field parameters, and the collection of groundwater samples for laboratory analysis were conducted during September and October 2001. These activities were performed in general accordance with procedures outlined in the Final Sampling and Analysis Plan (SAP) for Expanded Site Investigation (LAW, 1992) and the Quarterly Groundwater Sampling Plan (LAW, 2001).

2.0.0.2 A total of 28 groundwater monitoring wells screened in the upper aquifer and a total of 25 groundwater monitoring wells screened in the lower aquifer were proposed for sampling. Due to field conditions, groundwater samples were collected from a total of 26 wells screened in the upper aquifer and a total of 20 wells screened in the lower aquifer; these wells are listed in Tables 2-1 and 2-2 respectively. Locations of these wells are shown on Figure 2-1.

2.1 WATER LEVEL ELEVATIONS

2.1.0.1 Depths to static water levels in the proposed groundwater monitoring wells were measured from September 18 through 20, 2001. An electronic water level meter was used to measure the depths to water and the total depths of each well. The top of casing was used as the reference level for each well. Resource International, Inc. surveyed the top of well casing elevations during 1997 with reference to the National Geodetic Vertical Datum of 1929. The OU 9 groundwater recovery and treatment system was not operational from July 2001 through the sampling event and therefore, should have no impact on the static water levels measured in the monitoring wells.

2.2 MONITORING WELL EVALUATION

2.2.0.1 Prior to specific sampling activities, monitoring wells were visually inspected to evaluate their overall condition and identify obstructions or accumulations of sediment potentially affecting performance of the wells.

2.2.0.2 Six monitoring wells were vandalized. These wells included USGS-G2, USGS-I1, USGS-I2, USGS-N2, USGS-O1 and USGS-O2, all of which are located off-site. The following two wells screened in the upper aquifer were dry and could not be sampled: USGS-B4 and USGS-D4.

2.3 DEDICATED PUMPS INSTALLATION

2.2.0.1 To facilitate the ongoing groundwater sampling program at OU 6, dedicated bladder pumps were installed in the wells to be sampled. In order to install the bladder pump, depth to groundwater and total well depth were measured and the water column thickness calculated. After calculating the water column thickness and determining if the water column was appropriate to install a bladder pump, a bladder pump was installed to approximately 2 feet from the bottom of the well. The bladder pumps were installed with well caps that allow the fast connection of an air source and flow cell for well purging, inline water quality monitoring, and groundwater collection.

2.2.0.2 Due to lack of sufficient thickness of water column, pumps were not installed in the following four wells screened in the upper aquifer: AEHA-18A, USGS-A4, USGS-F4 and USGS-J4. Pumps were also not installed in the six monitoring wells that had apparently been vandalized or the two wells that were dry.

2.4 MONITORING WELL SAMPLING

2.4.0.1 The monitoring wells were sampled using low flow sampling methods for the collection of groundwater samples submitted for analysis. The purpose of low flow sampling is to collect samples representative of the formation in which the well is screened, while equilibrating draw down and water extraction rates to minimize exposing the screened interval to atmospheric conditions. Wells were purged to achieve stabilization prior to sampling. Stabilization parameters monitored during purging and sampling were pH, oxidation-reduction potential (ORP), specific conductivity (SC), dissolved oxygen (DO), and groundwater drawdown. Stabilization was achieved after three successive readings were within ± 0.1 for pH, ± 10 millivolts (mV) for ORP, $\pm 3\%$ for SC, $\pm 10\%$ for DO and drawdown was equilibrated with groundwater recharge rate. After stabilization of the monitoring well, samples were collected with minimal turbulence and agitation in properly cleaned and preserved sampling containers. Groundwater samples were collected through dedicated discharge tubing. All samples were analyzed for VOCs, MNA parameters, and total and dissolved metals. The MNA parameters were nitrate, sulfate, sulfide, methane, ethane, ethane, carbon dioxide, hydrogen, alkalinity, chloride and total organic carbon (TOC). Samples to be analyzed for VOCs, methane, ethane and ethene were collected at a flow rate of approximately 100 milliliters per minute (mL/min) and the remaining samples were collected at a higher flow rate of approximately 200 to 300 mL/min. Samples for VOC analysis were collected with no head space in the sample containers. Groundwater obtained for dissolved metals was filtered using an inline

0.45 micrometer cellulose filter cartridge. Furthermore, hydrogen samples were obtained using the bubble strip method as outlined in the Sampling Plan. Field Sampling Reports are provided in Appendix B of this technical memorandum.

2.4.0.2 Following collection, samples were immediately placed on ice in an insulated container to initiate cooling of the samples to the target of 4 degrees Celsius (°C). After completing the sampling process at each well, samples were delivered to the field office, where samples were sorted and chain of custody documentation was completed by the Sample Coordinator. Samples were then packaged for shipment to the fixed based laboratory via Federal Express Priority Overnight delivery. Upon arrival at the laboratory, cooler temperatures were generally within prescribed limits (4°C $\pm$ 2°C).

2.4.0.3 Samples were collected from a total of 46 groundwater monitoring wells. Vandalized wells were not sampled. To replace the two dry wells, the following two wells were sampled as substitute wells: USGS-I4 (substitute for USGS-D4) and USGS-G3 (substitute for USGS-G2). Three wells were purged and sampled using hand bailors and/or peristaltic pumps: AEHA-18A, USGS-A4 and USGS-J4. Monitoring well USGS-F4 was purged dry but never recovered enough to collect a groundwater sample.

2.5 ANALYTICAL PROGRAM

2.5.0.1 This section describes the analytical methods and quality control program utilized for the sampling at OU 6. The analytical methods are described further in the sampling plan (LAW, 2001).

2.5.1 Field Analytical Parameters

2.5.1.1 The field analytical parameters were collected using a Horiba U-22 water quality meter. This instrument uses an in-line flow-through cell to monitor the groundwater geochemistry. The instruments were calibrated daily in general accordance with manufacturer's recommendations. The following field parameters were measured: ORP, SC, pH, temperature, DO and ferrous iron (using a Hach Test Kit). Results of the field analyses are presented in Table 3-2. DO was measured using two methods: 1) a flow-through C866 DO meter, and 2) Hach Test Kit. DO measurements using the meter ranged from 0 to approximately 5.31 milligrams per liter (mg/L) with an average of 1.79 mg/L. The DO concentrations measured with the Hach Test Kit ranged from 0 to 5 mg/L, with an average of 4.64 mg/L. The DO meter and Hach Test Kit measurements were determined to be statistically unequal. Since data obtained using the DO meter are less subjective than those obtained from the test kit, all DO measurements discussed in subsequent sections are those obtained using the meter.

2.5.2 Chemical Analysis

2.5.2.1 A total of 26 upper aquifer wells and 20 lower aquifer wells were sampled for chemical analysis. The analytical methods are summarized in Table 2-3. A total of 14 upper aquifer wells and 20 lower aquifer wells were sampled for VOCs, metals, and MNA parameters. A total of 11 upper aquifer wells were sampled for VOCs and metals only. Laboratory analyses were performed by Severn Trent Laboratories (STL) of North Canton, Ohio. Field duplicate samples were sent to the USACE Missouri River Division (CERMD) laboratory for quality assurance (QA).

2.5.3 Field Quality Control

2.5.3.1 The field control program for the collection of samples included specific procedures for sampling of the monitoring wells as described in the Sampling Plan (LAW, 2001). Field quality control samples were collected to evaluate collection technique. These samples included duplicate samples and trip blanks. Documentation of the sampling was performed in the field to ensure that the sample collection, labeling, chain-of-custody, and request for analysis were in agreement. Custody seals were placed on each cooler before shipping by common carrier.

2.5.3.2 Sample bottles were provided by the laboratory and met the USEPA cleaning requirements for environmental clean containers. Each sample was preserved according to the SAP requirements and immediately placed in a cooler containing ice. The ice was placed in resealable plastic bags to prevent water leakage. Sample labels were pre-printed and placed immediately on the container prior to placement in the cooler.

2.5.4 Laboratory Quality Control

2.5.4.1 The laboratory quality control (QC) program including sample handling, laboratory control and reporting, is documented in the SAP (LAW, 1992). Sample handling includes documentation of sample receipt, placement in storage, lab personnel using the sample, and disposal. The laboratory control consists of instrument calibration and maintenance, laboratory control samples (LCS), method blanks, and matrix spikes. Reporting of the laboratory control data was planned prior to the collection of the data, allowing the laboratory to place the appropriate information into the data package so that the data quality evaluation (DQE) could be performed.

2.5.5 Data Quality Evaluation

2.5.5.1 DQE was performed by LAW with reference to the USACE Shell Document for Analytical Chemistry Requirements. In general, the Shell document prescribes limits for the mainstream methods commonly used in site evaluation, specifically USEPA SW-846 Methods. Although the Shell document does not prescribe criteria for most of the MNA parameters, a standardized approach to DQE was adopted following generic DQE as outlined in the USEPA Region III Modifications to the Organic National Functional Guidelines (September, 1994) and USEPA Region III Modifications to the inorganic National Functional Guidelines (April, 1993). Results of the DQE are provided in Appendix C.

2.5.6 Data Quality Objectives

2.5.6.1 The Data Quality Objective (DQO) process is defined by the USEPA as a seven-step iterative planning approach used to prepare plans for environmental data collection activities (USEPA, 2000). The DQO process clearly defines the problem, what the decisions criteria for answering the problem are, and how the decision criteria will be addressed. The USEPA DQO process is similar to the four-phase USACE Technical Project Planning process, which includes a project identification phase, determining data needs phase, data collection options phase, and program finalization phase (USACE, 1998b). The seven steps in the USEPA DQO process are:

1. State the problem – summarize the contamination problem that will require new environmental data and identify the resources available to resolve the problem.
2. Identify the decision – identify the decision that requires new environmental data to address the contamination problem.
3. Identify inputs – identify the information that will be required to support the decision and specify which inputs require new environmental measurements.
4. Define boundaries – define the spatial and temporal boundaries that the data must represent to support the decision.
5. Develop a decision rule – develop a logical "if...then.." statement that defines the conditions that would cause the decision maker to choose among alternative actions.
6. Specify limits on decision errors – specify the decision maker's tolerable limits on decision errors, which are sued to establish performance goals for limiting uncertainty in the data.
7. Optimize the design – identify a resource-effective sampling and analysis design for generating data that are expected to satisfy the DQOs.

2.5.6.2 LAW has applied the DQO process to this First Quarterly Groundwater Sampling activity.

3.0 DISCUSSION OF RESULTS

3.0.0.1 This section provides a discussion of the results of the field activities discussed in Section 2.0.

3.1 GROUNDWATER EVALUATION DATA

3.1.0.1 Static water level measurements collected during September 2001 indicated that the elevation of groundwater in the upper aquifer at OU 6 ranged from 118.22 feet in MWA50-38 to 96.22 feet in USGS-J4. Groundwater elevation data are summarized in Table 3-1. The potentiometric surface of the upper aquifer and the direction of groundwater flow are shown in Figure 3-1. Static water level elevations indicate that groundwater in the upper aquifer flows in a northeasterly direction.

3.1.0.2 Static water level measurements collected in the lower aquifer during September 2001 indicated that the elevation of groundwater at OU 6 ranged from 94.88 feet in AEHA-21B to 87.51 feet in USGS-O2 (Table 3-1). The potentiometric surface of the lower aquifer and the direction of groundwater flow in the lower aquifer are shown in Figure 3-2. Static water level elevations indicate that groundwater in the lower aquifer flows in an easterly direction.

3.2 FIELD ANALYTICAL PARAMETERS

3.2.0.1 The following section presents a discussion of the parameters measured during the sampling of the wells. The field analytical parameters were collected using a Horiba U-22 water quality meter. This instrument uses an in-line flow-through cell to monitor the groundwater geochemistry. The instruments were calibrated daily in general accordance with manufacturer's recommendations. Parameters measured using field instruments are listed in Tables 3-2 and 3-3 for the upper and lower aquifers, respectively.

3.2.1 Upper Aquifer

3.2.1.1 Field ORP readings ranged from –145 in AEHA-5 to 380 millivolts (mV) in AEHA-15A. Ferrous Iron (Fe^{+2}) readings ranged from 0.0 in several wells to 4.2 mg/L in AEHA-28A. SC ranged from 0.034 milliSiemens per centimeter (mS/cm) in USGS-I4 to 1.81 mS/cm in MWA-50-36. Measurement of pH ranged from 4.16 in AEHA-12A to 8.8 in MWA50-37. Temperature readings ranged from 17.26 °C in USGS-I4 to 30.89 °C in AEHA-26A. DO readings ranged from 0.0 in several wells to 5.31 mg/L in AEHA-12A.

3.2.2 Lower Aquifer

3.2.2.1 Field ORP readings ranged from –104 mV in AEHA-26B to 148 mV in AEHA-21B. Fe^{+2} readings ranged from 0.0 in several wells to 3.0 mg/L AEHA-30B. SC ranged from 0.053 mS/cm in USGS-B2 to 0.85 mS/cm in AEHA-23B. Measurement of pH ranged from 5.35 in AEHA-31B to 8.73 in AEHA-26B. Temperature readings ranged from 14.4°C in USGS-I4 to 20.28 °C in AEHA-24B. DO readings ranged from 0.0 in several wells to 2.94 mg/L in AEHA-24B.

3.3 LABORATORY ANALYTICAL PARAMETERS

3.3.0.1 This section provides results of laboratory analyses for groundwater samples collected from OU 6. The analytical methods were selected to complement the analytical needs for this area with consideration given to detection limits, inherent method accuracy and precision, and the compounds to be identified. In general, USEPA SW-846 methodologies were used to facilitate data evaluation by USACE standards as outlined in the USACE Shell Document (USACE, 1998a). Data Summary Tables are included in Appendix C, along with a summary of the DQE.

3.3.1 Upper Aquifer Detection Summary

3.3.1.1 Samples were collected at OU 6 during September/October 2001 and analyzed for VOCs, metals, and MNA parameters.

3.3.1.2 As part of the field program, 3 duplicate samples were collected for VOC analysis from the upper aquifer wells. The duplicates (OU 6 Dup 1, 2 and 3) correlate closely with their parent samples (AEHA-5, AEHA-23A, and AEHA-25A, respectively). Relative percent difference (RPD) ranged from 0 to 13 percent, with typical limits less than 30 percent being acceptable.

3.3.1.3 A total of 3 samples were sent to the CEMRD lab as QA splits. Data from the QA split samples were not available for review; therefore, comparison to site data was not performed.

3.3.1.4 Positive detections for the upper aquifer are provided in Table 3-4. Wells AEHA-12A, DMW-7A, and DMW-9A were designated for sampling to provide upgradient information on VOCs and MNA. As expected, VOC concentrations in these wells were less than laboratory reporting limits.

3.3.2 VOCs

3.3.2.1 Results of VOC analyses in the upper aquifer wells indicate the presence of chlorinated solvent constituents in addition to their degradation products. The primary constituents present across the 26 upper aquifer wells in order of highest to lowest concentrations are as follows:

- trichloroethylene (TCE) (1900 micrograms per liter [µg/L] in AEHA-28A)
- cis-1,2-dichloroethene (1400 µg/L in AEHA-28A)
- chlorobenzene (230 µg/L in AEHA-28A)
- PCE (170 µg/L in AEHA-28A)
- 1,4-dichlorobenzene (150 µg/L in AEHA-28A)
- vinyl chloride (VC) (96 JQ µg/L in AEHA-28A)
- chloroform (69 µg/L in AEHA-28-A)
- 1,2-dichlorobenzene (37 JQ µg/L in AEHA-28A)
- 1,1-dichloroethene (29 JQ µg/L in AEHA28-A)
- 1,2-dichlorethene (total) (29 µg/L in AEHA-32A)
- 1,1-dichloroethane (22 JQ µg/L in AEHA28-A)
- 1,2-dichlorethane (21 JQ µg/L in AEHA-28A)
- 1,3-dichlorobenzene (11 JQ µg/L in AEHA-28-A)
- naphthalene (9.3 JQ µg/L in AEHA-5)
- carbon disulfide (5.7 JL µg/L in AEHA-5)
- isopropylbenzene (2.8 µg/L in AEHA-34A)
- acetone (2.3 JQ µg/L in AEHA-30A)
- sec-butylbenzene (2 µg/L in AEHA-34A)
- n-propylbenzene (1.1 µg/L in AEHA-34A)
- 1,2,4-trimethylbenzene (0.65 JQ µg/L in AEHA-34A)
- trans-1,2-dichloroethene (0.5 µg/L in AEHA-30A)
- xylene (total) (0.46 JQ µg/L in DMW-7A)
- benzene (0.45 JQ µg/L in AEHA-34A)
- n-butylbenzene (0.43 JQ µg/L in AEHA-34A)
- ethylbenzene (0.42 µg/L in AEHA-34A)
- toluene (0.39 JQ µg/L in DMW-7A)
- 1,3,5-trimethylbenzene (0.24 JQ µg/L in AEHA-34A)
- 1,2-dichloropropane (0.19 JQ µg/L in MWA50-36)

3.3.2.2 TCE was detected in 14 wells (AEHA-15A, AEHA-18A, AEHA-23A, AEHA-24A, AEHA-25A, AEHA-28A, AEHA-30A, AEHA-32A, DMW-7A, DMW-9A, MWA50-35, MWA50-37, USGS-A4, and USGS-J4) at concentrations ranging from 0.15 JQ µg/L to 1900 µg/L. In the previous (September/October 2000) sampling event, TCE was detected in 19 wells (AEHA-15A, AEHA-18A, AEHA-19A, AEHA-23A, AEHA-24A, AEHA-25A, AEHA-27A, AEHA-28A, AEHA-29A, AEHA-30A, AEHA-32A, DMW-8A, DMW-18A, MWA50-35, MWA50-37, USGS-A4, USGS-B4, USGS-B5, and USGS-F4) at concentrations ranging from 0.21 JQ µg/L in USGS-F4 to 1500 µg/L in AEHA-28A DUP.

3.3.2.3 PCE was detected in 9 wells (AEHA-18A, AEHA-24A, AEHA-25A, AEHA-28A, AEHA-32A, DMW-7A, DMW-9A, MWA50-35, and USGS-A4) at concentrations ranging from 0.23 JQ µg/L to 170 µg/L. In the September/October 2000 sampling event, tetrachloroethylene (PCE) was detected in 11 wells (AEHA-15A, AEHA-18A, AEHA-19A, AEHA-24A, AEHA-25A, AEHA-28A, AEHA-29A, AEHA-32A, DMW-18A, MWA50-35 and USGS-A4) with concentrations ranging from 0.45 JQ µg/L in AEHA-15A to 120 JH µg/L in AEHA-28A.

3.3.2.4 VC was detected in 10 wells (AEHA-23A, AEHA-24A, AEHA-25A, AEHA-28A, AEHA-30A, AEHA-31A, AEHA-32A, MWA50-35, MWA50-37 and USGS-A4) at concentrations ranging from 0.67 JQ µg/L to 96 JQ µg/L. In the September/October 2000 sampling event, vinyl chloride (VC) was detected in 13 wells (AEHA-19A, AEHA-21A, AEHA-23A, AEHA-24A, AEHA-26A, AEHA-27A, AEHA-28A, AEHA-29A, AEHA-30A, AEHA-31A, MWA50-35, MWA50-37, and DMW-8A) at concentrations ranging from 0.2 JQ µg/L in AEHA-26A to 40 JQ µg/L in AEHA-28A.

3.3.2.5 Laboratory analytical results of individual chlorinated solvents detected in groundwater samples collected during September/October 2001 and October 2000 from wells screened in the lower aquifer are shown in Figures 3-7 and 3-8 respectively.

3.3.3 MNA Parameters

3.3.3.1 The upper aquifer wells were sampled and analyzed, as stated in Section 2.4, for TOC, chloride, nitrate, sulfate, alkalinity, sulfide, carbon dioxide, ethane, ethane, methane, total and dissolved hydrogen in order to facilitate a review of the viability of MNA. The results of the analyses are included in Table 3-4. The frequency, range, and average concentrations for the detections of each of the constituents are provided below:

- TOC was measured in 14 of the 26 sampled wells with results ranging from less than the detection limit (1 mg/L) to 190 mg/L in AEHA-5. The average concentration from the upgradient wells was 22.23 mg/L.
- Chloride was measured in 14 of the 26 sampled wells, and results ranged from 2.4 mg/L in AEHA-31A to 140 mg/L AEHA-28A. The average concentration from the upgradient wells was 23.81 mg/L.
- Nitrate was measured in 14 of the 26 sampled wells, and results ranged from less than the reporting limit (0.1 mg/L) to 2.3 mg/L in AEHA-12A. The average concentration from the upgradient wells was 0.72 mg/L.

- Sulfate was measured in 14 of the 26 sampled wells, and results ranged from less than the reporting limit (1.0 mg/L) to 34.4 mg/L in AEHA-18A. The average concentration from the upgradient wells was 9.47 mg/L.

- Total alkalinity was measured in 14 of the 26 sampled wells, and results ranged from 11.0 mg/L to 1,100 mg/L in MWA50-37. The average concentration from the upgradient wells was 361.33 mg/L.

- Total sulfide was measured in 14 of the 26 sampled wells, and results ranged from less than the reporting limit (1.0 mg/L) to 1.5 mg/L in AEHA-28A and AEHA-32A. The average concentration from the upgradient wells was 1.37 mg/L.

- Carbon dioxide was measured in 13 of the 26 sampled wells, and results ranged from 45 mg/L in AEHA-12A (upgradient well) to 260 mg/L in AEHA-28A. The average concentration from the upgradient wells was 128.46 mg/L.

- Ethene, ethane and methane were measured in 14 of the 26 sampled wells. Ethane was detected ranging from concentrations less than the reporting limit of 0.002 mg/L to 0.0069 mg/L in MWA50-37. Methane was detected at concentrations ranging from less than the reporting limit of 0.001 mg/L to 6.8 mg/L in MWA50-37. Ethane was detected above the detection limit (0.001mg/L) only in AEHA-28A (0.02 mg/L).

- Hydrogen was measured in 12 of the 26 sampled wells. Concentrations measured ranged from 1.9 nanomolar (nM) (1 nanomolar is equivalent to 10^{-9} moles per liter) in DMW-9A to 14 nM in AEHA-25A.

3.3.4 Metals

3.3.4.1 Samples for analyses for total and dissolved metals were collected from the upper aquifer wells. Dissolved metals concentrations are tabulated in Table 3-4, and total metals concentrations are discussed below.

- The maximum concentrations of total aluminum, antimony, arsenic, and barium were 19,800 µg/L (USGS-J4), 3.7 JQ µg/L (AEHA-30A), 9.5 µg/L (USGS-J4), and 462 JQ µg/L (AEHA-31A), respectively.

- The maximum concentrations of total cadmium, calcium and chromium detected were 3.7 µg/L (AEHA-30A), 115,000 µg/L (MWA50-37), and 33.6 µg/L (USGS-J4), respectively.

- The maximum concentrations of total cobalt, copper, iron, and lead detected were 46.8 µg/L (AEHA-28A), 40 µg/L (DMW-7A), 40,100 µg/L (USGS-J4), and 14.7 µg/L (USGS-J4), respectively.

- The maximum concentrations of total magnesium, manganese, nickel, and potassium detected were 130,000 µg/L (MWA50-37), 2,820 µg/L (AEHA-18A), 9 JQ µg/L (AEHA-28A), and 12,700 µg/L (MWA50-37), respectively.

- The maximum concentrations of total selenium, sodium, vanadium, and zinc detected were 4.9 JQ µg/L (MWA50-36), 454,000 µg/L (MWA50-36), 39.5 JQ µg/L (USGS-J4), and 485 µg/L (AEHA-30A), respectively.

- Total beryllium and molybdenum were also detected; however, concentrations were qualified as biased high or false positive due to blank contamination (see Appendix C).

3.3.5 Lower Aquifer Detection Summary

3.3.5.1 Samples were collected from the lower aquifer at OU 6 during the September/October 2001 sampling event and analyzed for VOCs, metals, and MNA parameters.

3.3.5.2 As part of the field program, 2 duplicate samples were collected for analysis from the lower aquifer wells. The duplicates (OU 6 Dup 4 and 5) correlate closely with their parent samples (AEHA-25B and AEHA-30B, respectively). RPD ranged from 0 to 13 percent, with typical limits less than 30 percent being acceptable.

3.3.5.3 Two samples were sent to the CEMRD lab as QA splits. Data from the QA split samples were not available for review; therefore, comparison to site data was not performed.

3.3.5.4 Positive detections for OU 6 lower aquifer wells are shown in Table 3-5.

3.3.6 VOCs

3.3.6.1 Results of VOC analyses in the lower aquifer wells indicate the presence of chlorinated solvent constituents in addition to their degradation products. The primary constituents present across the 20 lower aquifer wells in order of highest to lowest concentrations are as follows: TCE (150 µg/L in USGS-C2); cis-1,2-dichloroethene (64 µg/L in AEHA-30B); VC (5 µg/L in AEHA-30B); acetone (1.7 JQ µg/L in USGS-B2); PCE (1.6 µg/L in AEHA-31B); trans-1,2-dichloroethene (0.84 JQ µg/L in USGS-C2).

3.3.6.2 TCE was detected in 11 wells (AEHA-23B, AEHA-24B, AEHA-25B, AEHA-27B, AEHA-30B, AEHA-31B, USGS-B2, USGS-C2, USGS-F2, USGS-G3, and USGS-H2) at concentrations ranging from 0.35 JQ µg/L to 150 µg/L. In the previous (September/October 2000) sampling event, TCE was detected in 19 wells (AEHA-23B, AEHA-24B, AEHA-25B, AEHA-27B, AEHA-30B, AEHA-31B, USGS-A3, USGS-B2, USGS-B3, USGS-C1, USGS-C2, USGS-C3, USGS-G1, USGS-G2, USGS-G3,

USGS-H1, USGS-H2, USGS-N3, and USGS-O2) at concentrations ranging from 0.3 JQ µg/L in USGS-N3 to 320 µg/L in USGS-C2.

3.3.6.3 PCE was detected in 4 wells (AEHA-27B, AEHA-30B, AEHA-31B, and USGS-B2) at concentrations ranging from 0.27 JQ µg/L to 1.6 µg/L. In the September/October 2000 sampling event, PCE was detected in 6 wells (AEHA-24B, AEHA-27B, AEHA-30B, AEHA-31B, USGS-B2, and USGS-C2) with concentrations ranging from 0.34 R µg/L in AEHA-27B to 7.9 JQ µg/L in AEHA-30B.

3.3.6.4 VC was detected in 3 wells (AEHA-23B, AEHA-24B, and AEHA-30B) at concentrations ranging from 0.17 JQ µg/L to 5 µg/L. In the previous (September/October 2000) sampling event, VC was detected in one well (AEHA-24B) with a concentration of 1 JQ µg/L.

3.3.6.5 Laboratory analytical results of total VOCs detected in groundwater samples collected from wells screened in the lower aquifer are contoured and shown in Figure 3-4. Laboratory analytical results of individual chlorinated solvents detected in groundwater samples collected during September/October 2001 and October 2000 from wells screened in the lower aquifer are shown in Figures 3-7 and 3-8 respectively. Laboratory analytical results of individual chlorinated solvents detected in groundwater samples collected during September/October 2001 and October 2000 from wells screened in the upper aquifer are shown in Figures 3-5 and 3-6 respectively.

3.3.7 MNA Parameters

3.3.7.1 The lower aquifer wells were also sampled and analyzed for TOC, chloride, nitrate, sulfate, alkalinity, sulfide, carbon dioxide, ethane, ethane, methane, total and dissolved hydrogen to facilitate a review of the viability of MNA. The results of the analyses are included in Table 3-5. The frequency, range, and average concentrations for the detections of each of the constituents are provided below.

- TOC was measured in each of the 20 sampled wells with results ranging from less than the detection limit (1 mg/L) to 6 mg/L in AEHA-18B. The average concentration from the upgradient wells was 3.3 mg/L.
- Chloride was measured in each of the 20 sampled wells, and results ranged from 1.1 mg/L in AEHA-27B to 38.1 mg/L AEHA-26B. The average concentration from the upgradient wells was 6.25 mg/L.

- Nitrate was measured in each of the 20 sampled wells, and results ranged from less than the reporting limit (0.1 mg/L) to 3.7 mg/L in AEHA-23B. The average concentration from the upgradient wells was 0.83 mg/L.

- Sulfate was measured in each of the 20 sampled wells, and results ranged from 6 mg/L in AEHA-23B to 48.8 mg/L in AEHA-30B. The average concentration from the upgradient wells was 15.3 mg/L.

- Total alkalinity was measure in each of the 20 sampled wells, and results ranged from 18 mg/L in AEHA-21B to 130 mg/L in AEHA-27B. The average concentration from the upgradient wells was 43.61 mg/L.

- Total sulfide was measured in each of the 20 sampled wells, and results ranged from less than the reporting limit (1.0 mg/L) to 3.2 JL mg/L in AEHA-21B. The average concentration from the upgradient wells was 1.9 mg/L.

- Carbon dioxide was measured in each of the 20 sampled wells, and results ranged from 4.9 J mg/L in AEHA-26B to 60 mg/L in USGS-B2 and USGS-C2. The average concentration from the upgradient wells was 37.47 mg/L.

- Methane was measured in each of the 20 sampled wells, and results ranged from less than the reporting limit (0.001 mg/L) to 0.029 mg/L in AEHA-32B. The average concentration from the upgradient wells was 0.007 mg/L.

- Hydrogen was measured each of the 20 sampled wells. Concentrations were found to range from 1.3 nM (1 nM is equivalent to 10^{-9} moles per liter) in AEHA-26B, USGS-H2 and USGS-M2 to 8.2 nM in AEHA-24B and USGS-B2.

3.3.8 Metals

3.3.8.1 Samples for analyses for total and dissolved metals were collected from the lower aquifer wells. Dissolved metals concentrations are tabulated in Table 3-5, and total metals concentrations are discussed below:

- The maximum concentrations of total aluminum, antimony, barium, and cadmium detected were 1090 µg/L (AEHA-26B), 9.3 µg/L (AEHA-27B), 60 JQ µg/L (AEHA-32B), and 2.7 µg/L (AEHA-18B), respectively.

- The maximum concentrations of total calcium, copper, iron, and lead detected were 45,500 µg/L (AEHA-27B), 8.1 JQ µg/L (AEHA-18B), 9,650 µg/L (AEHA-30B), and 6.7 J µg/L (AEHA-26B), respectively.

- The maximum concentrations of total magnesium, manganese, nickel, and potassium detected were 9,480 µg/L (AEHA-33B), 151 µg/L (AEHA-30B), 6.4 JQ µg/L (AEHA-30B), and 11,500 µg/L (AEHA-27B), respectively.

- The maximum concentrations of total selenium, sodium, and zinc detected were 5.9 µg/L (AEHA-27B), 73,700 µg/L (AEHA-26B), and 201 µg/L (USGS-H2), respectively.

- Total beryllium and vanadium were also detected; however, the concentrations were qualified as biased high or false positive based upon blank data (see Appendix B).

3.3.9 MNA Results Summary

3.3.9.1 Upper Aquifer - The DO concentrations measured in groundwater from wells within the upper aquifer of OU 6 indicate that anaerobic conditions generally exist throughout the plume. However, DO levels measured in specific groundwater wells (AEHA-12A, AEHA-15A, USGS-M4) are greater than those generally favorable for reductive dechlorination to occur. This suggests that aerobic zones may exist locally in the vicinity of these wells and that reductive dechlorination may be inhibited in these areas.

3.3.9.2 The concentrations of Fe^{+2} detected in monitoring wells in the vicinity of AEHA-28A (area of high chlorinated VOCs) indicate that conditions are favorable for reductive dechlorination in this area. No ferrous iron was detected in wells AEHA-12A, AEHA-15A, AEHA-23A, AEHA-24A, AEHA-32A, AEHA-33A, DMW-7A, DMW-9A, MWA50-37, MWA50-38, USGS-J4, USGS-M4, and USGS-I4.

3.3.9.3 Dissolved hydrogen concentrations were generally above than 1 nanomolar (nM) in the upper aquifer groundwater, suggesting favorable conditions exist for reductive dechlorination.

3.3.9.4 Chloride is naturally occurring and is typically difficult to use as an indicator of reductive dechlorination. However, comparing relative concentrations can be an indication of degradation of chlorinated compounds. Chloride concentrations in upgradient wells (AEHA-12A, DMW-7A, and DMW-9A) at OU 6 are present at an average concentration of approximately 4.4 mg/L. Chloride levels in wells exhibiting higher VOC concentrations were generally twice the levels in upgradient wells, supporting the presence of degraded chlorinated compounds.

3.3.9.5 Sulfide is generally produced by the metabolic reduction of sulfate. Therefore, if subsurface sulfate is depleted, sulfide concentrations should be detected. The USEPA protocol states that if sulfide concentrations are in excess of 1 mg/L the reductive dechlorination pathway is possible. Sulfide concentrations were reported as being less than 1mg/L except for monitoring wells AEHA-25A, AEHA-28A, AEHA-31A, AND AEHA-32A.

3.3.9.6 Alkalinity generally results from the interaction between carbon dioxide (CO_2) and subsurface minerals. Therefore, if CO_2 concentrations increase, alkalinity also increases. CO_2 is the ultimate

degradation product of organic constituents including chlorinated constituents. The end product of reductive dechlorination is ethene. Alkalinity within the plume was measured between 11 and 1100 mg/L, with the highest measurement being in groundwater collected from the suspected initial source area in the proximity of MWA50-37. Trends in levels of alkalinity are inconclusive.

3.3.9.7 Based on the MNA analyses hydrogeochemical conditions in the upper aquifer appear to be generally conducive to reductive dechlorination.

3.3.9.8 **Lower Aquifer** - The DO measured in groundwater samples from wells screened in the lower aquifer indicates that anaerobic conditions generally exist throughout the plume. However, DO levels measured in monitoring well AEHA-24B are greater than those generally required for reductive dechlorination to occur (2.94 mg/L). To the east of No Name Creek, groundwater from wells USGS-C1 and USGS-C3 also exhibit DO concentrations greater than 0.5 mg/L. This indicates that aerobic zones may exist locally in the vicinity of these wells and reductive dechlorination may be inhibited in these areas.

3.3.9.9 The results of ORP measurements showed little correlation with DO concentrations and contaminant levels in the lower aquifer. Therefore, trends in ORP levels are considered inconclusive.

3.3.9.10 Fe^{+2} was measured in groundwater from nearly all wells sampled, indicating that iron reduction has occurred.

3.3.9.11 Dissolved hydrogen concentrations were generally greater than 1 nM in groundwater from the lower aquifer wells that were sampled, suggesting favorable conditions for reductive declorination.

3.3.9.12 Chloride concentrations above background levels generally indicate degradation of chlorinated constituents. Chloride concentrations in the plume within the lower aquifer were not significantly greater than those detected in upgradient (background) wells. Therefore, trends in chloride levels are inconclusive.

3.3.9.13 Nitrate concentrations were generally less than 1 mg/L throughout the lower aquifer, suggesting that either indigenous nitrate concentrations are limited or that nitrate reduction has occurred to reduce these concentrations. Low nitrate concentrations may indicate that reductive dechlorination will not be limited by competitive exclusion by nitrate reduction.

3.3.9.14 Sulfides, the major product of sulfate reduction, are generally less than the laboratory detection limit. Coupled with data present in the preceding paragraphs, this implies that indigenous sulfate concentrations are limited. The sulfide data, however, do indicate that conditions are conducive to reductive dechlorination.

3.3.9.15 Alkalinity in the chlorinated constituent plume within the lower aquifer is generally lower than that in upgradient wells (average of approximately 30 mg/L as $CaCO_3$). However, no conclusive trends were noted for alkalinity.

3.3.9.16 Based on results of the MNA analyses, hydrogeochemical conditions in the lower aquifer are nominally conducive to reductive dechlorination.

4.0 SUMMARY

4.0.0.1 LAW conducted a groundwater sampling and analysis event in September/October 2001 for OU 6 at DSCR. This sampling event was conducted to obtain hydrogeological and geochemical data to further define the chlorinated solvent plume existing within OU 6 and to evaluate whether conditions are conducive to MNA.

4.0.0.2 Groundwater in the upper aquifer generally flows to the northeast, following the natural topography of the site. Groundwater in the lower aquifer generally flows to the east.

4.0.0.3 A comparison of current and historical data shows that chlorinated VOCs (i.e., PCE, TCE, and their breakdown products) in the upper and lower aquifer continue to decrease over time. Total and dissolved metals are also consistent with previous investigations. Based on the results of the MNA analyses, hydrogeochemical conditions in the upper aquifer and lower aquifer appear to be generally conducive to reductive dechlorination.

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TABLES

TABLE 2-1

SUMMARY OF UPPER AQUIFER WELLS SAMPLED
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling – September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

DMW-7A	AEHA-22A	AEHA-31A	USGS-J4
DMW-9A	AEHA-23A	AEHA-32A	USGS-M4
AEHA-5	AEHA-24A	AEHA-33A	MWA50-35
AEHA-12A	AEHA-25A	AEHA-34A	MWA50-36
AEHA-15A	AEHA-26A	USGS-A4	MWA50-37
AEHA-16A	AEHA-28A	USGS-I4	MWA50-38
AEHA-18A	AEHA-30A		

PREPARED/DATE: FMM 12-4-01
CHECKED/DATE: AWE 12-4-01

TABLE 2-2

SUMMARY OF LOWER AQUIFER WELLS SAMPLED
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling – September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

AEHA-18B	AEHA-25B	AEHA-30B
AEHA-21B	AEHA-26B	AEHA-31B
AEHA-23B	AEHA-27B	AEHA-32B
AEHA-24B	AEHA-28B	AEHA-33B
USGS-B2	USGS-C2	USGS-F2
USGS-G3	USGS-H2	USGS-M2
USGS-N1	LAWMW-Q3	

PREPARED/DATE: EMM 2/5/02
CHECKED/DATE: AWE 2-5-02

TABLE 2-3

SUMMARY OF LABORATORY ANALYTICAL PARAMETERS
OPERABLE UNIT 6
First Quarterly Groundwater Sampling – September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

MATRIX: GROUNDWATER	
Laboratory Parameter	**Method [a]**
Volatile Organic Compounds (µg/L)	SW846 5030B/8260B
Dissolved Gases (µg/L): Methane Ethane Ethene Carbon Dioxide	STL-LA SOP COI-GC-005, Rev 1, (USEPA RSK SOP-175)
Hydrogen (nM/L)	Microseeps, Inc. AM20GA
Metals (total and dissolved) (mg/L)	SW846 3005A/6010B
Mercury (total and dissolved) (mg/L)	SW846 7470A
Thallium (total and dissolved) (mg/L)	SW846 7841
Anions (mg/L): Chloride Nitrate as N Sulfate	MCAWW 300.0A
Alkalinity (mg/L)	MCAWW 310.1
Sulfide (mg/L)	MCAWW 376.1
Total Organic Carbon (mg/L)	SW846 9060

Notes:

[a] MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

(1) Standard Operating Procedures for the Analysis of iodegradation Indicator Gases, Microseeps, Incorporated, OP-AM20GA, Revision 1.1, August 3, 2001.

(2) Sample Preparation and Determination of Water Samples Using a GC Headspace Equillibration Technique, Modified RSKSOP-175, SOP COI-GC-005, Revision 1, Severn Trent Laboratories – Los Angeles, September 10, 2001

PREPARED/DATE: FMM 2-5-02

CHECKED/DATE: JAH 2-5-02

TABLE 3-1

SUMMARY OF STATIC WATER LEVEL MEASUREMENTS
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Well ID	Screened Aquifer	Date Measured	Total Depth When Installed (ft. BGS)	Top of Casing Elevation (ft. MSL)	Depth to Water (ft. BTOC)	Water Level Elevation (ft. MSL)
AEHA- 18-B	Lower	9/18/2001	50.0	109.81	21.22	88.59
AEHA- 21-B	Lower	9/18/2001	50.0	110.46	15.58	94.88
AEHA- 23-B	Lower	9/18/2001	52.0	115.85	22.68	93.17
AEHA- 24-B	Lower	9/18/2001	52.0	113.44	21.71	91.73
AEHA- 25-B	Lower	9/18/2001	52.0	110.40	20.48	89.92
AEHA- 26-B	Lower	9/18/2001	55.0	107.46	16.89	90.57
AEHA- 27-B	Lower	9/18/2001	50.0	107.69	18.39	89.30
AEHA- 28-B	Lower	9/18/2001	50.0	111.21	21.54	89.67
AEHA- 30-B	Lower	9/18/2001	40.5	105.62	16.42	89.20
AEHA- 31-B	Lower	9/18/2001	50.0	107.52	18.49	89.03
AEHA- 32-B	Lower	9/18/2001	55.0	111.41	22.37	89.04
AEHA- 33-B	Lower	9/18/2001	60.0	115.94	26.02	89.92
LAW- MW-O	Lower	9/19/2001	52.1	115.86	28.32	87.54
USGS- C-2	Lower	9/20/2001	39.60	104.92	16.63	88.29
USGS- F-2	Lower	9/20/2001	37.50	102.27	13.76	88.51
USGS- G-2	Lower	9/20/2001	42.00	105.14	16.93	88.21
USGS- H-2	Lower	9/20/2001	42.00	104.74	16.52	88.22
USGS- I-2	Lower	9/20/2001	38.00	105.28	17.11	88.17
USGS- M-2	Lower	9/20/2001	46.00	105.24	17.17	88.07
USGS- N-1	Lower	9/20/2001	67.00	113.60	25.97	87.63
USGS- O-1	Lower	9/20/2001	63.90	111.52	23.92	87.60
USGS- O-2	Lower	9/20/2001	53.90	111.59	24.08	87.51
AEHA- 5	Upper	9/20/2001	23.9	125.95	9.41	116.54
AEHA- 12-A	Upper	9/18/2001	20.9	126.35	8.81	117.54
AEHA- 15-A	Upper	9/18/2001	21.0	113.87	10.87	103.00
AEHA- 16-A	Upper	9/18/2001	24.2	117.67	9.36	108.31
AEHA- 18-A	Upper	9/18/2001	13.5	109.77	8.02	101.75
AEHA- 22-A	Upper	9/18/2001	19.0	112.73	5.03	107.70
AEHA- 23-A	Upper	9/18/2001	20.0	115.85	7.42	108.43
AEHA- 24-A	Upper	9/18/2001	19.0	113.20	8.96	104.24
AEHA- 25-A	Upper	9/18/2001	18.1	110.61	7.69	102.92
AEHA- 26-A	Upper	9/18/2001	15.0	107.46	4.13	103.33
AEHA- 28-A	Upper	9/18/2001	19.0	111.29	5.89	105.40
AEHA- 30-A	Upper	9/18/2001	14.0	105.51	4.43	101.08
AEHA- 31-A	Upper	9/18/2001	14.5	107.33	5.72	101.61
AEHA- 32-A	Upper	9/18/2001	19.0	111.53	10.29	101.24
AEHA- 33-A	Upper	9/18/2001	24.1	115.81	7.31	108.50
AEHA- 34-A	Upper	9/18/2001	24.2	118.12	7.27	110.85
MWA- 5035	Upper	9/19/2001	20.0	116.93	11.18	105.75
MWA- 5036	Upper	9/19/2001	16.0	119.78	9.06	110.72
MWA- 5037	Upper	9/20/2001	16.0	121.03	4.86	116.17
MWA- 5038	Upper	9/20/2001	18.0	125.68	7.46	118.22
USGS- A-4	Upper	9/19/2001	6.50	102.82	5.31	97.51
USGS- F-4	Upper	9/19/2001	4.60	102.31	4.82	97.49
USGS- I-4	Upper	9/19/2001	17.00	110.90	14.68	96.22
USGS- M-4	Upper	9/20/2001	9.70	105.31	6.30	99.01

Notes:
Ft. BGS Feet below ground surface
Ft. MSL Feet above the mean sea level
Ft. BTOC Feet below top of casing

PREPARED/DATE: EMM 2/5/02
CHECKED/DATE: AWE 2-5-02

TABLE 3-2

RESULTS OF FIELD ANALYSES - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID:	AEHA-5	AEHA-12A	AEHA-15A	AEHA-16A	AEHA-18A	AEHA-22A	AEHA-23A	AEHA-24A	AEHA-25A	AEHA-26A
Sample Date:	9/26/2001	10/2/2001	10/2/2001	10/4/2001	10/4/2001	10/6/2000	10/3/2001	10/3/2001	10/4/2001	10/3/2001
FIELD MEASUREMENTS										
Oxidation Reduction Potential (mV)	-145	369	380	188	61	339	361	317	216	-106
Ferrous Iron (Hach Test[mg/L])	0.4	0	0	2.98	2.0	0.4	0	0	0.2	3.8
Specific Conductance (mS/cm)	1.13	0.089	0.065	0.092	0.23	0.068	0.085	0.131	0.06	0.312
pH (Standard pH Units)	6.69	4.16	4.41	5.52	5.19	4.21	4.28	4.62	4.8	6.19
Temperature (deg. Celsius)	19.79	23.52	22.71	21.45	21.03	26.15	24.47	27.07	26.58	30.89
Dissolved Oxygen (mg/L)	0	5.31	3.44	0.88	0	0.59	0.57	0.3	2.0	1.04

Notes:
mV millivolts
mg/L milligrams/liter
mS/cm milliSiemens/centimeter

TABLE 3-2

RESULTS OF FIELD ANALYSES - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID:	AEHA-28A	AEHA-30A	AEHA-31A	AEHA-32A	AEHA-33A	AEHA-34A	DMW-7A	DMW-9A	MWA50-35	MWA50-36
Sample Date:	10/4/2001	10/3/2001	10/3/2001	10/3/2001	10/3/2001	10/2/2001	10/16/2001	10/16/2001	9/25/2001	9/25/2001
FIELD MEASUREMENTS										
Oxidation Reduction Potential (mV)	276	61	-83	344	213	-65	321	228	-33	-64
Ferrous Iron (Hach Test[mg/L])	4.2	1.2	3.2	0	0	3.2	0	0	3.4	3
Specific Conductance (mS/cm)	0.99	0.107	0.403	0.089	0.052	0.133	0.056	0.072	0.434	1.81
pH (Standard pH Units)	4.4	5.64	6.08	4.99	4.77	5.66	4.7	4.68	5.74	6.44
Temperature (deg. Celsius)	27.82	25.7	25.07	25.07	25.56	25.72	22.1	18.71	19.06	21.01
Dissolved Oxygen (mg/L)	1.09	1.06	0	2.56	1.62	1.15	0.89	0	0	0

Notes:

mV millivolts
mg/L milligrams/liter
mS/cm milliSiemens/centimeter

TABLE 3-2

RESULTS OF FIELD ANALYSES - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID:	MWA50-37	MWA50-38	USGS-A4	USGS-J4	USGS-M4	USGS-I4
Sample Date:	9/25/2001	9/25/2001	10/3/2001	10/3/2001	9/28/2001	10/8/2001
FIELD MEASUREMENTS						
Oxidation Reduction Potential (mV)	-101	312	167	334	338	312
Ferrous Iron (Hach Test[mg/L])	0	0	1.4	0	0	0
Specific Conductance (mS/cm)	178	0.051	0.113	0.048	0.038	0.034
pH (Standard pH Units)	8.8	4.5	5.24	4.32	4.59	4.67
Temperature (deg. Celsius)	20.4	21.03	19.6	16.7	18.49	17.26
Dissolved Oxygen (mg/L)	031	1.64	2.91	0.19	4.26	2.37

Notes:

mV	millivolts
mg/L	milligrams/liter
mS/cm	milliSiemens/centimeter

PREPARED/DATE: EMM 2-5-02
CHECKED/DATE: AWE 2/5/02

TABLE 3-3

RESULTS OF FIELD ANALYSES - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID:	AEHA-18B	AEHA-21B	AEHA-23B	AEHA-24B	AEHA-25B	AEHA-26B	AEHA-27B	AEHA-28B	AEHA-30B	AEHA-31B
Sample Date:	9/26/2001	9/26/2001	9/26/2001	9/27/2001	9/27/2001	10/9/2001	9/27/2001	9/27/2001	9/27/2001	9/27/2001
FIELD MEASUREMENTS										
Oxidation Reduction Potential (mV)	81	148	55	58	59	-104	-26	95	-2	126
Ferrous Iron (Hach Test[mg/L])	0	0	0	0	0.3	0.1	0	0	3.0	0
Specific Conductance (mS/cm)	0.16	0.055	0.85	0.139	0.081	0.48	0.249	0.099	0.143	0.131
pH (Standard pH Units)	6.03	5.83	6.39	6.22	7.26	8.73	7.36	7.2	6.0	5.35
Temperature (deg. Celsius)	17.8	17.93	18.3	20.28	19.6	22.1	20.2	20.01	21.3	19.22
Dissolved Oxygen (mg/L)	1.64	1.93	1.93	2.94	0.76	0.88	1.66	0.55	0.31	0

Notes:
mV millivolts
mg/L milligrams/liter
mS/cm milliSiemens/centimeter

TABLE 3-3

RESULTS OF FIELD ANALYSES - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID:	AEHA-32B	AEHA-33B	LAWMW-Q	USGS-B2	USGS-C2	USGS-F2	USGS-G3	USGS-H2	USGS-M2	USGS-N1
Sample Date:	9/27/2001	9/26/2001	9/28/2001	9/28/2001	9/28/2001	9/25/2001	10/8/2001	9/28/2001	9/28/2001	9/28/2001
FIELD MEASUREMENTS										
Oxidation Reduction Potential (mV)	13	-37	-10	137	72	90	36	88	135	18
Ferrous Iron (Hach Test[mg/L])	0.6	1.0	1.3	0.75	0.41	0.5	1.6	0.3	0	0.8
Specific Conductance (mS/cm)	0.154	0.225	0.113	0.053	0.092	0.127	0.085	0.074	0.077	0.159
pH (Standard pH Units)	6.24	6.92	6.32	5.76	5.53	6.0	5.91	6.34	5.54	6.23
Temperature (deg. Celsius)	17.5	20.5	15.34	15.6	14.69	14.89	14.4	14.7	14.53	14.68
Dissolved Oxygen (mg/L)	0	0	0	0	0	0.64	0	0	0	0

Notes:
mV millivolts
mg/L milligrams/liter
mS/cm milliSiemens/centimeter

PREPARED/DATE: EMM 2-5-02
CHECKED/DATE: AWE 2-5-02

TABLE 3-4

POSITIVE RESULTS TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:		Practical (a) Quantitation Limit	Sample AEHA-5 9/26/2001	Duplicate AEHA-5 9/26/2001	Sample AEHA-12A 10/2/2001	Sample AEHA-15A 10/2/2001	Sample AEHA-16A 10/4/2001	Sample AEHA-18A 10/4/2001	Sample AEHA-22A 10/4/2001	Sample AEHA-23A 10/3/2001	Duplicate AEHA-23A 10/3/2001	Sample AEHA-24A 10/3/2001	Sample AEHA-25A 10/4/2001	Duplicate AEHA-25 10/4/2001
FIXED BASE LABORATORY ANALYSIS:														
Anions - MCAWW 300.3A mg/L:														
Chloride		1	32.8	35.2	7.7	NA	NA	14	NA	17	17.3	NA	5.5	5.6
Nitrate		0.1	<0.1	<0.1	2.3	NA	NA	<0.1	NA	0.02 JQ	0.02 JQ	NA	<0.1	<0.1
Sulfate		1	0.86	1.3	2.4	NA	NA	34.4	NA	4	4.4	NA	8.4	8.6
Dissolved Gases - RSK SOP-175 mg/L:														
Carbon dioxide		0.001	97	100	45 J	NA	NA	230 J	NA	100 J	110 J	NA	83 J	78 J
Ethane		0.002	0.00038 JQ	0.00038 JQ	<0.002	NA	NA	<0.002	NA	<0.002	<0.002	NA	<0.002	<0.002
Ethene		0.001	<0.001	<0.001	<0.001	NA	NA	<0.001	NA	<0.001	<0.001	NA	<0.001	<0.001
Methane		0.001	5.3	5.8	<0.001	NA	NA	0.013	NA	0.0019 JB	0.0016 JB	NA	0.025	0.02
Dissolved Hydrogen by Microseeps AM20GA nM/L:														
Hydrogen		0.03	8.1	7.5	11	NA	NA	2.3	NA	5.9 J	2.4 J	NA	8.6 J	14 J
Mercury - SW846 7470A (Dissolved) ug/L:														
Mercury	Not Detected	1												
Mercury - SW846 7470A (Total) ug/L:														
Mercury	Not Detected	1												
Metals - SW846 6010B (Dissolved) ug/L:														
Aluminum		200	71.3 JB	45.1 JB	<200 UJ	<200 UJ	199 JB	91.5 JB	301 JB	456 JB	467 JB	85.4 JB	101 JB	105 JB
Antimony		5	<5	<5	<5 UJ	<5 UJ	<5	<5	<5	<5 UJ	<5 UJ	3.3 JQ	<5	<5
Arsenic		5	5.1	4.2 JB	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Barium		200	123 JQ	101 JQ	110 JQ	83 JQ	64.4 JQ	61.9 JQ	71 JQ	109 JQ	124 JQ	25.9 JQ	18.4 JQ	19.4 JQ
Beryllium		10	<10	<10	<10	<10	<10	<10	0.55 JB	<10	<10	<10	<10	<10
Cadmium		2	<2	<2	<2	<2	<2	0.48 JQ	0.32 JQ	<2	<2	<2	0.58 JQ	0.66 JQ
Calcium		5000	6140	4720 JQ	811 JQ	963 JQ	5620	5090	3260 JQ	3110 JQ	3210 JQ	1280 JQ	4720 JQ	4950 JQ
Cobalt		30	<30	<30	3.7 JQ	2.4 JB	2 JQ	42.8	2.1 JQ	1.9 JB	2.5 JB	1.4 JB	2.1 JQ	1.5 JQ
Iron		200	10800	11300	<200	<200	5070	23500	207	333 J	451 J	<200	311	310
Lead		3	<3	<3	<3	<3	<3 UJ	<3 UJ	2.8 JQ	2.9 JQ	2.7 JQ	<3	<3 UJ	<3 UJ
Magnesium		5000	3930 JQ	3100 JQ	2000 JQ	984 JQ	1790 JQ	3000 JQ	1600 JQ	1610 JQ	1790 JQ	947 JQ	916 JQ	957 JQ
Manganese		20	96.3	74.9	35.8	98	44.4 J	2780	83.3	58.6	62.6	98.2	43.5	45.4 JQ
Molybdenum		40	3.2 JB	3.6 JB	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40
Nickel		100	4.5 JB	4.4 JB	2.5 JQ	<100	<100	<100	<100	<100	<100	<100	<100	<100
Potassium		5000	1990 JQ	1660 JQ	2220 JQ	1870 JQ	1190 JQ	3150 JQ	1400 JQ	1600 JQ	1690 JQ	1830 JQ	1790 JQ	1880 JQ
Selenium		5	<5	5.5	<5	<5	5.6 JB	<5	<5	<5	<5	<5	<5	5.1 JB
Sodium		5000	329000	353000	3230 JQ	6510	6570 J	16300	3350 JQ	6020	6470	13400	2660 JQ	2760 JQ
Vanadium		50	0.98 JB	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Zinc		20	<20	<20	<20	<20	<20	17 JB	32.8 JB	18.7 JQ	<20	<20	17.9 JB	14.4 JB

TABLE 3-4

POSITIVE RESULTS TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-5 9/26/2001	Duplicate AEHA-5 9/26/2001	Sample AEHA-12A 10/2/2001	Sample AEHA-15A 10/2/2001	Sample AEHA-16A 10/4/2001	Sample AEHA-18A 10/4/2001	Sample AEHA-22A 10/4/2001	Sample AEHA-23A 10/3/2001	Duplicate AEHA-23A 10/3/2001	Sample AEHA-24A 10/3/2001	Sample AEHA-25A 10/4/2001	Duplicate AEHA-25 10/4/2001
FIXED BASE LABORATORY ANALYSIS:													
Metals - SW846 6010B (Total) ug/L:													
Aluminum	200	585 JB	120 JB	<200 UJ	62.4 JQ	6350	78 JB	713 JB	632	506 J	103 JB	116 JB	118 JB
Antimony	5	<5	<5	2.5 JQ	2.5 JQ	<5	<5	<5	<5 UJ	<5 UJ	<5 UJ	<5	<5
Arsenic	5	<5	4.2 JB	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	200	144 JQ	124 JQ	104 JQ	87.3 JQ	74.7 JQ	63.7 JQ	72.6 JQ	107 JQ	110 JQ	26.9 JQ	18.2 JQ	17.7 JQ
Beryllium	10	<10	<10	<10	<10	0.76 JB	<10	<10	<10	<10	<10	<10	<10
Cadmium	2	<2	<2	<2	<2	0.3 JQ	0.52 JQ	0.29 JQ	<2	<2	<2	0.79 JQ	0.79 JQ
Calcium	5000	7170	5800	817 JQ	1070 JQ	5840	5180	3390 JQ	3110 JQ	3090 JQ	1360 JQ	4870 JQ	4910 JQ
Chromium	10	<10	<10	<10	<10	3.9 JQ	<10	<10	<10	<10	<10	<10	<10
Cobalt	30	<30	<30	3.6 JQ	2.3 JB	2.5 JQ	43.1	2.2 JQ	2.1 JB	2 JB	1.5 JB	1.7 JQ	1.7 JQ
Copper	10	<10	<10	<10	<10	7.9 JQ	<10	<10	<10	<10	<10	5.4 JQ	<10
Iron	200	14600	13900	<200	126 JQ	13100	24000	659	402	335	<200	516	540
Lead	3	<3	<3	<3	<3	9.2 J	<3 UJ	4.9 J	3.6	3.4	<3	<3 UJ	<3 UJ
Magnesium	5000	4430 JQ	3700	1900 JQ	1080 JQ	1910 JQ	3080 JQ	1640 JQ	1610 JQ	1630 JQ	986 JQ	919 JQ	890 JQ
Manganese	20	110	90.3	33.7	115 JQ	47.4 J	2820	85.7	56.6	57.5	103	43.7	43.5
Molybdenum	40	5.4 JB	5.4 JB	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40
Nickel	100	5.2 JB	5.5 JB	<100	<100	2.6 JQ	<100	<100	2.3 JB	<100	<100	<100	<100
Potassium	5000	2250 JQ	1940 JQ	2110 JQ	1980 JQ	1550 JQ	3220 JQ	1460 JQ	1650 JQ	1640 JQ	1870 JQ	1820 JQ	1830 JQ
Selenium	5	<5	<5	<5	<5	5.7 JB	5.4 JB	<5	<5	<5	<5	<5	<5
Sodium	5000	346000	376000	3060 JQ	7070	9320	16500	3380 JQ	6190	6150	13600	2550 JQ	2490 JQ
Vanadium	50	1.7 JB	0.87 JB	<50	<50	6.8 JQ	<50	<50	<50	<50	<50	0.86 JB	<50
Zinc	20	<20	46.1	70.1 JB	<20	17.2 JB	<20	36.1 JB	13.7 JQ	<20	<20	17.8 JB	13.5 JB
Thallium - SW846 7841 (Dissolved) ug/L:													
Thallium	2	2.8 JB	4.5 JB	<2 UJ	<2 UJ	<2	1.9 JB	<2	<2 UJ	<2 UJ	2.2 JB	<2	<2
Thallium - SW846 7841 (Total) ug/L:													
Thallium	2	2.1 JB	2.7 JB	<2 UJ	<2 UJ	<2	<2	<2	<2 UJ	<2 UJ	3.2 JB	<2	<2
Total Alkalinity - MCAWW 310.1 mg/L:													
Total Alkalinity	5	610	710	1.7 JB	NA	NA	37	NA	1.4 JB	2 JB	NA	6.8 JB	7.1 JB
Total Organic Carbon - SW846 9060 mg/L:													
Total Organic Carbon	1	170	190	<1 UJ	NA	NA	2	NA	<1 UJ	<1 UJ	NA	3	3
Total Sulfide - MCAWW 376.1 mg/L:													
Total Sulfide	1	<1	<1	<1	NA	NA	<1	NA	<1	<1	NA	<1	1.1

TABLE 3-4

POSITIVE RESULTS TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quartitation Limit	Sample AEHA-5 9/26/2001	Duplicate AEHA-5 9/26/2001	Sample AEHA-12A 10/2/2001	Sample AEHA-15A 10/2/2001	Sample AEHA-16A 10/4/2001	Sample AEHA-18A 10/4/2001	Sample AEHA-22A 10/4/2001	Sample AEHA-23A 10/3/2001	Duplicate AEHA-23A 10/3/2001	Sample AEHA-24A 10/3/2001	Sample AEHA-25A 10/4/2001	Duplicate AEHA-25 10/4/2001
FIXED BASE LABORATORY ANALYSIS:													
Volatile Organic Compounds - SW846 8260B ug/L:													
1,1-Dichloroethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
1,1-Dichloroethene	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
1,2,4-Trimethylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
1,2-Dichlorobenzene	1	7.4	7.3 JQ	<1	<1.7	<1	0.12 JQ	<1	<1	<1	<5	<1	<1
1,2-Dichloroethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	1.1 JQ	0.23 JQ	0.22 JQ
1,2-Dichloroethene (total)	1	NA	NA	NA	NA	NA	2.2	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
1,3,5-Trimethylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
1,3-Dichlorobenzene	1	2.4 JQ	2.5 JQ	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
1,4-Dichlorobenzene	1	24	28	<1	<1.7	<1	<1	<1	<1	<1	1.4 JQ	<1	<1
Acetone	10	<100	<100	<10	<17	<10	1.1 JL	<10	<10	<10	<50	<10	<10
Benzene	1	2.7 JQ	2.9 JQ	<1	<1.7	<1	<1	<1	<1	<1	<5	0.18 JQ	0.2 JQ
Bromodichloromethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
Carbon disulfide	1	5.7 JL	<10 UL	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
Chlorobenzene	1	200	200	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
Chloroform	1	<10	<10	<1	1.5 JB	<1	<1	<1	<1	<1	1.8 JQ	<1	<1
cis-1,2-Dichloroethene	0.5	<5	<5	<0.5	<0.84	<0.5	2.2	<0.5	6.7	5.9	160	29	30
Ethylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
Isopropylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
m-Xylene & p-Xylene	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
n-Butylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
n-Propylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
Naphthalene	1	8.9 JQ	9.3 JQ	<1 UJ	<1.7	<1	<1	<1	<1 UJ	<1 UJ	<5 UJ	<1	<1
sec-Butylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1
Tetrachloroethene	1	<10	<10	<1	<1.7	<1	0.84 JQ	<1	<1	<1	19	3.8	4.2
Toluene	1	<10	<10	<1	<1.7	0.27 JQ	<1	<1	<1	0.23	<5	0.28 JQ	0.3 JQ
trans-1,2-Dichloroethene	0.5	<5	<5	<0.5	<0.84	<0.5	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5
Trichloroethene	1	<10	<10	<1	45	<1	1.1	<1	0.26 JQ	0.21	180	33	34
Vinyl chloride	2	<20	<20	<2	<3.3	<2	<2	<2	1.1 JQ	0.87	5.3 JQ	1.3 JQ	1.3 JQ
Xylenes (total)	1	<10	<10	<1	<1.7	<1	<1	<1	<1	<1	<5	<1	<1

TABLE 3-4

POSITIVE RESULTS TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:		Practical (a) Quantitation Limit	Sample AEHA-26A 10/3/2001	Sample AEHA-28A 10/4/2001	Sample AEHA-30A 10/3/2001	Sample AEHA-31A 10/3/2001	Sample AEHA-32A 10/3/2001	Sample AEHA-33A 10/3/2001	Sample AEHA-34A 10/2/2001	Sample DMW-7A 10/16/2001	Sample DMW-9A 10/16/2001	Sample MWA50-35 9/25/2001	Sample MWA50-36 9/25/2001
FIXED BASE LABORATORY ANALYSIS:													
Anions - MCAWW 300.3A mg/L:													
Chloride		1	NA	140	6	2.4	15.5	NA	NA	NA	7.1	20.9	NA
Nitrate		0.1	NA	<0.1	<0.1	<0.1	1.4	NA	NA	NA	0.43	<0.1	NA
Sulfate		1	NA	1.8	11.3	<1	1.3	NA	NA	NA	8.4	27.9	NA
Dissolved Gases - RSK SOP-175 mg/L:													
Carbon dioxide		0.001	NA	260 J	110 J	120 J	110 J	NA	NA	NA	NA	260	NA
Ethane		0.002	NA	0.0042	<0.002	<0.002	<0.002	NA	NA	NA	<0.002	0.0032	NA
Ethene		0.001	NA	0.02	<0.001	<0.001	<0.001	NA	NA	NA	<0.001	<0.001	NA
Methane		0.001	NA	0.21	0.049	1.6	0.003 JB	NA	NA	NA	0.0046	0.33	NA
Dissolved Hydrogen by Microseeps AM20GA nM/L:													
Hydrogen		0.03	NA	9.9	7.9	11	6.1	NA	NA	NA	1.9	8.7	NA
Mercury - SW846 7470A (Dissolved) ug/L:													
Mercury	Not Detected	1											
Mercury - SW846 7470A (Total) ug/L:													
Mercury	Not Detected	1											
Metals - SW846 6010B (Dissolved) ug/L:													
Aluminum		200	100 JB	553 JB	<200	<200	126 JB	134 JB	<200 UJ	<200	118 JQ	37.8 JB	52.6 JB
Antimony		5	<5 UJ	<5	2.7 JQ	<5 UJ	<5 UJ	<5 UJ	<5 UJ	2.9 JQ	2.7 JQ	<5	<5
Arsenic		5	<5	<5	5.1	4.6 JQ	<5	<5	<5	<5	<5	<5	<5
Barium		200	45.2 JQ	200	34.6 JQ	460	30.8 JQ	12.7 JQ	24.1 JQ	62 JQ	45.3 JQ	58.2 JQ	15.4 JQ
Beryllium		10	<10	0.99 JB	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium		2	<2	0.65 JQ	2	<2	0.81 JQ	<2	<2	<2	<2	<2	<2
Calcium		5000	18400	14600	3410 JQ	62500	940 JQ	1810	7920	1060 JQ	3740 JQ	30500	3000 JQ
Cobalt		30	7.6 JQ	49.1	4.2 JQ	<30	<30	<30	2.1 JB	13 JB	<30	3.8 JQ	<30
Iron		200	23900	2220	2440	17800	<200	<200	19400	<200	<200	31400	5940
Lead		3	<3	<3 UJ	<3	<3	<3	<3	<3	<3	<3	<3	<3
Magnesium		5000	3090	8120	602	5250	950 JQ	911	1220 JQ	836 JQ	1480 JQ	5230	437 JQ
Manganese		20	598 J	1880	119	375	17.6 JQ	28	235	21.8	26.4	224	22.8
Molybdenum		40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40
Nickel		100	<100	8.8 JQ	4 JB	<100	<100	<100	<100	<100	3.1 JB	5.1 JQ	4 JQ
Potassium		5000	2550	4980 JQ	2400 JQ	8220	1800 JQ	1370 JQ	1280 JQ	1960 JQ	1580 JQ	2770 JQ	691 JB
Selenium		5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	4.7 JQ
Sodium		5000	5900	50300	4480 JQ	5320	11300	2420 JQ	3880 JQ	4800 JQ	3340 JQ	20500	428000
Vanadium		50	<50	<50	<50	<50	<50	<50	1 JB	<50	<50	<50	<50
Zinc		20	<20	34.9 JB	343	<20	22.4	16.1 JQ	24.4 JB	<20	22.1	<20	<20

TABLE 3-4

POSITIVE RESULTS TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-26A 10/3/2001	Sample AEHA-28A 10/4/2001	Sample AEHA-30A 10/3/2001	Sample AEHA-31A 10/3/2001	Sample AEHA-32A 10/3/2001	Sample AEHA-33A 10/3/2001	Sample AEHA-34A 10/2/2001	Sample DMW-7A 10/16/2001	Sample DMW-9A 10/16/2001	Sample MWA50-35 9/25/2001	Sample MWA50-36 9/25/2001
FIXED BASE LABORATORY ANALYSIS:												
Metals - SW846 6010B (Total) ug/L:												
Aluminum	200	<200	2910	335 JB	323 JB	238 JB	2920 JH	<200 UJ	<200	163 JQ	50.6 JB	759 JB
Antimony	5	<5 UJ	<5	3.7 JQ	<5 UJ	<5 UJ	<5 UJ	2.3 JQ	2.6 JQ	2.7 JQ	<5	<5
Arsenic	5	<5	<5	8.1	5	<5	<5	4.1 JQ	<5	<5	<5	<5
Barium	200	34.7 JQ	194 JQ	38.5 JQ	462	32.7 JQ	20.8 JQ	24.4 JQ	63.2 JQ	49.1 JQ	66.4 JQ	19.1 JQ
Beryllium	10	<10	1.1 JB	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium	2	<2	0.76 JQ	3.7	0.72 JQ	0.72 JQ	<2	<2	<2	<2	<2	<2
Calcium	5000	16600	14600	4110 JQ	61800	949 JQ	2420 JQ	8290	1580 JQ	3940 JQ	34700	3150 JQ
Chromium	10	<10	2.6 JQ	<10	<10	<10	5.7 JQ	<10	<10	<10	<10	3 JQ
Cobalt	30	4.2 JQ	46.8	4.6 JQ	<30	<30	1.4 JB	2.2 JB	<30	<30	4.1 JQ	<30
Copper	10	<10	9 JQ	<10	7.9 JQ	7.1 JQ	7.8 JQ	<10	40	<10	<10	<10
Iron	200	27500	5590	3280	18200	144 JQ	3810	20500	<200	92.7 JQ	35200	7250
Lead	3	<3	4 J	3.4	2.5 JQ	<3	4.9	<3	<3	<3	<3	<3
Magnesium	5000	2290	7880	682	5210	1010 JQ	1180	1270 JQ	856 JQ	1610 JQ	5960	470 JQ
Manganese	20	422 J	1790	140	372	18.8 JQ	34.9	234	22	27.8	252	23.8
Molybdenum	40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40
Nickel	100	<100	9 JQ	5.9 JQ	<100	<100	2.5 JB	2.6 JQ	<100	2.7 JB	6.3 JQ	3.9 JQ
Potassium	5000	2080 JQ	4980 JQ	2510 JQ	8180	1870 JQ	1750 JQ	1270 JQ	1980 JQ	1660 JQ	3150 JQ	771 JQ
Selenium	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	4.9 JQ
Sodium	5000	4300	50300	4600	5180	11500	5330	3810 JQ	4860 JQ	3700 JQ	23300	454000
Vanadium	50	<50	4.1 JB	1.6 JB	1.5 JB	<50	5.7 JQ	1.1 JB	<50	<50	<50	2.2 JB
Zinc	20	<20	39.6 JB	485	17.1 JQ	20.7	39.9	18.6 JB	35.9	24.2	<20	15.7 JQ
Thallium - SW846 7841 (Dissolved) ug/L:												
Thallium	2	<2 UJ	<2	<2 UJ	<2 UJ	<2 UJ	1.7 JB	<2 UJ	<2	<2	<2	<2
Thallium - SW846 7841 (Total) ug/L:												
Thallium	2	1.7 JB	<2	<2 UJ	<2 UJ	2.1 JB	2.2 JB	<2 UJ	<2	<2	<2	<2
Total Alkalinity - MCAWW 310.1 mg/L:												
Total Alkalinity	5	NA	3.8 JB	11	190	3.8 JB	NA	NA	NA	7.3 JB	120	NA
Total Organic Carbon - SW846 9060 mg/L:												
Total Organic Carbon	1	NA	2	3	6	<1 UJ	NA	NA	NA	0.5 JQ	5	NA
Total Sulfide - MCAWW 376.1 mg/L:												
Total Sulfide	1	NA	1.5	<1	1.1	1.5	NA	NA	NA	<1	<1	NA

TABLE 3-4

POSITIVE RESULTS TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-26A 10/3/2001	Sample AEHA-28A 10/4/2001	Sample AEHA-30A 10/3/2001	Sample AEHA-31A 10/3/2001	Sample AEHA-32A 10/3/2001	Sample AEHA-33A 10/3/2001	Sample AEHA-34A 10/2/2001	Sample DMW-7A 10/16/2001	Sample DMW-9A 10/16/2001	Sample MWA50-35 9/25/2001	Sample MWA50-36 9/25/2001
FIXED BASE LABORATORY ANALYSIS:												
Volatile Organic Compounds - SW846 8260B ug/L:												
1,1-Dichloroethane	1	<1	22 JQ	<1	<1	0.73 JQ	<1	<1	0.18 JQ	<1	0.35 JQ	<1
1,1-Dichloroethene	1	<1	29 JQ	<1	<1	1.3 JQ	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	1	<1	<50	<1	<1	<4	<1	0.65 JQ	0.17 JQ	<1	<1	<1
1,2-Dichlorobenzene	1	<1	37 JQ	<1	<1	0.51 JQ	<1	<1	<1	<1	1.5	<1
1,2-Dichloroethane	1	<1	21 JQ	<1	<1	0.97 JQ	<1	<1	<1	<1	<1	<1
1,2-Dichloroethene (total)	1	NA	NA	NA	NA	29	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	1	<1	<50	<1	<1	<4	<1	<1	<1	<1	<1	0.19 JQ
1,3,5-Trimethylbenzene	1	<1	<50	<1	<1	<4	<1	0.24 JQ	<1	<1	<1	<1
1,3-Dichlorobenzene	1	<1	11 JQ	<1	<1	<4	<1	<1	<1	<1	0.2 JQ	<1
1,4-Dichlorobenzene	1	<1	150	<1	<1	0.85 JQ	<1	<1	<1	<1	1	<1
Acetone	10	1.9 JQ	<500	2.3 JQ	1.2 JQ	<40 UL	<10	1.4 JQ	0.93 JB	0.57 JB	<10	<10
Benzene	1	<1	<50	<1	<1	<4	<1	0.45 JQ	<1	<1	<1	1.2
Bromodichloromethane	1	<1	<50	<1	<1	<4	<1	<1	0.32 JB	<1	<1	<1
Carbon disulfide	1	<1	<50	<1	<1	<4	<1	<1	<1	<1	0.27 JL	<1 UL
Chlorobenzene	1	<1	230	<1	<1	0.64 JQ	<1	<1	<1	<1	4.2	<1
Chloroform	1	<1	69	<1	<1	2.9 JQ	<1	0.25 JB	6.1 JB	<1	<1	<1
cis-1,2-Dichloroethene	0.5	0.97	1400	18	0.83	29	<0.5	<0.5	<0.5	<0.5	23	<0.5
Ethylbenzene	1	<1	<50	<1	<1	<4	<1	0.42 JQ	0.15 JQ	<1	<1	<1
Isopropylbenzene	1	<1	<50	<1	<1	<4	<1	2.8	<1	<1	<1	<1
m-Xylene & p-Xylene	1	<1	<50	<1	<1	<4	<1	<1	0.46 JQ	<1	<1	<1
n-Butylbenzene	1	<1	<50	<1	<1	<4	<1	0.43 JQ	<1	<1	<1	<1
n-Propylbenzene	1	<1	<50	<1	<1	<4	<1	1.1	<1	<1	<1	<1
Naphthalene	1	<1 UJ	<50	<1 UJ	<1 UJ	<4 UJ	<1 UJ	3.4	<1	<1	<1	<1
sec-Butylbenzene	1	<1	<50	<1	<1	<4	<1	2	<1	<1	<1	0.1 JQ
Tetrachloroethene	1	<1	170	<1	<1	6.2	<1	<1	0.35 JQ	0.23 JQ	6.3	<1
Toluene	1	<1	<50	<1	<1	<4	<1	<1	0.39 JQ	<1	0.19 JQ	<1
trans-1,2-Dichloroethene	0.5	<0.5	<25	0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	0.32 JQ	<0.5
Trichloroethene	1	<1	1900	1.9	<1	83	<1	<1	0.37 JQ	0.16 JQ	13	<1
Vinyl chloride	2	<2	96 JQ	7.2	3.1	1.5 JQ	<2	<2	<2	<2	2.5	<2
Xylenes (total)	1	<1	<50	<1	<1	<4	<1	<1	0.46 JQ	<1	<1	<1

TABLE 3-4

POSITIVE RESULTS TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:		Practical (a) Quantitation Limit	Sample MWA50-37 9/25/2001	Sample MWA50-38 9/25/2001	Sample USGS-A4 10/3/2001	Sample USGS-I4 10/8/2001	Sample USGS-J4 10/3/2001	Sample USGS-M4 9/28/2001
FIXED BASE LABORATORY ANALYSIS:								
Anions - MCAWW 300.3A mg/L:								
Chloride		1	46.3	NA	7.7	NA	7.6	NA
Nitrate		0.1	<0.1	NA	0.07 JQ	NA	0.09 JQ	NA
Sulfate		1	16.8	NA	10.8	NA	2.4	NA
Dissolved Gases - RSK SOP-175 mg/L:								
Carbon dioxide		0.001	86	NA	88 J	NA	73 J	NA
Ethane		0.002	0.0069	NA	<0.002	NA	<0.002	NA
Ethene		0.001	<0.001	NA	<0.001	NA	<0.001	NA
Methane		0.001	6.8	NA	0.014	NA	0.00055 JB	NA
Dissolved Hydrogen by Microseeps AM20GA nM/L:								
Hydrogen		0.03	6.4	NA	NA	NA	NA	NA
Mercury - SW8467470A (Dissolved) ug/L:								
Mercury	Not Detected	1						
Mercury - SW8467470A (Total) ug/L:								
Mercury	Not Detected	1						
Metals - SW846 6010B (Dissolved) ug/L:								
Aluminum		200	55.5 JB	44.7 JB	90.9 JB	92.1 JB	<200	<200 UJ
Antimony		5	<5	<5	<5 UJ	<5	<5 UJ	2.6 JQ
Arsenic		5	<5	<5	<5	<5	<5	<5
Barium		200	158 JQ	120 JQ	35.6 JQ	24 JQ	19 JQ	34.4 JQ
Beryllium		10	<10	<10	<10	<10	<10	<10
Cadmium		2	<2	<2	0.29 JQ	<2	<2	<2
Calcium		5000	119000	1250 JQ	9800	701 JQ	2360 JQ	736 JQ
Cobalt		30	<30	<30	3.1 JB	<30	6.5 JQ	<30
Iron		200	975	<200	1990	<200	<200	<200
Lead		3	<3	<3	<3	<3 UJ	<3	<3
Magnesium		5000	134000	1240 JQ	1860 JQ	487 JQ	1060	580 JQ
Manganese		20	595	28.6	65.7	29.3	26.7	66.1
Molybdenum		40	2.9 JB	<40	<40	<40	<40	<40
Nickel		100	3.6 JQ	<100	3.1 JB	<100	<100	<100
Potassium		5000	13600	1770 JQ	3250 JQ	770 JB	1870 JQ	1280 JQ
Selenium		5	<5	5.1	<5	<5	<5	<5
Sodium		5000	147000	3210 JQ	5590	4070 JQ	3500 JQ	3090 JQ
Vanadium		50	6.3 JQ	<50	<50	<50	<50	<50
Zinc		20	<20	<20	35	<20	23.6	<20

TABLE 3-4

POSITIVE RESULTS TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Sample MWA50-37 9/25/2001	Sample MWA50-38 9/25/2001	Sample USGS-A4 10/3/2001	Sample USGS-I4 10/8/2001	Sample USGS-J4 10/3/2001	Sample USGS-M4 9/28/2001
FIXED BASE LABORATORY ANALYSIS:							
Metals - SW846 6010B (Total) ug/L:							
Aluminum	200	57.4 JB	62 JB	3100	97 JB	19800	<200 UJ
Antimony	5	<5	<5	<5 UJ	<5	2.8 JQ	<5 UJ
Arsenic	5	<5	<5	<5	<5	9.5	<5
Barium	200	158 JQ	135 JQ	47.4 JQ	26.2 JQ	71.6 JQ	36.9 JQ
Beryllium	10	<10	<10	<10	<10	<10	<10
Cadmium	2	<2	<2	<2	<2	<2	<2
Calcium	5000	115000	1250 JQ	9370	849 JQ	3830 JQ	625 JQ
Chromium	10	1.9 JQ	<10	4.6 JB	<10	33.6	<10
Cobalt	30	<30	<30	2 JB	1.5 JQ	7.6 JQ	1.4 JB
Copper	10	<10	<10	9 JQ	<10	20.3	<10
Iron	200	1260	<200	8450	<200	40100	<200
Lead	3	<3	<3	7.8	<3 UJ	14.7	<3
Magnesium	5000	130000	1310 JQ	1810 JQ	531 JQ	2460 JQ	552 JQ
Manganese	20	542	31	63	32.7	71.2	67.2
Molybdenum	40	3 JB	<40	<40	<40	<40	<40
Nickel	100	5 JQ	<100	4.6 JB	<100	8.6 JQ	<100
Potassium	5000	12700	1930 JQ	3770 JQ	813 JQ	4370 JQ	1370 JQ
Selenium	5	<5	<5	<5	4.9 JB	<5	<5
Sodium	5000	137000	3420 JQ	8350	4390 JQ	7110	3340 JQ
Vanadium	50	7 JQ	<50	7.5 JQ	<50	39.5 JQ	<50
Zinc	20	<20	<20	75.7	<20	110	<20
Thallium - SW846 7841 (Dissolved) ug/L:							
Thallium	2	<2	<2	<2 UL	<2	<2 UJ	<2 UJ
Thallium - SW846 7841 (Total) ug/L:							
Thallium	2	<2	<2	<2 UJ	<2	<2 UJ	<2 UJ
Total Alkalinity - MCAWW 310.1 mg/L:							
Total Alkalinity	5	1100	NA	17 JB	NA	6.4 JB	NA
Total Organic Carbon - SW846 9060 mg/L:							
Total Organic Carbon	1	27	NA	4	NA	2	NA
Total Sulfide - MCAWW 376.1 mg/L:							
Total Sulfide	1	<1	NA	<1	NA	<1	NA

TABLE 3-4

POSITIVE RESULTS TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample MWA50-37 9/25/2001	Sample MWA50-38 9/25/2001	Sample USGS-A4 10/3/2001	Sample USGS-I4 10/8/2001	Sample USGS-J4 10/3/2001	Sample USGS-M4 9/28/2001
FIXED BASE LABORATORY ANALYSIS:							
Volatile Organic Compounds - SW846 8260B ug/L:							
1,1-Dichloroethane	1	1.2	<1	0.29 JQ	<1	<1	<1
1,1-Dichloroethene	1	<1	<1	0.55 JQ	<1 UJ	<1	<1
1,2,4-Trimethylbenzene	1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	1	0.21 JQ	<1	0.25 JQ	<1	<1	<1
1,2-Dichloroethane	1	0.92 JQ	<1	0.46 JQ	<1	<1	<1
1,2-Dichloroethene (total)	1	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	1	0.48 JQ	<1	0.92 JQ	<1	<1	<1
Acetone	10	0.85 JQ	<10	<10	0.61 JB	0.6 JQ	<10
Benzene	1	0.37 JQ	<1	<1	<1	<1	<1
Bromodichloromethane	1	<1	<1	<1	<1	<1	<1
Carbon disulfide	1	<1 UL	<1 UL	<1	<1 R	<1	<1
Chlorobenzene	1	2.3	<1	1.6	<1	<1	<1
Chloroform	1	<1	<1	0.39 JQ	0.2 JB	<1	0.16 JB
cis-1,2-Dichloroethene	0.5	7.7	<0.5	23	<0.5	<0.5	<0.5
Ethylbenzene	1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	1	<1	<1	<1	<1	<1	<1
m-Xylene & p-Xylene	1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	1	<1	<1	<1	<1	<1	<1
n-Propylbenzene	1	<1	<1	<1	<1	<1	<1
Naphthalene	1	2.1	<1	<1 UJ	<1	<1 UJ	<1
sec-Butylbenzene	1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	1	<1	<1	1.4	<1	<1	<1
Toluene	1	0.38 JQ	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	0.5	0.19 JQ	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	1	2.9	<1	28	<1	0.15 JQ	<1
Vinyl chloride	2	5.4	<2	0.67 JQ	<2	<2	<2
Xylenes (total)	1	<1	<1	<1	<1	<1	<1

Notes:

J	Estimated
JB	Estimated; possibly biased high or false positive based on blank contamination
JH	Estimated; possibly biased high based on QC data
JL	Estimated; possibly biased low based on QC data
JQ	Estimated; Value is between reporting limit and detection limit
NA	Not Analyzed
R	Rejected
UJ	Undetected; Reported Detection Limit is imprecise
UL	Undetected; Data biased low - Reported Detection Limit is higher than indicated
(a)	Quantitation limits are ideal. Sample quantitation limits may vary due to sample volume/weight extracted and dilutions

PREPARED/DATE: RWB 2/5/02
CHECKED/DATE: JAH 2-5-02

TABLE 3-5

POSITIVE RESULTS TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:		Practical (a) Quantitation Limit	Sample AEHA-18B 9/26/2001	Sample AEHA-21B 9/26/2001	Sample AEHA-23B 9/27/2001	Sample AEHA-24B 9/27/2001	Sample AEHA-25B 9/27/2001	Duplicate AEHA-25B 9/27/2001	Sample AEHA-26B 10/9/2001	Sample AEHA-27B 9/27/2001	Sample AEHA-28B 9/27/2001
FIXED BASE LABORATORY ANALYSIS											
Anions - MCAWW 300.3A mg/L:											
Chloride		1	1.9	1.5	2.3	4.2	3.1	3.1	38.1	1.1	4
Nitrate		0.1	1.4	0.18	3.7	0.05 JQ	0.073 JQ	0.11	<0.1	0.32	<0.1
Sulfate		1	28.4	6.5	6	11.5	10	9.9	46.7	14.7	11.9
Dissolved Gases - RSK SOP-175 mg/L:											
Carbon dioxide		0.001	24	31	37 J	28 J	36 J	41 J	4.9 J	7.5 J	31 J
Methane		0.001	0.01	0.0012	0.00084 JB	0.00096 JB	0.0015 JB	0.0017 JB	0.0021	0.0088	0001 JB
Dissolved Hydrogen by Microseeps AM20GA nM/L:											
Hydrogen		0.03	7.6	5	1.9	8.2	7.8 J	5.4 J	1.3	2.8	2.1
Mercury - SW846 7470A (Dissolved) ug/L:											
Mercury	Not Detected	1									
Mercury - SW846 7470A (Total) ug/L:											
Mercury	Not Detected	1									
Metals - SW846 6010B (Dissolved) ug/L:											
Aluminum		200	38.6 JB	<200	36.6 JB	42.3 JB	38.1 JB	87.7 JB	122 JB	444 JB	75.7 JB
Antimony		5	<5	2.4 JB	<5	<5	<5	<5	<5	10.3	<5
Barium		200	19.3 JQ	10.9 JQ	16 JQ	16.7 JQ	15 JQ	15 JQ	51.6 JQ	34.4 JQ	19.5 JQ
Beryllium		10	<10	<10	<10	0.61 JB	0.66 JB	0.79 JB	<10	0.73 JB	0.86 JB
Cadmium		2	2.3	1.9 JQ	<2	<2	<2	<2	<2	1.9 JB	<2
Calcium		5000	13500	3650 JQ	7460	5390	4890 JQ	4420 JQ	15800	46000	4970 JQ
Copper		10	5.6 JQ	<10	<10	<10	<10	<10	<10	8.5	<10
Iron		200	433	<200	628	294	479	637	365	507 J	53.8 JQ
Lead		3	<3	<3	<3	<3	<3	<3	<3 UJ	5.6 JB	<3
Magnesium		5000	3020 JQ	1230 JQ	3690 JQ	3190 JQ	2340 JQ	2310 JQ	9390	1680 JQ	2840 JQ
Manganese		20	77.6	29.5	69.5	33.4	23.3	23.6	57.5	10.3 JQ	26.8
Nickel		100	3.3 JB	<100	<100	<100	<100	<100	<100	<100	<100
Potassium		5000	4440 JQ	2390 JQ	3110 JQ	3470 JQ	3560 JQ	3460 JQ	8020	11600	3350 JQ
Selenium		5	4.6 JQ	<5	<5	<5	<5	<5	<5	<5	<5
Sodium		5000	5540	3230 JQ	3950 JQ	9450	8420	7940	74200	5010	12400
Vanadium		50	<50	<50	0.98 JB	0.85 JB	<50	<50	<50	2.4 JB	<50
Zinc		20	23.6	<20	<20	<20	<20	<20	14 JB	23.7 JB	<20
Metals - SW846 6010B (Total) ug/L:											
Aluminum		200	266 JB	147 JB	78.8 JB	176 JB	69.7 JB	82.7 JB	1090	72.5 JB	10 JB
Antimony		5	<5	2.4 JB	<5	<5	<5	<5	<5	9.3	<5
Barium		200	20.6 JQ	14.7 JQ	21.1 JQ	20.5 JQ	14.2 JQ	14.8 JQ	57.4 JQ	30.2 JQ	21.3 JQ
Beryllium		10	<10	<10	<10	0.68 JB	0.75 JB	0.78 JB	<10	0.68 JB	0.89 JB
Cadmium		2	2.7	2.1	<2	<2	<2	<2	1.4 JQ	0.31 JB	<2
Calcium		5000	13800	3930 JQ	7530	5560	4510 JQ	4650 JQ	15900	45500	4840 JQ
Copper		10	8.1 JQ	<10	<10	<10	<10	<10	7.6 JQ	<10	<10
Iron		200	657	226	1420	902	533	580	1210	<200 J	258
Lead		3	5.4	<3	<3	4.1	<3	<3	6.7 J	<3	<3
Magnesium		5000	3070 JQ	1350 JQ	3730 JQ	3280 JQ	2190 JQ	2280 JQ	9450	1730 JQ	2820 JQ
Manganese		20	78.5	50.2	73.9	38.1	21.8	22.9	67.2	9.8 JQ	28.7

TABLE 3-5

POSITIVE RESULTS TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-18B 9/26/2001	Sample AEHA-21B 9/26/2001	Sample AEHA-23B 9/27/2001	Sample AEHA-24B 9/27/2001	Sample AEHA-25B 9/27/2001	Duplicate AEHA-25B 9/27/2001	Sample AEHA-26B 10/9/2001	Sample AEHA-27B 9/27/2001	Sample AEHA-28B 9/27/2001
FIXED BASE LABORATORY ANALYSIS										
Nickel	100	3.9 JB	<100	<100	<100	<100	<100	<100	<100	<100
Potassium	5000	4580 JQ	2600 JQ	3100 JQ	3450 JQ	3310 JQ	3450 JQ	7770	11500	3350 JQ
Selenium	5	<5	<5	<5	<5	<5	<5	5.1 JB	5.9	<5
Sodium	5000	5560	3480 JQ	3830 JQ	9550	7740	7950	73700	5070	12100
Vanadium	50	1.4 JB	0.99 JB	<50	0.84 JB	0.88 JB	<50	1.8 JB	1.7 JB	<50
Zinc	20	29.3	<20	<20	<20	<20	<20	90.4 JB	<20	<20
Thallium - SW846 7841 (Dissolved) ug/L:										
Thallium	2	2.2 JB	<2	2.1	1.8 JB	<2	<2	<2	<2	<2
Thallium - SW846 7841 (Total) ug/L:										
Thallium	2	<2	<2	2.4	1.7 JB	<2	<2	<2	<2	<2
Total Alkalinity - MCAWW 310.1 mg/L:										
Total Alkalinity	5	22	18	25	32	27	27	110	130	34
Total Organic Carbon - SW846 9060 mg/L:										
Total Organic Carbon	1	6	0.9 JB	<1	<1	<1	<1	<1	0.6 JQ	<1
Total Sulfide - MCAWW 376.1 mg/L:										
Total Sulfide	1	<1	3.2 JL	<1	<1	<1	<1	1.4	<1	<1
Volatile Organic Compounds - SW846 8260B ug/L:										
Acetone	10	<10	<10	<10 UL	<10 UL	<40 UL	<40 UL	<10	<10 UL	<10 UL
cis-1,2-Dichloroethene	0.5	<0.5	<0.5	1.9	4.1	6.9	6.6	<0.5	1.1	<0.5
trans-1,2-Dichloroethene	0.5	<0.5	<0.5	<0.5	<0.5	<2	<2	<0.5	<0.5	<0.5
Tetrachloroethene	1	<1	<1	<1	<1	<4	<4	<1	0.27 JQ	<1
Trichloroethene	1	<1	<1	0.71 JQ	4.4	100	100	<1	5.4	<1
Vinyl chloride	2	<2	<2	0.17 JQ	0.31 JQ	<8	<8	<2	<2	<2

TABLE 3-5

POSITIVE RESULTS TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:		Practical (a) Quantitation Limit	Sample AEHA-30B 9/27/2001	Duplicate AEHA-30B 9/27/2001	Sample AEHA-31B 9/27/2001	Sample AEHA-32B 9/27/2001	Sample AEHA-33B 9/26/2001	Sample LAWMW-Q 9/28/2001	Sample USGS-B2 9/28/2001	Sample USGS-C2 9/28/2001	Sample USGS-F2 9/25/2001
FIXED BASE LABORATORY ANALYSIS											
Anions - MCAWW 300.3A mg/L:											
Chloride		1	6.4	6.3	9.6	10.5	17.4	2.4	2.7	3.5	2.6
Nitrate		0.1	<0.1	<0.1	<0.1	0.069 JQ	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfate		1	48.4	48.8	16.2	11.6	20.5	6.7	9	8.3	7.7
Dissolved Gases - RSK SOP-175 mg/L:											
Carbon dioxide		0.001	50 J	50 J	56 J	42 J	37	26	60	60	49
Methane		0.001	0.0068	0.0072	0.003 JB	0.029	0.014	0.0041	0.0092	0.012	0.017
Dissolved Hydrogen by Microseeps AM20GA nM/L:											
Hydrogen		0.03	2.1	2	7.8	1.9	6.6	2	8.2	1.4	5
Mercury - SW846 7470A (Dissolved) ug/L:											
Mercury	Not Detected	1									
Mercury - SW846 7470A (Total) ug/L:											
Mercury	Not Detected	1									
Metals - SW846 6010B (Dissolved) ug/L:											
Aluminum		200	76.5 JB	82.8 JB	57 JB	54.1 JB	30.8 JB	<200 UJ	<200 UJ	<200 UJ	28.6 JB
Antimony		5	<5	<5	<5	<5	<5	<5 UJ	3.4 JQ	<5 UJ	<5
Barium		200	27.6 JQ	26 JQ	17.1 JQ	61 JQ	54.5 JQ	7.5 JB	11.1 JQ	14.8 JQ	45.4 JQ
Beryllium		10	1 JB	1 JB	0.91 JB	0.74 JB	<10	<10	<10	<10	<10
Cadmium		2	<2	<2	<2	0.37 JB	<2	<2	<2	<2	<2
Calcium		5000	9970	9510	5470 JQ	11500	15500	6530	3210 JQ	5920	9240
Copper		10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Iron		200	8760	8360	647	1700	1160	2130	646	931	291
Lead		3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Magnesium		5000	4070 JQ	3890 JQ	3140 JQ	6670	8830	3490 JQ	1900 JQ	2580 JQ	1710 JQ
Manganese		20	142	136	36.1	118	108	130	37.4	56.6	22.3
Nickel		100	6 JQ	5.5 JQ	<100	<100	<100	<100	<100	<100	<100
Potassium		5000	3680 JQ	3530 JQ	3410 JQ	3840 JQ	4410 JQ	8870	3150 JQ	4370 JQ	2630 JQ
Selenium		5	<5	<5	<5	<5	4.8 JQ	<5	<5	<5	<5
Sodium		5000	4890 JQ	4480 JQ	5700	9590	15800	6380	3440 JQ	4680 JQ	3920 JQ
Vanadium		50	1.7 JB	2 JB	<50	0.83 JB	<50	<50	<50	<50	<50
Zinc		20	<20	<20	<20	<20	<20	117	<20	182	<20
Metals - SW846 6010B (Total) ug/L:											
Aluminum		200	155 JB	167 JB	66.5 JB	56.3 JB	244 JB	<200 UJ	<200 UJ	<200 UJ	50.6 JB
Antimony		5	<5	<5	<5	<5	<5	3.2 JQ	<5 UJ	3.2 JQ	<5
Barium		200	28.4 JQ	29.7 JQ	18.2 JQ	60 JQ	54.5 JQ	10.3 JQ	13.2 JQ	16.5 JQ	59.3 JQ
Beryllium		10	1.2 JB	1.2 JB	0.95 JB	0.71 JB	<10	<10	<10	<10	<10
Cadmium		2	<2	<2	<2	0.34 JB	<2	<2	<2	<2	<2
Calcium		5000	9900	10500	5590 JQ	11300	17100	6940	3420 JQ	6470	11700
Copper		10	<10	<10	<10	<10	4.6 JB	<10	<10	<10	<10
Iron		200	9060	9650	993	1620	1590	2440	1540	1150	433
Lead		3	<3	<3	<3	<3	3.5 JB	<3	<3	<3	<3
Magnesium		5000	4040 JQ	4260 JQ	3230 JQ	6500	9480	3730 JQ	2020 JQ	2740 JQ	2060 JQ
Manganese		20	142	151	36.8	116	116	139	39	63	26.1

TABLE 3-5

POSITIVE RESULTS TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-30B 9/27/2001	Duplicate AEHA-30B 9/27/2001	Sample AEHA-31B 9/27/2001	Sample AEHA-32B 9/27/2001	Sample AEHA-33B 9/26/2001	Sample LAWMW-Q 9/28/2001	Sample USGS-B2 9/28/2001	Sample USGS-C2 9/28/2001	Sample USGS-F2 9/25/2001
FIXED BASE LABORATORY ANALYSIS										
Nickel	100	5.9	6.4 JQ	<100	<100	2.5 JB	<100	<100	<100	<100
Potassium	5000	3590 JQ	3810 JQ	3480 JQ	3780 JQ	4290 JQ	9990	3330 JQ	4600 JQ	3230 JQ
Selenium	5	<5	<5	<5	<5	<5	<5	<5	<5	5.5
Sodium	5000	4630 JQ	4840 JQ	5790	9260	16000	6920	3500 JQ	4960 JQ	4300 JQ
Vanadium	50	2.8 JB	2.3 JB	<50	<50	<50	<50	<50	<50	<50
Zinc	20	<20	<20	<20	<20	14 JQ	124	12.3 JB	192	<20
Thallium - SW846 7841 (Dissolved) ug/L:										
Thallium	2	<2	<2	<2	<2	1.8 JB	<2 UJ	<2 UJ	<2 UJ	<2
Thallium - SW846 7841 (Total) ug/L:										
Thallium	2	<2	<2	<2	<2	<2	<2 UJ	<2 UJ	<2 UJ	<2
Total Alkalinity - MCAWW 310.1 mg/L:										
Total Alkalinity	5	18	16 JB	21 JB	52	68	49	17 JB	31	42
Total Organic Carbon - SW846 9060 mg/L:										
Total Organic Carbon	1	<1	<1	<1	<1	0.7 JB	<1	<1 UJ	<1 UJ	0.8 JB
Total Sulfide - MCAWW 376.1 mg/L:										
Total Sulfide	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Volatile Organic Compounds - SW846 8260B ug/L:										
Acetone	10	<29 UL	<25 UL	<10 UL	<10 UL	<10	0.76 JQ	1.7 JQ	<50	<10
cis-1,2-Dichloroethene	0.5	61	64	<0.5	<0.5	<0.5	<0.5	1.7	10	<0.5
trans-1,2-Dichloroethene	0.5	<1.4	<1.2	<0.5	<0.5	<0.5	<0.5	<0.5	0.84 JQ	<0.5
Tetrachloroethene	1	1.2 JQ	1.1 JQ	1.6	<1	<1	<1	1.1	<5	<1
Trichloroethene	1	85	88	1.6	<1	<1	<1	25	150	035 JQ
Vinyl chloride	2	4.8 JQ	5	<2	<2	<2	<2	<2	<10	<2

TABLE 3-5

POSITIVE RESULTS TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:		Practical (a) Quantitation Limit	Sample USGS-G3 10/8/2001	Sample USGS-H2 9/28/2001	Sample USGS-M2 9/28/2001	Sample USGS-N1 9/28/2001
FIXED BASE LABORATORY ANALYSIS						
Anions - MCAWW 300.0A mg/L:						
Chloride		1	1.8	3.4	3.4	5.2
Nitrate		0.1	<0.1	<0.1	<0.1	<0.1
Sulfate		1	7.4	10.9	10.8	12.5
Dissolved Gases - RSK SOP-175 mg/L:						
Carbon dioxide		0.001	51 J	38	49	27
Methane		0.001	0.0012 JB	0.0028	0.0035	<0.001
Dissolved Hydrogen by Microseeps AM20GA nM/L:						
Hydrogen		0.03	2.2	1.3	1.3	1.6
Mercury - SW846 7470A (Dissolved) ug/L:						
Mercury	Not Detected	1				
Mercury - SW846 7470A (Total) ug/L:						
Mercury	Not Detected	1				
Metals - SW846 6010B (Dissolved) ug/L:						
Aluminum		200	69.2 JB	<200 UJ	<200 UJ	<200 UJ
Antimony		5	<5	3.3 JQ	<5 UJ	<5 UJ
Barium		200	7.7 JQ	14.9 JQ	10.6 JQ	14 JQ
Beryllium		10	<10	<10	<10	<10
Cadmium		2	<2	<2	<2	<2
Calcium		5000	5960	5560	4570 JQ	6450
Copper		10	<10	<10	<10	<10
Iron		200	2530	705	223	931
Lead		3	<3 UJ	<3	<3	<3
Magnesium		5000	2850 JQ	2590 JQ	2720 JQ	3200 JQ
Manganese		20	111	57.4	40.2	67.6
Nickel		100	<100	<100	<100	<100
Potassium		5000	3030 JQ	4690 JQ	3300 JQ	3790 JQ
Selenium		5	4.7 JB	<5	<5	<5
Sodium		5000	5520	5180	5370	12800
Vanadium		50	<50	<50	<50	<50
Zinc		20	<20	192	<20	<20
Metals - SW846 6010B (Total) ug/L:						
Aluminum		200	85.3 JB	203 J	<200 UJ	<200 UJ
Antimony		5	<5	<5 UJ	<5 UJ	<5 UJ
Barium		200	8.4 JQ	17.5 JQ	11.3 JQ	13.6 JQ
Beryllium		10	<10	<10	<10	<10
Cadmium		2	<2	<2	<2	<2
Calcium		5000	6710	5920	4580 JQ	5740
Copper		10	<10	<10	<10	<10
Iron		200	2620	1270	449	974
Lead		3	<3 UJ	<3	<3	<3
Magnesium		5000	3000 JQ	2770 JQ	2750 JQ	2810 JQ
Manganese		20	116	61.2	40.2	58.6

TABLE 3-5

POSITIVE RESULTS TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample USGS-G3 10/8/2001	Sample USGS-H2 9/28/2001	Sample USGS-M2 9/28/2001	Sample USGS-N1 9/28/2001
FIXED BASE LABORATORY ANALYSIS					
Nickel	100	<100	<100	<100	<100
Potassium	5000	3130 JQ	4930 JQ	3270 JQ	3340 JQ
Selenium	5	<5	<5	<5	<5
Sodium	5000	5800	5370	5240	11000
Vanadium	50	<50	<50	<50	0.92 JB
Zinc	20	24.7 JB	201	<20	<20
Thallium - SW846 7841 (Dissolved) ug/L:					
Thallium	2	<2	<2 UJ	<2 UJ	<2 UJ
Thallium - SW846 7841 (Total) ug/L:					
Thallium	2	<2	<2 UJ	<2 UJ	<2 UJ
Total Alkalinity - MCAWW 310.1 mg/L:					
Total Alkalinity	5	28	26	25	48
Total Organic Carbon - SW846 9060 mg/L:					
Total Organic Carbon	1	<1	<1 UJ	<1 UJ	<1 UJ
Total Sulfide - MCAWW 376.1 mg/L:					
Total Sulfide	1	<1	<1	<1	1.2
Volatile Organic Compounds - SW846 8260B ug/L:					
Acetone	10	0.55 JB	<10	<10	<10
cis-1,2-Dichloroethene	0.5	2.9	3.8	<0.5	<0.5
trans-1,2-Dichloroethene	0.5	<0.5	0.51	<0.5	<0.5
Tetrachloroethene	1	<1	<1	<1	<1
Trichloroethene	1	17	28	<1	<1
Vinyl chloride	2	<2	<2	<2	<2

Notes:

J	Estimated
JB	Estimated; possibly biased high or false positive based on blank contamination
JH	Estimated; possibly biased high based on QC data
JL	Estimated; possibly biased low based on QC data
JQ	Estimated; Value is between reporting limit and detection limit
NA	Not Analyzed
R	Rejected
UJ	Undetected; Reported Detection Limit is imprecise
UL	Undetected; Data biased low - Reported Detection Limit is higher than indicated
(a)	Quantitation limits are ideal Sample quantitation limits may vary due to sample volume/weight extracted and dilutions

PREPARED/DATE: 2/5/02
CHECKED/DATE: JAH 2-5-02

0 0.3 0.6

Scale in Miles

U.S. ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE

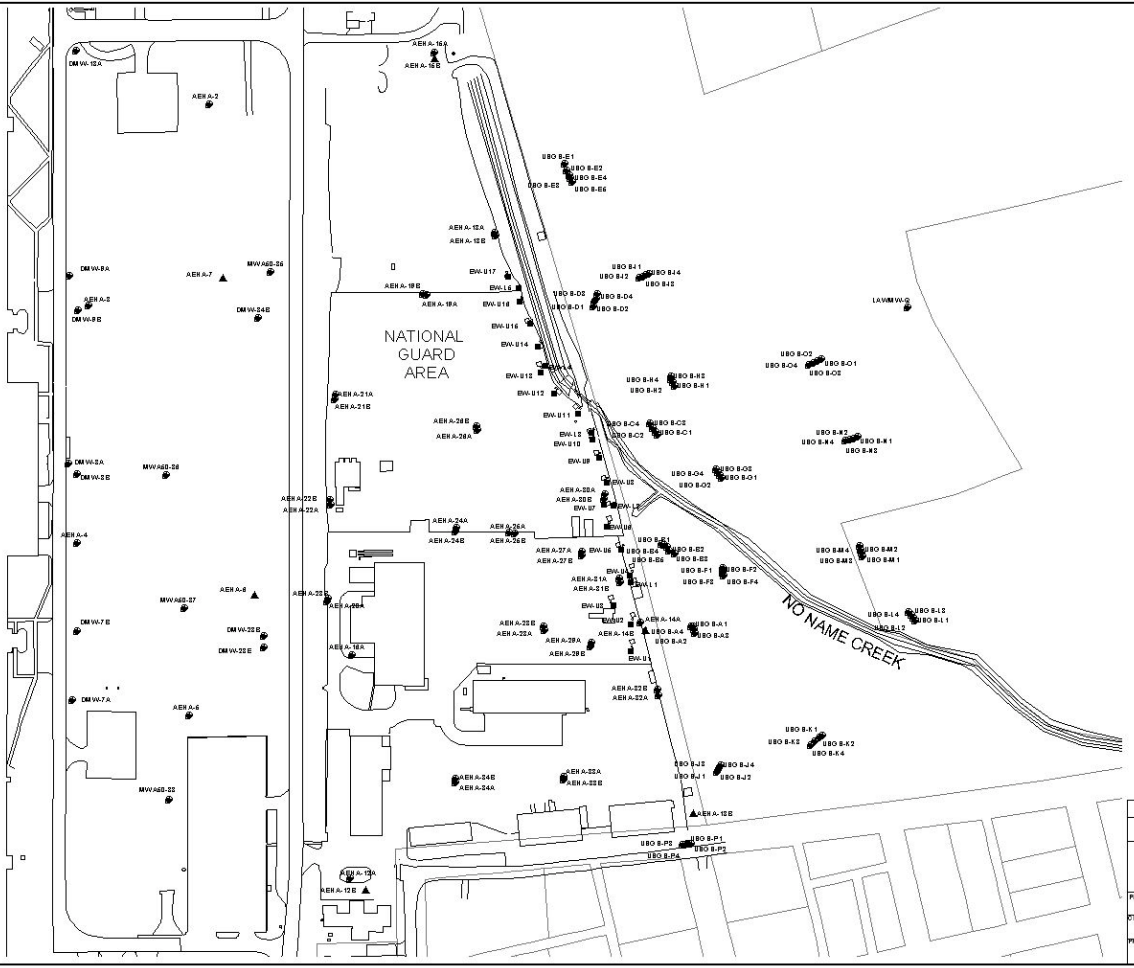
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA

TECHNICAL MEMORANDUM
FIRST QUARTERLY GROUNDWATER SAMPLING - OCTOBER 2001

DEFENSE SUPPLY CENTER RICHMOND
AND SURROUNDING AREA

OU 6 - NATIONAL GUARD AREA, OPEN STORAGE AREA, AREA 50 GROUNDWATER

PREPARED DATE:	FIGURE NUMBER:	PLOT DATE: 1/23/02
CHECKED DATE:	1-1	FILE DATE: 12/21/01
PROJECT NO: 12001-1-1632		FILENAME: dscr_sites.apr

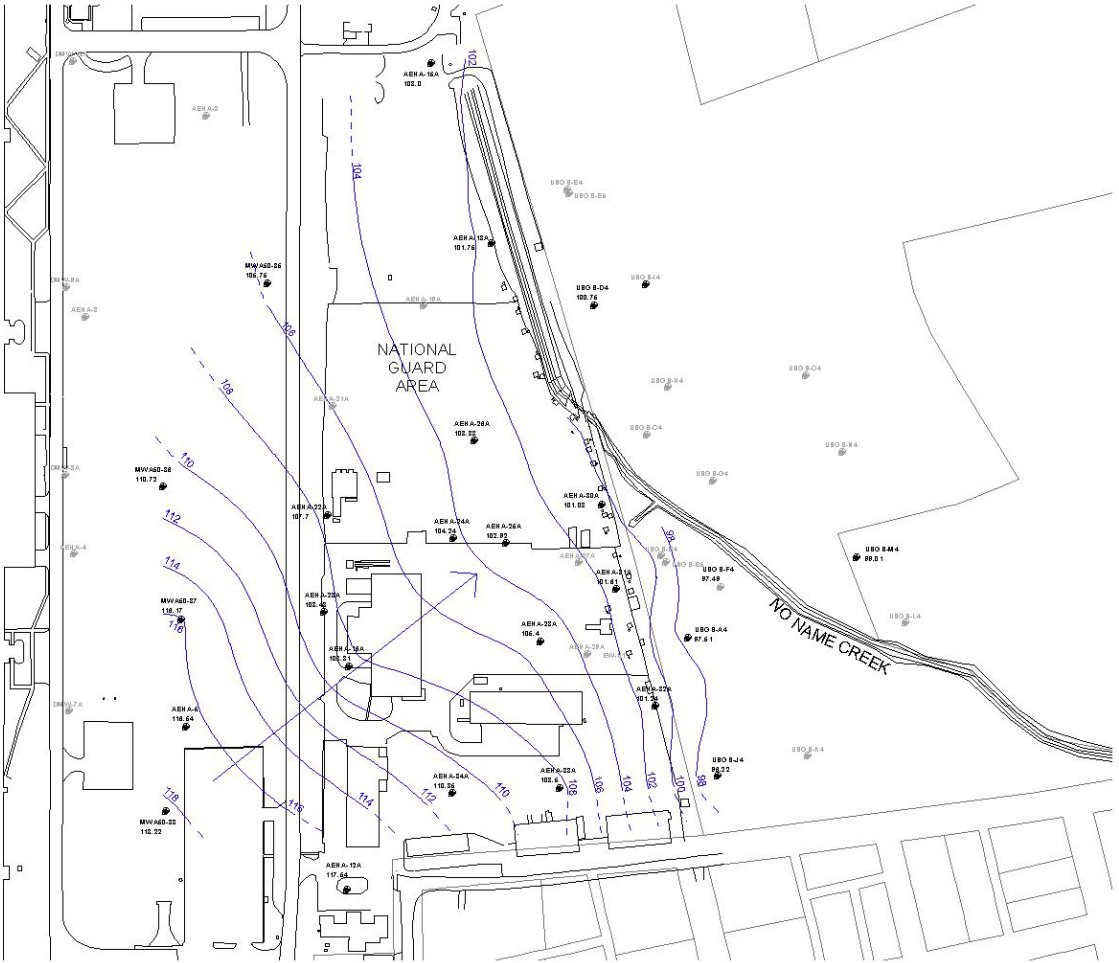


U.S. ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE

DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA

TECHNICAL MEMORANDUM
FIRST QUARTERLY GROUNDWATER SAMPLING - OCTOBER 2001
LOCATIONS OF MONITORING WELLS
IN AREA 50 AND THE NGA
OU 9 - NATIONAL GUARD AREA, OPEN STORAGE AREA, AREA 50 GROUNDWATER

PREPARED BY/DATE:	FIGURE NUMBER:	FILE DATE: 1/15/02
CHECKED BY/DATE:	2-1	PLOT DATE: 1/23/02
PROJECT NO.: 12001-1-1632		FILE NAME: ou9_site.apr



LEGEND:

- AEH A-4 116.64 — MONITORING WELL LOCATION AND STATIC WATER LEVEL ELEVATION
- UBO B-J4 — MONITORING WELL NOT MEASURED FOR STATIC WATER LEVEL
- BASE MAP
- CITY PROPERTY PARCEL
- 108 — POTENTIOMETRIC CONTOUR (FT.)
- 108 — EXTRAPOLATED POTENTIOMETRIC CONTOUR (FT.)
- DIRECTION OF GROUNDWATER FLOW

Notes:
Static water levels were measured September 18, 19 & 20, 2001

The OU9 groundwater treatment system and the recovery wells were turned off prior to the water level measurement and are not shown on this figure

Static water level elevations are in feet with reference to the mean sea level

0 150 300 Feet

US ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE

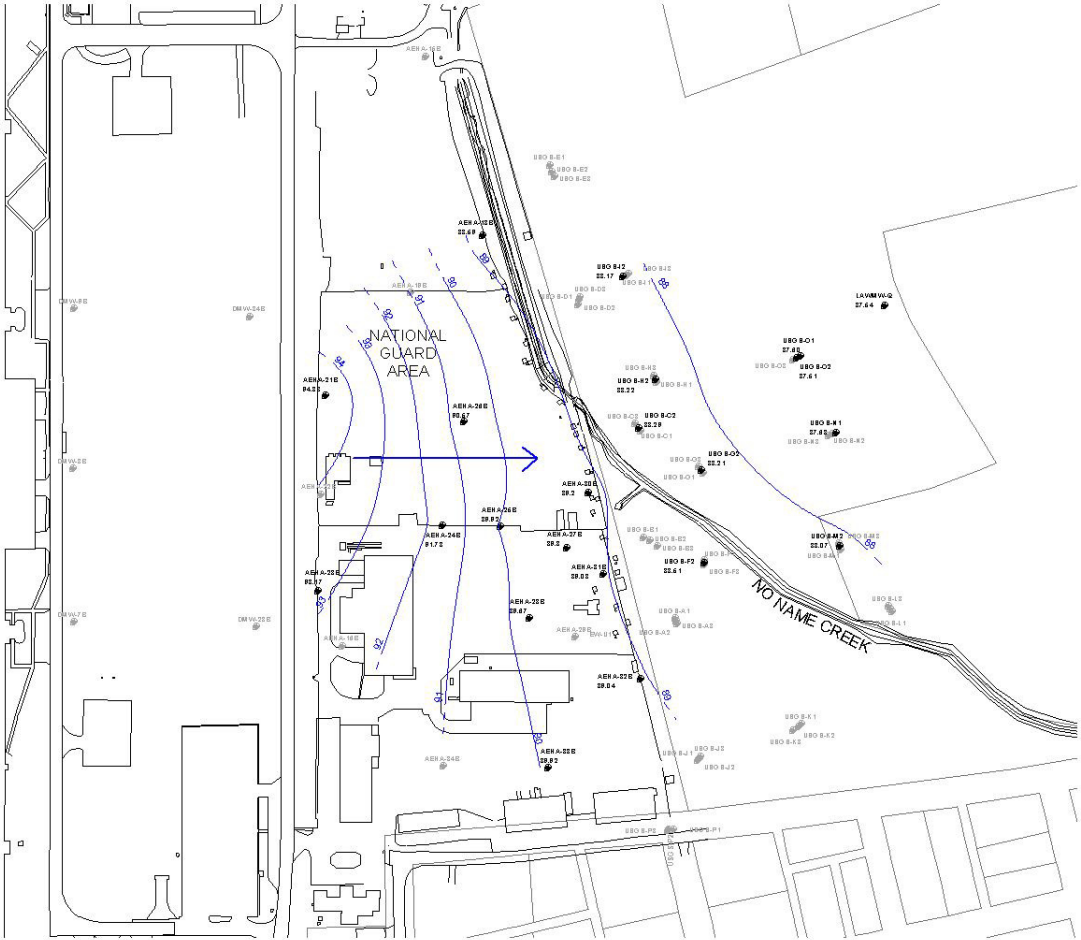
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA

TECHNICAL MEMORANDUM
FIRST QUARTERLY GROUNDWATER SAMPLING - OCTOBER 2001

POTENTIOMETRIC SURFACE MAP
UPPER AQUIFER - OCTOBER 2001

OU 9 - NATIONAL GUARD AREA OPEN STORAGE AREA, AREA 62 GROUNDWATER

PREPARED BY	FIGURE NUMBER: 3-1	FILE DATE 12/20/01
CHECKED BY		PLOT DATE 1/23/02
PROJECT NO. 12001-1-1632		FILE NAME techmemos_kim.apr



LEGEND:

- AEH A-12E 26.69 — MONITORING WELL LOCATION AND STATIC WATER LEVEL ELEVATION
- USGS-11 — MONITORING WELL NOT MEASURED FOR STATIC WATER LEVEL
- BASE MAP
- CITY PROPERTY PARCEL
- 89 — POTENTIOMETRIC CONTOUR (FT.)
- 89 — EXTRAPOLATED POTENTIOMETRIC CONTOUR (FT.)
- DIRECTION OF GROUNDWATER FLOW

Notes:
Static water levels were measured September 18, 19 & 20, 2001

The OU9 groundwater treatment system and the recovery wells were turned off prior to the water level measurement and are not shown on this figure

Static water level elevations are in feet with reference to the mean sea level

0 150 300 Feet

US ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE

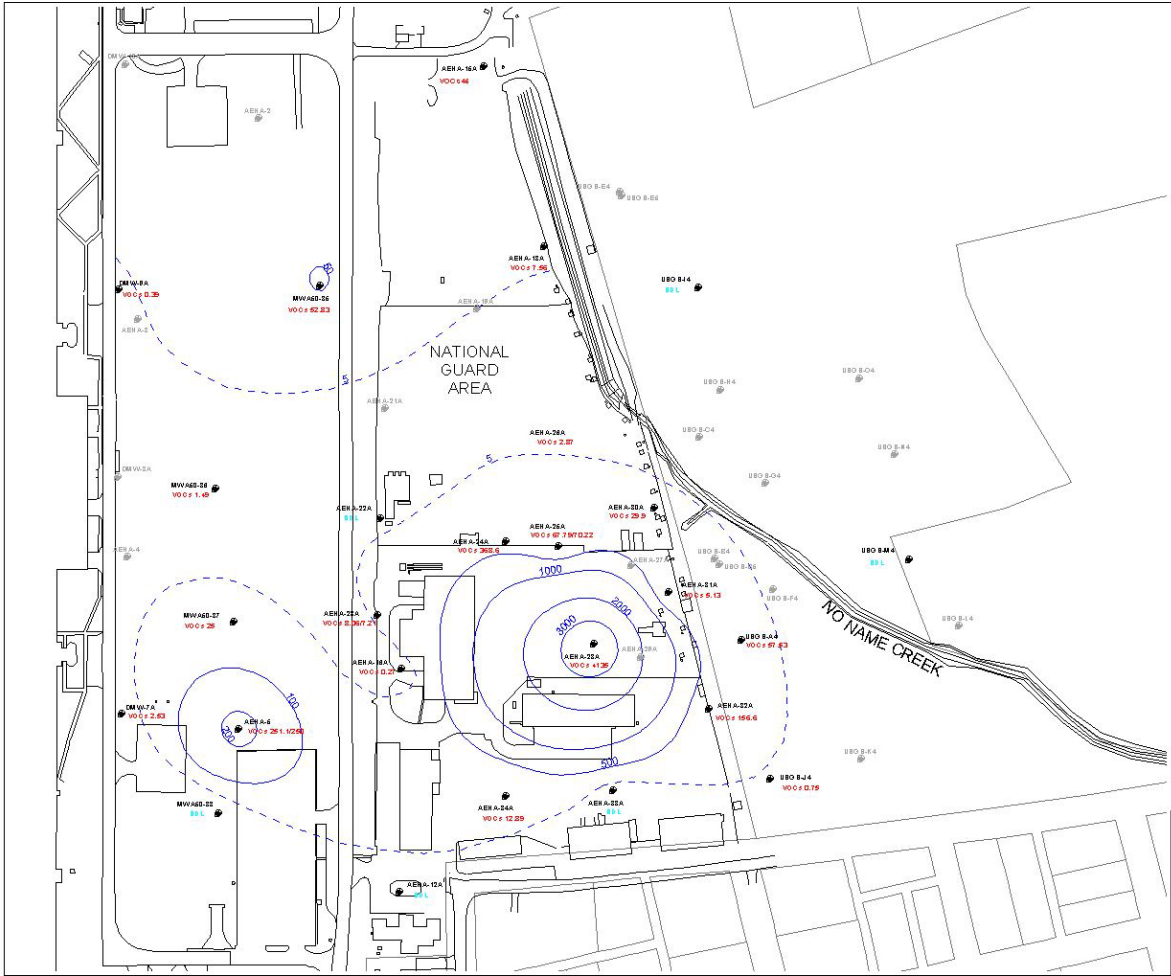
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA

TECHNICAL MEMORANDUM
FIRST QUARTERLY GROUNDWATER SAMPLING - OCTOBER 2001

POTENTIOMETRIC SURFACE MAP
LOWER AQUIFER - OCTOBER 2001

OU 8 - NATIONAL GUARD AREA, OPEN STORAGE AREA, AREA 60 GROUNDWATER

PREPARED BY:	FIGURE NUMBER: 3-2	FILED DATE: 12/20/01
CHECKED BY:		PLOT DATE: 1/23/02
PROJECT NO: 12001-1-1632		FILE NAME: techmemos_kim.apr



LEGEND:

AEH A-12E — MONITORING WELL LOCATION AND ID

MONITORING WELL NOT SAMPLED

BASE MAP

CITY PROPERTY PARCEL

500 — TOTAL VOC CONCENTRATION IN GROUNDWATER (ug/L)

5 — INTERPOLATED TOTAL VOC CONCENTRATIONS IN GROUNDWATER (ug/L)

Notes:
If a duplicate sample was collected, results are shown as original/duplicate

VOCs = TOTAL VOLATILE ORGANIC COMPOUNDS

BDL = BELOW DETECTION LIMITS

Units:
ug/L = Micrograms per Liter

0 150 300 Feet

US ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE

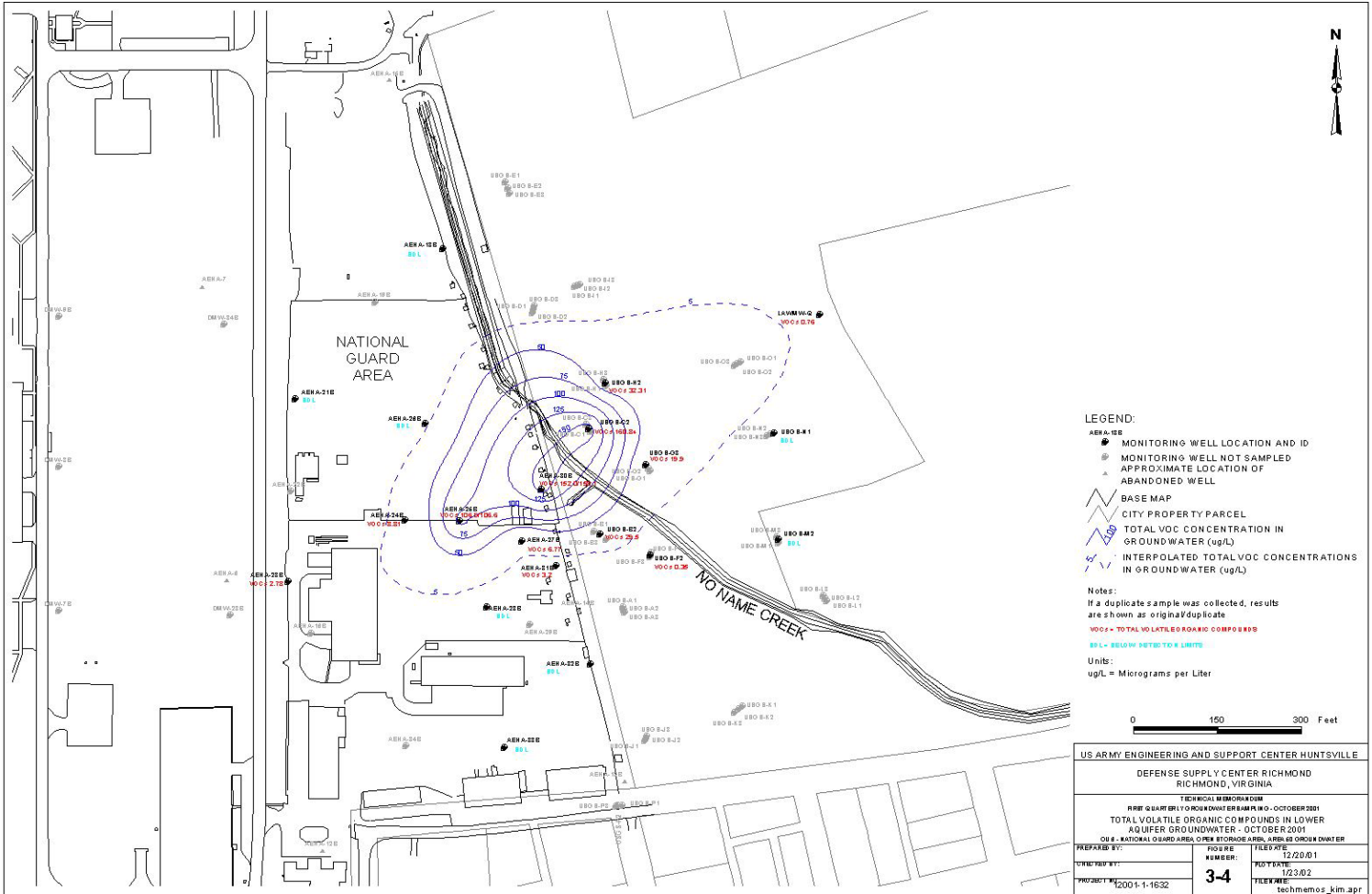
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA

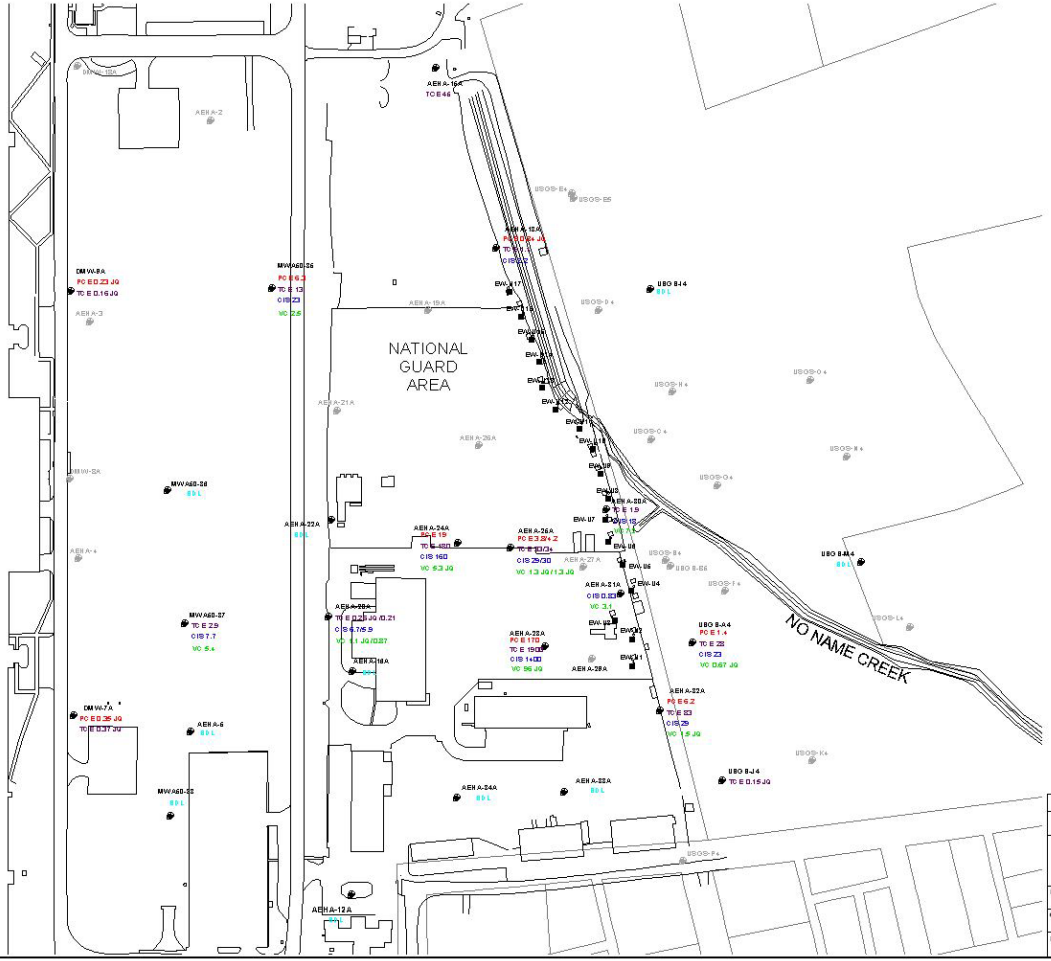
TECHNICAL MEMORANDUM
FIRST QUARTERLY GROUNDWATER SAMPLING - OCTOBER 2001

TOTAL VOLATILE ORGANIC COMPOUNDS IN UPPER AQUIFER GROUNDWATER - OCTOBER 2001

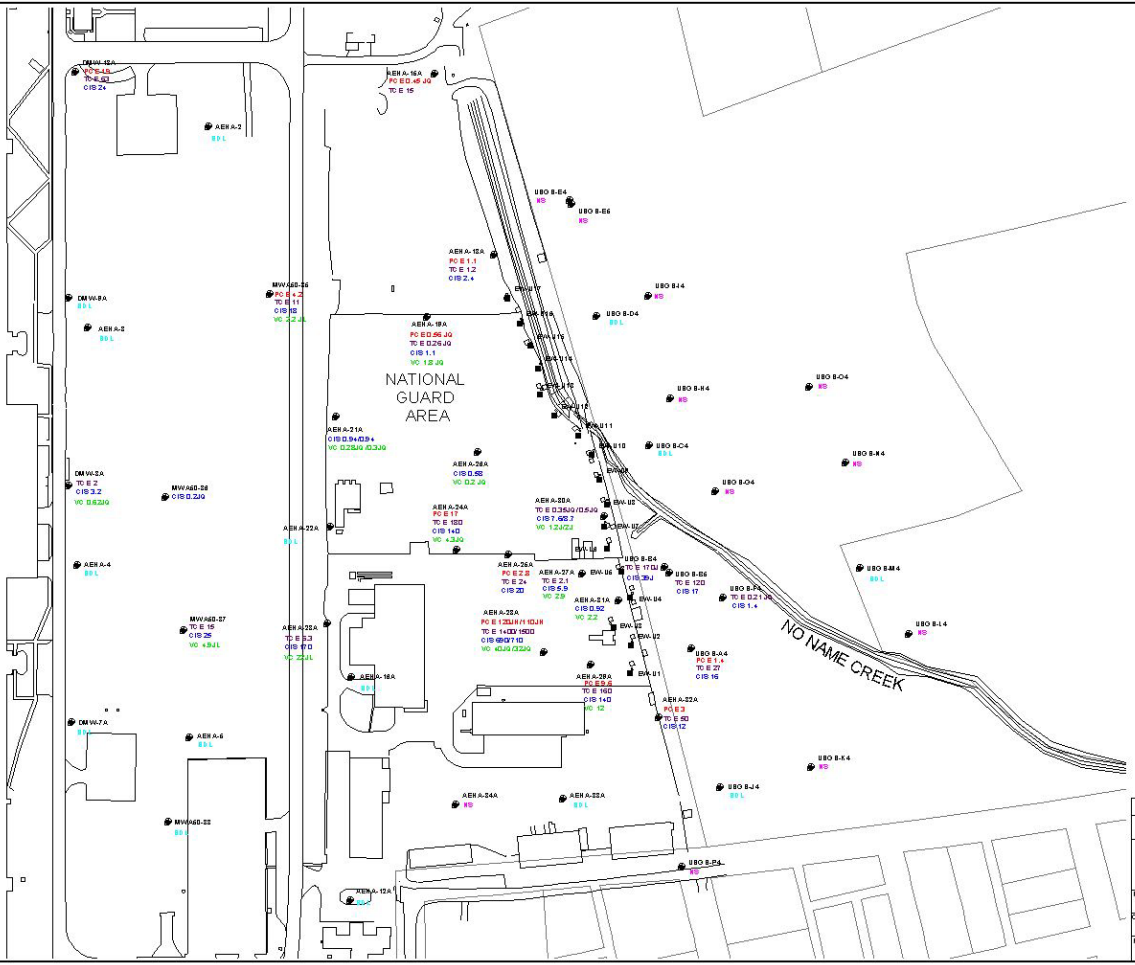
OU 8 - NATIONAL GUARD AREA, OPEN STORAGE AREA, AREA 60 GROUNDWATER

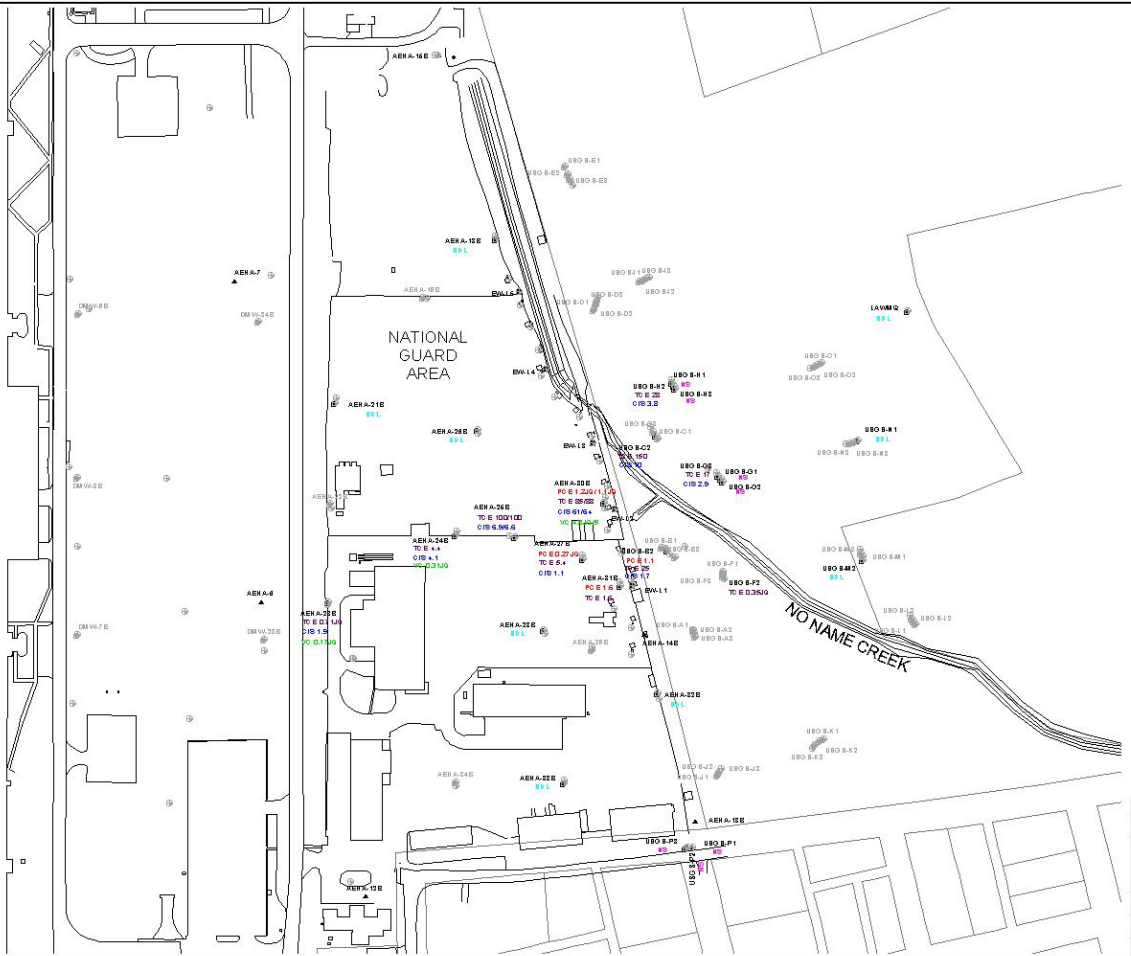
PREPARED BY:	FIGURE NUMBER: 3-3	FILED DATE: 12/20/01
CHECKED BY:		PLOT DATE: 1/23/02
PROJECT NO: 12001-1-1632		FILE NAME: techmemos_kim.apr


N
NATIONAL GUARD AREA
NO NAME CREEK
LEGEND:
MONITORING WELL LOCATION AND ID
MONITORING WELL NOT SAMPLED
APPROXIMATE LOCATION OF ABANDONED WELL
BASE MAP
CITY PROPERTY PARCEL
TOTAL VOC CONCENTRATION IN GROUNDWATER (ug/L)
INTERPOLATED TOTAL VOC CONCENTRATIONS IN GROUNDWATER (ug/L)
Notes:
If a duplicate sample was collected, results are shown as original/duplicate
VOCs = TOTAL VOLATILE ORGANIC COMPOUNDS
BDL = BELOW DETECTION LIMITS
Units:
ug/L = Micrograms per Liter
0 150 300 Feet
US ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA
TECHNICAL MEMORANDUM
FIRST QUARTERLY GROUNDWATER SAMPLING - OCTOBER 2001
TOTAL VOLATILE ORGANIC COMPOUNDS IN LOWER AQUIFER GROUNDWATER - OCTOBER 2001
OU 6 - NATIONAL GUARD AREA, OPEN STORAGE AREA, AREA 60 GROUNDWATER
PREPARED BY:
CHECKED BY:
PROJECT NO. 12001-1-1632
FIGURE NUMBER: 3-4
FILE DATE: 12/20/01
PLOT DATE: 1/23/02
FILE NAME: techmemos_kim.apr



U.S. ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE		
DEFENSE SUPPLY CENTER RICHMOND RICHMOND, VIRGINIA		
TECHNICAL MEMORANDUM		
FIRST QUARTERLY GROUNDWATER SAMPLING - OCTOBER 2001 CHLORINATED SOLVENTS DETECTED IN GROUNDWATER - UPPER AQUIFER - OCTOBER 2001 OU 8 - NATIONAL GUARD AREA, OPEN STORAGE AREA, AREA 60 GROUNDWATER		
PREPARED BY DATE:	FIGURE NUMBER:	FILE DATE: 12/20/01
CHECKED BY DATE:		PLOT DATE: 1/23/02
PROJECT NO: 12001-1-1632	3-5	FILE NAME: techmemos B_kim01.apr


NATIONAL GUARD AREA
NO NAME CREEK
N
LEGEND:
APPROXIMATE LOCATION OF ABANDONED WELL
OU 9 EXTRACTION WELL-UPPER AQUIFER
MONITORING WELL-UPPER AQUIFER
BASE MAP
CITY PROPERTY PARCEL
Notes:
Well locations based on survey performed by Resource International, Inc., 1997
Constituents are shown for those wells that have a result over the reporting limit
Explanation of qualification flags can be found on the Positive Results Table
If a duplicate sample was taken, results are shown as original/duplicate
Groundwater samples were collected during September - October 2000
PCE = TETRACHLOROETHENE
TCE = TRICHLOROETHENE
CIS = cis-1,2-DICHLOROETHENE
VC = VINYL CHLORIDE
BDL = BELOW DETECTION LIMITS
NS = NO NITO RING WELL NOT SAMPLED
Units:
ug/L = Micrograms per Liter
0 150 300 Feet
U.S. ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA
TECHNICAL MEMORANDUM
FIRST QUARTERLY GROUNDWATER SAMPLING - OCTOBER 2001
CHLORINATED SOLVENTS DETECTED IN GROUNDWATER - UPPER AQUIFER - OCTOBER 2000
OSB - NATIONAL GUARD AREA, OPEN STORAGE AREA, AREA 60 GROUNDWATER
PREPARED BY/DATE:
CHECKED BY/DATE:
PROJECT NO: 12001-1-1632
FIGURE NUMBER: 3-6
FILE DATE: 12/20/01
PLOT DATE: 1/23/02
FILE NAME: techmemos B_kim00.apr



LEGEND:

- ▲ APPROXIMATE LOCATION OF ABANDONED WELL
- ■ OU 9 EXTRACTION WELL-LOWER AQUIFER
- MONITORING WELL NOT SAMPLED
- MONITORING WELL-LOWER AQUIFER
- BASE MAP
- CITY PROPERTY PARCEL

Notes:
Well locations based on survey performed by Resource International, Inc., 1997.

Constituents are shown for those wells that have a result over the reporting limit.

Explanation of qualification flags can be found on the Positive Results Table

If a duplicate sample was taken, results are shown as original/duplicate.

Groundwater samples were collected during September - October 2001.

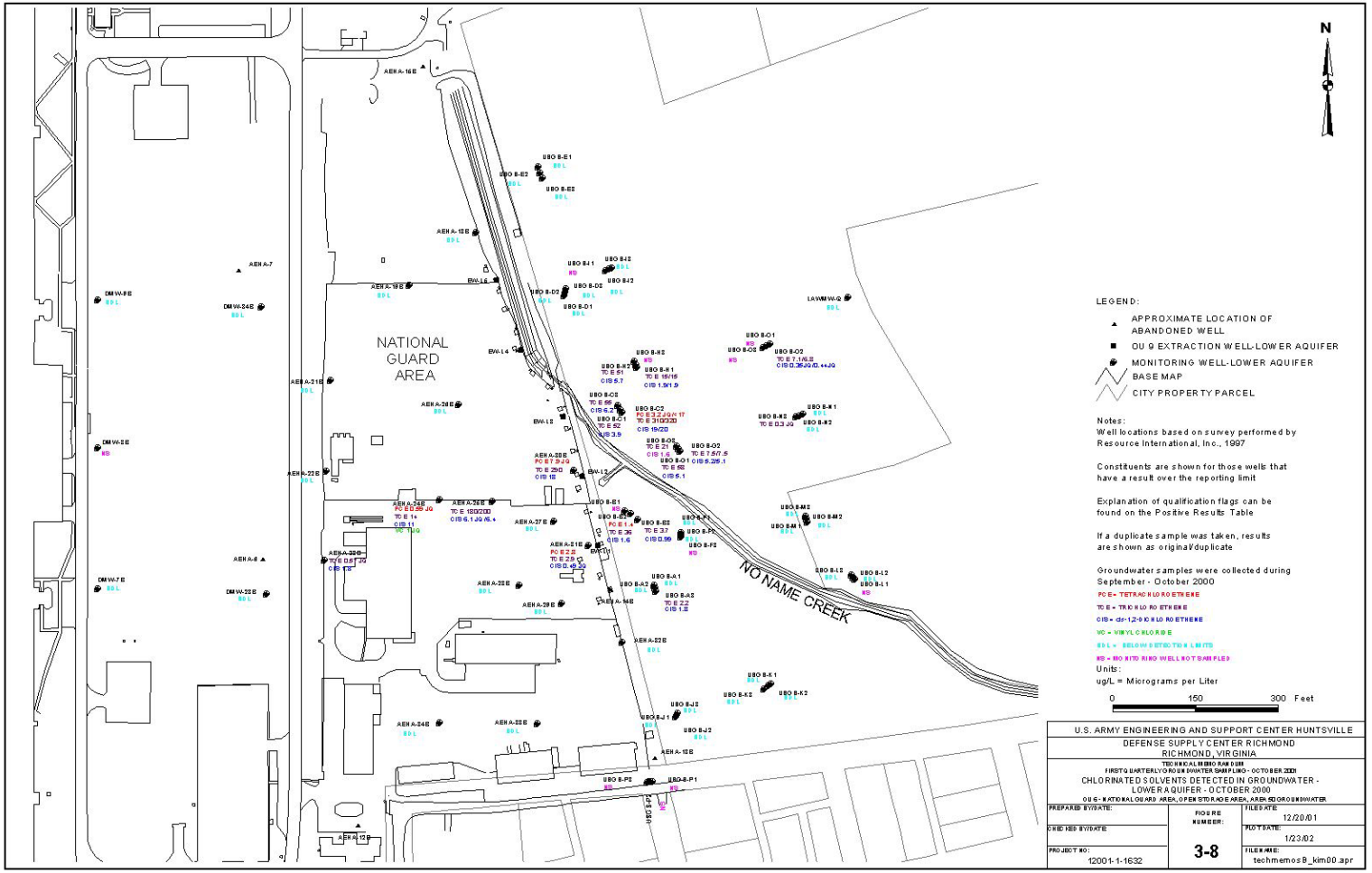
PCE = TETRACHLOROETHENE
TCE = TRICHLOROETHENE
CIS = cis-1,2-DICHLOROETHENE
VC = VINYL CHLORIDE
BDL = BELOW DETECTION LIMITS

Units:
ug/L = Micrograms per Liter

0 150 300 Feet

U.S. ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA
TECHNICAL MEMORANDUM
FIRST QUARTERLY GROUNDWATER SAMPLING - OCTOBER 2001
CHLORINATED SOLVENTS DETECTED IN GROUNDWATER - LOWER AQUIFER - OCTOBER 2001
OU 8 - NATIONAL GUARD AREA, OPEN STORAGE AREA, AREA 60 GROUNDWATER

PREPARED BY/DATE:	FIGURE NUMBER:	FILE DATE: 12/20/01
CHECKED BY/DATE:		PLOT DATE: 1/23/02
PROJECT NO: 12001-1-1632	3-7	FILE NAME: techmemos B_kim01.apr


N
NATIONAL GUARD AREA
NO NAME CREEK
LEGEND:
APPROXIMATE LOCATION OF ABANDONED WELL
OU 9 EXTRACTION WELL-LOWER AQUIFER
MONITORING WELL-LOWER AQUIFER
BASE MAP
CITY PROPERTY PARCEL
Notes:
Well locations based on survey performed by Resource International, Inc., 1997
Constituents are shown for those wells that have a result over the reporting limit
Explanation of qualification flags can be found on the Positive Results Table
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Groundwater samples were collected during September - October 2000
PCE = TETRACHLOROETHENE
TCE = TRICHLOROETHENE
CIS = cis-1,2-DICHLOROETHENE
VC = VINYL CHLORIDE
SDL = BELOW DETECTION LIMITS
NS = MONITORING WELL NOT SAMPLED
Units:
ug/L = Micrograms per Liter
0
150
300
Feet
U.S. ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA
TECHNICAL MEMORANDUM
FIRST QUARTERLY GROUNDWATER SAMPLING - OCTOBER 2000
CHLORINATED SOLVENTS DETECTED IN GROUNDWATER - LOWER AQUIFER - OCTOBER 2000
OU 6 - NATIONAL GUARD AREA, OPEN STORAGE AREA, AREA 50 GROUNDWATER
PREPARED BY/DATE:
CHECKED BY/DATE:
PROJECT NO:
12001-1-1632
FIGURE NUMBER:
3-8
FILE DATE:
12/20/01
PLOT DATE:
1/23/02
FILE NAME:
techmemos8_kim00.apr

APPENDIX A

SUMMARY OF PREVIOUS INVESTIGATIONS

APPENDIX A – SUMMARY OF PREVIOUS INVESTIGATIONS

A.0 INTRODUCTION

A.0.0.1 In January 1981, the Chemical Systems Laboratory (CSL) conducted an Installation Assessment of Defense Supply Center Richmond (DSCR). The purpose of the Installation Assessment was to evaluate the existence of toxic and hazardous materials in the subsurface environment at DSCR with an emphasis on contaminants that could potentially migrate off-site. The final report identified Area 50 as a previously used burning ground and depository for many items used in past operations and indicated that operations conducted in the Open Storage Area (OSA) and the National Guard Area (NGA) involved materials that could have served as potential contaminants (e.g., solvents and solvent oils). The report recommended further assessment of the OSA and Area 50, the proper storage of hazardous materials, and establishment of a groundwater monitoring program.

A.1 UNITED STATES ARMY ENVIRONMENTAL HYGIENE AGENCY

A.1.0.1 In March 1982, the United States Army Environmental Hygiene Agency (USAEHA) began a sampling program of the groundwater in Area 50 by installing and sampling six monitoring wells adjacent to Area 50 and monitoring well within the OSA to collect background samples (USAEHA, 1982a). The USAEHA conducted confirmatory sampling of these seven wells in July 1982.

A.1.0.2 The USAEHA installed five additional well pairs (one shallow well and one deep well per pair) in October 1982. These wells were located immediately downgradient of Area 50 (USAEHA, 1982b). The original 7 wells were sampled along with the 10 newly installed wells in November 1982 and January 1983.

A.1.0.3 After obtaining sampling results within Area 50 and the NGA, both Area 50 and the NGA were identified as potential sources of the contamination in the NGA wells. To confirm this, the USAEHA evaluated past and present operations at the NGA during April 1983 (USAEHA, 1983). This evaluation indicated that dumping and spillage of solvents and solvent sludges at the NGA were potential sources of contamination found in the wells at the NGA.

A.1.0.4 In September 1983, the USAEHA installed 18 additional monitoring well pairs in the NGA to further define the nature and extent of subsurface contamination in this area. This sampling effort included analyses of not only volatile organic compounds (VOCs) but also of semi-volatile organic

compounds (SVOCs). The only SVOC detected during this sampling event was bis(ethylhexyl)phthalate, which is a common laboratory artifact. This SVOC was detected in monitoring wells AEHA-27A and AEHA-29A at concentrations of 70 and 50 micrograms per liter (µg/L), respectively. The maximum concentration of total VOCs (1,425 µg/L) was detected in groundwater collected from monitoring well AEHA-27B.

A.2 COMMONWEALTH OF VIRGINIA/U.S. GEOLOGICAL SURVEY

A.2.0.1 In October 1982, the Commonwealth of Virginia's Department of Health began monitoring private groundwater wells in the Rayon Park subdivision to evaluate whether chemicals released in Area 50 had potentially impacted groundwater intended for potable use. Three private wells were sampled in October 1982, six were sampled in January 1984, and five were sampled in February 1984 (Commonwealth of Virginia, 1982, 1984). Of the three wells sampled in 1982, only one well was sampled again in January 1984. Each of the five wells sampled in February 1984 was also sampled in January 1984. The United States Geologic Survey (USGS) assumed responsibility for the Rayon Park monitoring plan in February 1984. The USGS initiated a bimonthly monitoring program involving the sampling of 21 private wells that continued until 1987 (USGS, 1987a). From 1984 to 1987, the following VOCs (shown with their maximum concentration detected in parentheses) were consistently detected in various wells of the 21 sampled: chloroform (100 µg/L), 1,1-dichloroethane (7.2 µg/L), 1,1-dichloroethene (41 µg/L), 1,1,1-trichloroethane (500 µg/L), and tetrachloroethene (3.5 µg/L).

A.2.0.2 The USGS also began an investigation of the groundwater plume immediately downgradient of the NGA during the fall of 1984. The intent of this sampling event was to define the extent of contamination and the rate of contaminant migration off-site (USGS, 1987b).

A.3 DAMES & MOORE

A.3.0.1 Dames & Moore initiated a Phase I assessment of Area 50 and the NGA in April 1984 to locate, identify, and quantify potential contamination sources in the two areas (Dames & Moore, 1984). The Phase I assessment included a review of existing data, aerial photographic interpretation, and a geophysical survey. The assessment indicated that three potential sources of contamination existed in Area 50 and that four existing and one former storage tank in the NGA were also potential sources of contamination (Dames & Moore, 1984).

A.3.0.2 Dames & Moore conducted a Phase II assessment in late 1984 and 1985 for Area 50 and the NGA to verify the location and extent of contamination from the potential sources indicated during the Phase I assessment. The results of the Phase II assessment were used to characterize the contaminants by type and quantity and to evaluate the potential for future release and migration. This required two field exploration and sampling programs, which included installation of temporary stand-pipe wells and additional monitoring wells.

A.3.0.3 As part of a Remedial Investigation (RI) of the site, Dames & Moore conducted additional field sampling programs from October 1986 through November 1988. These sampling programs were designed to further define the potential paths of contaminant migration from the three areas within Area 50. As part of the RI, the following activities were performed:

- Seven additional monitoring wells were installed in the OSA
- Four soil samples were collected from Area 50
- Surface water was sampled at three locations along the eastern border of the NGA in fall 1986 (Dames & Moore, 1986)
- Twenty four soil borings were completed and 24 soil samples were analyzed (Dames & Moore, 1989)
- One bedrock well was installed and sampled at the OSA, one bedrock well was installed and sampled off site and upgradient of the OSA, and six wells were installed and sampled in Area 50
- Surface water and sediment were sampled from No Name Creek
- Benthics and aquatic toxicity were analyzed from No Name Creek
- Soil gas sampling of a potential toluene source along the NGA fence line (Dames & Moore, 1989)

A.3.0.4 A quarterly monitoring program was also initiated as part of DSCR's Resource Conservation and Recovery Act (RCRA) Part B permit, which was in place at that time. This monitoring program included collection of four rounds of samples from nine surface water locations and 28 monitoring wells. The first round was included in the January 1987 field sampling program, while rounds 2, 3, and 4 were conducted in April and July 1987, and November 1988, respectively (Dames & Moore, 1989).

A.4 LAW ENGINEERING AND ENVIRONMENTAL SERVICES – TRENCHING ACTIVITIES

A.4.0.1 LAW conducted trenching activities within the Former Area 50 Landfill to investigate geophysical anomalies reported by Dames & Moore in a Geophysical Investigation Report (1989). The objective of the trenching activities conducted by LAW was to uncover and remove buried debris that was potentially an on-going source of subsurface contamination. The results of these trenching activities are presented in LAW's "Final Exploratory Trenching Characterization Report" submitted in May 1995, and are discussed below.

A.4.0.2 Construction and demolition debris was encountered in nearly every trench. Metal rebar, which was associated with the buried concrete, was apparently the buried iron mass identified as geophysical anomalies by Dames & Moore (1989).

A.4.0.3 Chemical containers in the form of 5-gallon pails and smaller plastic bottles, were encountered throughout Area 50. Many of the containers were crushed and/or decayed and were empty of their original contents. Several containers were found intact and were identified as containing photographic developing chemicals (thiourea and glycerine) and cleaning chemicals (disinfectant and ammonia). Only three crushed 55-gallon drums were encountered.

A.4.0.4 Soil contamination was detected throughout Area 50 during the trenching operation using on-site monitoring equipment. Several soil samples contained VOCs and SVOCs based upon laboratory analyses. Petroleum contamination, including free-product, was also detected in soil and groundwater samples collected from within Area 50. Apparent sources of the soil contamination were not uncovered, and no containers indicative of the contaminants within the Operable Unit (OU) 6 groundwater (chlorinated solvents) were encountered.

A.5 HYDROGEOLOGIC, INC.

A.5.0.1 Hydrogeologic, Inc. conducted a subsurface investigation in 1998 to evaluate the nature and extent of the free-phase fuel or liquid petroleum hydrocarbons (LPH) encountered during Law Engineering and Environmental Services, Inc.'s (LAW's) trenching activities at Area 50 and to recommend an appropriate remedial action to remove the LPH (Hydrogeologic, 1998).

A.5.0.2 Twenty-six subsurface test borings were advanced within Area 50. Twenty-two of the borings were completed as temporary piezometers. Analytical results demonstrated that most of the contamination was diesel fuel and heavy oil. Concentrations ranged from non-detect to approximately 12,300 milligrams per kilogram (mg/kg) heavy oil in Area 50 northwest of MWA50-37. Although this elevated concentration was detected in soil, fuel oil generally tends to partition and normally adsorbs strongly to soil, which often prevents migration of heavy oils to groundwater. One groundwater sample, collected between MWA50-37 and MWA50-36, contained diesel fuel concentrations of 2.9 milligrams per liter (mg/L). A sheen was observed in nine of the piezometers on the first day of gauging, however on the following day, the sheen was observed in only one well. LPH measurements on both days were less than 0.01 feet. Other investigations completed since 1998 have not demonstrated the presence of LPH in groundwater collected from monitoring wells within Area 50. Since only a sheen was found during the investigation, no LPH removal actions were recommended.

A.6 LAW ENGINEERING AND ENVIRONMENTAL SERVICES – GROUNDWATER SAMPLING

A.6.0.1 A data gap for metals and SVOCs was identified during the preliminary effort to identify chemicals of concern (COCs) for a Revised Draft Focused FS Report (LAW, 1995). To fill this data gap, additional analytical data for the upper aquifer at OU 6 were collected through sampling and analysis of 18 upper aquifer wells in March 1999. The data were used to identify metals and SVOCs that are potential COCs at OU 6. The SVOCs were detected infrequently, at concentrations below the quantifiable limits and less than the United States Environmental Protection Agency (USEPA) Region III Risk-Based Screening Concentrations (RBCs). Therefore, no SVOCs were identified as potential COCs. Five metals (antimony, arsenic, cadmium, iron, and manganese) were detected at concentrations exceeding background groundwater concentrations and Region III RBCs and were identified as potential COCs.

A.6.0.2 LAW also conducted further studies of the OU 6 groundwater to evaluate the potential of natural attenuation as a remedial action for the site (LAW, 2000a). The results of these studies are provided in LAW's "Natural Attenuation Studies Report" and are briefly described below.

A.6.0.3 Two basic source areas have been identified during the previous investigations: The area around MWA50-37 and MWA50-35. MWA50-37 is in the southern portion of Area 50 while MWA50-35 is in the northern portion of Area 50.

A.6.0.4 The concentration of VOCs in the area surrounding MWA50-37 has decreased significantly over time. Monitoring well MWA50-37 was installed in the vicinity of the abandoned monitoring well AEHA-6, which was generally believed to be in the center of the plume in Area 50. By evaluation of isoconcentration maps prepared using data collected prior to installation of MWA50-37, estimated concentrations of VOCs in the vicinity of MWA50-37 may have been as high as 20,000 µg/L and have decreased to approximately 46 µg/L in this same well (recent September/October 2001). Historical data suggests migration of the contaminants to the east.

A.6.0.5 The concentrations in the vicinity of MWA50-35 have also decreased with time although to a lesser extent. The initial concentration of VOCs within this area decreased from approximately 60 to 40 µg/L during the monitoring period from 1995 to present. There is limited evidence suggesting that the area of high VOC concentrations has moved eastward from MWA50-35 as is the case for MWA50-37).

A.6.0.6 The "*Natural Attenuation Studies Report*" (LAW, 2000) also demonstrated that naturally occurring biodegradation has occurred in the lower aquifer within OU 6. This conclusion was based on the detection of degradation products of tetrachloroethylene (PCE) and trichloroethylene (TCE) such as dichloroethene (DCE) and vinyl chloride (VC) in groundwater collected from lower aquifer monitoring wells. The upper aquifer was not evaluated for natural attenuation during this sampling event.

A.7 SUMMARY OF PREVIOUS FINDINGS

A.7.0.1 Forty-four organic compounds have been detected from 1982 to present in the upper aquifer groundwater from OSA/Area 50/NGA. Of these 44, only six of the compounds (acetone, methylene chloride, total phenols, and three phthalate esters) were detected in groundwater samples collected from upgradient wells of Area 50. TCE, trans-1,2-DCE, and PCE were detected most frequently in OSA/Area 50/NGA. Except for oil and grease, these chlorinated compounds were also found to exist at the highest concentrations in the upper aquifer. The maximum historical concentrations of TCE, PCE, and trans-1,2-DCE were measured to be 18,000, 3,000, and 13,000 µg/L, respectively.

A.7.0.2 Twenty-one organic compounds were detected in groundwater samples collected from lower aquifer wells in and downgradient of OSA/Area 50/NGA. Of these 21 compounds, 6 were detected in groundwater samples collected from the lower aquifer upgradient of OSA/Area 50/NGA. The organic compounds present at the highest concentrations historically in the lower aquifer wells were TCE (7,100 µg/L), 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) (590 µg/L), trans-1,2-DCE (220 µg/L), toluene (150 µg/L), and PCE (76 µg/L).

A.7.0.3 TCE and PCE were detected at the highest concentrations in upper aquifer samples from within the OSA (210 and 140 µg/L, respectively). The contaminants detected in the OSA upper aquifer wells were primarily solvent-related compounds typically associated with the storage and recoupment operations in the OSA (Dames & Moore, 1989). TCE and PCE were not detected in groundwater samples from the lower aquifer in the OSA.

A.7.0.4 There was a higher incidence of organic compounds in Area 50 than the OSA or the NGA. Thirty-seven of the 47 organic compounds detected throughout the previous studies were detected in groundwater samples collected from wells in Area 50. TCE, PCE, and trans-1,2-DCE were detected most frequently and in the highest number of different wells. These compounds were also present at the highest concentrations. Well AEHA-6 contained the highest historic levels. These compounds were not detected in groundwater samples collected from lower aquifer wells in Area 50.

A.7.0.5 Although the same compounds detected from 1982 to present in the shallow soil samples from the OSA were also found in samples from Area 50 (except trans-1,2-DCE) the contamination present in the OSA was not believed to be the only source of contamination in the groundwater in Area 50. This was supported by the detection similar VOCs is Area 50 soil as well, although to a lesser extent. This was further supported by the detection of VOCs at higher levels at Area 50 are generally greater than those present in groundwater samples collected from the OSA. The contaminant concentrations detected within the OSA did not require remediation to meet remedial action goals. The calculated site risks were such that the only remedial action required was the implementation of institutional controls. During the performance of the Five-Year Review, it was noted that the institutional controls may be removed if residential risks were acceptable using current toxicity values. The revised risk assessment is currently being prepared.

A.7.0.6 These same VOCs (i.e. TCE and PCE) were detected along with other organics in the NGA and the USAEHA wells, both downgradient of Area 50. However, the concentration of the major constituents, TCE and PCE, were typically less in the samples from the NGA as compared to those from Area 50, indicating that the source of the contamination was most likely within Area 50. It should be noted that total VOC concentrations in the vicinity of well AEHA-28A have been in excess of 2,000 ppb.

A.7.0.7 Petroleum hydrocarbons were detected in Area 50 west of AEHA-6. The significance of this detection to the impact of chlorinated constituents is that some fractions of the petroleum hydrocarbons

been demonstrated to facilitate reductive dechlorination and may potentially enhance natural attenuation processes.

PREPARED/DATE: DWK 12-17-01

SENIOR REVIEW/DATE: GH 12-18-01

APPENDIX B

FIELD SAMPLING REPORTS

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9-25-01 TIME 1735
SAMPLING POINT USGS-F2
(LOCATION)
DEPTH

MPLE INFORMATION SAMPLE I.D. NO.: USGS-F2

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER Nice/Partly Cloudy AIR TEMPERATURE 70°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: Miguel Vasquez SAMPLING OBSERVED BY: Laura Nichols
DISCREPANCIES:

Location DSCR - OU 8
Site Name

Reference Measuring Point (eg. Top of Casing)

Well ID: USGS - F2

Depth to Screen below MP: ~~35.64'~~ 35.64' of screen (Top) 37.64' of screen (Bottom)

Field Sampling Personnel: TAMRA NICHOLS, KATHERINE ADAMS, MIGUEL VAZQUEZ

Pump Intake at (ft. below MP): 36.64'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: TURBIDITY (NTU)
9/25/01	1555	13.61												
	1612					15.78	0.201	6.57	2.53				64	4.6
	1622					15.27	0.179	6.42	1.21				61	4.3
	1632					15.12	0.169	6.34	0.98				66	3.0
	1642					15.08	0.164	6.32	1.10				69	3.5
	1652	~~13.75~~ 13.74				15.02	0.153	6.24	0.93				80	3.6
	1702	13.73				15.02	0.141	6.16	0.80				80	3.6
	1712					14.99	0.135	6.10	0.71				84	3.6
	1722					14.91	0.133	6.06	0.78				85	3.7
	1732					14.89	0.127	6.00	0.64				90	3.9

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

1. source data

Ground Water Sampling Log

Project DSCR Site Richmond Well No. USGS-F2 Date 9-25-01

Well Depth ~~13.61'~~ Screen Length 2ft Well Diameter 3" Casing Type PVC

Sampling Device ~~Bladder Pump~~ QED Tubing type Teflonlined PE Water Level 13.61'

Measuring Point TOC Other Infor

Sampling Personnel Tauen Nichols / Miguel Vasquez / Katherine Adams

Time	pH	Temp (°C)	Cond. (mS/cm)	Dis.O_2 (mg/L)	Turb. (NTU)	[ ]Conc	ORP (mV)	PID	Notes
1612	6.57	16.78	0.201	2.53	4.6		64	0.0	
1622	6.42	15.27	0.179	1.21	4.3		61	0.0	
1632	6.34	15.12	0.169	0.98	3.0		66	0.0	
1642	6.32	15.08	0.164	1.10	3.5		69	0.0	
1652	6.24	15.02	0.153	0.93	3.6		74	0.0	
1702	6.16	15.02	0.141	0.80	3.6		80	0.0	water level 13.73
1712	6.10	14.99	0.135	0.71	3.6		84	0.0	
1722	6.06	14.91	0.133	0.78	3.7		85	0.0	
1732	6.00	14.89	0.127	0.64	3.9		90	0.0	

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 09/27/01 TIME ~~1130~~ 0930
SAMPLING POINT AEHA-32B
(LOCATION)
DEPTH 22.9' ~~BGS~~ ~~FBTG~~ FTBTOC

PLE INFORMATION SAMPLE I.D. NO.: AEHA-32B

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Clear samples, no odor, good recharge.

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER Clear, Sunny AIR TEMPERATURE ~70°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: Charlette Clark & Loretta Markham SAMPLING OBSERVED BY: G. Prouvada

DISCREPANCIES: _____

Location DSCR - [illegible] Site Name

Identify Measuring Point (MP): [illegible] (eg. Top of Casing)

Well ID: AEHA 32B

Depth to Screen below MP: ~~35.865~~ 34.68' of screen (Top) ~~55.865~~ 54.68' of screen (Bottom)

Field Sampling Personnel: ROBERT FORSTER, CHARLETTE CLARKE, LORETTA MARKHAM

Pump Intake at (ft. below MP): 2' up from bottom

Purging Device (Pump Type): Ded. Bladder Pump

9/27

AEHA - 32B

Sept. 26, 2001

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: (ntu) Turbidity	Comments: P.I.D.
9/26	1540	22.43		300	<1	18.58	0.152	6.33	0.76				4	43.6	0.7
	1550	22.52			1	18.09	0.152	6.32	0.45				-8	17.4	0.7
	1600	22.53				17.92	0.152	6.31	0.29				-12	20.1	0.6
	1610	22.52				17.91	0.152	6.30	0.22				-12	15.1	0.6
	1620	22.53				17.97	0.151	6.28	0.38				-9	14.0	0.6
	1630	22.53				18.08	0.146	6.28	1.59				7	4.7	0.6
	1640	22.54				18.43	0.144	6.26	2.01				11	0	0.6
	1650	22.54				18.53	0.141	6.28	2.34				17	4.4	0.6
	1700	22.53				18.61	0.141	6.29	2.26				18	7.6	0.5
	1710	22.52				18.60	0.137	6.29	2.84				23	6.3	0.5
DUE TO NATIONAL GUARD CLOSING TIME; HAD TO LEAVE SITE										DEMOB		1715 - TO REMOB 9/27/01			
9/27	0830	22.9				17.36	0.168	6.21	1.67				36	5.5	0.3
9/27	0840	22.9				17.48	0.159	6.24	0.64				25	3.4	0.1
9/27	0850	22.85				17.47	0.156	6.26	0.57				23	5.1	0.2
9/27	0900	22.9				17.47	0.156	6.26	0.12				16	2.1	0.3
9/27	0910	22.9				17.45	0.155	6.24	0.0				15	1.0	0.2
9/27	0920	22.9				17.50	0.154	6.24	0.0				13	0.7	0.2
9/27	1830									3		0.60			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/26/01 TIME 1200
SAMPLING POINT AEHA-21B
(LOCATION)
DEPTH

MPLE INFORMATION SAMPLE I.D. NO.: AEHA-21B MS/MSD

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	9	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	9	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	3	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	3	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	3	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER SUNNY (CLEAR) AIR TEMPERATURE 52° AM / 78° PM.

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: R. FORISTER SAMPLING OBSERVED BY: C. CLARKE
DISCREPANCIES:

Location DSCR - OU 6 (Site Name)

Identify Measuring Point (MP): TOC (eg. Top of Casing)

Well ID: AEHA-21B

Depth to Screen below MP: 30.87' of screen (Top) 50.87' of screen (Bottom)

Field Sampling Personnel: ROBERT FORSTER, CHARLETTE CLARK

Pump Intake at (ft. below MP): 48.87'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit (mg/L) (high)	DO Hach Test Kit (mg/L) (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: TURBIDITY (NTU)
9/26/01														
	0850					17.48	0.078	5.42	4.71				149	13.4
	0900					17.72	0.068	5.05	6.74				156	6.7
	0910					17.75	0.061	5.27	5.68				151	11.1
	0920					17.73	0.060	5.49	4.91				144	8.5
	0930					17.79	0.059	5.63	4.29				139	7.2
	0940					17.81	0.058	5.73	3.70				138	11.1
	0950					17.87	0.055	5.76	3.29				140	10.3
	1000					17.85	0.057	5.77	2.96				141	9.5
	1010					17.81	0.057	5.81	2.66				141	6.5
	1020					17.83	0.057	5.81	2.38				143	9.2
	1030					17.86	0.056	5.83	2.21				144	8.6
	1040					17.84	0.056	5.82	2.08				145	9.2
	1050					17.85	0.055	5.83	2.01				146	6.7
	1100					17.93	0.055	5.83	1.93				148	2.7
											4	0		
	1600													

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

Ground Water Sampling Log

Project PSCR Site OU6 Well No. AEHA 21B Date 9/26/01

Well Depth _____ Screen Length _____ Well Diameter 2 Casing Type _____

Sampling Device DED. BLAD. PUMP Tubing type _____ Water Level 15.7'

Measuring Point _____ Other Infor _____

Sampling Personnel R. FORISTER, C. CLARKE

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc	ORP	P.I.D.	Notes
0850	5.42	17.48	0.078	4.71	13.4		149	0.2	
0900	5.05	17.72	0.068	6.74	6.7		156	0.2	
0910	5.27	17.75	0.061	5.68	11.1		151	0.0	
0920	5.47	17.73	0.060	4.91	8.5		144	0.2	
0930	5.63	17.79	0.059	4.29	7.2		139	0.2	
0940	5.73	17.81	0.058	3.70	11.1		138	0.2	
0950	5.76	17.87	0.058	3.29	10.3		140	0.2	
1000	5.77	17.85	0.057	2.96	9.5		141	0.2	
1010	5.81	17.81	0.057	2.66	6.5		141	0.2	
1020	5.81	17.83	0.057	2.38	9.2		143	0.1	
1030	5.83	17.86	0.056	2.21	8.6		144	0.1	
1040	5.82	17.84	0.056	2.08	9.2		145	0.2	
1050	5.83	17.85	0.055	2.01	6.7		146	0.2	
1100	5.83	17.93	0.055	1.93	2.7		148	0.2	
STABIL (2FT)		@	1100						
	SAMPLE	TIME		1200					

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9-26-01 TIME 1145
SAMPLING POINT AEHA-33B
(LOCATION)
DEPTH 54.5

PLE INFORMATION SAMPLE I.D. NO.: AEHA-33B

IATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

IAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME. SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
No odor, smell

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
4 gallons purged

ENERAL INFORMATION WEATHER Sunny, Cool AIR TEMPERATURE 50

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: L. Barlow, B. Ware SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Location DUCK - [illegible]
Site Name

Identify Measuring Point (MP): _____
(eg. Top of Casing)

Well ID: AEHA 33B

Depth to Screen below MP: AWE ~~41.5~~ 39.45' of screen (Top) ~~54.5~~ 59.45' AWE of screen (Bottom)

Field Sampling Personnel: L. Barlow, B. Ware

Pump Intake at (ft. below MP): AWE ~~52.5~~ 57.45'

Purging Device (Pump Type): Well Wizard

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. +/- 3% umhos/cm	pH +/- .1 pH Units	DO Flow Cell +/- 10% mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential +/- 10 mV	Comments Turbidity ≤ 5	Comments PID
9-26-01	1027	26.15	35 PSI	200				6							0.00
	1033	26.21	"	"		20.9	0.239	6.69	2.41				24	77	0.00
	1043	26.21				20.7	0.228	6.98	0.30				-24	18	0.00
	1053	26.21				20.5	0.228	6.96	0.04				-34	11	
	1103	26.21				20.6	0.226	6.93	0.04				-37	5	
	1113	26.21				20.5	0.225	6.92	0.00				-37	4	
														Sampled at 1145	
	1430										2	1.0			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project DSCR Site NGA Well No. AEHA 35B Date 9 26 01

Well Depth 54.5 Screen Length 3.0 Well Diameter 4" Casing Type Flush Mount

Sampling Device _____ Tubing type _____ Water Level 26.15

Measuring Point 52.5 Other Infor _____

Sampling Personnel L. Barlow, B. Ware

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc	ORP	Flow Rate	Notes
1033	6.69	20.9	0.239	2.41	77		24	200	
1043	6.98	20.7	0.228	0.30	18		-24	200	
1053	6.96	20.5	0.228	0.04	11		-34	200	
1103	6.93	20.6	0.226	0.04	5		-37	200	
1113	6.92	20.5	0.225	0.00	4		-37	200	
									Sampled @ 1145

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/26/01 TIME 12 10
SAMPLING POINT AEHA-18B
(LOCATION)
DEPTH 21.45ft BTOC

IPLE INFORMATION SAMPLE I.D. NO.: AEHA-18B

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Approx. 12 gal. purged. Samples slightly orange. No apparent odor.

ENERAL INFORMATION WEATHER sunny 65° AIR TEMPERATURE 65°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: K. Adams + T. Nichols SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Location DSCR - OU 5 (Site Name)

(eg. Top of Casing)

Well ID: AEHA - 18B

Depth to Screen below MP: 29.07' (Top) of screen 49.07' (Bottom) of screen

Field Sampling Personnel: KATHERINE ADAMS, TAMRA NICHOLS

Pump Intake at (ft. below MP): 47.07'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: TURBIDITY (NTU)
9/26/01	0918	21.45												
	0955			265		18.4	0.131	5.87	1.06				124	69.7
	1005	21.62		265		17.56	0.125	6.03	0.63				109	38.8
	1015			265		17.42	0.125	6.06	1.01				103	19.8
	1025			265		17.32	0.126	6.06	1.30				99	14.2
	1035			265		17.47	0.128	6.06	1.45				95	19.1
	1045			265		17.45	0.133	6.06	1.94				93	14.6
	1055	21.68		265		17.49	0.136	6.07	1.90				90	11.5
	1105			265		17.48	0.139	6.07	2.01				89	11.0
	1115			265		17.54	0.142	6.06	1.96				88	9.0
	1125			265		17.43	0.146	6.05	1.93				86	8.3
	1135			265		17.40	0.149	6.04	1.82				85	7.6
	1145			265		17.60	0.152	6.03	1.76				84	7.0
	1155			265		17.74	0.156	6.03	1.64				83	7.1
	1205					17.80	0.160	6.03	1.64				81	7.5
											2	0		
	1615													

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project DSCR Site OU 6 Well No. AEHA 18B Date 9/26/01

Well Depth _____ Screen Length _____ Well Diameter 4"? Casing Type PVC

Sampling Device QED Dtl. bladder pump Tubing type teflon lined PE Water Level 21.45 ft BTOC

Measuring Point TOC Other Infor _____

Sampling Personnel K. Adams + T. Nichols

Time	pH	Temp	Cond.	Dis.O_2	Turb. (NTU)	~~Lt~~ Conc	ORP	PID	Notes
0955	5.87	18.4	0.131	1.06	69.7		124	0.0	
1005	6.03	17.56	0.125	0.63	38.8		109	0.0	
1015	6.06	~~19.80~~ 17.42	0.125	1.01	19.8		103	0.0	
1025	6.06	17.32	0.126	1.30	14.2		99	0.0	
1035	6.06	17.47	0.128	1.45	19.1		95	0.0	
1045	6.06	17.45	0.133	1.94	14.6		93	0.0	
1055	6.07	17.49	0.136	1.90	11.5		90	0.0	
1105	6.07	17.48	0.139	2.01	11.0		89	0.0	
1115	6.06	17.54	0.142	1.96	9.0		88	0.0	
1125	6.05	17.43	0.146	1.93	8.3		86	0.0	
1135	6.04	17.40	0.149	1.82	7.6		85	0.0	
1145	6.03	17.60	0.152	1.76	7.0		84	0.0	
1155	6.03	17.74	0.156	1.64	7.1		83	0.0	
12:05	6.03	17.80	0.160	1.64	7.5		81	0.0	

Type of Samples Collected _____

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9-26-01 TIME 0945
SAMPLING POINT AEHA-23B
(LOCATION)
DEPTH 52.0

MPLE INFORMATION SAMPLE I.D. NO.: AEHA-23B

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

no odor

ENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 65

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: L. Barlow B. Ware SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Location DSCR - OU6 NGA (Site Name)

Identify Measuring Point (MP): TOC (eg. Top of Casing)

Well ID: AEHA 23B

Depth to Screen below MP: ~~47.0~~ 31.94' (Top) of screen; ~~52.0~~ 51.94' (Bottom) of screen

Field Sampling Personnel: L. Barlow, B. Ware

Pump Intake at (ft. below MP): 50.0

Purging Device (Pump Type): Bladder Pump

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (gal ~~liters~~)	Temp. (deg. C)	Spec Cond. (+/- 3% umhos/cm)	pH (+/- .1 pH Units)	DO Flow Cell (+/- 10% mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (+/- 10 mV)	Comments (NTU Turbidity / PID)
														0.00
9-26-01	1455	22.82	35 PSI	160	0									
	1502	22.90	"		0.52 gal	21.3	.098	6.60	6.30				4	16
	1512				0.52 gal	20.3	.094	6.54	0.93				3	6
	~~1522~~													had to get Miguel to come & check pump
	~~1532~~													
	~~1542~~													Started purging again @ 1544
	1544	23.08		200	0.52 gal	18.4	.092	6.49	1.02				6	30
	1554	23.05			0.52 gal	18.3	.091	6.52	0.38				6	28
	1604	22.87		200	0.52 gal	19.9	.093	6.52	0.84				11	29
	1614	22.87		↓	0.52 gal	20.0	.093	6.54	1.54				14	33
	1624	22.87			0.52 gal	19.9	.092	6.54	1.74				18	26
	1634	22.87			0.52 gal	20.0	.092	6.55	1.71				19	20
	1644	22.87			0.52 gal	19.4	.090	6.52	1.87				21	39
	1654	22.87			0.52 gal	19.6	.091	6.55	2.04				24	31
9/27/01	0835	22.75		300	0.10 gal	18.4	.089	6.27	2.80				79	5
	0845	22.72			0.50 gal	17.9	.086	6.31	1.53				56	6
	0855	22.74			1.00 gal	18.0	.085	6.28	1.50				53	10
	0905	22.75			1.50 gal	18.0	.085	6.31	1.55				54	14
	0915	22.75			2.00 gal	18.3	.085	6.39	~~2.28~~ 1.93				55	1
	1415									3		0		

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project OSCR Site OU-6 NGA Well No. _____ Date 9-26-01

Well Depth 52.0 Screen Length 5.0 Well Diameter 4" Casing Type Flush Mount

Sampling Device _____ Tubing type _____ Water Level 22.82

Measuring Point 50.0 Other Infor _____

Sampling Personnel L. Barlow, B. Ware

	Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ] ~~Conc~~ ORP	Flow Rate		Notes
/26	1502	6.60	21.3	.098	6.30	16	4	160		
	1512	6.54	20.3	.094	0.93	6	3			had to stop & have Miguel check pump
	1544	6.49	18.4	.092	1.02	30	6			
	1554	6.52	18.3	.091	.38	28	6	200		
	1604	6.52	19.9	.093	.84	29	11			
	1614	6.54	20.0	.093	1.54	33	14			
	1624	6.54	19.9	.092	1.74	26	18			
	1634	6.55	20.0	.092	1.71	20	19			
	1644	6.52	19.4	.090	1.87	39	21			
	1654	6.55	19.6	.091	2.04	31	24			
/27	0835	6.27	18.4	.089	2.80	5	79	300		
	0845	6.31	17.9	.086	1.52	6	56			
	0855	6.28	18.0	.085	1.50	10	53			
	0905	6.31	18.0	.085	1.55	14	54			
	0915	6.39	18.3	.085	1.93	1	55			

Type of Samples Collected _____

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/27/01 TIME 1000
SAMPLING POINT AEHA-24B
(LOCATION)
DEPTH 21.93 ft BTOC

MPLE INFORMATION SAMPLE I.D. NO.: AEHA-24B

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Approx. 8 gallons, turbid but no odor, color

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER Sunny 65° AIR TEMPERATURE _____

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: K. Adams / T. Nichols SAMPLING OBSERVED BY: A. Meyers

DISCREPANCIES: _____

Location Book - _____ Site Name

(eg. Top of Casing)

Well ID: AFNA-24B

Field Sampling Personnel: KATHERINE ADAMS, TAMRA NICHOLS

Depth to Screen below MP: 31.46' of screen (Top) 51.46' of screen (Bottom)

Pump Intake at (ft. below MP): 49.46'

Purging Device (Pump Type): BLADDER PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	Comments TURBIDITY NTU
9/26/01	1500	21.90				~~21~~		~~6.55~~						
	1546	22.3		250		21.36	0.293	6.55	1.63				-25	13.9
	1550			250		20.82	0.251	6.39	0.90				-14	19.2
	1600	22.35		250		20.69	0.226	6.36	1.78				1	10.9
	1610	22.36		250		20.51	0.209	6.30	1.65				12	9.8
	1620			250		20.45	0.204	6.29	1.60				15	16.6
	1630	22.36		250		20.56	0.196	6.28	1.91				21	28.9
	1640			250		20.31	0.188	6.26	2.11				27	27.3
	1650	22.48		250		20.28	0.182	6.26	2.13				30	34.9
	1700			250		20.20	0.178	6.25	2.08				33	20.4 CEASED DUE TO TIME CONSTRAINT
9/27/01	0749	21.93												
	0815	22.40		270		19.52	0.293	6.44	0.72				4	8.6
	0825			270		19.92	0.218	6.39	0.25				28	14.7
	0835	22.48		270		19.91	0.177	6.30	0.80				47	23.3
	0845	22.46		~~270~~ 225		20.22	0.159	6.25	1.36				53	38.8
	0855	22.46		225		20.51	0.152	6.25	2.12				55	51.7
	0905	22.44		225		20.67	0.148	6.25	2.56				55	58.0
	0915			225		20.69	0.144	6.24	2.79				56	66.3
	0925	22.44		225		20.64	0.142	6.24	3.05				57	71.1 RINSE OUT FLOW CELL
	0940	22.41		225		20.60	0.139	6.22	3.83				60	2.5
	0950			225		20.28	0.139	6.22	2.44				58	1.8
											4	0		
	1450													

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project DSCR Site OU 6 Well No. AEHA-24B Date 9/27/01

Well Depth _____ Screen Length _____ Well Diameter 4-5? Casing Type PVC

Sampling Device QED Ded. Bled. Tubing type teflon-lined PE Water Level 21.93 ft BTOC

Measuring Point TOC Other Infor _____

Sampling Personnel K. Adams & T. Nichols

Continued from 9/26/01

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc	ORP	PID	Notes
0815	6.44	19.52	0.193	0.72	8.6		4	0.5	270 mL/min
0825	6.39	19.92	0.218	0.25	14.7		28	1.1	
0835	6.30	19.91	0.177	0.80	23.3		47	1.6	
0845	6.25	20.22	0.159	1.36	38.8		53	0.6	changed rate
0855	6.25	20.51	0.152	2.12	51.7		55	0.1	to 225 mL/min
0905	6.25	20.67	0.148	2.56	58.0		55	0.0	b/c of drawdown
0915	6.24	20.69	0.144	2.79	66.3		56	0.0	
0925	6.24	20.64	0.142	3.05	71.1		57	0.1	called Miguel
0940	6.22	20.60	0.139	3.83	2.5		60	0.0	in to assess
0950	6.22	20.28	0.139	2.94	1.8		58	0.0	DO and Turb.
1450				Hach test DO = 4 mg/L Fe = 0 mg/L					Rinsed Horiba
									but water still slightly
									turbid looking,
									With yesterdays
									purge, we've
									gone over 2
									hours.

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft; $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

Ground Water Sampling Log

Project DSCR Site OU6 Well No. AEHA-24B Date 9/26/01

Well Depth _____ Screen Length _____ Well Diameter 4"-5? Casing Type PVC

Sampling Device QED Ded. Bladder Pump Tubing type teflon-lined PE Water Level 21.90' BTOC

Measuring Point TOC Other Infor _____

Sampling Personnel K. Adams + T. Nichols

Time	pH	Temp (°C)	Cond. (mS/cm)	Dis.O_2 (mg/L)	Turb. (NTU)	[ ] ~~Conc~~	ORP (mV)	PID (ppm)	Notes
1540	6.55	21.36	0.293	1.63	13.9	~~-2~~ KH	-25	0.2	Drawdown
1550	6.39	20.82	0.251	0.90	19.2		-14	0.2	occurred from
1600	6.36	20.69	0.226	1.78	10.9		1	0.3	21.90 to 22.36
1610	6.30	20.51	0.209	1.65	9.8		12	0.3	feet and
1620	6.29	20.45	0.204	1.60	16.6		15	0.1	stabilized by
1630	6.28	20.56	0.196	1.91	28.9		21	0.1	second reading.
1640	6.26	20.31	0.188	2.11	27.3		27	0.2	
1650	6.26	20.28	0.182	2.13	34.9		30	0.2	
1700	6.25	20.30	0.178	2.08	20.4		33	0.2	← Ceased due
									to time
									constraints.

Type of Samples Collected _____

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9-27-01 TIME 1030
SAMPLING POINT AEHA-25B
(LOCATION)
DEPTH 52.0' TD

PLE INFORMATION SAMPLE I.D. NO.: AEHA-25B

IATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

IAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
no color no odor

ENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 60°

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

IA/QC

SAMPLE COLLECTED BY: R. Forister, L. Barlow SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9-27-01 TIME 1030
SAMPLING POINT AEHA-25BQA
(LOCATION)
DEPTH QA Split

MPLE INFORMATION SAMPLE I.D. NO.: AEHA-25BQA

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) ____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) ____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
~~VOA VIAL~~	~~20 ml~~	~~1~~	~~None~~	~~Hydrogen by AM19~~

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

no odor, no color

ENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 60°

SAMPLES SHIPPED TO: CEMRD – Omaha, NE

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: R. Forster, L. Barlow SAMPLING OBSERVED BY: ____

DISCREPANCIES: ____

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9-27-01 TIME 1200
SAMPLING POINT OU6DUP-4
(LOCATION)
DEPTH Dup of AEHA-25B

IPLE INFORMATION SAMPLE I.D. NO.: OU6 DUP-4

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 60°

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: R. Forister, L. Barlow SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Site Name (eg. Top of Casing)

Well ID: AEHA 25B

Field Sampling Personnel: Robert Forister, Lauren Barlow

Depth to Screen below MP: ~~47.0~~ 51.21' of screen (Top) ~~52.0~~ 51.21' of screen (Bottom)

Pump Intake at (ft. below MP): ~~50.0~~ 49.21'

Purging Device (Pump Type): BLADDER PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. +/- 3% umhos/cm	pH +/- .1 pH Units	DO Flow Cell +/- 10% mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	ORP Redox Potential +/- 10 mV	Comments: Turbidity	Comments: PID
9-27-01	0816	20.50	35	350		~~19.67~~	~~0.106~~	~~6.97~~	~~4.28~~				~~75~~	~~34.4~~	0.0
	0830	20.76	35	350		19.67	0.106	6.97	4.28				75	34.4	0.0
	0840	20.76	35	350		19.67	0.098	7.05	2.01				52	35.9	0.0
	0850	20.78				19.61	0.091	7.12	1.43				51	29.3	0.0
	0900	20.78				19.57	0.087	7.08	1.14				54	39.8	
	0910	20.78				19.51	0.083	7.10	0.94				55	34.0	
	0920	20.78				19.55	0.082	7.11	0.86				56	32.0	
	0930	20.78				19.57	0.082	7.22	0.74				57	36	
	0940	20.78				19.57	0.081	7.22	0.72				58	37	
	0950	20.78				19.60	0.081	7.26	0.76				59	39	
														Stabilized and sampled @ 1030	
	1330									2		0.30		Sampled AEHA 25B + AEHA 25B QA @1030	
														Sampled DUGDUP-4 @ 1200	

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project DSCR Site OU6 - NGA Well No. AEHA 25B Date 9-27-01

Well Depth 52.0 Screen Length 5 Well Diameter 4" Casing Type Flush mount

Sampling Device Well Wizard Tubing type _____ Water Level 20.5'

Measuring Point _____ Other Infor _____

Sampling Personnel L. Barlow, R. Forister

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc	ORP	Flow Rate	PID	Notes
0830	6.97	19.67	0.106	4.28	34.4		75	350	0.0	
0840	7.05	19.67	0.098	2.01	35.9		52	350	0.0	
0850	7.12	19.61	0.091	1.43	29.3		51	"	"	
0900	7.08	19.57	0.087	1.14	29.8		54			
0910	7.10	19.51	0.083	0.94	34		55			
0920	7.11	19.55	0.082	0.86	32.0		56			
0930	7.22	19.57	0.082	0.74	36.0		57			
0940	7.22	19.57	0.081	0.72	37		58			
0950	7.26	19.60	0.081	0.76	39		59			

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/27/01 TIME 3:00
SAMPLING POINT AEHA-27B
(LOCATION)
DEPTH

MPLE INFORMATION SAMPLE I.D. NO.: AEHA-27B

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

IELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

GENERAL INFORMATION WEATHER AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

QA/QC

SAMPLE COLLECTED BY: CC, LM (Charlotte Clark, Loretta Mazzuca) SAMPLING OBSERVED BY:
DISCREPANCIES:

Location DSCR - [illegible]
Site Name

Identify Measuring Point (MP): Top of Casing
(eg. Top of Casing)

Well ID: AEHA 27-B

Field Sampling Personnel: Charlotte Clark
Loretta Markham

Depth to Screen below MP: 29.71' of screen (Top) 49.71' of screen (Bottom)

Pump Intake at (ft. below MP): 47.71'

Purging Device (Pump Type): BLADDER PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	Comments Turb. ntu
9/27/01	1300	18.9		280		20.43	0.287	7.4	4.81				-16	214.0
	1310	18.9				20.23	0.281	7.49	3.74				-16	31.5
	1320	19.0				20.20	0.269	7.44	2.83				-26	15.6
	1330	18.9				20.19	0.261	7.41	2.31				-29	9.2
	1340	18.9				20.12	0.275	7.39	2.03				-27	4.8
	1350	18.93				20.15	0.253	7.38	1.82				-28	4.5
	1400	18.9				20.06	0.251	7.37	1.73				-27	2.6
	1410	18.9				20.20	0.249	7.36	1.66				-26	1.1
	1330									2		0		

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/27/01 TIME 14:10
SAMPLING POINT AEHA-31B
(LOCATION)
water DEPTH 18.40 ft BTOC

MPLE INFORMATION SAMPLE I.D. NO.: AEHA-31B

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Approx 5 gal. Clear samples, no odor.

ENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 83°

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: K. Adams/T. Nichols SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Location DSCR - OU 6
Site Name

(eg. Top of Casing)

Well ID: AEHA - 316

Depth to Screen below MP: 29.79' of screen (Top) 49.79' of screen (Bottom)

Field Sampling Personnel: K. ADAMS, T. NICHOLS

Pump Intake at (ft. below MP): 49.79'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: TURBIDITY (NTU)
9/27/01	1248	18.40												
	1320	18.55		250		23.05	0.134	5.31	1.79				129	8.0
	1330	18.55		250		20.30	0.132	5.33	0.29				125	1.2
	1340			250		19.71	0.131	5.35	0.00				124	3.6
	1350	18.55		250		19.45	0.131	5.35	0.00				124	2.9
	1400	18.55		250		19.22	0.131	5.35	0.00				126	2.6
	1815										2	0		

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project DSCR Site OU6 Well No. AEHA-31 Date 9/27/01

Well Depth _____ Screen Length _____ Well Diameter 4" Casing Type 4" PVC

Sampling Device QED bcd. Tubing type teflon-lined PE Water Level 18.40 ft BTOC

Measuring Point TOC (bolts) Other Infor _____

Sampling Personnel K. Adams / T. Nichols

Time	pH	Temp	Cond.	Dis.O_2	Turb.	~~[ ]Conc~~	ORP	PID	Notes
1320	5.31	23.05	0.134	1.79	8.0		129	0.1	
1330	5.33	20.30	0.132	0.29	1.2		125	0.1	
1340	5.35	19.71	0.131	0.00	3.6		124	0.2	
1350	5.35	19.45	0.131	0.00	2.9		126	0.1	
1400	5.35	19.22	0.131	0.00	2.6		126	0.1	
1330									Hach Field Tests
									DO = 2 mg/L
									Fe = 0 mg/L

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/27/01 TIME 1520
SAMPLING POINT (LOCATION) AEHA-30B
DEPTH

AMPLE INFORMATION SAMPLE I.D. NO.: AEHA-30B

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

IELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
purged 3 gallons, No Odor

GENERAL INFORMATION WEATHER AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

QA/QC

SAMPLE COLLECTED BY: SAMPLING OBSERVED BY: William Wa
DISCREPANCIES:

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/27/01 TIME 1520
SAMPLING POINT AEHA-30BQ1
(LOCATION)
DEPTH QA Split

MPLE INFORMATION SAMPLE I.D. NO.: AEHA-30B QA

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
~~VOA VIAL~~	~~20 ml~~	~~1~~	~~None~~	~~Hydrogen by AM19~~

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
purged 3 gallons, No odor

ENERAL INFORMATION WEATHER _____ AIR TEMPERATURE _____

SAMPLES SHIPPED TO: CEMRD – Omaha, NE

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: [signature] SAMPLING OBSERVED BY: [signature]

DISCREPANCIES: _____

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/27/01 TIME 1200
SAMPLING POINT OU6DUP-5
(LOCATION)
~~DEPTH~~ Dup of AEHA-30B

AMPLE INFORMATION SAMPLE I.D. NO.: OU6DUP-5

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

IELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
purged 3 gallons, No odor

ENERAL INFORMATION WEATHER _____ AIR TEMPERATURE _____

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: _____ SAMPLING OBSERVED BY: William Ward

DISCREPANCIES: _____

Location DSCR - UU6 (Site Name)

Identify Measuring Point (MP): AIUC (eg. Top of Casing)

Well ID: AEHA-30B

Depth to Screen below MP: 19.52' (Top) of screen 39.52' (Bottom) of screen

Field Sampling Personnel: Chris Williamson, Bill Ware

Pump Intake at (ft. below MP): 37.52'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (gallons ~~liters~~)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: Turbidity (NTU)
9/27/01	1255	16.95		140	0.1	21.0	0.145	5.93	2.78				13	97
	1305	16.99		140	0.5	21.0	0.142	5.95	0.90				6	19
	1315	16.91		100	1	21.5	0.142	5.95	0.26				3	7
	1325	16.91		100	1.25	21.6	0.141	5.97	0.11				1	2
	1335	16.91		100	1.5	21.6	0.142	5.97	0.05				0	1
	1345	16.88		100	2	21.8	0.142	5.98	0.09				-1	1
	1355	16.87		100	2.75	22.0	0.143	5.98	0.14				-1	1
	1405	16.85		100	2.5	22.2	0.144	5.98	0.22				-3	4
	1415	16.85		100	2.6	21.5	0.144	6.02	0.5				-3	5
	1425	16.85		100	3	21.3	0.143	6.00	0.31				-2	4
										3		3		
	1825													

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9-27-01 TIME 1445
SAMPLING POINT AEHA-28B
(LOCATION)
DEPTH 50.0

MPLE INFORMATION SAMPLE I.D. NO.: AEHA-28B

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
no color, no odor

ENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 65°-75°

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: L. Barlow, R. Forister SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Location DSCR - [illegible]
Site Name

Well ID: AEHA 28B
Field Sampling Personnel: Robert Forister
Lauren Barlow

Identify Measuring Point (MP): _____
(eg. Top of Casing)

Depth to Screen below MP: ~~45.0~~ 29.71' of screen (Top) ~~50.0~~ 49.71' of screen (Bottom)

Pump Intake at (ft. below MP): ~~47.0~~ 47.71'
Purging Device (Pump Type): BLADDER PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. ± 3% umhos/cm	pH ± .1 pH Units	DO Flow Cell ± 10% mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential ± 10 mV	Comments Turbidity	Comments Pid
9-27-01	1300	21.46	35 PSI	300									91	183	0.0
	1305	21.75	35	300		20.78	0.103	7.16	3.87				91	52	↓
	1310	21.75	35 PSI	300		20.32	0.102	7.17	1.79				95	38	
	1325	21.75				20.21	0.101	7.19	1.23				97	33	
	1335	21.75				20.21	0.101	7.19	1.03				93	37	
	1345	21.75				21.11	0.101	7.21	1.02				95	38	
	1355	21.75				20.45	0.100	7.19	0.81				99	36.9	
	1405	21.75				20.35	0.099	7.18	0.75				97	38.3	
	1415	21.75				20.38	0.099	7.18	0.63				95	30	
	1425	21.75				20.01	0.099	7.20	0.55					* DO did not stabilize b/c of bubbles in the Horiba. Miguel gave us the ok. Sampled @ 1445	
	1330									1		0			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project DSCR Site ~~[illegible]~~ OU6 NGA Well No. AEHA 28B Date 9-27-01

Well Depth 50.0 Screen Length 5.0 Well Diameter 4" Casing Type _____

Sampling Device _____ Tubing type _____ Water Level _____

Measuring Point _____ Other Infor _____

Sampling Personnel Robert Forister, Lauren Barlow

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc	ORP	Flow Rate	Notes
1305	7.16	20.78	0.103	3.87	183		91	300	
1315	7.17	20.32	0.102	1.79	52		91	300	
1325	7.19	20.21	0.101	1.23	38		95		
1335	7.19	20.21	0.101	1.02	33		97		
1345	7.21	21.11	0.101	1.02	37		93		
1355	7.19	20.45	0.100	0.81	38		95		
1405	7.18	20.35	0.099	0.75	36.9		99		
1415	7.18	20.38	0.099	0.63	38		97		
1425	7.20	20.01	0.099	0.55	36		95		Sampled @ 1445

Type of Samples Collected _____

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/28/01 TIME 0745
SAMPLING POINT LAWMW-Q
(LOCATION)
DEPTH 28.30ft.

IPLE INFORMATION SAMPLE I.D. NO.: LAWMW-Q

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

WATER CLEAR, ODORLESS

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 60°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: Loretta Markham Charlette Clark SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Location DSCR - [illegible]
Site Name

Facility Measuring [illegible]
(eg. Top of Casing)

Well ID: LAW MWQ

Field Sampling Personnel: CHAROLETTE CLARK
LORETTA MARKHAM

Depth to Screen below MP: 40' of screen (Top) 50' of screen (Bottom)

Pump Intake at (ft. below MP): 50'

Purging Device (Pump Type): BLADDER PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	TURB. NTU	Comments
9/27	1725	28.4		248		15.84	0.127	6.43	0.46				-15	27	
	1735	28.35				15.59	0.121	6.34	0.23				-12	19.4	
	1745	28.4				15.52	0.117	6.34	0.09				-12	14.8	
	1755	28.38				15.48	0.116	6.35	0.02				-12	8.0	
	1805	28.4				15.41	0.114	6.32	0.0				-11	5.3	
	1815					15.34	0.113	6.32	0.0				-10	3.5	
9/28	1030									2		1.30			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9-28-01 TIME 920
SAMPLING POINT USGS-M2
(LOCATION)
DEPTH 48.0

PLE INFORMATION SAMPLE I.D. NO.: USGS-M2

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____
PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____
AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
No color, no odor

ENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 60

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: R. Forister L. Barlow SAMPLING OBSERVED BY: _____
DISCREPANCIES: _____

Site Name (eg. Top of Casing)

Well ID: USGS M2

Field Sampling Personnel: Lauren Barlow, Robert Forister

Depth to Screen below MP: ~~43.0~~ 45.14' of screen (Top) ~~48.0~~ 47.14' of screen (Bottom)

Pump Intake at (ft. below MP): ~~46.0~~ 46.14'

Purging Device (Pump Type): Bladder pump

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. +/- 3% umhos/cm	pH +/- .1 pH Units	DO Flow Cell +/- 10% mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential +/- 10 mV	Comments Turbidity	Comments PID
		17.15													
9-28-01	750	17.40	30 PSI	280		15.16	0.093	5.55	3.22				189	51.8	0.1
	800	17.40				14.75	0.082	5.76	0.75				168	19.5	
	810	17.40				14.58	0.079	5.72	0.07				150	10.2	0.1
	820	17.40				14.53	0.077	5.65	0.00				141	7.7	0.1
	830	17.40				14.53	0.077	5.59	0.00				139	5.8	0.2
	840	17.40				14.53	0.077	5.57	0.00				135	5.2	
	850	17.40				14.53	0.077	5.54	0.00				135	4.5	
														Sampled at 920	
	1230									2		0			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/23/01 TIME 0925
SAMPLING POINT USGS-H2
(LOCATION)
DEPTH

PLE INFORMATION SAMPLE I.D. NO.: USGS-H2

IATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)

AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: CHRIS WILLIAMSON / BILL WARE SAMPLING OBSERVED BY:

DISCREPANCIES:

Site Name (eg. Top of Casing)

Well ID: USGS-H2

Field Sampling Personnel: William Ware, Chris Williamson

Depth to Screen below MP: 39.75' of screen (Top) 41.75' of screen (Bottom)

Pump Intake at (ft. below MP): 40.75'

Purging Device (Pump Type): Bladder pump

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged ~~liters~~ gal.	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: Turbidity
~~0815~~														
9/28/01	0815	16.81		200	0.1	14.8	0.088	5.29	2.28				187	6
	0825	16.82		200	0.5	14.6	0.080	5.48	0.43				182	6
	0835	16.78		200	1	14.7	0.077	6.27	0.00				109	7
	0845	16.81		200	1.5	14.7	0.075	6.35	0.00				91	8
	0855	16.81		200	1.75	14.7	0.074	6.38	0.00				86	7
	0905	16.81		200	2.00	14.7	0.074	6.35	0.00				86	6
	0915	16.81		200	2.25	14.7	0.074	6.34	0.00				88	6
	1255									3		0.30		

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/28/01 TIME 1020
SAMPLING POINT USGS-N1
(LOCATION)
DEPTH

IPLE INFORMATION SAMPLE I.D. NO.: USGS-N1

IATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)

IAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Approx. 10 gal purged, grey colored water, no odor

ENERAL INFORMATION WEATHER 60° Sunny AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: K. Adams / T. Nichol SAMPLING OBSERVED BY:

DISCREPANCIES:

Location DSCR - OU 8 (Site Name)

Identify Measuring Point (MP): TOC (eg. Top of Casing)

Well ID: USGS-N1

Depth to Screen below MP: 65.34' (Top) of screen 67.34' (Bottom) of screen

Field Sampling Personnel: K. ADAMS, T. NICHOLS

Pump Intake at (ft. below MP): 66.34'

Purging Device (Pump Type): BLADDER Pump

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: TURBIDITY NTU
9/28/01	0710	25.98												
	0805	26.30		250		14.45	0.179	6.18	0.75				62	186.0
	0815			250		14.46	0.170	6.22	0.32				41	65.5
	0825			250		14.49	0.167	6.23	0.44				32	40.0
	0835	26.32		250		14.50	0.165	6.22	0.10				27	36.1
	0845	26.32		250		14.52	0.163	6.21	0.00				23	39.3
	0855	26.30		250		14.52	0.162	6.21	1.57				28	110.0
	0905			250		14.52	0.161	6.21	0.00				22	37.3
	0915			250		14.54	0.161	6.22	0.00				19	27.5
	0925			250		14.56	0.161	6.21	0.00				18	15.2
	0935			250		14.59	0.160	6.20	0.00				18	18.5
	0945			250		14.83	0.156	6.27	2.67				21	24.5
	0955			250		14.64	0.161	6.22	0.00				21	30.1
	1005	26.28		250		14.64	0.159	6.21	0.00				21	16.9
	1023			250		14.65	0.159	6.23	0.00				18	13.9
	1245										3	0.8		

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project DSCR Site OU10 Well No. ~~USG~~ USGS-N1 Date 9/28/01

Well Depth _____ Screen Length _____ Well Diameter 2" Casing Type PVC

Sampling Device _____ Tubing type _____ Water Level 25.98 ft

Measuring Point TOC Other Infor _____

Sampling Personnel K. Adams / T. Nichols

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc	ORP	PID	Notes
805	6.18	14.45	0.179	0.75	186.0		62	0.0	
815	6.22	14.46	0.170	0.32	65.5		41	0.0	
825	6.23	14.49	0.167	0.44	40.0		32	0.0	
835	6.22	14.50	0.165	0.10	36.1		27	0.0	
845	6.21	14.52	0.163	0.00	39.3		23	0.0	
855	6.21	14.52	0.162	1.57	110.0		28	0.0	
905	6.21	14.52	0.161	0.00	37.3		22	0.0	
0915	6.22	14.54	0.161	0.00	27.5		19	0.0	
0925	6.21	14.56	0.161	0.00	15.2		18	0.0	
0935	6.20	14.59	0.160	0.00	18.5		18	0.0	
0945	6.27	14.53	0.156	2.67	24.5		21	0.0	
0955	6.22	14.64	0.161	0.00	30.2		21	0.0	
1005	6.21	14.64	0.159	0.00	16.9		21	0.0	
1023	6.23	14.68	0.159	0.00	13.9		18	0.0	
1245									Hach Test DO = 3 mg/L Fe = 0.80 mg/L

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/28/01 TIME 1145
SAMPLING POINT USGS-C2
(LOCATION)
DEPTH

IPLE INFORMATION SAMPLE I.D. NO.: USGS-C2

IATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)

IAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
WATER CLEAR, NO ODOR

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
FILLED APPROXIMATELY 1.5 1gallon BUCKETS, RECHARGED GOOD

ENERAL INFORMATION WEATHER SUNNY, FEW CLOUDS AIR TEMPERATURE ~55°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: LORETTA MARKHAM, C.CHAP SAMPLING OBSERVED BY:
DISCREPANCIES:

Location DSCR - 006 (Site Name)

Identify Measuring Point (MP): ~~40.7 TOC~~ (eg. Top of Casing)

Well ID: USGS - C2

Depth to Screen below MP: 35.93' (Top) of screen 37.93' (Bottom) of screen

Field Sampling Personnel: LORETTA MARKHAM, CHARLETTE CLARK

Pump Intake at (ft. below MP): ~~175 ml/min~~ @ 36.93'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments
09/28/01	1010	16.9	13/2	200		14.68	0.130	5.65	0.0					
	1020	16.9	13/2	200		14.64	0.109	5.60	0.0					
	1030	16.89	13/2	200		14.66	0.100	5.57	0.0					
	1040	16.95	13/2	200		14.64	0.101	5.58	0.0					
	1100	16.95	13/2	175		14.65	0.096	5.55	0.0					
	1110	16.89	13/2	175		14.66	0.094	5.54	0.0					
	1120	16.89	13/2	175		14.68	0.093	5.54	0.0					
	1130	16.89	13/2	175		14.67	0.092	5.52	0.0					
09/28/01	1140	16.89	13/2	175		14.69	0.092	5.53	0.0					
	1440									2		0.41		

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/28/01 TIME 1320
SAMPLING POINT USGS-B2
(LOCATION)
DEPTH

MPLE INFORMATION SAMPLE I.D. NO.: USGS-B2

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
No Odor, 4 gallons purged

ENERAL INFORMATION WEATHER AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: William N Ware SAMPLING OBSERVED BY: [illegible]
DISCREPANCIES:

Location [illegible] _____ Site Name (eg. Top of Casing)

Well ID: USGS-B2

Field Sampling Personnel: Chris Williamson, Bill Ware

Depth to Screen below MP: 36' Top of screen, 38' Bottom of screen

Pump Intake at (ft. below MP): 37'

Purging Device (Pump Type): BLADDER PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	Comments Turbidity
9/28/6	1215	14.32		300	0.1	15.6	0.053	5.53	2.44				158	59
	1225	14.21		200	0.35	15.6	0.053	5.67	0.18				140	23
	1235	14.13		200	0.6	15.6	0.053	5.65	0.00				138	13
	1245	14.21		200	0.85	15.6	0.053	5.67	0.00				137	10
	1255	14.21		200	1.1	15.6	0.053	5.67	0.00				137	4
										3		0.75		
	1440													

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10-8-01 TIME 1300
SAMPLING POINT USGS-~~G2~~ G3
(LOCATION)
DEPTH 28.28

IPLE INFORMATION SAMPLE I.D. NO.: USGS-~~G2~~ G3

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
no color or odor

ENERAL INFORMATION WEATHER Clear, cool AIR TEMPERATURE 50°

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: L. Barbu & R. Forister SAMPLING OBSERVED BY:
DISCREPANCIES:

Site Name (eg. Top of Casing)

Well ID: USGS 63

Field Sampling Personnel: Robert Forister, Lauren Barlow

Depth to Screen below MP: 28.28 of screen (Top) 30.28 of screen (Bottom)

Pump Intake at (ft. below MP): 28.28

Purging Device (Pump Type): Bladder Pump

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: Turbidity
10-8-01	1110	17.58											237	6.3
	1120	18.09	25	200		14.31	0.108	5.24	6.39				159	5.7
	1130	18.05	↓	↓		14.27	0.096	5.10	2.36				105	4.8
	1140	17.96				14.29	0.092	5.24	0.82				81	2.9
	1150	17.96				14.26	0.089	5.46	0.58				64	3.2
	1200	17.96				14.27	0.088	5.68	0.30				51	3.3
	1210	17.96				14.30	0.087	5.79	0.15				42	2.3
	1220	17.96				14.34	0.086	5.88	0.00				39	1.6
	1230	17.96				14.39	0.086	5.90	0.00				36	1.7
	1240					14.40	0.085	5.91	0.00					Sampled at 1300
											2	1.60		
	1800													

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9-25-01 TIME 1120
SAMPLING POINT MWA50-35
(LOCATION)
DEPTH 11.13

PLE INFORMATION SAMPLE I.D. NO.: MWA50-35

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Organic to Clear

ENERAL INFORMATION WEATHER _____ AIR TEMPERATURE _____

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: [signature] SAMPLING OBSERVED BY: Loretta Markham

DISCREPANCIES: _____

Location DSCR - OU 6 (Site Name)

Identify Measuring Point (MP): TOC (eg. Top of Casing)

Well ID: MWA50-35

Depth to Screen below MP: 10.04' (Top) of screen 20.04' (Bottom) of screen

Field Sampling Personnel: CHRIS WILLIAMSON, LORETTA MARKHAM

Pump Intake at (ft. below MP): 18'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (GAL ~~liters~~)	Temp. (deg. C)	Spec Cond. (mS/cm umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	TURBIDITY (NTU)	Comments
9/25/01	0950			100	0.25	18	.145	5.65	0.00				3	63.1	
	1000				.5	17.92	.427	5.69	0.00				-16	18.9	
	1010				.75	17.92	.43	5.70	0.00				-21	14.0	
	1020				1.0	18.01	.432	5.71	0.00				-25	9.7	
	1030				1.25	18.27	.434	5.72	0.00				-29	8.2	
	1040				1.5	18.46	.434	5.73	0.00				-30	8.6	
	1050				1.75	18.7	.434	5.73	0.00				-32	8.0	
	1100				2.0	19.05	.434	5.73	0.00				-33	8.0	
	1110				2.25	19.06	.434	5.74	0.00				-33	8.2	
	1410										0	3.4			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

[illegible] DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project DSCR Site 006 Well No. MW450-35 Date 9/25/01

Well Depth _____ Screen Length 10 ft Well Diameter 2 in Casing Type PVC

Sampling Device Horiba Tubing type Teflon lined PE Water Level 16.13' BTOC

Measuring Point TOC Other Infor _____

Sampling Personnel Chris / Loretta M.

Time	pH	Temp (°C)	Cond. (mS/cm)	Dis.O_2 (mg/L)	Turb. (NTU)	[ ]Conc (gal)	ORP (mV)		Notes
0950	5.65	18	.145	0.00	63.1	.25	3		
01000	5.69	17.92	.427	0.00	18.9	.5	-16		
01010	5.70	17.92	.43	0.00	14.0	.75	-21		
01020	5.71	18.01	.432	0.00	9.7	1.0	-25		
01030	5.72	18.27	.434	0.00	8.2	1.25	-29		
01040	5.73	18.46	.434	0.00	8.6	1.5	-30		
01050	5.73	18.7	.434	0.00	8.0	1.75	-32		
01100	5.73	19.05	.434	0.00	8.0	2.0	-33		
01110	5.74	19.06	.434	0.00	8.2	2.25	-33		
1410									Field Test
									DO 0mg/L
									Fe^{+2} 3.4mg/L

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9-25-01 TIME ~~10:15~~ 1300
SAMPLING POINT MWA50-36
(LOCATION)
DEPTH 9.22 ft btoc. to static water level

LE INFORMATION SAMPLE I.D. NO.: MWA50-36

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to ph<2; Cool to 4°C	VOCs by SW8260B
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Total Metals by SW6010B/7470A
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Diss. Metals by SW6010B/7470A

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Total purging volume approx. 5 gal. water yellow-orange color, slightly sulfur odor.

ENERAL INFORMATION WEATHER HOT/Overcast/Sunny AIR TEMPERATURE Approx 75 °F

SAMPLES SHIPPED TO: STL – North Canton, Ohio

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: K Adams + T. Nichols SAMPLING OBSERVED BY: G. Purvada

DISCREPANCIES: _____

Location DSCR - OU 6
Site Name

Identify Measuring Point (eg. Top of Casing)

Well ID: MWASO-36

Depth to Screen below MP: 6.75' (Top) of screen 16.75' (Bottom) of screen

Field Sampling Personnel: K. ADAMS, T. NICHOLS

Pump Intake at (ft. below MP): 14.75'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (mS/cm ~~umhos/cm~~)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit (mg/L) (high)	DO Hach Test Kit (mg/L) (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Turbidity (NTU)	Comments
9/25/01	1015	9.22				~~14.66~~	~~1.80~~	~~6.47~~	~~0.00~~				~~-93~~	~~13.1~~	
	1136			156		19.66	1.80	6.47	0.00				-93	13.1	
	1146			156		19.44	1.80	6.45	0.00				-93	13.2	
	1156	11.15		156		19.76	1.81	6.46	0.00				-83	11.9	
	1206	11.25		100		20.22	1.81	6.45	0.00				-76	11.0	
	1216			100		21.14	1.81	6.45	0.00				-74	10.6	
	1226	11.42		100		20.85	1.81	6.44	0.00				-71	10.9	
	1236			100		20.70	1.81	6.44	0.00				-65	11.6	
	1246			100		21.01	1.81	6.44	0.00				-64	11.5	
											2	3.0			
	1410														

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project DSCR Site OU6 Well No. HW50-36 Date 9/25/01

Well Depth _____ Screen Length 10' Well Diameter 2" Casing Type 2" PVC Schedule 40

Sampling Device QED Bladder Pump Tubing type teflon-lined PE Water Level 9.22ft BTOC

Measuring Point top of casing Other Infor _____

Sampling Personnel Laura Nichols and Katharine Adams

Time	pH	Temp (°C)	Cond. (mS/cm)	Dis.O_2 (mg/L)	Turb. (NTU ~~mg/L~~)	[ ]Conc	ORP (mV)	P.I.D.	Notes
1136	6.47	19.66	1.80	0.00	13.1		-93	0.0	
1146	6.45	19.44	1.80	0.00	13.2		-93	0.0	
1156	6.46	19.76	1.81	0.00	11.9		-83	0.0	
1200	6.45	20.22	1.81	0.00	11.0		-76	0.0	
1216	6.45	21.14	1.81	0.00	10.6		-74	0.0	
1226	6.44	20.85	1.81	0.00	10.9		-71	0.0	
1236	6.44	20.70	1.81	0.00	11.6		-65	0.0	
1246	6.44	21.01	1.81	0.00	11.5		-64	0.0	
									Field Tests
1410									DO 2mg/L
									Fe^{+2} 3.0mg/L

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

Conductance is ~~millisiemens~~ milli siemens / centimeter

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/25/01 TIME 1255
SAMPLING POINT MWA50-37
(LOCATION)
DEPTH

LE INFORMATION SAMPLE I.D. NO.: MWA50-37

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
5 gallons purged. Sample clear, no apparent odors

ENERAL INFORMATION WEATHER Cloudy AIR TEMPERATURE 75°

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: Lauren Barlow Bill Ware
SAMPLING OBSERVED BY: William N Ward Lauren Barlow
DISCREPANCIES:

Location DSCR - DU-6 (Site Name)

Identify Measuring Point (MP): TOC (eg. Top of Casing)

Well ID: MW 50-37

Field Sampling Personnel: Lauren Barlow, Bill Wace

Depth to Screen below MP: 6.30 (Top) of screen 16.30 (Bottom) of screen

Pump Intake at (ft. below MP): 14.30

Purging Device (Pump Type): Bladder Pump

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. +/- 3% (umhos/cm)	pH +/- .1 (pH Units)	DO Flow Cell +/- 10% (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	ORP Redox Potential +/- 10 (mV)	Comments (Turbidity)
9-25-01	10:35	5.21	60 PSI	220		18.4	1.59	7.51	3.06				-113	12
	10:45	5.45		220		18.7	1.48	7.74	.40				-129	16
	10:55	5.53		100		19.1	1.45	7.74	.55				-121	28
	11:05	5.61		100		19.2	1.48	7.74	.66				-113	31
	11:15	5.67		100		19.3	1.52	7.75	.68				-109	45
	11:25	5.75		125		19.3	1.56	7.76	.68				-105	53
	11:35	5.80		125		19.2	1.58	7.76	.71				-104	53
	12:02	5.99		125		20.4	1.67	7.74	2.18				-88	5 Started pumping again @ 11:5
	12:12	5.91		75		20.6	1.70	8.09	.81				-95	5
	12:22	5.94		115		20.5	1.71	8.47	.72				-98	3
	12:32	5.94		115		19.9	1.71	8.58	.63				-100	4
	12:42	5.91		115		20.7	1.76	8.61	.49				-96	2
	12:52			115		20.4	1.78	8.80	.31				-101	4
														Pumped well for 2hr max limit then we sampled
	1410									2		0		

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

4.88'

Ground Water Sampling Log

Project DSCR Site OU-6 Well No. MWA 5037 Date 9-25-01

Well Depth 16.3' Screen Length 5.0 Well Diameter 2" Casing Type PVC

Sampling Device BLADDER PUMP Tubing type TEFLON LINED PE Water Level 4.86' BTOC

Measuring Point TOC Other Infor

Sampling Personnel Bill Ware, Lauren Barlow

Time	pH	Temp	Cond.	Dis.O_2	Turb.	ORP [~~]Conc~~	Flow		Notes
1035	7.51	18.4	1.59	3.06	12	-113	220		
1045	7.74	18.7	1.48	.40	16	-129	220		
1055	7.74	19.1	1.45	.55	28	-121	100		
1105	7.74	19.2	1.48	.66	31	-113	100		
1115	7.75	19.3	1.52	.68	45	-109	100		
1125	7.76	19.3	1.56	.68	53	-105	125		
1135	7.76	19.2	1.58	.71	53	-104	125		
1202	7.74	20.4	1.67	2.18	5	-88	125		

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/25/01 TIME 1225
SAMPLING POINT MWA50-38
(LOCATION)
DEPTH

PLE INFORMATION SAMPLE I.D. NO.: MWA50-38

IATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to ph<2; Cool to 4°C	VOCs by SW8260B
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Total Metals by SW6010B/7470A
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Diss. Metals by SW6010B/7470A

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER CLOUDY AIR TEMPERATURE ≈ 73°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: R. FORISTER SAMPLING OBSERVED BY: C. CLARKE
DISCREPANCIES:

Location DSCR - 046 (Site Name)

Identify Measuring Point (MP): (eg. Top of Casing)

Well ID: MWASO-38

Depth to Screen below MP: 7.28' (Top) of screen 17.28' (Bottom) of screen

Field Sampling Personnel: ROBERT FORSTER, CHARLETTE CLARK

Pump Intake at (ft. below MP): 15.28

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (mS/cm ~~umhos/cm~~)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Turbidity (NTU)	Comments
9/25/01															
	1115					20.95	0.065	5.61	3.43				271	26.0	
	1125					20.69	0.058	4.64	6.61				280	14.8	
	1135					20.50	0.054	4.56	4.72				295	7.3	
	1145					20.00	0.053	4.50	1.83				310	0	
	1155					19.93	0.052	4.44	1.67				318	0	
	1205					20.53	0.051	4.44	1.63				317	0	
	1215					21.03	0.051	4.50	1.64				312	0	
	1410										4	0			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FORM TO DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project DSCR Site OU6 Well No. MWA 50-38 Date 9/25/01

Well Depth _____ Screen Length 10' Well Diameter 2 Casing Type PVC

Sampling Device Bladder Pump Tubing type TEFLON LINED PE Water Level 7.27' BTOC

Measuring Point N. of T.O.C. Other Infor _____

Sampling Personnel Robert Forister & Charlette Clarke

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc	ORP	PID	Notes
1115	5.61	20.95	0.065	3.43	26.0		271	0.4	
1125	4.64	20.69	0.058	6.61	14.8		280	0.4	
1135	4.56	20.50	.054	4.72	7.3		295	0.4	
1145	4.50	20.00	.053	1.83	0		310	0.4	
1155	4.44	19.93	.052	1.67	0		318	0.4	
1205	4.44	20.53	.051	1.63	0		317	0.3	
1215	4.50	21.03	.051	1.64	0		312	0.3	
		STABALIZED @			1215				
									Field Test
1410									DO 4mg/L
									Fe^{+2} 0mg/L

Type of Samples Collected _____

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/24/01 TIME 11:30
SAMPLING POINT AEHA-5A
(LOCATION)
DEPTH

MPLE INFORMATION SAMPLE I.D. NO.: AEHA-5

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER P. cloudy AIR TEMPERATURE 70°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: CW/LM (Chris Williamson/Loretta Markham) SAMPLING OBSERVED BY: CW/LM
DISCREPANCIES:

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/26/01 TIME 11:30
SAMPLING POINT AEHA-5QA
(LOCATION)
DEPTH QA Split

.E INFORMATION SAMPLE I.D. NO.: AEHA-5QA

'ERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

'E: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

'ARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
~~-01 VOA VIAL~~	~~20 ml~~	~~1~~	~~None~~	~~Hydrogen by AM19~~

OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

.D MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

:OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

NERAL INFORMATION WEATHER P. Cloudy AIR TEMPERATURE 70°F

SAMPLES SHIPPED TO: CEMRD – Omaha, NE

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

VQC

SAMPLE COLLECTED BY: Chris Williamson/Loretta Monchan CW/LM SAMPLING OBSERVED BY: CW/LM

DISCREPANCIES: _____

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9/24/01 TIME 12:00
SAMPLING POINT ~~AEHA-5~~ 9/24
(LOCATION) OU6 DUP-1
DEPTH Dup of AEHA-5

E INFORMATION SAMPLE I.D. NO.: OU6 DUP-1

TERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____
PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____
ZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

D MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

NERAL INFORMATION WEATHER Pt cloudy AIR TEMPERATURE 70°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

/QC

SAMPLE COLLECTED BY: Chris Williamson/Loretta Markham CW/LM SAMPLING OBSERVED BY: LM/CW
DISCREPANCIES: _____

Site Name (eg. Top of Casing)

Well ID: AEHA-5

Field Sampling Personnel: Chris Williamson, Loretta Markham

Depth to Screen below MP: ~~[illegible]~~ 16.53' of screen (Top) ~~[illegible]~~ 26.53' of screen (Bottom)

Pump Intake at (ft. below MP): ~~[illegible]~~ 24.53'

Purging Device (Pump Type): QED Micropurge

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Turbidity (NTU)	Comments
9/26/01	0910			80 ml/min	0.51	16.77	0.93	6.47	0.0				-103	467	
"	0920			80	1 L	16.98	0.94	6.48	0.0				-113	269	
"	0940			80	2 L	17.01	0.97	6.52	0.0				-117	138	
"	0950			80	3 L	17.12	1.01	6.56	0.0				-120	102	
"	01000			80	4 L	17.19	1.04	6.57	0.0				-122	94.8	
"	1030			80	6 L	18.65	1.66	6.60	0.0				-128	117	
"	1040			80	6.5 L	19.58	1.10	6.60	0.0				-131	121	
"	1050			80	7.0 L	19.67	1.07	6.61	0.0				-137	127	
"	1100			80	7.5 L	19.68	1.10	6.63	0.0				-140	134	
"	1110			80	8.0 L	19.79	1.13	6.69	0.0				-145	137	
~~[illegible]~~	~~[illegible]~~			~~80~~	~~8.5 L~~										
											4	0.4			
	1515														

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 9-28-01 TIME 1215
SAMPLING POINT (LOCATION) USGS-M4
DEPTH 10.0

MPLE INFORMATION SAMPLE I.D. NO.: USGS-M4

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to ph<2; Cool to 4°C	VOCs by SW8260B
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Total Metals by SW6010B/7470A
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Diss. Metals by SW6010B/7470A

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER Sunny, cool AIR TEMPERATURE 60°

SAMPLES SHIPPED TO: STL – North Canton, Ohio

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: L. Barlow R. Foristal SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Location DSCR - [illegible]
Site Name (eg. Top of Casing)

Well ID: USGS M4
Field Sampling Personnel: Robert Forister, Lauren Barlow

Depth to Screen below MP: ~~[illegible]~~ 7.55' of screen (Top) ~~[illegible]~~ 9.55' of screen (Bottom)
Pump Intake at (ft. below MP): ~~[illegible]~~ 8.05'
Purging Device (Pump Type): PERISTALTIC PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous ron mg/L	Redox Potential mV	Comments Turbidity	Comments PID
9-28-01		6.38													
	1015	7.75		350		18.37	0.040	4.84	4.04				271	5.5	0.1
	1025	8.42		240		18.40	0.041	4.70	2.09				292	10.3	0.1
	1035			240		18.54	0.040	4.55	4.45				321	11.9	0.1
	1045	8.20		160		18.47	0.040	4.63	3.69				312	19.0	
	1055					18.43	0.040	4.62	3.67				314	20.0	
	1105	8.30				18.41	0.039	4.60	3.99				318	6.2	* Tapped Horiba + turbidity dropped
	1115					18.44	0.038	4.60	3.69				322	0.3	0.1
	1125	8.34				18.45	0.038	4.59	4.16				328	1.5	
	1135					18.46	0.038	4.60	4.13				328	1.8	
	1145	8.40				18.49	0.038	4.59	4.26				338	4.2	
														Stabilized and sampled @ 1215	
										3		0.0			
	1330														

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/2/01 TIME 1345
SAMPLING POINT AEHA-15A
(LOCATION)
DEPTH

LE INFORMATION SAMPLE I.D. NO.: AEHA-15A

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)

PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)

AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to ph<2; Cool to 4°C	VOCs by SW8260B
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Total Metals by SW6010B/7470A
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Diss. Metals by SW6010B/7470A

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

NERAL INFORMATION WEATHER AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: G. Plevvada/L. Markham SAMPLING OBSERVED BY: G Plevvada

DISCREPANCIES:

Site Name (eg. Top of Casing)

Well ID: AEHA - 15A

Field Sampling Personnel: George Puwada, Loretta Markham

Depth to Screen below MP: 21.01' of screen (Top) 23.01' of screen (Bottom)

Pump Intake at (ft. below MP): 22.01'

Purging Device (Pump Type): BLADDER PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	TURB NTU	Comments
10/2/01	1110	11.3		250		21.64	0.070	4.44	3.37				341	178.0	
	1120	10.95				22.08	0.069	4.44	3.65				360	95.0	
	1210	10.95				30.47	0.067	4.44	4.27				346	64.8	
	1220					23.92	0.066	4.42	3.95				367	76.0	
	1230	10.95				22.65	0.066	4.39	3.77				373	58.5	
	1240	10.87				22.75	0.066	4.41	3.71				379	48.2	
	1250					22.68	0.066	4.39	3.59				380	38.1	
	1300					22.70	0.066	4.40	3.51				379	32.9	
	1315					22.73	0.066	4.41	3.51				380	34.9	
	1330					22.71	0.065	4.41	3.44				380	45.3	
	1705									4		0			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/02/01 TIME 1350
SAMPLING POINT AEHA-34A
(LOCATION)
DEPTH 7.87

E INFORMATION

SAMPLE I.D. NO.: AEHA-34A

'ERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
E: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
'ARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to ph<2; Cool to 4°C	VOCs by SW8260B
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Total Metals by SW6010B/7470A
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Diss. Metals by SW6010B/7470A

OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

.D MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

.OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

NERAL INFORMATION

WEATHER CLEAR AIR TEMPERATURE 78°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

/QC

SAMPLE COLLECTED BY: C. CLARK SAMPLING OBSERVED BY: R. FORISTER
DISCREPANCIES:

Site Name (eg. Top of Casing)

Well ID: AEHA-34A

Field Sampling Personnel: CHARLETTE CLARK, ROBERT FORISTER

Depth to Screen below MP: 12.23' of screen (Top) 22.23' of screen (Bottom)

Pump Intake at (ft. below MP): 20.23'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Turb	Comments
10/01/01	1135	7.86	150cc	150		24.73	0.118	5.64	1.87				-11	130	
"	1145	7.85				26.0	0.119	5.56	0.0				-43	60.3	
"	1155	7.87				26.19	0.117	5.53	0.0				-48	29.9	
"	1205	7.90				26.23	0.118	5.55	0.0				-54	17.7	
"	1215					26.32	0.120	5.56	0.0				-50	12.4	
"	1225	7.9				26.41	0.127	5.61	0.52				-65	8.6	
"	1235	7.89				26.49	0.129	5.63	0.77				-67	7.3	
"	1345	7.88				26.03	0.131	5.65	0.93				-69	5.9	
"	1355	7.87				25.77	0.133	5.66	1.09				-69	5.8	
"	1405	7.87				25.74	0.135	5.66	1.20				-68	5.9	
"	1415	7.87				25.69	0.135	5.67	1.41				-68	6.1	
"	1425	7.87				25.73	0.134	5.67	1.28				-67	4.4	
	1335	7.87				25.72	0.133	5.66	1.15				-65	3.6	
	1705									1		3.20			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/2/01 TIME 1350
SAMPLING POINT AEHA-12A
(LOCATION)
DEPTH initial 10.01' BTOC

PLE INFORMATION SAMPLE I.D. NO.: AEHA-12A

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Purged approx 5 gal. Fairly clear, no odor.

ENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 80°

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: K. Adams SAMPLING OBSERVED BY: T. Nichols

DISCREPANCIES: _____

Site Name (eg. Top of Casing)

Well ID: AEHA-12A

Field Sampling Personnel: K. ADAMS, T. NICHOLS

Depth to Screen below MP: 12.47' of screen (Top) 22.47' of screen (Bottom)

Pump Intake at (ft. below MP): 20.47'

Purging Device (Pump Type): BLADDER PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	Comments TURBIDITY NTU
10/2/01	1205	10.01												
	1230	10.07		300		23.61	0.094	6.70	6.01				279	41.6
	1240	10.10		300		23.60	0.091	4.43	4.80				233	6.8
	1250			300		23.78	0.090	4.29	4.92				344	0.9
	1300	10.11		300		23.86	0.089	4.27	5.02				349	0.5
	1310			300		23.83	0.089	4.24	5.09				353	0.0
	1320	10.20		300		23.93	0.089	4.19	5.21				361	0.0
	1330	10.18		300		23.94	0.089	4.17	5.28				368	0.0
	1340	10.10		300		23.52	0.089	4.16	5.31				369	0.0
	1705										5	0		

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

Ground Water Sampling Log

Project DSCR Site OU6 Well No. AEHA-12A Date 10/2/01

Well Depth — Screen Length — Well Diameter 2" Casing Type PVC

Sampling Device QED Tubing type teflon-lined PE Water Level initial 10.01'

Measuring Point TOC Other Infor

Sampling Personnel K. Adams / T. Nichols

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc	ORP	PID	Notes
1230	6.70	23.61	0.094	6.01	41.6		279	N/A	
1240	4.43	23.60	0.091	4.80	6.8		233	N/A	
1250	4.29	23.78	0.090	4.92	0.9		344	N/A	
1300	4.27	23.86	0.089	5.02	0.5		349	N/A	
1310	4.24	23.83	0.089	5.09	0.0		353	N/A	
1320	4.19	23.93	0.089	5.21	0.0		361	N/A	
1330	4.17	23.94	0.089	5.28	0.0		366	N/A	
1340	4.16	23.52	0.089	5.31	0.0		369	N/A	Hach Test
1705									DO = 5
									Fe = 0

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3 \pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/4/01 TIME 1200
SAMPLING POINT AEHA-28A
(LOCATION)
DEPTH 5.78' BTOC

PLE INFORMATION SAMPLE I.D. NO.: AEHA-28A

IATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

IAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Approx 3.5 gallons, contains orange sediment, no apparent odor,

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

NERAL INFORMATION WEATHER 80°F Sunny, Clear Skies AIR TEMPERATURE 80°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

/QC

SAMPLE COLLECTED BY: TLW SAMPLING OBSERVED BY: GPP

DISCREPANCIES: _____

Site Name (eg. Top of Casing)

Well ID: AEMA-28A

Field Sampling Personnel: George Puvvada, Tawa Nichols

Depth to Screen below MP: 7.77' (Top) of screen 17.77' (Bottom) of screen

Pump Intake at (ft. below MP): 15.77'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water ~~Below MP~~ ft BTOC	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged Gallons ~~liters~~	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	Comments	Turbidity (NTU)
10/4/01	0845	8.07		85		21.33	0.697	4.34	1.10				264		500
	0855	8.10				21.50	0.680	4.38	1.20				267		315
	0905	8.06				22.2	0.69	4.4	1.30				269		256
	0915	7.96				22.4	0.70	4.4	1.30				270	Changed Horiba	245
	0930	7.83				23.5	0.71	4.4	2.5				266		254
	0940	7.69				24.2	0.73	4.4	2.1				270		160
	0950	7.68				24.9	0.76	4.4	1.8				270		125
	1000	7.67				25.4	0.78	4.4	1.4				274		106
	1010	7.62				25.71	0.83	4.4	1.22				276		86.7
	1020	7.58				26.5	0.90	4.4	1.19				275		69.2
	1032	7.58				26.9	0.95	4.4	1.17				277		67.0
10/4/01	1050	7.47			3.5 gallons	27.82	0.99	4.4	1.09				276		56.2
	1420									2		4.20			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/3/01 TIME 0800
SAMPLING POINT (LOCATION) AEHA-33A
DEPTH initial WL on 10/5/01 8.20 ft BTOC

PLE INFORMATION SAMPLE I.D. NO.: AEHA-33A

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to ph<2; Cool to 4°C	VOCs by SW8260B
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Total Metals by SW6010B/7470A
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Diss. Metals by SW6010B/7470A

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Sample appearance was mostly clear w/ greyish tinge. No odor

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER Clear AIR TEMPERATURE 60°

SAMPLES SHIPPED TO: STL – North Canton, Ohio

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: T. Nichols SAMPLING OBSERVED BY: K. Adams

DISCREPANCIES: _____

Location DSCR - 04 b (Site Name)

Identify Measuring Point (MP): TOC (eg. Top of Casing)

Well ID: AEHA - [redacted]33A

Depth to Screen below MP: 13.44' of screen (Top), 23.44' of screen (Bottom)

Field Sampling Personnel: K. ADAMS, T. NICHOLS

Pump Intake at (ft. below MP): 21.44

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: TURBIDITY (NTU)
10/2/01	1458	7.90												
	1512	10.65	~~260~~ AVG	260		24.96	0.046	4.73	3.28				254	85.4
	1523	10.40		65		25.86	0.045	4.76	1.30				251	68.4
	1533	10.37		65		25.86	0.045	4.76	1.08				~~248~~ 243 AVG	57.0
	1543	10.10		65		26.60	0.046	4.80	1.18				235	51.4
	1553	10.10		65		26.78	0.046	4.79	1.16				229	50.6
	1606	10.05		65		25.92	0.047	4.77	1.69				220	39.6
	1616	9.95		65		26.24	0.048	4.80	1.28				218	36.4
	1626	9.90		65		26.29	0.049	4.79	1.35				217	37.4
	1636	9.90		65		26.25	0.050	4.79	1.23				215	37.0
	1646	9.88		65		26.18	0.051	4.77	1.20				215	34.4
	1657	10.10		65		25.17	0.052	4.78	2.19				212	29.8
	1707	10.02		65		25.56	0.052	4.77	1.62				213	26.9
10/3/01	1930										3	0		

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

Ground Water Sampling Log

Project DSCR Site OUC2 Well No. AEAA-33A Date 10/2/01 (sampled on 10/3/01)

Well Depth _____ Screen Length _____ Well Diameter 2" Casing Type PVC

Sampling Device QED Tubing type teflon-lined PE Water Level 7.90 ft / 8.20 ft BTOC on 10/3/01

Measuring Point BTOC Other Infor _____

Sampling Personnel K. Adams & T. Nichols

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc	ORP	PID	Notes
1512	4.73	24.96	0.046	3.28	85.4		254	N/A	
1523	4.76	25.86	0.045	1.30	68.4		251	N/A	
1533	4.76	25.86	0.045	1.08	57.0		243	N/A	
1543	4.80	26.60	0.046	1.18	51.4		235	N/A	
1553	4.79	26.78	0.046	1.16	50.6		229	N/A	
KA ~~1603~~	4.77	25.92	0.047	1.69	39.6		220	N/A	← ~~che~~ emptied
1616	4.80	26.24	0.048	1.28	36.4		218	N/A	Horiba prior
1626	4.79	26.29	0.049	1.35	37.4		217	N/A	to reading.
1636	4.79	26.25	0.050	1.23	37.0		215	N/A	
1646	4.77	26.18	0.051	1.20	34.4		215	N/A	
1657	4.78	25.17	0.052	2.19	29.8		212	N/A	
1707	4.77	25.56	0.052	1.62	26.9		213	N/A	
1930				3					Hach Field Test (Fe=0)

Type of Samples Collected

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/3/01 TIME 0830
SAMPLING POINT USGS-J4
(LOCATION)
DEPTH

IPLE INFORMATION SAMPLE I.D. NO.: USGS-J4

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
~~VOA VIAL~~	~~20 ml~~	~~1~~	~~None~~	~~Hydrogen by AM19~~

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Sampled with a bailer. Unable to collect hydrogen.

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio/~~Microsweeps~~ – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: SAMPLING OBSERVED BY:
DISCREPANCIES:

Location DSCR - [illegible] (eg. Top of Casing)
Site Name

Well ID: USGS - J4
Field Sampling Personnel: William Vaie, Chris Williamson

Depth to Screen below MP: 15.40' (Top) of screen 17.40' (Bottom) of screen
Pump Intake at (ft. below MP): 16.4
Purging Device (Pump Type): PERISTALTIC PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: Turbidity
10/2/01	1110	15.68		240	0.2	17.1	0.052	4.73	2.86				228	990
	1120	15.92		240	0.6	16.8	0.046	4.40	1.15				308	57
	1130	16.55		240	1	16.8	0.046	4.25	0.35				340	180
	1140	Dry		240	1.5	16.7	0.048	4.32	0.19				334	610
	1930									3		0		

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/3/01 TIME 0830
SAMPLING POINT AEHA-30A
(LOCATION)
DEPTH

PLE INFORMATION SAMPLE I.D. NO.: AEHA-30A

IATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)

IAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: George Pulada Loretta Markham SAMPLING OBSERVED BY:

DISCREPANCIES:

Site Name (eg. Top of Casing)

Well ID: AEHA - 30A

Depth to Screen below MP: 2.77' of screen (Top) 12.77' of screen (Bottom)

Field Sampling Personnel: GEORGE PURWAON, LORETTA MARKHAM

Pump Intake at (ft. below MP): 10.77'

Purging Device (Pump Type): BLADDER PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	Turb. NTU	Comments
10/2/01	1510			90		26.82	0.153	6.03	2.30				-15	134	
	1520					27.19	0.144	5.98	0.66				-14	55	
	1530					27.08	0.132	5.87	0.47				2	48.8	
	1540					27.11	0.124	5.80	0.41				16	25.4	
	1550					27.24	0.119	5.77	0.36				25	18.8	
	1600					27.33	0.118	5.75	0.34				29	16.2	
	1610					27.21	0.115	5.74	0.30				33	15.4	
	1620					27.09	0.113	5.73	0.32				36	16.6	
	1630					26.62	0.112	5.71	0.40				42	18.3	
	1640					26.43	0.111	5.70	0.48				46	19.3	
	1650					26.31	0.111	5.70	0.56				49	13.1	
	1700					26.04	0.109	5.69	0.58				53	14.2	
	1710					25.70	0.107	5.64	1.06				61	14.3	
	1930									3		1.20			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/03/01 TIME 1045
SAMPLING POINT AEHA-31A
(LOCATION)
DEPTH

LE INFORMATION SAMPLE I.D. NO.: AEHA-31A

TERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
ZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
URGED DAY BEFORE. SAMPLING WATER CLEAR, NO ODOR

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
GOOD RECHARGE, Clear, Odorless

NERAL INFORMATION WEATHER CLEAR, SUNNY AIR TEMPERATURE ~ 75° F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

VQC

SAMPLE COLLECTED BY: R. Forister / C. Clark SAMPLING OBSERVED BY:
DISCREPANCIES:

Location DSCR - [illegible]
Site Name

Identify Measuring Point (MP): [illegible]
(eg. Top of Casing)

Well ID: AEHA-31 A

Field Sampling Personnel: Robert Forister
Charlette Clark

Depth to Screen below MP: 3.09' of screen (Top) 13.09' of screen (Bottom)

Pump Intake at (ft. below MP): 11.09'

Purging Device (Pump Type): BLADDER Pump

Date	Time 24 hr.	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	Comments	Turbidity
10/02/01	1525	4.42		140		26.42	0.397	6.07	0.11				-85		7.2
10/02/01	1535	4.74		140		26.41	0.402	6.07	4.37				-92		2.2
10/02/01	1545	4.87		140		25.98	0.406	6.07	5.30				-93	PID Mini Rae Battery dead	2.8
10/02/01	1555	4.89		140		25.72	0.406	6.07	5.32				-92		2.8
10/02/01	1605	4.9		140		25.50	0.406	6.07	4.71				-89		1.4
10/02/01	1615	4.9		140		25.33	0.405	6.07	3.47				-88		1.0
10/02/01	1625	4.91		140		25.19	0.404	6.07	1.80				-86		1.3
10/02/01	1635	4.94		140		25.16	0.403	6.07	0.26				-85		0.8
10/02/01	1645	4.99		140		25.12	0.403	6.07	0.05				-84		0.3
10/02/01	1655	~~4.99~~ 5.02		140		25.10	0.403	6.07	0.0				-83		1.2
10/02/01	1705	5.02		140		25.07	0.403	6.08	0.0				-83		0.5
	1930									1		3.20			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/3/01 TIME 0940
SAMPLING POINT USGS-A4
(LOCATION)
DEPTH

LE INFORMATION SAMPLE I.D. NO.: USGS-A4

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)

PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)

AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
~~VOA VIAL~~	~~20 ml~~	1	~~None~~	~~Hydrogen by AM19~~

10-3-01

OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

Well went dry during purging. Allowed well to recharge overnight to collect samples. Sampled with a bailer. Did not collect hydrogen.

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

NERAL INFORMATION WEATHER AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

VQC

SAMPLE COLLECTED BY: SAMPLING OBSERVED BY: William N Ward

DISCREPANCIES:

Location DSCR - OU6
Site Name

(eg. Top of Casing)

Well ID: USGS-A4

Field Sampling Personnel: C. WILLIAMSON, B. WARE

Depth to Screen below MP: 5.10' of screen (Top) 7.10' of screen (Bottom)

Pump Intake at (ft. below MP): -

Purging Device (Pump Type): BAILER

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	Comments Turbidity
10/3/01	1022				~~0.113~~ EM	19.6	0.113	5.24	2.91				167	20
	Well went Dry									3		1.40		
	1930													

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/3/01 TIME
SAMPLING POINT AEHA-~~24A~~ 24A E.M. 10/3/01
(LOCATION)
DEPTH initial WL

LE INFORMATION SAMPLE I.D. NO.: AEHA-25A

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
~~VOA VIAL~~	~~40 ml~~	~~3~~	~~H_2SO_4 to ph c2; Cool to 4°C~~	~~TOC by SW9060~~
~~VOA VIAL~~	40 ml	3	HCl to pH < 2; Cool to 4°C	~~Methane, Ethane &~~ Ethene by RSK175
~~VOA VIAL~~	~~40 ml~~	~~2~~	Cool to 4°C	~~Carbon Dioxide by RSK~~175
~~Poly~~	~~500 ml~~	~~1~~	Zn Acetate & NaOH; Cool to 4°C	Sulfide by ~~E376.1~~
~~Poly~~	~~250 ml~~	~~1~~	Cool to 4°C	~~Alkalinity by E310.1~~
~~Poly~~	~~250 ml~~	~~1~~	~~Cool to 4°C~~	~~NO_3, SO_4 & Cl_2 by E300~~
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
~~VOA VIAL~~	~~20 ml~~	~~1~~	~~None~~	~~Hydrogen by AM19~~

OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
water purged clear. no odor.

.D MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
3.5 gallons, clear, no odor

NERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 70°

AMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
PECIAL HANDLING: FedEx
IODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

QC

AMPLE COLLECTED BY: KCA SAMPLING OBSERVED BY: JLW
ISCREPANCIES:

Site Name (eg. Top of Casing)

Well ID: AEHA-24A

Field Sampling Personnel: K Adams, T. Nichols

Depth to Screen below MP: 8.49' Top of screen 18.49 Bottom of screen

Pump Intake at (ft. below MP): 16.49'

Purging Device (Pump Type): QED Ded. Bladder

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit (mg/L) (high)	DO Hach Test Kit (mg/L) (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments: Turb	Comments: ORP	Comments: PID
10/3/01	0945	9.70		150		25.50	0.141	4.51	1.62					15.7	321	0.0
	0955	9.72				26.01	0.135	4.57	1.13					5.4	318	0.0
	1005	9.73				26.31	0.133	4.60	0.78					2.5	315	0.0
	1015	—				26.59	0.132	4.61	~~8.70~~ 8.31 KA					~~1.0~~ 0.8 KA	~~317~~ 314 KA	0.0
	1025	9.73				26.79	0.132	4.61	0.40					1.0	317	0.0
	1035	9.73				26.92	0.131	4.62	0.35					0.4	317	0.0
	1045	9.70				27.07	0.131	4.62	0.30					0.7	317	
	1930									2		0				

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/3/01 TIME 1400
SAMPLING POINT AEHA-32A
(LOCATION)
DEPTH

LE INFORMATION SAMPLE I.D. NO.: AEHA-32A

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)

PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)

AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

NERAL INFORMATION WEATHER AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

VQC

SAMPLE COLLECTED BY: GEORGE PUNYADA LORETTA MARKHAM SAMPLING OBSERVED BY:

DISCREPANCIES:

Location DSCR - OU-6 (Site Name)

Identify Measuring Point (eg. Top of Casing)

Well ID: AEHA-32A

Depth to Screen below MP: 5.12' (Top) of screen 15.12' (Bottom) of screen

Field Sampling Personnel: GEORGE POLLADA, LORETTA MARKHAM

Pump Intake at (ft. below MP): 13.12'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit (mg/L) (high)	DO Hach Test Kit (mg/L) (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Turb (NTU)	Comments
10/3/01	1030			70		21.36	0.095	4.92	7.41				313	182.0	
	1045					21.39	0.086	5.04	4.31				317	165.0	
	1055					21.71	0.085	5.06	3.59				317	88.5	
	1105					23.24	0.085	5.11	3.20				322	82.3	
	1115					25.14	0.084	5.11	3.57				317	-5.9	
	1155					23.83	0.083	4.99	5.79				333	38.0	
	1205			60		24.38	0.083	5.01	3.50				336	41.8	
	1215					24.74	0.083	5.00	2.88				338	33.5	
	1225					24.85	0.084	5.01	2.71				341	42.4	
	1235					24.95	0.091	5.01	2.51				341	56.1	
	1245					25.07	0.089	4.99	2.56				344	77.5	
	1930									3		0			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/03/01 TIME 1330
SAMPLING POINT AEHA-23A
(LOCATION)
DEPTH

PLE INFORMATION SAMPLE I.D. NO.: AEHA-23A

IATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)

IAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
NO ODOR, NO COLOR

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
NO ODOR, NO COLOR

NERAL INFORMATION WEATHER SUNNY AIR TEMPERATURE ~75°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

VQC

SAMPLE COLLECTED BY: R. Forister / C. Clark SAMPLING OBSERVED BY:

DISCREPANCIES:

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/03/01 TIME 1330
SAMPLING POINT ~~AEHA-23A QA~~
(LOCATION)
DEPTH QA Split

PLE INFORMATION SAMPLE I.D. NO.: ~~AEHA-23A QA~~

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
~~VOA VIAL~~	~~20 ml~~	~~1~~	None	~~Hydrogen by AM19~~

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

NO ODOR, NO COLOR

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

NO ODOR, NO ODOR

ENERAL INFORMATION WEATHER SUNNY AIR TEMPERATURE ~~[illegible]~~ 75°F

SAMPLES SHIPPED TO: CEMRD – Omaha, NE

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: R. Forister / C. Clark SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/03/01 TIME 1330
SAMPLING POINT AEHA-23A
(LOCATION) OU6DUP-2
DEPTH Dup of AEHA-23A

LE INFORMATION SAMPLE I.D. NO.: OU6DUP-2

TERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

ZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
NO ODOR, NO COLOR

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
NO ODOR, NO COLOR

NERAL INFORMATION WEATHER Sunny AIR TEMPERATURE ~~80~~ 75° F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

/QC

SAMPLE COLLECTED BY: R. Forister / C. Clark SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Site Name (eg. Top of Casing)

Well ID: AEHA-23A

Field Sampling Personnel: R. Forister, C. Clark

Depth to Screen below MP: 8.13' (Top) of screen 18.13' (Bottom) of screen

Pump Intake at (ft. below MP): 16.13'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Turb.	PID	Comments
10/3/01	1145	8.72		150		23.67	0.093	4.25	3.16				323	125	0.0	
10/3/01	1155	8.83		150		33.85	0.089	4.25	1.44				345	51.7	0.5	
10/3/01	1205	8.78		150		23.96	0.088	4.25	0.96				355	37.0	0.5	
10/3/01	1215	8.75		150		24.15	0.089	4.25	0.61				359	25.8	0.5	
10/3/01	1225	8.65		150		24.31	0.086	4.27	0.56				361	19.3	19" 0.5	
10/3/01	1235			150		24.47	0.085	4.28	0.57				361	9.7		
	1930									4		0				

Clear

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/3/01 TIME 1530
SAMPLING POINT AEHA-26A
(LOCATION)
DEPTH

PLE INFORMATION SAMPLE I.D. NO.: AEHA-26A

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to ph<2; Cool to 4°C	VOCs by SW8260B
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Total Metals by SW6010B/7470A
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Diss. Metals by SW6010B/7470A

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
2.5 Gallons, light brown suspended sediment, no odor

ENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 90°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: KCA SAMPLING OBSERVED BY: TLW
DISCREPANCIES:

Site Name (eg. Top of Casing)

Well ID: AEA-26A

Field Sampling Personnel: K. Adams, T. Nichols

Depth to Screen below MP: 1.74' (Top) of screen 11.74 (Bottom) of screen

Pump Intake at (ft. below MP): 9.74'

Purging Device (Pump Type): QED Bladder

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	ORP	PID	Comments
10/31/01	1320	5.50		50		31.36	0.350	6.09	0.75					-87	0.0	
	1330	5.51				31.49	0.353	6.11	0.72					-83	0.0	
	1340	5.57				31.19	0.360	6.12	0.97					-83	0.0	
	1350	5.65				31.06	0.367	6.14	0.98					-86	0.0	
	1410					31.12	0.360	6.17	1.56					-101	0.0	
	1420	5.80				31.04	0.351	6.17	1.29					-104	0.0	
	~~1500~~	~~6.80~~				30.52	0.344	6.17	1.19					-106	0.0	
	1430	5.88				30.58	0.335	6.18	1.16					-107	0.0	
(8)	1440	5.89				30.78	0.320	6.18	1.39					-106	0.0	
	1500	6.08														
	1510	6.08				30.89	0.316	6.19	1.11					-106	0.0	
	1520	6.10				30.89	0.312	6.19	1.04					-106	0.0	
	1750									2		3.80				

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/4/01 TIME 0815
SAMPLING POINT AEHA-16A
(LOCATION)
DEPTH

PLE INFORMATION SAMPLE I.D. NO.: AEHA-16A

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
/PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to ph<2; Cool to 4°C	VOCs by SW8260B
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Total Metals by SW6010B/7470A
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Diss. Metals by SW6010B/7470A

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: Katherine Adams / Loretta Markham SAMPLING OBSERVED BY:
DISCREPANCIES:

Site Name (eg. Top of Casing)

Well ID: AEHA-16A

Field Sampling Personnel: L. Markham, K. Adams

Depth to Screen below MP: 4.56' (Top) of screen 26.56' (Bottom) of screen

Pump Intake at (ft. below MP): 24.56'

Purging Device (Pump Type): QED

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1) LA	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	ORP mV	PID	Comments
10/2/01	1545	10.48	100	100		24.38	0.100	5.44	15.3					176	0.0	
	1555	10.14	80	80		23.03	0.098	5.48	4.57					177	0.0	
	1605	10.14				22.30	0.096	5.46	2.54					178	0.0	
	1615	10.14				22.18	0.094	5.45	2.02					181	0.0	
	1625	10.14				21.93	0.092	5.45	1.56					183	0.0	
	1635	10.14				21.70	0.091	5.46	1.30					185	0.0	
	1647	10.14				21.58	0.091	5.49	1.05					186	0.0	
	1657	10.14				21.45	0.092	5.52	0.88					188	0.0	
	1750									2		2.98				

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/04/01 TIME 1030
SAMPLING POINT AEHA-18A
(LOCATION)
~~DEPTH~~ MS/MSD

PLE INFORMATION SAMPLE I.D. NO.: AEHA-18A MS/MSD

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	9	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	9	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	3	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	3	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	3	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
ODORLESS, Clear

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
ODORLESS, Clear

NERAL INFORMATION WEATHER SUNNY, CLEAR AIR TEMPERATURE ~70°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

/QC

SAMPLE COLLECTED BY: R. Forister C. Clark SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Location DSCR - 006 (Site Name)

Identify Measuring Point (MP): TOC (eg. Top of Casing)

Well ID: AEHA 18 A

Field Sampling Personnel: CHARLETTE CLARK, R. Forister

Depth to Screen below MP: 3.00' (Top) of screen 13.00' (Bottom) of screen

Pump Intake at (ft. below MP): 11.00'

Purging Device (Pump Type): BLADDEL PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	Turb.	Comments
10/03/01	1605	8.21		240		22.19	0.208	5.45	2.73				104	287	Water cloudy & dirty when
10/03/01	1615	8.20		240		21.72	0.211	5.47	0.33				98	78.2	first pumped
10/03/01	1625	8.21		240		21.58	0.209	5.45	0.21				99	35.4	
10/03/01	1635	8.26		240		21.34	0.204	5.42	0.12				101	20.1	
10/03/01	1645	8.21		240		21.39	0.204	5.42	0.08				100	17.3	
10/03/01	1655	8.20		240		21.29	0.204	5.42	0.14				99	20.1	
	1705	8.25				21.18	0.204	5.43	0.03				98	18.1	
CLOSED SITE DUE TO SITE TIME RESTRAINTS															
10/4/01			RESUMED READINGS 10/4/01												
10/04/01	0840	8.15		240		19.50	0.248	5.16	7.95				82	6.5	Water clear, odorless
10/04/01	0850	8.18		240		20.01	0.242	5.16	8.80				75	10.0	~~when~~ during readings
10/04/01	0900	8.19		240		20.26	0.233	5.14	5.82				71	8.9	
10/04/01	0910	8.19		240		20.43	0.231	5.17	0.52				68	9.8	
10/04/01	0920	8.20		240		20.60	0.230	5.16	0.12				64	11.1	
10/04/01	0930	8.21		240		20.73	0.231	5.17	0.17				64	10.0	
10/04/01	0940	8.21		240		20.88	0.230	5.17	0.00				63	8.0	
10/04/01	0950	8.22		240		20.98	0.229	5.18	0.00				62	8.8	
10/05/01	1000	8.20		240		21.03	0.230	5.19	0.00				61	8.6	
10/4/01	1420									1		2.0			SAMPLE CALLED 1030

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/4/01 TIME 1130
SAMPLING POINT (LOCATION) AEHA-22A
DEPTH

LE INFORMATION SAMPLE I.D. NO.: AEHA-22A

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to ph<2; Cool to 4°C	VOCs by SW8260B
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Total Metals by SW6010B/7470A
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Diss. Metals by SW6010B/7470A

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE 68°

SAMPLES SHIPPED TO: STL – North Canton, Ohio
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: K. Adams SAMPLING OBSERVED BY: L. Markham
DISCREPANCIES:

Location Code: [illegible] Site Name (eg. Top of Casing)

Well ID: AEHA-22A

Field Sampling Personnel: K. Adams, L. Markham

Depth to Screen below MP: 6.76' (Top) of screen 16.76' (Bottom) of screen

Pump Intake at (ft. below MP): 14.76'

Purging Device (Pump Type): BLADDER PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential ORP (mV)	Turb. (NTU)	P.I.D (ppm)	Comments
10/4/01	0923	5.82		100		21.45	0.064	4.20	2.47				290	63.6	0.0	
	0933	5.71				21.67	0.066	4.15	1.56				306	68.1	0.0	
	0943	5.71				21.72	0.066	4.14	2.23				313	68.0	0.0	
	1003	5.71				22.18	0.066	4.10	0.97				339	20.5	0.0	
	1013	5.76				22.68	0.066	4.11	0.70				340	18.0	0.0	
	1023	5.70				23.42	0.067	4.13	0.66				340	12.2	0.0	
	1033	5.75				24.19	0.066	4.16	0.067				340	21.4	0.0	
	1047	5.94				23.85	0.067	4.15	~~0.~~ 1.63				344	12.3	0.0	
	1057	5.71				24.88	0.067	4.18	0.68				342	8.9	0.0	
	1107	5.71				25.53	0.067	4.19	0.61				342	3.3	0.0	
	1117	5.71				26.15	0.068	4.21	0.59				339	1.7	0.0	
	1750									2		0.40				

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/04/01 TIME 1515
SAMPLING POINT (LOCATION) AEHA-25A
DEPTH

LE INFORMATION SAMPLE I.D. NO.: AEHA-25A

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Clear, odorless

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
samples were clear, became cloudy @ end of sampling cycle

GENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE ~80°F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

QA/QC

SAMPLE COLLECTED BY: C. Clark, R. Forister SAMPLING OBSERVED BY:
DISCREPANCIES:

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/04/01 TIME 1515
SAMPLING POINT AEHA-25QA
(LOCATION)
DEPTH QA Split

IPLE INFORMATION SAMPLE I.D. NO.: AEHA-25A QA

MATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____
TYPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____
HAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Clear, odorless

IELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
Samples were clear, became cloudy @ end of sampling cycle.

GENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE ~ 80° F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

QA/QC

SAMPLE COLLECTED BY: C. Clark, R. Forister SAMPLING OBSERVED BY: _____
DISCREPANCIES: _____

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/04/01 TIME 1515 1206
SAMPLING POINT AEHA-25A
(LOCATION) OUDUP-3
DEPTH Dup of AEHA 25A

PLE INFORMATION SAMPLE I.D. NO.. OU6DUP-3

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2SO_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
clear, odorless

IELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
SAMPLES WERE clear, became cloudy @ end of sampling cycle.

GENERAL INFORMATION WEATHER Sunny AIR TEMPERATURE ~ 80° F

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

QA/QC

SAMPLE COLLECTED BY C. Clark / R. Forister SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Site Name (eg. Top of Casing)

Well ID: AEHA-25A

Field Sampling Personnel: Charlette Clark, Robert Forister

Depth to Screen below MP: 5.72' of screen (Top) 15.72' of screen (Bottom)

Pump Intake at (ft. below MP): 13.72'

Purging Device (Pump Type): BLADDER Pump

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Turb	Comments
10/04/01	1225	8.32		260		26.84	0.064	4.89	4.66				155	30.6	Water clear
10/04/01	1235	8.35		260		26.89	0.063	4.88	1.15				164	22.0	
10/04	1245			260		26.77	0.062	4.88	1.03				172	24.4	
10/04	1255	8.45		260		26.68	0.062	4.86	0.64				180	22.0	
10/04	1305	8.47		260		26.76	0.062	4.85	0.79				186	19.8	
10/04	1315	8.45		260		26.8	0.062	4.85	1.14				190	19.4	
10/04	1325	8.50		260		26.69	0.062	4.84	1.57				194	19.2	
10/04	1335	8.58		260		26.59	0.062	4.82	1.81				200	17.0	
10/04	1345	8.59		260		26.62	0.061	4.82	1.89				205	15.7	
10/04	1355	8.61		260		26.57	0.061	4.81	1.98				209	18.9	
10/04	1405	8.69		260		26.56	0.060	4.80	1.98				212	18.9	
10/04	1415	8.69		260		26.56	0.060	4.81	2.03				214	16.7	
10/04	1425	8.69		260		26.58	0.060	4.80	2.00				216	15.7	
	1750									3		0.20			FINAL Depth to Water 8.6 After all samples were taken

C. Clark

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10-8-01 TIME 1635
SAMPLING POINT USGS-~~D4~~ I4 [illegible]
(LOCATION)
DEPTH 7.75'

PLE INFORMATION SAMPLE I.D. NO.: USGS-~~D4~~ I4 [illegible]

IATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST) _____

YPE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST) _____

IAZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to ph<2; Cool to 4°C	VOCs by SW8260B
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Total Metals by SW6010B/7470A
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Diss. Metals by SW6010B/7470A

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

ELD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
no odor, no color

ENERAL INFORMATION WEATHER Clear, Cool AIR TEMPERATURE 60°

SAMPLES SHIPPED TO: STL – North Canton, Ohio

SPECIAL HANDLING: FedEx

MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: L. Barlow, R. Forister SAMPLING OBSERVED BY: _____

DISCREPANCIES: _____

Location DSCR - OU-6 USGS
Site Name

Identify Measuring Point (MP): TOC
(eg. Top of Casing)

Well ID: USGS I4

Depth to Screen below MP: 5.75' of screen Top 7.75 of screen Bottom

Field Sampling Personnel: L. Barlow, R. Forister

Pump Intake at (ft. below MP): 5.75

Purging Device (Pump Type): PERISTALTIC PUMP

Date	Time (24 hr)	Depth to Water Below MP (ft)	Pump Dial Setting (1)	Purge Rate (mL/min)	Cum. Volume Purged (liters)	Temp. (deg. C)	Spec Cond. (umhos/cm)	pH (pH Units)	DO Flow Cell (mg/L)	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron (mg/L)	Redox Potential (mV)	Comments
10-8-01	1425	4.56	55	290		16.70	0.035	4.86	3.42				220	1.5
	1435	4.87				17.10	0.035	4.79	2.74				233	.2
	1445	4.87				17.24	0.034	4.75	2.64				245	0
	1455	4.87				17.28	0.034	4.75	2.59				252	.8
	1505	4.90				17.29	0.034	4.73	2.51				260	0
	1515	4.91				17.29	0.034	4.71	2.49				267	0
	1525	4.91				17.28	0.034	4.68	2.47				276	0
	1535	4.91				17.28	0.034	4.68	2.45				281	.6
	1545	4.91				17.25	0.034	4.69	2.46				290	.5
	1555	4.91				17.40	0.037	4.68	2.50				297	.8
	1605	4.91				17.24	0.037	4.67	2.45				302	1.0
	1615					17.40	0.034	4.66	2.41				308	1.1
	1625					17.26	0.034	4.67	2.37				312	4.3
														Sampled at 1635
											4	0		Stabilized at 2hr. reading
	1800													

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/16/01 TIME 1030
SAMPLING POINT DMW-7A
(LOCATION)
DEPTH

LE INFORMATION SAMPLE I.D. NO.: DMW-7A

ATERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
AZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to ph<2; Cool to 4°C	VOCs by SW8260B
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Total Metals by SW6010B/7470A
Poly	1 liter	1	HNO_3 to ph<3; Cool 4°C	Diss. Metals by SW6010B/7470A

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
NO ODOR, NO COLOR

LD MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)
NO ODOR, NO COLOR

ENERAL INFORMATION WEATHER SUNNY, CLEAR AIR TEMPERATURE ~70°

SAMPLES SHIPPED TO: STL – North Canton, Ohio
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

A/QC

SAMPLE COLLECTED BY: C. Clark / L. Markham SAMPLING OBSERVED BY:
DISCREPANCIES:

Location DSCR - OU 6 (Site Name)

Identify Measuring Point (MP): TOC (eg. Top of Casing)

Well ID: DMW-7A

Depth to Screen below MP: 10.7' (Top) of screen 15.7' (Bottom) of screen

Field Sampling Personnel: L. Markham, C. Clark

Pump Intake at (ft. below MP): 13.7'

Purging Device (Pump Type): BLADDER Pump

Date 2001	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	Turb.	Comments
10/15	825	8.19		100		19.80	0.069	4.85	3.53				261	-1	
10/15	0835	8.19		100		20.2	0.060	4.93	1.35				255	-3	
10/15	0845	8.19		100		20.3	0.058	4.90	1.07				248	-5	
10/15	0855	8.19		100		20.6	0.056	4.88	1.02				249	-5	
10/15	0905	8.19		100		21.2	0.056	4.84	1.10				262	-16"	
10/15	0915	8.19		100		21.3	0.056	4.81	1.09				274	0	
10/15	0925	8.19		100		21.5	0.056	4.79	1.09				280	-1	
10/15	0935	8.19		100		21.7	0.056	4.75	1.05				289	-3	
10/15	0945	8.19		100		21.9	0.056	4.76	1.05				301	-3	
10/15	0955	8.19		100		22.2	0.056	4.72	0.97				311	-3	
10/15	1005	8.19		100		22.0	0.056	4.70	0.93				316	-3	
10/15	1015	8.19		100		22.1	0.056	4.70	0.89				321	-3	
10/16	1900										3	0			

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

FIELD SAMPLING REPORT

JOB No. 12001-1-1633
JOB NAME DSCR MNA – OU 6
DATE 10/18/01 TIME 1015
SAMPLING POINT DMW-9A
(LOCATION)
DEPTH

.E INFORMATION SAMPLE I.D. NO.: DMW-9A

TERIAL: ☒ WATER ☐ SOIL ☐ SLUDGE ☐ OTHER (LIST)
PE: ☒ GRAB ☐ COMPOSITE ☐ OTHER (LIST)
ZARDOUS?: ☐ YES ☐ NO ☐ UNKNOWN

CONTAINER TYPE	CONTAINER VOLUME	NUMBER	PRESERVATIVE/ PREPARATION	COMMENTS
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	VOCs by SW8260B
VOA VIAL	40 ml	3	H_2S0_4 to ph c2; Cool to 4°C	TOC by SW9060
VOA VIAL	40 ml	3	HCl to pH < 2; Cool to 4°C	Methane, Ethane & Ethene by RSK175
VOA VIAL	40 ml	2	Cool to 4°C	Carbon Dioxide by RSK175
Poly	500 ml	1	Zn Acetate & NaOH; Cool to 4°C	Sulfide by E376.1
Poly	250 ml	1	Cool to 4°C	Alkalinity by E310.1
Poly	250 ml	1	Cool to 4°C	NO_3, SO_4 & Cl_2 by E300
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Total Metals by 6010B/7470A
Poly	1 liter	1	HNO_3 to ph<2; Cool to 4°C	Diss. Metals by 6010B/7470A
VOA VIAL	20 ml	1	None	Hydrogen by AM19

OMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

.D MEASUREMENTS

PARAMETER	EQUIPMENT I.D.	RESULTS (UNITS)	COMMENTS
SEE ATTACHED TABLE			

COMMENTS: (WELL PURGING VOLUME: SAMPLE APPEARANCE; ODOR; COLOR, ETC.)

NERAL INFORMATION WEATHER AIR TEMPERATURE

SAMPLES SHIPPED TO: STL – North Canton, Ohio/Microsweeps – Pittsburg, PA
SPECIAL HANDLING: FedEx
MODE OF SHIPMENT: ☐ CAR/TRUCK ☐ BUS ☒ PLANE ☐ COMMERCIAL VEHICLE

VQC

SAMPLE COLLECTED BY: K. ADAMS L. GREENAAW SAMPLING OBSERVED BY:
DISCREPANCIES:

Site Name (eg. Top of Casing)

Well ID: DMW-9A

Field Sampling Personnel: K. Adams, L. Greenhaus

Depth to Screen below MP: 9.6' of screen (Top) 14.6' of screen (Bottom)

Pump Intake at (ft. below MP): 12.6'

Purging Device (Pump Type): BLADDER PUMP

Date	Time 24 hr	Depth to Water Below MP ft	Pump Dial Setting (1)	Purge Rate mL/min	Cum. Volume Purged liters	Temp. deg. C	Spec Cond. umhos/cm	pH pH Units	DO Flow Cell mg/L	DO Hach Test Kit mg/L (high)	DO Hach Test Kit mg/L (low)	Ferrous Iron mg/L	Redox Potential mV	Comments Turb
10/16/01	0855	15.15		1000	4	18.79	0.071	4.67	1.02				243	14.8
	0905	15.15			5	18.9	0.074	4.73	6.03				243	4.0
	0915	15.15			6	18.76	0.074	4.63	5.26				245	7.2
	0925	15.15			7	18.76	0.073	4.64	0.28				238	3.5
	0935	15.20			8	18.76	0.072	4.66	0.0				235	2.2
	0945	15.20			9	18.89	0.072	4.73	0.0				225	0.0
	1000	15.20			10	18.71	0.072	4.68	0.0				228	0.4
	1900										3	0		

(1) Pump Dial Setting (eg. Hertz, cycles/min, etc.)

USE FIELD SAMPLING REPORT FORM TO DOCUMENT SAMPLE COLLECTION

APPENDIX C

DATA QUALITY EVALUATION AND DATA SUMMARY

APPENDIX C - DATA QUALITY EVALUATION AND DATA SUMMARY TABLES

C.0 INTRODUCTION

C.0.0.1 The following sections present the analytical laboratory used, the data quality objectives for the project, results of the analyses of the quality control (QC) samples, tabular summaries of the analytical data obtained, and a discussion of the quality of the analytical data for OU 6 (Area 50 Groundwater) at the Defense Supply Center, Richmond (DSCR). This data quality evaluation (DQE) case narrative summarizes the data quality from the September/October groundwater sampling event at OU 6.

C.0.0.2 The data validation was performed in general accordance with the Final Sampling and Analysis Plan (SAP) (LAW, 1992), United States Army Corps of Engineers (USACE) Shell for Analytical Chemistry Requirements (USACE, 1998), United States Environmental Protection Agency (USEPA) Region III National Functional Guidelines for Organic and Inorganic Data Review (USEPA, 1999 and 1994, respectively), and the appropriate analytical method requirements as presented in Test Methods for Evaluating Solid Waste, EPA SW–846, Update III (USEPA, 1996).

C.1 ANALYTICAL LABORATORY

C.1.0.1 Groundwater samples collected from OU 6 monitoring wells in September and October 2001 were analyzed by Severn Trent Laboratories, Inc., (STL) of North Canton, Ohio for volatile organic compounds (VOCs), anions (chloride, nitrate, and sulfate), alkalinity, sulfide, total and dissolved metals, and total organic carbon (TOC). Samples were also sent to STL of Santa Anna, CA for analysis of dissolved gases (carbon dioxide, methane, ethane, and ethene). In addition, Microseeps of Pittsburgh, Pennsylvania analyzed select samples for dissolved hydrogen.

C.1.0.2 All samples collected were analyzed using USEPA SW-846 methods. VOCs were analyzed by Method 8260B, anions by Method 300.0A, alkalinity by 310.1, sulfide by 376.1, dissolved gases by Method RSK-175, total and dissolved metals by Methods 6010B, 7470A, and 7841, and TOC by Method 9060. Dissolved hydrogen was analyzed by Microseeps Method AM20GAX. Table 2-3 is a listing of all the groundwater analytical methods to support the investigation at OU 6.

C.2 DATA QUALITY OBJECTIVES

C.2.0.1 Project-specific data quality objectives (DQOs) are described in Section 7.0 and presented in Figure 7-1 of the Quarterly Groundwater Sampling Plan for OU 6 (LAW, 2001a). The DQO procedure is a strategic planning process involving the interested project parties (consultant specialists, clients, regulatory agencies, stakeholders, etc.) and was initially developed by the USEPA as a tool to ensure that the type, quantity, and quality of environmental data used in decision making is appropriate for the intended application. The USACE adopted the USEPA's DQO process in theory, and transformed the USEPA's seven step process into four phases (I through IV), subsequently published as Engineering Manual (EM) 200-1-2. Figure C-1 (included as an attachment to this appendix) of the USACE Technical Project Planning (TPP) Process (EM200-1-2, 1998) is a chart outlining the alignment between the EPA process and the USACE process. This procedure provides a systematic approach for defining the criteria that a data collection design should satisfy, including when and where to collect samples, the tolerable level of decision errors, and how many samples to collect. All of these criteria are evaluated in Phase I and II of the USACE DQO procedure by several technical professions which include engineering, scientific and legal disciplines. Overall, the collective goal of the TPP process is eventual site closeout. Once the environmental data have been collected and analyzed, the consultants assess the laboratory data for its usability as prescribed by project goals. The criteria which measure the usability of environmental data as it relates to project objectives are data accuracy, precision, and completeness. Evaluation of these criteria ultimately reveals the representativeness and bias, if any, present in the sampling and analytical processes. These criteria are explained in detail in the following sections.

C.2.1 Accuracy

C.2.1.1 Accuracy is a measure of the closeness of an observed value to the "true" value, e.g., theoretical or reference value, or population mean. Accuracy includes a combination of random error and systematic error (bias) that result from sampling and analytical operations. To determine the accuracy of an analytical method, a sample spiking program is conducted, which determines bias in the laboratory procedures (via a laboratory control sample [LCS]) and bias inherent in the sample matrix (via a matrix spike/matrix spike duplicate [MS/MSD]). The percent recovery (%R) of the compounds spiked into a matrix is used to evaluate the accuracy of the environmental sampling process. The %R is defined as the observed concentration minus the sample concentration, divided by the true concentration of the spike added and multiplied by 100 to express percent.

$$\%R = \frac{X - T}{K} \times 100$$

where:

X = Analytical result from the spiked sample
T = Analytical result from the unspiked aliquot
K = Known value of the spike
%R = Percent Recovery

C.2.2 Precision

C.2.2.1 Precision is the distribution of a set of reported values about the mean, or the closeness of agreement between individual test results obtained under prescribed and similar conditions. To measure precision in environmental samples, duplicate field samples or MS/MSD samples are collected concurrently with the parent sample under the same field conditions. Precision determination can also be performed in the laboratory by the analysis of laboratory replicates, which are performed by analyzing the same sample twice. An added measure of precision is obtained by collecting quality assurance split samples, which is a field duplicate sample sent to the USACE Missouri River Division (CEMRD) laboratory for analysis. A split sample duplicate compares results from two different laboratories ultimately deriving a determination of relative percent difference (RPD) for each constituent present. Precision is best expressed in terms of RPD. The RPD for each compound or element is calculated using the following equation:

$$RPD = \frac{A - B}{(A + B)/2} \times 100$$

where:

A = Replicate value 1
B = Replicate value 2
RPD = Relative Percent Difference

C.2.3 Completeness

C.2.3.1 Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct or normal conditions. The completeness goals established for the project DQOs were 90 percent for Level IV analytical data. Level IV analytical data are equivalent to the USACE Definitive Data Package. To calculate completeness, the

amount of valid data obtained is divided by the amount of data planned to be obtained and the result is multiplied by 100 to convert to percent. The percent complete is then used to evaluate whether sufficient data were acquired from the sampling event.

C.2.4 Representativeness

C.2.4.1 Representativeness refers to the degree sample data accurately and precisely describe the population of samples at a sampling point or under certain environmental conditions. Samples that are not properly preserved or are analyzed beyond holding times may not be considered representative. Review of sampling procedures, laboratory preparation, analysis holding times, trip blank and field blank analysis help in providing this assessment.

C.3 DATA QUALITY EVALUATION PROCEDURES

C.3.0.1 The procedures used by LAW for data evaluation and validation are described in the DQE Standard Operating Procedures (SOPs) (LAW, 2001a). The primary data quality evaluation was performed by LAW's staff or project chemist. The data quality evaluation narrative and qualified (flagged) data tables were reviewed by a senior chemist.

C.3.0.2 The laboratory, field QC data and field notes provide the information to evaluate the analytical data for accuracy, precision, completeness, and representativeness with respect to the project-specific DQOs. The data are first evaluated based on field notes taken during collection of the samples to assess sampling conditions and sampling procedures or if changes to the planned procedures were necessary. Secondly, each sample shipment sent to the laboratory is assessed for adherence to method prescribed holding times, proper chain-of-custody documentation, correct usage of sample containers, and sample integrity upon receipt by the laboratory.

C.3.0.3 The laboratory's internal QC procedures for calibration, method validation, and performance evaluation include appraisal of method prescribed tune (for gas chromatograph/mass spectrometer [GC/MS]) and calibration criteria, method blank analyses, LCS analysis, MS/MSD analyses, and assessment of surrogate and internal standard recovery where applicable. LAW's evaluation of the laboratory data focuses on exceptions to the planned QC activities, problems encountered, and the effectiveness of the methodologies used within the laboratory. The data are then evaluated overall with

respect to the project DQOs, providing the completeness. The following sections present the evaluation procedures used for the analytical data with respect to the project-specific DQOs.

C.3.1 Evaluation of Field Data Quality

C.3.1.1 QC and quality assurance (QA) samples were collected to assess the quality and representativeness of the field sampling activities and the accuracy of analytical results from the primary laboratory. Field QC and QA samples are required by the USACE protocols (USACE, 1994) and were specified for collection in the Quarterly Groundwater Sampling Plan for OU 6 at DSCR (LAW, 2001a).

C.3.1.2 Quality Control Samples - The QC samples were collected concurrently with the field samples to assess the accuracy and precision of sampling and analysis. The field QC samples collected consisted of field duplicates, MS/MSD, trip blanks, field blanks and rinsates as defined in the USACE protocols (USACE, 1994) and as designated in the Final MNA Sampling Plan for OU 6 at DSCR. The QC samples were collected in the same type of sample containers concurrent with the sample and treated in the same manner as the parent samples. They were also analyzed by the laboratory concurrently with the field samples. QC samples are evaluated for reproducibility where applicable and the impact of blank contamination if present.

C.3.1.2.1 Field duplicates were collected to assess sampling precision. They consisted of replicate grab samples collected concurrently with the associated field samples. Although not collected at separate field locations, they were considered separate field samples for analytical purposes. Duplicate samples submitted to STL – North Canton were identified with unique sample codes to hide their identity from the laboratory, typically referred to as "blind duplicates". Cross references to the sample's true identity are annotated in field books and daily reports maintained by field sampling personnel.

C.3.1.2.2 Field duplicate samples were collected to meet the frequency of approximately 10 percent established by the USACE. Poor precision is represented if during evaluation of laboratory data, RPDs exceed those as outlined below per analysis classification.

MATRIX	RPD	ANALYSIS
Water	>30%	VOCs
Water	>25%	Metals
Water	>20%	Anions, alkalinity, sulfide, dissolved gases, TOC

C.3.1.2.3 Field duplicate RPDs are calculated in a manner similar to that described for MS/MSDs for analytical values that are greater than or equal to the practical quantitation limits (PQL).

C.3.1.2.4 Trip blank samples were collected to assess whether cross-contamination of water samples collected for analysis of volatile organic parameters occurred during sampling and shipment to the laboratories. The trip blanks were placed in the sample shipping container with the aqueous field samples to be analyzed for VOCs. One trip blank was submitted in conjunction with the field samples for each sample shipment sent to the laboratory containing VOCs.

C.3.1.3 Quality Assurance Samples - The QA split samples were collected along with the field samples to assess sampling accuracy and the accuracy of the primary laboratory. The QA samples collected were field splits, field blank splits, rinsate splits and trip blanks, as defined in the USACE protocols (USACE, 1994). The QA samples were sent to the CEMRD Laboratory located in Omaha, Nebraska for analysis. The field splits were collected the same as the field duplicates described above and were collected at approximately the same frequency (10 percent). Trip blanks were also included in shipments of samples to be analyzed for VOCs by the CEMRD laboratory. In order to facilitate the comparison of the field QC and QA data, the split samples sent to the CEMRD laboratory were assigned the same sample identification code as the field samples to which they were associated.

C.3.1.3.1 A total of five QA splits were collected from OU 6 during the first sampling event and were assayed for each parameter except hydrogen. Three QA splits were collected from the upper aquifer as listed below:

1. AEHA-5AQA
2. AEHA-23AQA
3. AEHA-25AQA

In addition, two QA splits were collected from the lower aquifer as listed below:

1. AEHA-25BQA
2. AEHA-30BQA

C.3.1.3.2 According to discussion with the CEMRD, the samples were received intact and in good condition. Data from the QA split samples were not available for review; therefore, comparison to site data was not performed.

C.3.2 Evaluation of Laboratory Data Quality

C.3.2.1 Laboratory data are evaluated to assess adherence to method prescribed calibration and/or continuing calibration criteria, method blank analysis results, analyte recoveries from LCS, MS/MSD recoveries and RPDs, surrogate recoveries and ultimately, completeness. Except for completeness, these criteria are used to evaluate the accuracy and precision of the data generated by the laboratory. Furthermore, the USACE specified control limits for the major USEPA SW-846 methodologies are presented in the Shell document (EM200-1-3, app I, Nov 1994) and data were evaluated based on those limits. The analytical methods and the associated limits used for analysis of the environmental samples collected during the September / October 2001 sampling event was included in the Shell document.

C.3.2.2 In general, control limits not addressed by the USACE in the Shell document default to laboratory generated limits. Laboratory-established control limits are based on the mean percent recovery plus or minus three standard deviations of the mean using a minimum population of 20 recovery values.

C.3.2.3 The *accuracy* of the laboratory data is assessed by consideration of:

- Recovery of spikes from field samples spiked with known amounts (MS and MSD)
- Recovery of surrogate spikes for most analyses by gas chromatography
- Recovery of analytes from LCS

C.3.2.4 To determine *precision*, duplicates and MS/MSDs were analyzed. The values reported for a spiked sample (MS) and a spiked duplicate (MSD) were used to calculate an RPD. At times, the laboratory may also analyze LCS duplicates and determine RPD. The control limits were those established by the USACE in the Shell document. Where the Shell document does not address a specific analytical method, the laboratory-established control limits are used. The laboratories internal control limits are based on a statistical population of at least 20 RPD values. They are calculated by determining the mean RPD plus three times the standard deviation for the upper limit and zero RPD as the lower limit.

C.3.2.5 To evaluate *completeness*, the number of valid data points obtained from the measurement systems are compared to the number that was expected to be obtained under correct or normal conditions. As noted previously, 90 percent of the Level IV OU 6 data were expected to be valid based upon the evaluation of the QC data.

C.3.2.6 *Representativeness* in the laboratory can be determined by making certain all sub-samples taken from a given sample represent the sample as a whole by premixing and homogenizing. However, overall representativeness is assessed by review of the precision obtained from field and laboratory duplicate samples.

C.4 DATA QUALITY EVALUATION

C.4.0.1 Summaries of analytes detected in the samples from the site for this investigation are presented in this Appendix as Tables 3-4 and 3-5. The comprehensive analytical results for samples associated with this site are summarized in this Appendix as Tables C-1, C-2, and C-3.

C.4.0.2 The following sections provide summary discussions of data quality for the September/October 2001 sampling event for OU 6 at DSCR. Each section highlights the main points of data quality indicators and identifies data points that require qualification.

C.4.0.3 DQE forms were generated and used by LAW to document the evaluated data components. These forms are arranged so that parameters affecting all samples are reviewed first, such as proper chain-of-custody execution, temperature of the samples upon receipt at the lab, appropriate sample containers/preservatives, etc. These original forms and the respectively flagged data tables are filed with each sample delivery group (SDG) after senior review.

C.4.1 GROUNDWATER – SEPTEMBER / OCTOBER 2001

C.4.1.0.1 A total of 46 groundwater and 5 duplicate samples were collected at OU 6 in September and October of 2001. Monitoring well sample locations selected to obtain information to determine weather natural attenuation of chlorinated solvents was occurring were assayed for VOCs, dissolved gases (including hydrogen), total and dissolved metals, anions, TOC, alkalinity, and sulfide. The remaining samples were assayed for VOCs and total and dissolved metals only.

C.4.1.0.2 The correct sample containers and preservatives were used for the analytical methods specified on the chain-of-custodies. The DMW-9A sample vials sent to STL for carbon dioxide (CO_2) analysis were received in good condition in North Canton, but arrived broken in Santa Anna. Therefore carbon dioxide could not be measured for DMW-9A. The chain-of-custodies were executed properly and all hold times were met with the exception of carbon dioxide (see Section C.4.1.2). Additionally, the correct methods were

employed for both extraction/digestion and analysis as outlined in the work plan. The appropriate units, detection limits and compounds were reported by the laboratory per the July 2001 subcontract agreement between LAW and STL – North Canton.

C.4.1 GROUNDWATER - UPPER AQUIFER

C.4.1.0.1 Twenty-six groundwater and three duplicate samples were collected from the upper aquifer at OU 6 in September and October of 2001. Fourteen monitoring well sample were assayed for VOCs, total and dissolved metals and MNA parameters. The remaining samples were assayed for VOCs and total and dissolved metals only.

C.4.1.0.2 An equipment blank sample, OU7EQB-1, was collected to represent any sample collected with a peristaltic pump in lieu of a dedicated bladder pump. The sample collected from monitoring well AEHA-18A was the only sample from OU 6 collected with a peristaltic pump.

C.4.1.1 Volatile Organic Compounds (SW8260B) – The initial calibration tunes passed the QC requirements outlined in the Shell document and the method. VOCs were calibrated using either the average relative response factor or quadratic curve and were within specified limits. The 2-hexanone recovery in the alternate source initial calibration verification performed on 10/08/01 exceeded the plus or minus 20 percent criteria. As a result, the 2-hexanone results were qualified as estimated and flagged "UJ" for the associated samples. The carbon disulfide and 1,1-dichloroethene recoveries in the alternate source initial calibration verification performed on 10/18/01 exceeded the plus or minus 20 percent criteria. Additionally, carbon disulfide failed LCS criteria as discussed below. As a result, the carbon disulfide results were rejected and flagged "R", and the 1,1-dichloroethene results were qualified as estimated and flagged "UJ" for the associated samples. In the ICV performed on 10/29/01, dichlorodifluoromethane and chloromethane exceeded the plus or minus 20 percent criteria and were flagged J (estimated) and R (rejected) respectively because the ICV also served as the continuing calibration verification (CCV). Chloromethane was rejected because of ICV / CCV criteria and low LCS recovery as described below.

ICV Date	Affected Compounds	Associated Samples		
10/08/01	2-hexanone	AEHA-12A	AEHA-15A	AEHA-23A
		AEHA-24A	AEHA-26A	AEHA-30A
		AEHA-31A	AEHA-32A	AEHA-33A
		AEHA-34A	USGS-A4	USGS-J4
		USGS-M4	OU6DUP-2	TB-092801
		TB-10201	TB-100301-1	TB-100301-2

ICV Date	Affected Compounds	Associated Samples		
10/18/01	Carbon disulfide (rejected) 1,1-Dichloroethene	USGS-I4	TB-100801-3	
10/29/01	Dichlorodifluoromethane (low) Chloromethane (rejected)	DMW-7A	DMW-9A	TB-101601

C.4.1.1.1 The CCV standards associated with the OU 6 groundwater samples were analyzed as appropriate and several compounds were not within limits specified by the USACE or the method. Qualifications were made based on percent difference (%D) observed in the continuing calibration verifications analyzed on the dates indicated below. Qualifications of "J" for positive results and "UJ" for non-detects were assigned for exceedances in the CCV, unless overridden by qualifications for other QC exceedances. If the %D observed for a compound exceeded plus or minus 40% or the compound exceeding %D criteria in the CCV also exceeded %R criteria in the LCS, the associated results were rejected (flagged R).

CCV Date	Affected Compounds	Associated Samples		
10/03/01	Hexachlorobutadiene	MWA50-35 MWA50-38 AEHA-5	MWA50-36 TB-092501 OU6DUP-1	MWA50-37 QATB-092601
10/10/01	Trichlorofluoromethane	AEHA-15A USGS-M4	AEHA-34A TB-092801	LAWMW-Q
10/11/00	Naphthalene	AEHA-12A AEHA-23A AEHA-24A AEHA-26A AEHA-30A	AEHA-31A AEHA-32A AEHA-33A OU6DUP-2 USGS-A4	USGS-J4 TB-10201 TB-100301 TB-100301-2
10/15/01	1,1,2,2-Tetrachloroethane 1,2,3-Trichloropropane	AEHA-16A AEHA-18A AEHA-22A	AEHA-25A AEHA-28A	OU6DUP-3 TB-100401
10/16/01	Acetone 1,1,2,2-Trichloroethane (rejected)	OU7EQB-1	TB-100501-2	

C.4.1.1.2 The batch specific method blanks did not have analytes of interest greater than the PQL. The following method blanks contained the indicated compounds at concentrations above the MDL, but less than the PQL. The associated OU 6 samples with concentrations less than or equal to ten times these

concentrations were accordingly qualified as estimated based on blank contamination and flagged as "JB", unless overridden by qualifications for other QC exceedances.

Blank Date	Compound	Concentration	Flagged Samples		
10/08/01	Acetone	0.56 µg/L	Associated positive results marked JB		
10/10/01	Chloroform	0.24 µg/L	AEHA-15A	AEHA-34A	USGS-M4
10/16/01	Methylene Chloride	0.61 µg/L	OU7EQB-1	TB-100501-2	

C.4.1.1.3 Batch specific LCSs were also analyzed and recoveries were acceptable, with the following exceptions. Qualifications were assigned for either high biased (JH for positive results and UJ for non-detects) or low biased (JL for positives or UL for non-detects) exceedances in the LCS, unless overridden by qualifications for other QC exceedances. If an LCS/LCSD pair was analyzed, qualification of associated results was performed only if both recoveries were outside of QC limits. If the %R observed for a compound exceeded plus or minus 40% or the compound exceeding %R criteria in the LCS also exceeded %D criteria in the CCV, the associated results were rejected (flagged R).

LCS/LCSD Date	Affected Compounds	Associated Samples		
10/03/01	Chloromethane (low) Carbon disulfide (low)	MWA50-35 MWA50-38 AEHA-5	MWA50-36 TB-092501 OU6DUP-1	MWA50-37 QATB-092601
10/10/01	Chloromethane (low) 2-Hexanone (low) 4-Methyl-2-pentanone (low)	AEHA-15A USGS-M4	AEHA-34A TB-092801	LAWMW-Q
10/11/01	2-Hexanone (low) 4-Methyl-2-pentanone (low)	AEHA-12A AEHA-23A AEHA-24A AEHA-26A AEHA-30A	AEHA-31A AEHA-32A AEHA-33A OU6DUP-2 USGS-A4	USGS-J4 TB-10201 TB-100301 TB-100301-2
10/18/01	Carbon disulfide (rejected)	USGS-I4	TB-100801-3	
10/16/01	2-Hexanone (low) 1,1,2,2-Trichloroethane (rejected)	OU7EQB-1	TB-100501-2	
10/29/01	Chloromethane (rejected)	DMW-7A	DMW-9A	TB-101601

C.4.1.1.4 MS/MSDs were specified and performed on groundwater sample AEHA-18A. Acetone, 2-hexanone, and 1,1,2,2-tetrachloroethane (MSD recovery only) exceeded the recovery criteria outlined in the Shell document. Only those compounds that exceeded both the MS and MSD recoveries were qualified. Therefore, for neat sample AEHA-18A, the acetone result was flagged "JL" and the 2-hexanone result was flagged "UL". MS/MSDs were also performed on groundwater sample AEHA-32A. Acetone and 2-hexanone exceeded the recovery criteria outlined in the Shell document for neat sample AEHA-32A and were flagged UL.

C.4.1.1.5 Three field duplicate pairs (AEHA-5/OU6DUP-1, AEHA-23A/OU6DUP-2, AEHA-25A/OU6DUP-3) were collected and analyzed. RPD between the parent sample and the duplicate sample is within specified limits (<30%). Furthermore, all surrogates and internal standards added to the samples by the laboratory were recovered within specified limits.

C.4.1.1.6 The trip blanks associated with the OU 6 samples were analyzed and reported to contain low levels of VOCs, as indicated below. The samples with concentrations less than or equal to five times these concentrations (ten times for acetone and methylene chloride) were accordingly qualified as estimated based on blank contamination and flagged as "JB", unless overridden by qualifications for other QC exceedances. Associated samples that were non-detects required no qualification.

Blank ID	Compound	Concentration	Action
TB-092501	Methylene Chloride	0.45 µg/L	No flag – associated results non-detect
QATB-092601	Methylene Chloride	0.57 µg/L	No flag – associated results non-detect
TB-100801-3	Acetone	0.55 µg/L	Acetone and chloroform for USGS-I4
	Bromodichloromethane	1.6 µg/L	
	Chloroform	18 µg/L	
	Dibromochloromethane	0.34 µg/L	
	Methylene chloride	0.43 µg/L	
TB-101601	Acetone	0.89 µg/L	Flag associated results JB
	Chloroform	23 µg/L	Flag associated results JB
	Bromodichloromethane	1.2 µg/L	Flag associated results JB

C.4.1.1.7 An equipment blank (OU7EQB-1) was collected to represent any sample collected via peristaltic pump in lieu of dedicated equipment. Sample AEHA-18A was collected via peristaltic pump. The equipment blank contained bromodichloromethane at 2.6 µg/L, chloroform at 45 µg/L, and methylene

chloride at 1.8 µg/L, but these results were previously flagged "JB" due to trip blank contamination. Therefore, qualification of the data was not necessary.

C.4.1.1.8 The following samples were diluted to place the VOC results within the range of the calibration curve, which resulted in elevated PQLs.

Sample	Dilution Factor	Sample	Dilution Factor	Sample	Dilution Factor
AEHA-5	10x	OU6DUP-1	10x	AEHA-15A	1.67x
AEHA-24A	5x	AEHA-28A	50x	AEHA-32A	4x
OU7EQB-1	2x				

C.4.1.1.9 Additionally, the following data points were reported at concentrations above the MDL, but less than the PQL and were qualified as estimated and flagged as "JQ".

Sample ID	Affected Compounds
AEHA-5	1,3-Dichlorobenzene, benzene, naphthalene
AEHA-16A	Toluene
AEHA-18A	1,2-Dichlorobenzene, Tetrachloroethene
AEHA-23A	Trichloroethene, Vinyl chloride
OU6DUP-2	Toluene, Trichloroethene, Vinyl chloride
AEHA-24A	Chloroform, 1,4-Dichlorobenzene, 1,2-Dichloroethane, Vinyl chloride
AEHA-25A	Benzene, 1,2-Dichloroethane, Toluene, Vinyl chloride
OU6DUP-3	Benzene, 1,2-Dichloroethane, Toluene, Vinyl chloride
AEHA-26A	Acetone
AEHA-28A	1,2-Dichlorobenzene, 1,3-Dichlorobenzene, 1,1-Dichloroethane, 1,2-Dichloroethane, 1,1-Dichloroethene, Vinyl chloride
AEHA-30A	Acetone
AEHA-31A	Acetone
AEHA-32A	Chlorobenzene, Chloroform, 1,2-Dichlorobenzene, 1,4-Dichlorobenzene, 1,1-Dichloroethane, 1,2-Dichloroethane, 1,1-Dichloroethene, Vinyl chloride
AEHA-34A	Acetone, Benzene, n-Butylbenzene, Ethylbenzene, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene
DMW-7A	1,1-Dichloroethane, ethylbenzene, tetrachloroethene, toluene, trichloroethene, 1,2,4-trimethylbenzene, m and p-xylene, xylenes (total)
DMW-9A	Tetrachloroethene, trichloroethene
MWA50-35	1,1-Dichloroethane, 1,3-dichlorobenzene, naphthalene, toluene, trans-1,2-dichloroethene
MWA50-36	1,2,-Dichloropropane, sec-butylbenzene
MWA50-37	1,2-Dichlorobenzene, 1,2-dichloroethane, acetone, benzene, toluene, trans-1,2-dichloroethene
OU6DUP-1	1,2-Dichlorobenzene, 1,3-dichlorobenzene, benzene, naphthalene

USGS-A4	Chloroform, 1,2-Dichlorobenzene, 1,4-Dichlorobenzene, 1,1-Dichloroethane, 1,2-Dichloroethane, 1,1-Dichloroethene, Vinyl chloride
USGS-J4	Acetone, Trichloroethene
TB-092501	Methylene Chloride
TB-100501-2	Dibromochloromethane
TB-100801-3	Acetone, Dibromochloromethane, Methylene chloride
TB-101601	Acetone

C.4.1.2 Dissolved Gases (RSK-175) – The initial calibration for each instrument used for the analysis of dissolved gases met acceptable criteria. The continuing calibration standards were also within 10 percent of their true value. Batch LCSs for dissolved gases were within acceptable limits. MS/MSD spikes were not performed for dissolved gases. The DMW-9A sample vials sent to STL for CO_2 analysis were received in good condition in North Canton, but arrived broken in Santa Anna. Therefore carbon dioxide could not be measured for DMW-9A.

C.4.1.2.1 The batch specific method blanks did not have analytes of interest greater than the PQL. The following method blanks contained the indicated compounds at concentrations above the MDL, but less than the PQL. The associated OU 6 samples with concentrations less than or equal to ten times these concentrations were accordingly qualified as estimated based on blank contamination and flagged as "JB", unless overridden by qualifications for other QC exceedances.

Blank Date	Compound	Concentration	Flagged Samples
10/11/01	Methane	0.00065 mg/L	None (associated results are non-detect)
10/15/01	Methane Carbon dioxide	0.00093 mg/L 0.080 mg/L	Methane for AEHA-23A, AEHA-32A, OU6DUP-2, USGS-J4, TB-100301, and TB-100301-2; Carbon dioxide for TB-100301 and TB-100301-2
10/16/01	Methane	0.00057 µg/L	OU7EQB-1

C.4.1.2.2 The trip blanks associated with the OU 6 samples were analyzed and reported to contain low levels of carbon dioxide. The samples with concentrations less than or equal to five times these concentrations were accordingly qualified as estimated based on blank contamination and flagged as "JB". No qualifications were required, since the carbon dioxide results were either non-detect or greater than five times the associated trip blank concentrations with the following exception:

Compound	Associated Samples
Carbon Dioxide	OU7EQB-1

C.4.1.2.3 An equipment blank (OU7EQB-1) was collected to represent any sample collected via peristaltic pump in lieu of dedicated equipment. Sample AEHA-18A was collected via peristaltic pump. The equipment blank contained methane at 0.00066 µg/L, and carbon dioxide at 0.32 µg/L, but these results were previously flagged "JB" due to trip blank contamination. Therefore, qualification of the data was not necessary.

C.4.1.2.4 The analytical holding time of 7 days for carbon dioxide was exceeded by 1-5 days in the following samples. The associated positive results were flagged J, and the non-detects were flagged UJ for the following samples:

AEHA-12A	AEHA-18A	AEHA-23A	AEHA-25A	OU6DUP-3	AEHA-28A
AEHA-30A	AEHA-31A	AEHA-32A	OU6DUP-2	USGS-J4	USGS-A4
TB-10201	TB-100301	TB-100301-2	TB-100801-3	TB-100401	

C.4.1.2.5 Three field duplicate pairs (AEHA-5/OU6DUP-1, AEHA-23A/OU6DUP-2, AEHA-25A/OU6DUP-3) were collected and analyzed. RPD between the parent sample and the duplicate sample is within specified limits (<20%).

C.4.1.2.6 The methane results for AEHA-5, OU6DUP-1, and MWA50-37 required a 100 times dilution to place the result within the calibration range resulting in elevated PQLs. Results were evaluated and reported down to the MDL. Flagging of dissolved gas results less than the PQL but greater than the MDL (marked as "JQ") is outlined below.

Sample	Compound
AEHA-5	Ethane
OU6DUP-1	Ethane
TB-100801-3	Methane, carbon dioxide
TB-100401	Methane

C.4.1.3 Total and Dissolved Metals (SW6010B) – The initial calibration for each instrument used for the analysis of dissolved and total metals met USACE criteria. The low-level check recovered outside the QC limits for aluminum and antimony on 10/09/01 and for antimony on 10/13/01. The total and dissolved aluminum results for AEHA-12A, AEHA-15A, AEHA-34A, and USGS-M4; and the antimony results for AEHA-12A, AEHA-15A, AEHA-23A, AEHA-24A, AEHA-26A, AEHA-30A, AEHA-31A, AEHA-32A, AEHA-33A, AEHA-34A, OU6DUP-2, USGS-A4, USGS-J4, and USGS-M4 were flagged "J" for the positive results and "UJ" for the non-detects. The low-level check recovered outside the QC

limit for lead on 10/17/01. The total and dissolved lead results for AEHA 16A, AEHA 18A, AEHA-22A, AEHA-25A, AEHA-26A, AEHA-28A, and OU6DUP-3 were flagged "J" for the positive results and "UJ" for the non-detects.

C4.1.3.1 The continuing calibration standards were also within 10 percent of their true value, with the exception of potassium in CCV8 (10/10/01, 02:50), which resulted in a "J" flag for positive results and a "UJ" flag for non-detects for total and dissolved potassium in samples AEHA-12A and AEHA-34A. The continuing calibration standards were also within 10 percent of their true value, with the exception of manganese in two CCVs (10/17/01, 17:40 and 10/17/01, 18:42), which resulted in a "J" flags for total and dissolved manganese in sample AEHA-16A.

C.4.1.3.2 The laboratory batch preparation blanks (Method Blanks) were less than the PQL, but above the MDL in the following instances.

Metal	Affected Samples
Arsenic	OU6DUP-1 (both)
Aluminum	MWA50-35 (both) MWA50-36 (both) MWA50-37 (both) MWA50-38(both) AEHA-5 (diss.) OU6DUP-1 (both) AEHA-24A (both) AEHA-32A (both) AEHA-33A (diss.) AEHA-26A (diss.) USGS-A4 (diss.) AEHA-18A (both) AEHA-25A (both) OU6DUP-3 (both) USGS-I4 (both) AEHA-16A (diss.) AEHA-22A (diss.) AEHA-28A (diss.)
Beryllium	AEHA-16A Total AEHA-28A (both) AEHA-22A (diss.)
Cobalt	AEHA-23A (both) AEHA-24A (both) AEHA-33A (total) OU6DUP-2 (both) USGS-A4 (both) DMW-7A (diss.)
Potassium	MWA50-36 (diss.) USGS-I4 (both)
Vanadium	AEHA-30A (total) AEHA-31A(total) AEHA-34A(both) AEHA-25A (total)
Zinc	AEHA-34A (both) AEHA-12A (total) AEHA-28A (total) AEHA-16A (total) AEHA-22A (both) AEHA-25A (both) AEHA-28A (both) OU6DUP-3 (both) AEHA-18A (diss.)

C.4.1.3.3 The subsequent continuing calibration blanks (CCBs) were also less than the PQL, and results were flagged JB if the sample concentration was less than 5 times the blank concentration.

Metal	Affected Samples
Aluminum	AEHA-16A(diss.)AEHA-18A (both) AEHA-30A (total) AEHA-33A (diss.)AEHA-25A (both)OU6DUP-3 (both) USGS-I4 (both)
Metal	Affected Samples
Beryllium	AEHA-16A (total)AEHA-28A(both) AEHA-22A (diss.) USGS-I4 (both)
Cobalt	AEHA-15A (both) AEHA-34A (both) USGS-M4 (total) AEHA-33A (total) AEHA-23A(both) AEHA-24A (both) USGS-A4 (both) OU6DUP-2 (both)
Chromium	USGS-A4 (total)
Manganese	OU7EQB-1 (both)
Molybdenum	MWA50-37 (both) AEHA-5 (both) OU6DUP-1 (both)
Nickel	AEHA-33A (total) AEHA-5 (both) AEHA-30A (diss.) OU6DUP-1 (both) DMW-9A (both) AEHA-23A (total) AEHA-33A (total) USGS-A4 (both)
Potassium	USGS-I4 (diss.)
Selenium	AEHA-16A (both) AEHA-18A (total)OU6DUP-3 (diss.) USGS-I4 (total) OU6DUP-3 (diss.)
Vanadium	AEHA-5 (both) AEHA-18B (total) OU6DUP-1 (total) AEHA-23B (diss.) AEHA-31A (total) AEHA-24B(both) AEHA-25B (total) AEHA-32B (diss.) AEHA-27B(both) AEHA-30A (Both.)AEHA-34A (both)MWA50-36 (total)

C.4.1.3.4 The associated OU 6 samples with concentrations less than or equal to five times these concentrations were accordingly qualified as estimated based on blank contamination and flagged as "JB", unless overridden by qualifications for other QC exceedances.

C.4.1.3.5 The batch LCSs for dissolved and total metals were within USACE prescribed limits (80-120%R). The MS/MSD recoveries for spiked sample AEHA-18A and DMW-7A were within USACE limits (75-125%R), with the exception of incalculable recoveries for iron and manganese in sample AEHA-18A. No qualification was necessary, as the unspiked results was greater than four times the spiking amounts. The MS/MSD recoveries for spiked sample AEHA-33A were within USACE limits (75-125%R), with the exception of high recoveries for aluminum. The total aluminum result for the spiked samples was qualified as estimated (biased high) and flagged "JH".

C.4.1.3.6 Three field duplicate pairs (AEHA-5/OU6DUP-1, AEHA23A/OU6DUP-2, and AEHA-25A/OU6DUP-3) were collected and analyzed. RPD between the parent sample and the duplicate sample is within specified limits (<25%), with the exception of dissolved cobalt and total zinc in AEHA23A/OU6DUP-2. The associated results were qualified as estimated and flagged "J", unless overridden by other QC exceedances. The dissolved manganese result exceeded the total manganese result by more than 10% in sample AEHA-26A, resulting in "J" flags for total and dissolved results.

C.4.1.3.7 A serial dilution was performed on upper aquifer samples AEHA-12A (total), OU6DUP-2 (total), AEHA-16A(dissolved), MWA50-36 (total) and lower aquifer sample AEHA-23B (dissolved) to assess unusual matricies. The serial dilution performed on AEHA-12A produced RPDs above the QC limit for zinc, while the serial dilution for OU6DUP-2 was out for aluminum. The associated total results were flagged "J" for positive results and "UJ" for non-detects, unless overridden by other QC exceedances. The serial dilution performed on AEHA-16A(dissolved) produced RPDs above the QC limit for selenium and sodium. The associated dissolved results were flagged "J" for positive results and "UJ" for non-detects, unless overridden by other QC exceedances. The percent difference between diluted and non-diluted results was outside of QC limits (± 10%) for aluminum and potassium in sample MWA50-36. Aluminum and potassium results were previously flagged JB and no further flagging was necessary.

C.4.1.3.8 An equipment blank (OU7EQB-1) was collected to represent any sample collected via peristaltic pump in lieu of dedicated equipment. Sample AEHA-18A was collected via peristaltic pump. The equipment blank contained total and dissolved manganese at 1.7 JQ µg/L and 0.99 JQ µg/L. Sample results were greater than five times the equipment blank amount, therefore, qualification of the data was not necessary.

C.4.1.3.9 Results were evaluated and reported down to the Method Detection Limit (MDL). The following data points were reported at concentrations above the MDL, but less than the PQL and were qualified as estimated and flagged as "JQ".

Sample ID	Affected Compounds
AEHA-5	Barium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)
OU6DUP-1	Barium (total and dissolved), Calcium (dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)

Sample ID	Affected Compounds
AEHA-12A	Antimony (total), Barium (total and dissolved), Calcium (total and dissolved), Cobalt (total and dissolved), Magnesium (total and dissolved), Nickel (dissolved), Potassium (total and dissolved), Sodium (total and dissolved),
AEHA-15A	Antimony (total), Barium (total and dissolved), Calcium (total and dissolved), Iron (total), Magnesium (total and dissolved), Potassium (total and dissolved)
AEHA-16A	Barium (total and dissolved), Cadmium (total), Chromium (total), Cobalt (total and dissolved), Copper (total), Magnesium (total and dissolved), Nickel (total), Potassium (total and dissolved), Vanadium (total)
AEHA-18A	Barium (total and dissolved), Cadmium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)
AEHA-22A	Barium (total and dissolved), Cadmium (total and dissolved), Calcium (total and dissolved), Cobalt (total and dissolved), Lead (dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
AEHA-23A	Barium (total and dissolved), Calcium (total and dissolved), Lead (dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Zinc (total and dissolved)
OU6DUP-2	Barium (total and dissolved), Calcium (total and dissolved), Lead (dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)
AEHA-24A	Barium (total and dissolved), Calcium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)
AEHA-25A	Barium (total and dissolved), Cadmium (total and dissolved), Calcium (total and dissolved), Cobalt (total and dissolved), Copper (total), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
OU6DUP-3	Barium (total and dissolved), Cadmium (total and dissolved), Calcium (total and dissolved), Cobalt (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
AEHA-26A	Barium (total and dissolved), Cobalt (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total)
AEHA-28A	Barium (total), Cadmium (total and dissolved), Chromium (total), Copper (total), Nickel (total and dissolved), Potassium (total and dissolved)
AEHA-30A	Antimony (total and dissolved), Barium (total and dissolved), Calcium (total and dissolved), Cobalt (total and dissolved), Magnesium (total and dissolved), Nickel (total), Potassium (total and dissolved), Sodium (total and dissolved)
AEHA-31A	Arsenic (dissolved), Cadmium (total), Copper (total), Lead (total), Zinc (total)
AEHA-32A	Barium (total and dissolved), Cadmium (total and dissolved), Calcium (total and dissolved), Copper (total), Iron (total), Magnesium (total and dissolved), Manganese (total and dissolved), Potassium (total and dissolved)
AEHA-33A	Barium (total and dissolved), Calcium (total and dissolved), Chromium (total), Copper (total), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (dissolved), Vanadium (total), Zinc (dissolved)
AEHA-34A	Arsenic (total), Antimony (total), Barium (total and dissolved), Magnesium (total and dissolved), Nickel (total), Potassium (total and dissolved), Sodium (total and dissolved)
DMW-7A	Antimony (total and dissolved), Barium (total and dissolved), Calcium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)

Sample ID	Affected Compounds
DMW-9A	Aluminum (total and dissolved), Antimony (total and dissolved), Barium (total and dissolved), Calcium (total and dissolved), Iron (total), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
MWA50-35	Barium (total and dissolved), Cobalt (total and dissolved), Nickel (total and dissolved), Potassium (total and dissolved)
MWA50-36	Barium (total and dissolved), Calcium (total and dissolved), Chromium (total), Magnesium (total and dissolved), Nickel (total and dissolved), Potassium (total), Selenium (total and dissolved), Zinc (total)
MWA50-37	Barium (total and dissolved), Chromium (total), Nickel (total and dissolved), Vanadium (total and dissolved)
MWA50-38	Barium (total and dissolved), Calcium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
USGS-A4	Barium (total and dissolved), Cadmium (dissolved), Copper (total), Magnesium (total and dissolved), Potassium (total and dissolved), Vanadium (total)
USGS-I4	Barium (total and dissolved), Calcium (total and dissolved), Cobalt (total), Magnesium (total and dissolved), Sodium (total and dissolved)
USGS-J4	Antimony (total), Barium (total and dissolved), Calcium (total and dissolved), Cobalt (total and dissolved), Magnesium (total and dissolved), Nickel (total), Potassium (total and dissolved), Sodium (dissolved), Vanadium (total)
USGS-M4	Antimony (dissolved), Barium (total and dissolved), Calcium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)

C.4.1.4 Total and Dissolved Thallium (SW7841) – The initial and continuing calibration for each instrument used for the analysis of total and dissolved thallium met acceptable criteria. The low-level check recovered outside the QC limits on 10/10/01 and 10/15/01. The total and dissolved thallium results for AEHA-12A, AEHA-15A, AEHA-23A, AEHA-24A, AEHA-26A, AEHA-30A, AEHA-31A, AEHA-32A, AEHA-33A, AEHA-34A, OU6DUP-2, USGS-A4, USGS-J4, and USGS-M4 were flagged "J" for the positive results and "UJ" for the non-detects.

C.4.1.4.1 The laboratory batch preparation blanks (Method Blanks) and subsequent CCBs were less than the PQL, but above the MDL in the following instances.

Blank	Compound	Flagged Samples
ICB	Thallium	AEHA-5 (both) OU6DUP-1 (both)
MB	Thallium	AEHA-18A (diss.)
CCB	Thallium	AEHA-18A (diss.) AEHA-24A(both) AEHA-26A (total) AEHA-32A (total) AEHA-33A (both)

C.4.1.4.2 Batch LCSs for thallium were within acceptable limits. The MS/MSD recoveries for spiked sample AEHA-18A and AEHA-33A were within acceptable limits. The analytical holding time of 6 months for thallium was met for the OU6 samples.

C.4.1.4.3 Three field duplicate pairs (AEHA-23A/OU6DUP-2, AEHA-25A/OU6DUP-3) were collected and analyzed. RPD between the parent sample and the duplicate sample could not be calculated because thallium was not detected in either sample.

C.4.1.4.4 A post digestion spike was performed on samples MWA50-36, MWA50-37, AEHA-5, OU6DUP-1 and USGS-A4 to confirm matrix effects. Recoveries of total and dissolved thallium were outside of QC limits (75-125%). Thallium results for samples MWA50-36 and MWA50-37 were non-detect and results were flagged UJ. Thallium results in samples AEHA-5 and OU6DUP-1 were previously flagged JB due to blank contamination, and no further flagging was necessary. Results were evaluated and reported down to the MDL. Flagging of thallium results less than the PQL but greater than the MDL was not required.

C.4.1.4.5 An equipment blank (OU7EQB-1) was collected to represent any sample collected via peristaltic pump in lieu of dedicated equipment. Sample AEHA-18A was collected via peristaltic pump. The equipment blank did not contain thallium. Therefore, qualification of the data was not necessary.

C.4.1.5 Total and Dissolved Mercury (7470A) – The initial and continuing calibration for each instrument used for the analysis of total and dissolved mercury met acceptable criteria. The low level check standard recovered outside QC limits for mercury. Mercury results for samples DMW-7A and DMW-9A were qualified as estimated. Subsequent LCS failures resulted in UL flags for mercury results in samples DMW-7A and DMW-9A. The laboratory batch preparation blanks (Method Blanks) and subsequent CCBs did not contain mercury.

C.4.1.5.1 Batch LCSs for mercury were within acceptable limits. However, the LCS recovery of total and dissolved mercury associated with samples DMW-7A and DMW-9A was below limits and results were marked UL (non-detect with low bias). The MS/MSD recoveries for spiked samples AEHA-33A were within acceptable limits. The MS/MSD recoveries for spiked sample AEHA-18A were below the QC limit of 75-125%. The total and dissolved mercury results for AEHA-18A were qualified as estimated (possibly biased low) and flagged "UL". The analytical holding time of 28 days for mercury was met for the OU6 samples.

C.4.1.5.2 Three field duplicate pairs (AEHA-5/OU6DUP-1, AEHA-23A/OU6DUP-2, AEHA-25A/OU6DUP-3) were collected and analyzed. RPD between the parent sample and the duplicate sample could not be calculated because mercury was not detected in either sample. Results were evaluated and reported down to the MDL. Flagging of mercury results less than the PQL but greater than the MDL was not required.

C.4.1.5.3 An equipment blank (OU7EQB-1) was collected to represent any sample collected via peristaltic pump in lieu of dedicated equipment. Sample AEHA-18A was collected via peristaltic pump. The equipment blank did not contain mercury. Therefore, qualification of the data was not necessary.

C.4.1.6 Anions (300.0A) – The initial and continuing calibration for each instrument used for the analysis of chloride, nitrate, and sulfate met acceptable criteria. The laboratory batch preparation blanks (Method Blanks) and subsequent CCBs contained chloride from 0.02 – 0.05 mg/L. No qualification was necessary, as the associated results were greater than five times the blank value.

C.4.1.6.1 Batch LCSs for anions were within acceptable limits.The MS/MSD recoveries for spiked sample AEHA-18A were within acceptable limits.

C.4.1.6.2 Three field duplicate pairs (AEHA-5/OU6DUP-1, AEHA-23A/OU6DUP-2, AEHA-25A/OU6DUP-3) were collected and analyzed. RPD between the parent sample and the duplicate sample is within specified limits (<20%). Nitrate for samples AEHA-23A, OU6DUP-2, USGS-A4 and USGS-J4 were reported at concentrations above the MDL, but less than the PQL and were qualified as estimated and flagged as "JQ".

C.4.1.6.3 An equipment blank (OU7EQB-1) was collected to represent any sample collected via peristaltic pump in lieu of dedicated equipment. Sample AEHA-18A was collected via peristaltic pump. The equipment blank did not contain anions. Therefore, qualification of the data was not necessary.

C.4.1.7 Total Organic Carbon (SW9060) – The initial and continuing calibration for each instrument used for the analysis of TOC met acceptable criteria, with the listed exceptions. The associated positive results were qualified as estimated and flagged "J", and the non-detects were flagged "UJ".

CCV Date/Time	%R	Flagged samples		
10/18/01 (16:23)	110.5%	AEHA-12A		
10/18/01 (23:12)	110.9%	AEHA-23A	AEHA-32A	OU6DUP-2

C.4.1.7.1 The laboratory batch preparation blanks (Method Blanks) and CCBs contained TOC from 0.0327 mg/L to 0.3275 mg/L in the CCBs. No qualification was necessary, as the associated results were greater than five times the blank value. Batch LCSs for TOC were within acceptable limits. The MS/MSD recoveries for spiked sample AEHA-18A were within acceptable limits.

C.4.1.7.2 Three field duplicate pairs (AEHA-5/OU6DUP-1, AEHA-23A/OU6DUP-2, AEHA-25A/OU6DUP-3) were collected and analyzed. RPD between the parent sample and the duplicate sample could not be calculated because TOC was not detected in either sample.

C.4.1.7.3 Samples AEHA-5 and OU6DUP-1 were diluted twenty times to place the TOC result within the range of the calibration curve, which resulted in an elevated PQL. Results were evaluated and reported down to the MDL. The TOC results for DMW-9A were reported at concentrations above the MDL, but less than the PQL and were qualified as estimated and flagged as "JQ".

C.4.1.7.4 An equipment blank (OU7EQB-1) was collected to represent any sample collected via peristaltic pump in lieu of dedicated equipment. Sample AEHA-18A was collected via peristaltic pump. The equipment blank did not contain TOC. Therefore, qualification of the data was not necessary.

C.4.1.8 Alkalinity (310.1) – The titration standardization performed for the analysis of alkalinity met acceptable criteria. The laboratory batch preparation blanks (Method Blanks) contained alkalinity from2.0 mg/L to 4.5 mg/L. As a result, alkalinity was qualified as estimated and flagged "JB" for samples AEHA-12A, AEHA-23A, OU6DUP-2, AEHA-25A, OU6DUP-3, AEHA-28A, AEHA-32A, DMW-9A, USGS-A4, USGS-J4 and OU7EQB-1.

C.4.1.8.1 Batch LCSs for alkalinity were within acceptable limits. The MS/MSD recoveries for spiked sample AEHA-18A were within acceptable limits.

C.4.1.8.2 Three field duplicate pairs (AEHA-5/OU6DUP-1, AEHA-23A/OU6DUP-2, AEHA-25A/OU6DUP-3) were collected from the upper aquifer and analyzed. RPD between the parent sample and

the duplicate sample exceeded the specified limits (<20%); however, the associated results were previously flagged "JB" due to method blank contamination. Results were evaluated and reported down to the MDL. Flagging of alkalinity results less than the PQL but greater than the MDL was not required.

C.4.1.8.3 An equipment blank (OU7EQB-1) was collected to represent any sample collected via peristaltic pump in lieu of dedicated equipment. Sample AEHA-18A was collected via peristaltic pump. The equipment blank contained alkalinity at 2.5 mg/L, but was previously flagged "JB" due to method blank contamination. Therefore, qualification of the data was not necessary.

C.4.1.9 Sulfide (376.1) – The titration standardization performed for the analysis of sulfide met acceptable criteria. The laboratory batch preparation blanks (Method Blanks) did not contain sulfide. Batch LCSs for sulfide were within acceptable limits. The MS/MSD recoveries for spiked sample AEHA-18A were within acceptable limits. The analytical holding time of 7 days for sulfide was met for the samples collected from OU 6.

C.4.1.9.2 Three field duplicate pairs (AEHA-5/OU6DUP-1, AEHA-23A/OU6DUP-2, AEHA-25A/OU6DUP-3) were collected and analyzed. RPD between the parent sample and the duplicate sample could not be calculated because sulfide was not detected in either sample. Results were evaluated and reported down to the MDL. Flagging of sulfide results less than the PQL but greater than the MDL was not required.

C.4.1.9.3 An equipment blank (OU7EQB-1) was collected to represent any sample collected via peristaltic pump in lieu of dedicated equipment. Sample AEHA-18A was collected via peristaltic pump. The equipment blank did not contain sulfide. Therefore, qualification of the data was not necessary.

C.4.1.10 Dissolved Hydrogen (AM20GA) - Initial and continuing calibration and instrument/method blanks were within method-stated control limits. LCS results were also within laboratory-established limits. Holding times were met for the samples submitted to Microseeps for analysis. MS/MSD samples were not required for hydrogen analysis.

C.1.10.1 Three field duplicate pairs (AEHA-5/OU6DUP-1, AEHA-23A/OU6DUP-2, and AEHA-25A/OU6DUP-3) were collected and analyzed. RPD between the parent sample and the duplicate sample exceeded specified limits (<20%) for duplicate pairs, AEHA-23A/OU6DUP-2 and AEHA-25A/OU6DUP-3. Hydrogen results were qualified as estimated and flagged "J".

C.4.2 GROUNDWATER - LOWER AQUIFER

C.4.2.0.1 A total of 20 groundwater and 2 duplicate samples were collected from the lower aquifer at OU 6 in September and October of 2001. Each monitoring well sample location in the lower aquifer was assayed for VOCs, total and dissolved metals, and MNA parameters.

C.4.2.1 Volatile Organic Compounds (SW8260B) – The initial calibration tunes passed the QC requirements outlined in the Shell document and the method. VOCs were calibrated using either the average relative response factor or quadratic curve and were within specified limits. In the ICV performed on 09/21/01, acetone and 2-hexanone exceeded the plus or minus 20 percent criteria. However, as the recoveries did not exceed plus or minus 40 percent and the average relative standard deviation for each run was less than 15%, no qualification was required. In the ICV performed on 10/8/01, 2-hexanone exceeded the plus or minus 20 percent criteria and was flagged as estimated (J) because the ICV also served as the continuing calibration for samples analyzed immediately following the calibration. The carbon disulfide and 1,1-dichloroethene recoveries in the alternate source initial calibration verification performed on 10/18/01 exceeded the plus or minus 20 percent criteria. Additionally, carbon disulfide failed LCS criteria as discussed below. As a result, the carbon disulfide results were rejected and flagged "R", and the 1,1-dichloroethene results were qualified as estimated and flagged "UJ" for the associated samples.

ICV Date	Affected Compounds	Associated Samples		
10/08/01	2-hexanone	AEHA-23B	AEHA-24B	AEHA-25B
		OU6DUP-4	AEHA-27B	AEHA-28B
		AEHA-30B	OU6DUP-5	AEHA-31B
		AEHA-32B	LAWMW-Q	USGS-B2
		USGS-C2	USGS-H2	USGS-M2
		USGS-N1	TB-092701	TB-092701-1
		TB-092801		
10/18/01	Carbon disulfide (rejected)	AEHA-26B	USGS-G3	TB-100801-3
	1,1-Dichloroethene	TB-100901-2		

C.4.2.1.1 The CCV standards associated with the OU 6 lower aquifer groundwater samples were analyzed as appropriate and several compounds were not within limits specified by the USACE or the method. Qualifications were made based on %D observed in the continuing calibration verifications analyzed on the dates indicated below. Qualifications were assigned for high and low biased (J for detects) exceedances in the CCV, unless overridden by qualifications for other QC exceedances. If the %D observed for a

compound exceeded plus or minus 40% or the compound exceeding %D criteria in the CCV also exceeded %R criteria in the LCS, the associated results were rejected (flagged R).

CCV Date	Affected Compounds	Associated Samples		
10/03/01	Hexachlorobutadiene (low)	USGS-F2 AEHA-21B	TB-092501 AEHA-33B	AEHA-18B QATB-092601
10/10/01	Trichlorofluoromethane	LAWMW-Q USGS-H2 TB-092801	USGS-B2 USGS-M2	USGS-C2 USGS-N1

C.4.2.1.2 The batch specific preparation blanks did not have analytes of interest greater than the PQL. The following preparation blanks contained the indicated compounds at concentrations above the MDL, but less than the PQL. The associated OU 6 samples with concentrations less than or equal to ten times these concentrations were accordingly qualified as estimated based on blank contamination and flagged as "JB", unless overridden by qualifications for other QC exceedances.

Blank Date	Compound	Concentration	Associated Samples
10/08/01	Acetone	0.56 µg/L	Associated positive results marked JB

C.4.2.1.3 Batch specific LCSs were also analyzed and recoveries were acceptable, with the following exceptions. Qualifications were assigned for either high biased (JH for positive results and UJ for non-detects) or low biased (JL for positives or UL for non-detects) exceedances in the LCS, unless overridden by qualifications for other QC exceedances. If the %R observed for a compound exceeded plus or minus 40% or the compound exceeding %R criteria in the LCS also exceeded %D criteria in the CCV, the associated results were rejected (flagged R).

LCS Date	Affected Compounds	Associated Samples		
10/03/01	Chloromethane (low) Carbon disulfide (low)	AEHA-18B USGS-F2	AEHA-21B TB-092501	AEHA-33B QATB-092601
10/08/01	2-Butanone (low) Acetone (low) 2-Hexanone (low) 4-Methyl-2-pentanone(low)	AEHA-23B AEHA-27B AEHA-31B OU6DUP-5	AEHA-24B AEHA-28B AEHA-32B TB-092701	AEHA-25B AEHA-30B OU6DUP-4 TB-092701-1
10/10/01	Chloromethane (low) 2-Hexanone (low) 4-Methyl-2-pentanone (low)	USGS-B2 USGS-M2	USGS-C2 USGS-N1	USGS-H2 TB-092801
10/18/01	Carbon disulfide (rejected)	AEHA-26B USGS-G3	TB-100801-3 TB-100901-2	

C.4.2.1.4 MS/MSDs were specified and performed on groundwater sample AEHA 21B. The MS/MSD recovery criteria outlined in the Shell document were met with the following exceptions. Recovery of acetone in MS/MSD sample AEHA-21B was below limits, and results were marked as estimated (UJ for negative results).

C.4.2.1.5 Two field duplicate pairs (AEHA-25B/OU6DUP-4, AEHA-30B/OU6DUP-5) were collected and analyzed. RPD between the parent sample and the duplicate sample is within specified limits (<30%). Furthermore, all surrogates and internal standards added to the samples by the laboratory were recovered within specified limits.

C.4.2.1.6 The trip blanks associated with the OU 6 samples were analyzed and reported to contain low levels of VOCs, as indicated below. The samples with concentrations less than or equal to five times these concentrations (ten times for acetone and methylene chloride) were accordingly qualified as estimated based on blank contamination and flagged as "JB", unless overridden by qualifications for other QC exceedances. Associated samples that were non-detects required no qualification.

Blank ID	Compound	Concentration	Action
TB-092501	Methylene Chloride	0.45 µg/L	No flag – associated results non-detect
QATB-092601	Methylene Chloride	0.57 µg/L	No flag – associated results non-detect
TB-092701	Acetone	0.63 µg/L	No flag – associated results previously marked JB
TB-100801-3	Acetone = 0.55 µg/L Bromodichloromethane = 1.6 µg/L Chloroform = 18 µg/L Dibromochloromethane = 0.34 µg/L Methylene chloride = 0.43 µg/L		Acetone for USGS-G3
TB-100901-2	Acetone = 1.1 µg/L		No flag; associated result was non-detect

C.4.2.1.7 The following samples were diluted to place the VOC results within the range of the calibration curve, which resulted in elevated PQLs.

Sample	Dilution Factor
USGS-C2	5x

C.4.2.1.8 Additionally, the following data points were reported at concentrations above the MDL, but less than the PQL and were qualified as estimated and flagged as "JQ".

Sample ID	Affected Compounds
AEHA-23B	Trichloroethene, vinyl chloride
AEHA-24B	Vinyl Chloride
AEHA-27B	Tetrachloroethene
AEHA-30B	Tetrachloroethene, vinyl chloride
OU6DUP-5	Tetrachloroethene
LAWMW-Q	Acetone
USGS-B2	Acetone
USGS-C2	trans-1,2-Dichloroethene
USGS-F2	Trichloroethene
TB-092501	Methylene Chloride
TB-100901-2	Acetone

C.4.2.2 Dissolved Gases (RSK-175) – The initial calibration for each instrument used for the analysis of dissolved gases met acceptable criteria. The continuing calibration standards were also within 25 percent of their true value. The laboratory batch preparation blanks (Method Blanks) did not contain dissolved gases with the following exceptions. Associated positive methane results less than 5 times the blank value were marked as estimated due to blank contamination and flagged "JB".

Blank Date	Compound	Concentration	Associated Samples
10/8/01	Methane	0.00076 µg/L	AEHA-23B AEHA-24B AEHA-25B OU6DUP-4 AEHA-31B AEHA-28B TB-092701 TB-092701-1
10/26/01	Methane	0.00053 µg/L	none

C.4.2.2.1 Batch LCSs for dissolved gases were within acceptable limits. MS/MSD spikes were not performed for dissolved gases.

C.4.2.2.2 The trip blanks associated with the OU 6 samples were analyzed and reported to contain low levels of carbon dioxide and methane. The samples with concentrations less than or equal to five times these concentrations were accordingly qualified as estimated based on blank contamination and flagged as "JB". The methane results for these samples were already flagged "JB" due to positive method blank results (see above). The methane result for sample USGS-G3 was qualified as estimated and flagged "JB".

C.4.2.2.3 The analytical holding time of 7 days for carbon dioxide was exceeded by 1-5 days for samples shown below. The associated positive results were flagged J, and the non-detects were flagged UJ.

AEHA-23B	AEHA-24B	AEHA-25B	AEHA-26B	AEHA-27B	AEHA-28B
AEHA-30B	AEHA-31B	AEHA-32B	OU6DUP-4	OU6DUP-5	USGS-G3
TB-092701	TB-092701-1	TB-100801-3	TB-100901-2		

C.4.2.2.4 Two field duplicate pairs (AEHA-25B/OU6DUP-4, and AEHA-30B/OU6DUP-5) were collected and analyzed. RPD between the parent sample and the duplicate sample is within specified limits (<20%). Results were evaluated and reported down to the MDL. Flagging of dissolved gas results less than the PQL but greater than the MDL (marked as "JQ") is outlined below.

Sample	Compound
TB-100801-3	Methane

C.4.2.3 Total and Dissolved Metals (SW6010B, SW7470A, SW7841) – The initial calibration for each instrument used for the analysis of dissolved and total metals met USACE criteria. The alternate source midpoint calibration check standards were within 10 percent of their true value. The continuing calibration standards were also within 10 percent of their true value. The low-level check recovered outside the QC limits for aluminum and antimony on 10/09/01 and for antimony on 10/13/01. The total and dissolved aluminum results for LAWMW-Q, USGS-B2, USGS-C2, USGS-H2, USGS-M2 and USGS-N1; and the antimony results for LAWMW-Q, USGS-B2, USGS-C2, USGS-H2, USGS-M2 and USGS-N1 were flagged "J" for the positive results and "UJ" for the non-detects The low-level check recovered outside the QC limit for lead on 10/17/01. The total and dissolved lead results for USGS-G3 were flagged "J" for the positive results and "UJ" for the non-detects.

C.4.2.3.1 The laboratory batch preparation blanks (Method Blanks) contained some metals above the DL. Samples containing these metals at less than 5 times the blank level were flagged as "JB" and are described below.

Metal	Affected Samples
Aluminum	AEHA-18B (diss.) AEHA-21B (total) AEHA-23B (both) AEHA-24B (both) AEHA-25B (both) AEHA-26B (diss.) AEHA-27B (total) AEHA-28B (both) AEHA-30B (both) AEHA-31B (both) AEHA-32B (both) AEHA-33B (diss.) USGS-F2(both) USGS-G3(both) OU6DUP-4 (both) OU6DUP-5 (both)
Potassium	MWA50-36 (diss.)
Vanadium	AEHA-26B (total) USGS-N1 (total)
Zinc	AEHA-26B (both) AEHA-27B (diss.) USGS-G3 (total)

C.4.1.3.2 The subsequent continuing calibration blanks (CCBs) were also less than the PQL, and results were flagged JB if the sample concentration was less than 5 times the blank concentration.

Metal	Affected Samples
Aluminum	AEHA-33B (total) AEHA-18B (total) USGS-G3 (both) AEHA-26B (diss.)
Antimony	AEHA-21B (both)
Barium	LAWMW-Q (diss.)
Beryllium	AEHA-24B (both) AEHA-25B (both) AEHA-32B(both) OU6DUP-4 (both) AEHA-27B (both) AEHA-31B(both) AEHA-30B (both) OU6DUP-5 (both) AEHA-28B(both)
Cadmium	AEHA-32B (both) AEHA-27B (both)
Copper	AEHA-33B (total)
Lead	AEHA-27B (diss.) AEHA-33B (total)
Nickel	AEHA-33B (total)) AEHA-18B (both)
Selenium	AEHA-26B (total) USGS-G3 (diss.)

Metal	Affected Samples
Vanadium	AEHA-18B (total) AEHA-23B (diss.) AEHA-21B (total) AEHA-24B(both) AEHA-25B (total) AEHA-32B (diss.) AEHA-27B(both) AEHA-30B (both) OU6DUP-5 (both) USGS-N1 (total)
Thallium	AEHA-18B (diss.) AEHA-24B (both) AEHA-33B (total)
Zinc	AEHA-26B (both) USGS-B2 (total)

C.4.2.3.3 The batch LCSs for total and dissolved metals were within USACE prescribed limits (80-120%R). The MS/MSD recoveries for spiked samples AEHA-21B, AEHA-23B, and LAWMW-Q were within USACE limits (75-125%R). No flags were applied.

C.4.2.3.4 Two field duplicate pairs (AEHA-25B/OU6DUP-4, and AEHA-30B/OU6DUP-5) were collected and analyzed. RPD between the parent sample and the duplicate sample is within specified limits (<25%). The dissolved iron result exceeded the total iron result by more than 10% in sample AEHA-27B resulting in J flags for total and dissolved results.

C.4.2.3.5 A serial dilution was performed on lower aquifer sample AEHA-23B (dissolved) and upper aquifer sample MWA50-36 (total) to assess unusual matricies. The percent difference between diluted and non-diluted results was outside of QC limits (± 10%) for aluminum and potassium in sample MWA50-36. Aluminum and potassium results were previously flagged JB and no further flagging was necessary.

C.4.2.3.6 Results were evaluated and reported down to the MDL. Flagging of total and dissolved metals results less than the PQL but greater than the MDL is outlined below.

Sample ID	Affected Compound
AEHA-18B	Barium (total and dissolved), Copper (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Selenium (dissolved)
AEHA-21B	Barium (total and dissolved), Cadmium (dissolved), Calcium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
AEHA-23B	Barium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
AEHA-24B	Barium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)
AEHA-25B	Barium (total and dissolved), Calcium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)

Sample ID	Affected Compound
OU6DUP-4	Barium (total and dissolved), Calcium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)
AEHA-26B	Barium (total and dissolved), Cadmium (total), Copper (total)
AEHA-27B	Barium (total and dissolved), Magnesium (total and dissolved), Manganese (total and dissolved)
AEHA-28B	Barium (total and dissolved), Calcium (total and dissolved), Iron (dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)
AEHA-30B	Barium (total and dissolved), Magnesium (total and dissolved), Nickel (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
OU6DUP-5	Barium (total and dissolved), Magnesium (total and dissolved), Nickel (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
AEHA-31B	Barium (total and dissolved), Calcium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)
AEHA-32B	Barium (total and dissolved), Potassium (total and dissolved)
AEHA-33B	Barium (total and dissolved), Potassium (total and dissolved), Selenium (dissolved), Zinc (total)
LAWMW-Q	Barium (total), Magnesium (total and dissolved)
USGS-B2	Barium (total and dissolved), Calcium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
USGS-C2	Barium (total and dissolved), Calcium (dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
USGS-F2	Barium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved), Sodium (total and dissolved)
USGS-G3	Barium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)
USGS-H2	Barium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)
USGS-M2	Barium (total and dissolved), Calcium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)
USGS-N1	Barium (total and dissolved), Magnesium (total and dissolved), Potassium (total and dissolved)

C.4.2.4 Total and Dissolved Thallium (SW7841) – The initial and continuing calibration for each instrument used for the analysis of total and dissolved thallium met acceptable criteria. The low-level check recovered outside the QC limits on 10/10/01 and 10/15/01. The total and dissolved thallium results for LAWMW-Q, USGS-B2, USGS-C2, USGS-H2, USGS-M2, and USGS-N1 were flagged "J" for the positive results and "UJ" for the non-detects.

C.4.2.4.2 Batch LCSs for thallium were within acceptable limits. The MS/MSD recoveries for spiked sample AEHA-21B and LAWMW-Q were within acceptable limits. The analytical holding time of 6 months for thallium was met for the OU6 samples.

CCV Date/Time	%R	Flagged samples		
10/16/01 (06:15)	111.4%	USGS-B2 USGS-C2	USGS-H2 USGS-M2	USGS-N1

C.4.2.7.1 The laboratory batch preparation blanks (Method Blanks) contained TOC. The laboratory batch preparation blanks (Method Blanks) and subsequent CCBs contained TOC as indicated below. The TOC result for USGS-F2 was qualified as estimated and flagged JB.

Blank/Date	Compound/Concentration	Flagged Samples
CCB (10/03/01)	TOC = 0.7 mg/L	USGS-F2
ICB (10/31/01)	TOC = 0.2982 mg/L	No flags; associated results were non-detect
CCB (10/31/01)	TOC = 1.0184 mg/L	No flags; associated results were non-detect
CCB (11/01/01)	TOC = 0.0940 mg/L	No flags; associated results were non-detect

C.4.2.7.2 Batch LCSs for TOC were within acceptable limits. The MS/MSD recoveries for the spiked sample AEHA-21B were within acceptable limits. No qualification was necessary.

C.4.2.7.3 The trip blanks associated with the OU 6 samples were reported to contain low levels of TOC. The samples with concentrations less than or equal to five times these concentrations were accordingly qualified as estimated based on blank contamination and flagged as "JB". The TOC results for AEHA-21B and AEHA-33B were flagged JB. The remaining TOC results were greater than five times the associated trip blank concentrations.

C.4.2.7.4 Two field duplicate pairs (AEHA-25B/OU6DUP-4, and AEHA-30B/OU6DUP-5) were collected and analyzed. RPD between the parent sample and the duplicate sample is within specified limits (<20%). Additionally, the TOC results for AEHA-27B were reported at concentrations above the MDL, but less than the PQL and were qualified as estimated and flagged as "JQ".

C.4.2.8 Alkalinity (310.1) – The titration standardization performed for the analysis of alkalinity met acceptable criteria, as did the initial calibration and calibration check. The laboratory batch preparation blanks (Method Blanks) contained alkalinity below the PQL. Results for samples AEHA-30B, AEHA-31B, USGS-B2 and OU6DUP-5 were less than five times the blank value and were flagged JB.

C.4.2.8.1 Batch LCSs for alkalinity were within acceptable limits. The MS/MSD recoveries for spiked sample AEHA-21B and LAWMW-Q were within acceptable limits.

C.4.1.8.2 Two field duplicate pairs (AEHA-25B/OU6DUP-3, and AEHA-30B/OU6DUP-5) were collected and analyzed. RPD between the parent sample and the duplicate sample is within specified limits (<20%). Results were evaluated and reported down to the MDL. Flagging of alkalinity results less than the PQL but greater than the MDL was not required.

C.4.2.9 Sulfide (376.1) – The titration standardization performed for the analysis of sulfide met acceptable criteria. The laboratory batch preparation blanks (Method Blanks) did not contain sulfide. Batch LCSs for sulfide were within acceptable limits. The MS/MSD recovery for spiked sample AEHA-21B was within acceptable laboratory limits, but outside of project limits. The sulfide result for that sample was marked JL (estimated with low bias). The analytical holding time of 7 days was met for sulfide.

C.4.2.9.1 Two field duplicate pairs (AEHA-25B/OU6DUP-4 and AEHA-30B/OU6DUP-5) were collected and analyzed. RPD between the parent sample and the duplicate sample could not be determined because both the parent and duplicate samples did not contain sulfide. Results were evaluated and reported down to the MDL. Flagging of sulfide results less than the PQL but greater than the MDL was not required.

C.4.2.10 Dissolved Hydrogen (AM20GA) - Initial and continuing calibration and instrument/method blanks were within method-stated control limits. LCS results were also within laboratory-established limits. Holding times were met for the samples submitted to Microseeps for analysis. MS/MSD samples were not required for hydrogen analysis.

C.4.2.10.1 Two field duplicate pairs (AEHA-25B/OU6DUP-4 and AEHA-30B/OU6DUP-5) were collected and analyzed. RPD between the parent sample and the duplicate sample exceeded specified limits (<20%) for duplicate pair AEHA-25B/OU6DUP-4. Hydrogen results were qualified as estimated and flagged "J".

C.4.2.10.2 Results were evaluated and reported down to the MDL. Flagging of hydrogen results less than the PQL but greater than the MDL was not required.

C.5.0 DATA QUALITY EVALUATION SUMMARY

C.5.0.1 Except as previously noted, the data quality indicators were within the USACE prescribed QC limits and requires only the qualifications described. Overall percent completeness for the data collection efforts and DQO attainment is 99. A discussion of compound and/or method completeness compared to project objectives, as well as affects of field conditions on project objectives, is presented below.

C.5.0.2 Obstructed or dry wells may have impacted the overall project objectives. A total of 28 upper aquifer and 25 lower aquifer wells were proposed to be sampled. However, due to dry well conditions and obstructions/vandalism, only 26 wells from the upper aquifer and 20 wells from the lower aquifer were sampled. In some cases, an alternate well was available for sampling. See section 2-4 for details.

C.5.0.3 Upper aquifer wells, USGS-B4 and USGS-F4 were not sampled because each well was dry. Monitoring well, USGS-D4 was also dry; however, USGS-I4 was selected as an alternate and a sample was collected to represent the necessary data point. Data obtained from wells located in the vicinity of USGS-B4 and USGS-F4 are sufficient to define extent, determine a potentiometric surface relative to the area of investigation, provide data to determine natural attenuation processes, and update the risk assessment.

C.5.0.4 Lower aquifer wells, USGS-G2, USGS-I1, USGS-I2, USGS-N2, USGS-O1, and USGS-O2 were not sampled due to obstructions/vandalism. Monitoring well USGS-G3 was selected as an alternate and a sample was collected to represent the necessary data point. The USGS wells are located outside the eastern DSCR property boundary. Data obtained from wells located in the vicinity of the USGS wells are sufficient to define extent, determine a potentiometric surface relative to the area of investigation, provide data to determine natural attenuation processes, and update the risk assessment.

PREPARED/DATE: DWK 12-18-01

SENIOR REVIEW/DATE: JAH 12-18-01

TABLE C-1

DATA SUMMARY TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
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Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-5 9/26/2001	Duplicate AEHA-5 9/26/2001	Sample AEHA-12A 10/2/2001	Sample AEHA-15A 10/2/2001	Sample AEHA-16A 10/4/2001	Sample AEHA-18A 10/4/2001	Sample AEHA-22A 10/4/2001	Sample AEHA-23A 10/3/2001
FIXED BASE LABORATORY ANALYSIS:									
Anions - MCAWW 300.3A mg/L:									
Chloride	1	32.8	35.2	7.7	NA	NA	14	NA	17
Nitrate	0.1	<0.1	<0.1	2.3	NA	NA	<0.1	NA	0.02 JQ
Sulfate	1	0.86	1.3	2.4	NA	NA	34.4	NA	4
Dissolved Gases - RSK SOP-175 mg/L:									
Carbon dioxide	0.001	97	100	45 J	NA	NA	230 J	NA	100 J
Ethane	0.002	0.00038 JQ	0.00038 JQ	<0.002	NA	NA	<0.002	NA	<0.002
Ethene	0.001	<0.001	<0.001	<0.001	NA	NA	<0.001	NA	<0.001
Methane	0.001	5.3	5.8	<0.001	NA	NA	0.013	NA	0.0019 JB
Dissolved Hydrogen by Microseeps AM20GA nM/L:									
Hydrogen	0.03	8.1	7.5	11	NA	NA	2.3	NA	5.9 J
Mercury - SW846 7470A (Dissolved) ug/L:									
Mercury	1	<1	<1	<1	<1	<1	<1 UL	<1	<1
Mercury - SW846 7470A (Total) ug/L:									
Mercury	1	<1	<1	<1	<1	<1	<1 UL	<1	<1
Metals - SW846 6010B (Dissolved) ug/L:									
Aluminum	200	71.3 JB	45.1 JB	<200 UJ	<200 UJ	199 JB	91.5 JB	301 JB	456 JB
Antimony	5	<5	<5	<5 UJ	<5 UJ	<5	<5	<5	<5 UJ
Arsenic	5	5.1	4.2 JB	<5	<5	<5	<5	<5	<5
Barium	200	123 JQ	101 JQ	110 JQ	83 JQ	64.4 JQ	61.9 JQ	71 JQ	109 JQ
Beryllium	10	<10	<10	<10	<10	<10	<10	0.55 JB	<10
Cadmium	2	<2	<2	<2	<2	<2	0.48 JQ	0.32 JQ	<2
Calcium	5000	6140	4720 JQ	811 JQ	963 JQ	5620	5090	3260 JQ	3110 JQ
Chromium	10	<10	<10	<10	<10	<10	<10	<10	<10
Cobalt	30	<30	<30	3.7 JQ	2.4 JB	2 JQ	42.8	2.1 JQ	1.9 JB
Copper	10	<10	<10	<10	<10	<10	<10	<10	<10
Iron	200	10800	11300	<200	<200	5070	23500	207	333 J
Lead	3	<3	<3	<3	<3	<3 UJ	<3 UJ	2.8 JQ	2.9 JQ
Magnesium	5000	3930 JQ	3100 JQ	2000 JQ	984 JQ	1790 JQ	3300 JQ	1600 JQ	1610 JQ
Manganese	20	96.3	74.9	35.8	98	44.4 J	2780	83.3	58.6
Molybdenum	40	3.2 JB	3.6 JB	<40	<40	<40	<40	<40	<40
Nickel	100	4.5 JB	4.4 JB	2.5 JQ	<100	<100	<100	<100	<100
Potassium	5000	1990 JQ	1660 JQ	2220 JQ	1870 JQ	1190 JQ	3150 JQ	1400 JQ	1600 JQ
Selenium	5	<5	5.5	<5	<5	5.6 JB	<5	<5	<5
Silver	10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	5000	329000	353000	3230 JQ	6510	6570 J	16300	3350 JQ	6020
Vanadium	50	0.98 JB	<50	<50	<50	<50	<50	<50	<50
Zinc	20	<20	<20	<20	<20	<20	17 JB	32.8 JB	18.7 JQ

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FIXED BASE LABORATORY ANALYSIS:									
Metals - SW846 6010B (Total) ug/L:									
Aluminum	200	585 JB	120 JB	<200 UJ	62.4 JQ	6350	78 JB	713 JB	632
Antimony	5	<5	<5	2.5 JQ	2.5 JQ	<5	<5	<5	<5 UJ
Arsenic	5	<5	4.2 JB	<5	<5	<5	<5	<5	<5
Barium	200	144 JQ	124 JQ	104 JQ	87.3 JQ	74.7 JQ	63.7 JQ	72.6 JQ	107 JQ
Beryllium	10	<10	<10	<10	<10	0.76 JB	<10	<10	<10
Cadmium	2	<2	<2	<2	<2	0.3 JQ	0.52 JQ	0.29 JQ	<2
Calcium	5000	7170	5800	817 JQ	1070 JQ	5840	5180	5390 JQ	3110 JQ
Chromium	10	<10	<10	<10	<10	3.9 JQ	<10	<10	<10
Cobalt	30	<30	<30	3.6 JQ	2.3 JE	2.5 JQ	43.1	2.2 JQ	2.1 JB
Copper	10	<10	<10	<10	<10	7.9 JQ	<10	<10	<10
Iron	200	14600	13900	<200	126 JQ	13100	24000	659	402
Lead	3	<3	<3	<3	<3	9.2 J	<3 UJ	4.9 J	3.6
Magnesium	5000	4430 JQ	3700	1900 JQ	1080 JQ	1910 JQ	3080 JQ	1640 JQ	1610 JQ
Manganese	20	110	90.3	33.7	115 JQ	47.4 J	2820	85.7	56.6
Molybdenum	40	5.4 JB	5.4 JB	<40	<40	<40	<40	<40	<40
Nickel	100	5.2 JB	5.5 JB	<100	<100	2.6 JQ	<100	<100	2.3 JB
Potassium	5000	2250 JQ	1940 JQ	2110 JQ	1980 JQ	1550 JQ	3220 JQ	1460 JQ	1650 JQ
Selenium	5	<5	<5	<5	<5	5.7 JB	5.4 JB	<5	<5
Silver	10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	5000	346000	376000	3060 JQ	7070	9320	16500	3380 JQ	6190
Vanadium	50	1.7 JB	0.87 JB	<50	<50	6.8 JQ	<50	<50	<50
Zinc	20	<20	46.1	70.1 JB	<20	17.2 JB	<20	36.1 JB	13.7 JQ
Thallium - SW846 7841 (Dissolved) ug/L:									
Thallium	2	2.8 JB	4.5 JB	<2 UJ	<2 UJ	<2	1.9 JB	<2	<2 UJ
Thallium - SW846 7841 (Total) ug/L:									
Thallium	2	2.1 JB	2.7 JB	<2 UJ	<2 UJ	<2	<2	<2	<2 UJ
Total Alkalinity - MCAWW 310.1 mg/L:									
Total Alkalinity	5	610	710	1.7 JB	NA	NA	37	NA	1.4 JB
Total Organic Carbon - SW846 9060 mg/L:									
Total Organic Carbon	1	170	190	<1 UJ	NA	NA	2	NA	<1 UJ
Total Sulfide - MCAWW 376.1 mg/L:									
Total Sulfide	1	<1	<1	<1	NA	NA	<1	NA	<1

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FIXED BASE LABORATORY ANALYSIS:									
Volatile Organic Compounds - SW846 8260B ug/L:									
1,1,1,2-Tetrachloroethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,1,1-Trichloroethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	1	<10	<10	<1	<1.7	<1 UJ	<1 UJ	<1 UJ	<1
1,1,2-Trichloroethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,1-Dichloroethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,1-Dichloroethene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,1-Dichloropropene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,2,3-Trichlorobenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,2,3-Trichloropropane	1	<10	<10	<1	<1.7	<1 UJ	<1 UJ	<1 UJ	<1
1,2,4-Trichlorobenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,2,4-Trimethylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	2	<20	<20	<2	<3.3	<2	<2	<2	<2
1,2-Dibromoethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,2-Dichlorobenzene	1	7.4	7.3 JQ	<1	<1.7	<1	0.12 JQ	<1	<1
1,2-Dichloroethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,2-Dichloroethene (total)	1	NA	NA	NA	NA	NA	2.2	NA	NA
1,2-Dichloropropane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,3,5-Trimethylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,3-Dichlorobenzene	1	2.4 JQ	2.5 JQ	<1	<1.7	<1	<1	<1	<1
1,3-Dichloropropane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
1,4-Dichlorobenzene	1	24	28	<1	<1.7	<1	<1	<1	<1
2,2-Dichloropropane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
2-Butanone	10	<100	<100	<10	<17	<10	<10	<10	<10
2-Chlorotoluene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
2-Hexanone	10	<100	<100	<10 UJ	<17 UJ	<10	<10 UJ	<10	<10 UJ
4-Chlorotoluene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
4-Methyl-2-pentanone	10	<100	<100	<10 UJ	<17 UJ	<10	<10	<10	<10 UJ
Acetone	10	<100	<100	<10	<17	<10	11 JL	<10	<10
Benzene	1	2.7 JQ	2.9 JQ	<1	<1.7	<1	<1	<1	<1
Bromobenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Bromochloromethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Bromodichloromethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Bromoform	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Bromomethane	2	<20	<20	<2	<3.3	<2	<2	<2	<2
Carbon disulfide	1	5.7 JL	<10 UL	<1	<1.7	<1	<1	<1	<1
Carbon tetrachloride	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Chlorobenzene	1	200	200	<1	<1.7	<1	<1	<1	<1
Chloroethane	2	<20	<20	<2	<3.3	<2	<2	<2	<2
Chloroform	1	<10	<10	<1	1.5 JB	<1	<1	<1	<1
Chloromethane	2	<20 UL	<20 UL	<2	<3.3 UJ	<2	<2	<2	<2
cis-1,2-Dichloroethene	0.5	<5	<5	<0.5	<0.84	<0.5	2.2	<0.5	6.7
cis-1,3-Dichloropropene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Dibromochloromethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Dibromomethane	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Dichlorodifluoromethane	2	<20	<20	<2	<3.3	<2	<2	<2	<2

TABLE C-1

DATA SUMMARY TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-5 9/26/2001	Duplicate AEHA-5 9/26/2001	Sample AEHA-12A 10/2/2001	Sample AEHA-15A 10/2/2001	Sample AEHA-16A 10/4/2001	Sample AEHA-18A 10/4/2001	Sample AEHA-22A 10/4/2001	Sample AEHA-23A 10/3/2001
FIXED BASE LABORATORY ANALYSIS:									
Ethylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Hexachlorobutadiene	1	<10 UJ	<10 UJ	<1	<1.7	<1	<1	<1	<1
Isopropylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
m-Xylene & p-Xylene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Methylene chloride	1	<10	<10	<1	<1.7	<1	<1	<1	<1
n-Butylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
n-Propylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Naphthalene	1	8.9 JQ	9.3 JQ	<1 UJ	<1.7	<1	<1	<1	<1 UJ
o-Xylene	0.5	<5	<5	<0.5	<0.84	<0.5	<0.5	<0.5	<0.5
p-Isopropyltoluene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
sec-Butylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Styrene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
tert-Butylbenzene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Tetrachloroethene	1	<10	<10	<1	<1.7	<1	0.84 JQ	<1	<1
Toluene	1	<10	<10	<1	<1.7	0.27 JQ	<1	<1	<1
trans-1,2-Dichloroethene	0.5	<5	<5	<0.5	<0.84	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Trichloroethene	1	<10	<10	<1	45	<1	1.1	<1	0.26 JQ
Trichlorofluoromethane	2	<20	<20	<2	<3.3 UJ	<2	<2	<2	<2
Vinyl chloride	2	<20	<20	<2	<3.3	<2	<2	<2	1.1 JQ
Xylenes (total)	1	<10	<10	<1	<1.7	<1	<1	<1	<1
Surrogate:									
1,2-Dichloroethane-d4	--	99	103	92	92	97	95	96	93
4-Bromofluorobenzene	--	96	97	86	88	84	85	86	89
Dibromofluoromethane	--	103	104	91	93	96	94	95	93
Toluene-d8	--	96	96	96	97	100	100	104	98

TABLE C-1

DATA SUMMARY TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Duplicate AEHA-23A 10/3/2001	Sample AEHA-24A 10/3/2001	Sample AEHA-25A 10/4/2001	Duplicate AEHA-25 10/4/2001	Sample AEHA-26A 10/3/2001	Sample AEHA-28A 10/4/2001	Sample AEHA-30A 10/3/2001	Sample AEHA-31A 10/3/2001
FIXED BASE LABORATORY ANALYSIS:									
Anions - MCAWW 300.3A mg/L:									
Chloride	1	17.3	NA	5.5	5.6	NA	140	6	2.4
Nitrate	0.1	0.02 JQ	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Sulfate	1	4.4	NA	8.4	8.6	NA	1.8	11.3	<1
Dissolved Gases - RSK SOP-175 mg/L:									
Carbon dioxide	0.001	110 J	NA	83 J	78 J	NA	260 J	110 J	120 J
Ethane	0.002	<0.002	NA	<0.002	<0.002	NA	0.0042	<0.002	<0.002
Ethene	0.001	<0.001	NA	<0.001	<0.001	NA	0.02	<0.001	<0.001
Methane	0.001	0.0016 JB	NA	0.025	0.02	NA	0.21	0.049	1.6
Dissolved Hydrogen by Microseeps AM20GA nM/L:									
Hydrogen	0.03	2.4 J	NA	8.6 J	14 J	NA	9.9	7.9	11
Mercury - SW846 7470A (Dissolved) ug/L:									
Mercury	1	<1	<1	<1	<1	<1	<1	<1	<1
Mercury - SW846 7470A (Total) ug/L:									
Mercury	1	<1	<1	<1	<1	<1	<1	<1	<1
Metals - SW846 6010B (Dissolved) ug/L:									
Aluminum	200	467 JB	85.4 JB	101 JB	105 JB	100 JB	553 JB	<200	<200
Antimony	5	<5 UJ	3.3 JQ	<5	<5	<5 UJ	<5	2.7 JQ	<5 UJ
Arsenic	5	<5	<5	<5	<5	<5	<5	5.1	4.6 JQ
Barium	200	124 JQ	25.9 JQ	18.4 JQ	19.4 JQ	45.2 JQ	200	34.6 JQ	460
Beryllium	10	<10	<10	<10	<10	<10	0.99 JB	<10	<10
Cadmium	2	<2	<2	0.58 JQ	0.66 JQ	<2	0.65 JQ	2	<2
Calcium	5000	3210 JQ	1280 JQ	4720 JQ	4950 JQ	18400	14600	3410 JQ	62500
Chromium	10	<10	<10	<10	<10	<10	<10	<10	<10
Cobalt	30	2.5 JB	1.4 JB	2.1 JQ	1.5 JQ	7.6 JQ	49.1	4.2 JQ	<30
Copper	10	<10	<10	<10	<10	<10	<10	<10	<10
Iron	200	451 J	<200	311	310	23900	2220	2440	17800
Lead	3	2.7 JQ	<3	<3 UJ	<3 UJ	<3	<3 UJ	<3	<3
Magnesium	5000	1790 JQ	947 JQ	916 JQ	957 JQ	3090	8120	602	5250
Manganese	20	62.6	98.2	43.5	45.4 JQ	598 J	1880	119	375
Molybdenum	40	<40	<40	<40	<40	<40	<40	<40	<40
Nickel	100	<100	<100	<100	<100	<100	88 JQ	4 JB	<100
Potassium	5000	1690 JQ	1830 JQ	1790 JQ	1880 JQ	2550	4980 JQ	2400 JQ	8220
Selenium	5	<5	<5	<5	5.1 JB	<5	<5	<5	<5
Silver	10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	5000	6470	13400	2660 JQ	2760 JQ	5900	50300	4480 JQ	5320
Vanadium	50	<50	<50	<50	<50	<50	<50	<50	<50
Zinc	20	<20	<20	17.9 JB	14.4 JB	<20	34.9 JB	343	<20

TABLE C-1

DATA SUMMARY TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Duplicate AEHA-23A 10/3/2001	Sample AEHA-24A 10/3/2001	Sample AEHA-25A 10/4/2001	Duplicate AEHA-25 10/4/2001	Sample AEHA-26A 10/3/2001	Sample AEHA-28A 10/4/2001	Sample AEHA-30A 10/3/2001	Sample AEHA-31A 10/3/2001
FIXED BASE LABORATORY ANALYSIS:									
Metals - SW846 6010B (Total) ug/L:									
Aluminum	200	506 J	103 JB	116 JB	118 JB	<200	2910	335 JB	323 JB
Antimony	5	<5 UJ	<5 UJ	<5	<5	<5 UJ	<5	3.7 JQ	<5 UJ
Arsenic	5	<5	<5	<5	<5	<5	<5	8.1	5
Barium	200	110 JQ	26.9 JQ	18.2 JQ	17.7 JQ	34.7 JQ	154 JQ	38.5 JQ	462
Beryllium	10	<10	<10	<10	<10	<10	1.1 JB	<10	<10
Cadmium	2	<2	<2	0.79 JQ	0.79 JQ	<2	0.76 JQ	3.7	0.72 JQ
Calcium	5000	3090 JQ	1360 JQ	4870 JQ	4910 JQ	16600	14600	4110 JQ	61800
Chromium	10	<10	<10	<10	<10	<10	2.6 JQ	<10	<10
Cobalt	30	2 JB	1.5 JB	1.7 JQ	1.7 JQ	4.2 JQ	46.8	4.6 JQ	<30
Copper	10	<10	<10	5.4 JQ	<10	<10	9 JQ	<10	7.9 JQ
Iron	200	335	<200	516	540	27600	5590	3280	18200
Lead	3	3.4	<3	<3 UJ	<3 UJ	<3	4 J	3.4	2.5 JQ
Magnesium	5000	1630 JQ	986 JQ	919 JQ	890 JQ	2290	7880	682	5210
Manganese	20	57.5	103	43.7	43.5	422 J	1790	140	372
Molybdenum	40	<40	<40	<40	<40	<40	<40	<40	<40
Nickel	100	<100	<100	<100	<100	<100	9 JQ	5.9 JQ	<100
Potassium	5000	1640 JQ	1870 JQ	1820 JQ	1830 JQ	2080 JQ	4980 JQ	2510 JQ	8180
Selenium	5	<5	<5	<5	<5	<5	<5	<5	<5
Silver	10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	5000	6150	13600	2550 JQ	2490 JQ	4300	50300	4600	5180
Vanadium	50	<50	<50	0.86 JB	<50	<50	4.1 JB	1.6 JB	1.5 JB
Zinc	20	<20	<20	17.8 JB	13.5 JB	<20	39.6 JB	485	17.1 JQ
Thallium - SW846 7841 (Dissolved) ug/L:									
Thallium	2	<2 UJ	2.2 JB	<2	<2	<2 UJ	<2	<2 UJ	<2 UJ
Thallium - SW846 7841 (Total) ug/L:									
Thallium	2	<2 UJ	3.2 JB	<2	<2	1.7 JB	<2	<2 UJ	<2 UJ
Total Alkalinity - MCAWW 310.1 mg/L:									
Total Alkalinity	5	2 JB	NA	6.8 JB	7.1 JB	NA	38 JB	11	190
Total Organic Carbon - SW846 9060 mg/L:									
Total Organic Carbon	1	<1 UJ	NA	3	3	NA	2	3	6
Total Sulfide - MCAWW 376.1 mg/L:									
Total Sulfide	1	<1	NA	<1	1.1	NA	1.5	<1	1.1

TABLE C-1

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OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Duplicate AEHA-23A 10/3/2001	Sample AEHA-24A 10/3/2001	Sample AEHA-25A 10/4/2001	Duplicate AEHA-25 10/4/2001	Sample AEHA-26A 10/3/2001	Sample AEHA-28A 10/4/2001	Sample AEHA-30A 10/3/2001	Sample AEHA-31A 10/3/2001
FIXED BASE LABORATORY ANALYSIS:									
Volatile Organic Compounds - SW846 8260B ug/L:									
1,1,1,2-Tetrachloroethane	1	<1	<5	<1	<1	<1	<50	<1	<1
1,1,1-Trichloroethane	1	<1	<5	<1	<1	<1	<50	<1	<1
1,1,2,2-Tetrachloroethane	1	<1	<5	<1 UJ	<1 UJ	<1	<50 UJ	<1	<1
1,1,2-Trichloroethane	1	<1	<5	<1	<1	<1	<50	<1	<1
1,1-Dichloroethane	1	<1	<5	<1	<1	<1	22 JQ	<1	<1
1,1-Dichloroethene	1	<1	<5	<1	<1	<1	29 JQ	<1	<1
1,1-Dichloropropene	1	<1	<5	<1	<1	<1	<50	<1	<1
1,2,3-Trichlorobenzene	1	<1	<5	<1	<1	<1	<50	<1	<1
1,2,3-Trichloropropane	1	<1	<5	<1 UJ	<1 UJ	<1	<50 UJ	<1	<1
1,2,4-Trichlorobenzene	1	<1	<5	<1	<1	<1	<50	<1	<1
1,2,4-Trimethylbenzene	1	<1	<5	<1	<1	<1	<50	<1	<1
1,2-Dibromo-3-chloropropane	2	<2	<10	<2	<2	<2	<100	<2	<2
1,2-Dibromoethane	1	<1	<5	<1	<1	<1	<50	<1	<1
1,2-Dichlorobenzene	1	<1	<5	<1	<1	<1	37 JQ	<1	<1
1,2-Dichloroethane	1	<1	1.1 JQ	0.23 JQ	0.22 JQ	<1	21 JQ	<1	<1
1,2-Dichloroethene (total)	1	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	1	<1	<5	<1	<1	<1	<50	<1	<1
1,3,5-Trimethylbenzene	1	<1	<5	<1	<1	<1	<50	<1	<1
1,3-Dichlorobenzene	1	<1	<5	<1	<1	<1	11 JQ	<1	<1
1,3-Dichloropropane	1	<1	<5	<1	<1	<1	<50	<1	<1
1,4-Dichlorobenzene	1	<1	1.4 JQ	<1	<1	<1	150	<1	<1
2,2-Dichloropropane	1	<1	<5	<1	<1	<1	<50	<1	<1
2-Butanone	10	<10	<50	<10	<10	<10	<500	<10	<10
2-Chlorotoluene	1	<1	<5	<1	<1	<1	<50	<1	<1
2-Hexanone	10	<10 UJ	<50 UJ	<10	<10	<10 UJ	<500	<10 UJ	<10 UJ
4-Chlorotoluene	1	<1	<5	<1	<1	<1	<50	<1	<1
4-Methyl-2-pentanone	10	<10 UJ	<50 UJ	<10	<10	<10 UJ	<500	<10 UJ	<10 UJ
Acetone	10	<10	<50	<10	<10	1.9 JQ	<500	2.3 JQ	1.2 JQ
Benzene	1	<1	<5	0.18 JQ	0.2 JQ	<1	<50	<1	<1
Bromobenzene	1	<1	<5	<1	<1	<1	<50	<1	<1
Bromochloromethane	1	<1	<5	<1	<1	<1	<50	<1	<1
Bromodichloromethane	1	<1	<5	<1	<1	<1	<50	<1	<1
Bromoform	1	<1	<5	<1	<1	<1	<50	<1	<1
Bromomethane	2	<2	<10	<2	<2	<2	<100	<2	<2
Carbon disulfide	1	<1	<5	<1	<1	<1	<50	<1	<1
Carbon tetrachloride	1	<1	<5	<1	<1	<1	<50	<1	<1
Chlorobenzene	1	<1	<5	<1	<1	<1	230	<1	<1
Chloroethane	2	<2	<10	<2	<2	<2	<100	<2	<2
Chloroform	1	<1	1.8 JQ	<1	<1	<1	69	<1	<1
Chloromethane	2	<2	<10	<2	<2	<2	<100	<2	<2
cis-1,2-Dichloroethene	0.5	5.9	160	29	30	0.97	1400	18	0.83
cis-1,3-Dichloropropene	1	<1	<5	<1	<1	<1	<50	<1	<1
Dibromochloromethane	1	<1	<5	<1	<1	<1	<50	<1	<1
Dibromomethane	1	<1	<5	<1	<1	<1	<50	<1	<1
Dichlorodifluoromethane	2	<2	<10	<2	<2	<2	<100	<2	<2

TABLE C-1

DATA SUMMARY TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Duplicate AEHA-23A 10/3/2001	Sample AEHA-24A 10/3/2001	Sample AEHA-25A 10/4/2001	Duplicate AEHA-25 10/4/2001	Sample AEHA-26A 10/3/2001	Sample AEHA-28A 10/4/2001	Sample AEHA-30A 10/3/2001	Sample AEHA-31A 10/3/2001
FIXED BASE LABORATORY ANALYSIS:									
Ethylbenzene	1	<1	<5	<1	<1	<1	<50	<1	<1
Hexachlorobutadiene	1	<1	<5	<1	<1	<1	<50	<1	<1
Isopropylbenzene	1	<1	<5	<1	<1	<1	<50	<1	<1
m-Xylene & p-Xylene	1	<1	<5	<1	<1	<1	<50	<1	<1
Methylene chloride	1	<1	<5	<1	<1	<1	<50	<1	<1
n-Butylbenzene	1	<1	<5	<1	<1	<1	<50	<1	<1
n-Propylbenzene	1	<1	<5	<1	<1	<1	<50	<1	<1
Naphthalene	1	<1 UJ	<5 UJ	<1	<1	<1 UJ	<50	<1 UJ	<1 UJ
o-Xylene	0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<25	<0.5	<0.5
p-Isopropyltoluene	1	<1	<5	<1	<1	<1	<50	<1	<1
sec-Butylbenzene	1	<1	<5	<1	<1	<1	<50	<1	<1
Styrene	1	<1	<5	<1	<1	<1	<50	<1	<1
tert-Butylbenzene	1	<1	<5	<1	<1	<1	<50	<1	<1
Tetrachloroethene	1	<1	19	3.8	4.2	<1	170	<1	<1
Toluene	1	0.23	<5	0.28 JQ	0.3 JQ	<1	<50	<1	<1
trans-1,2-Dichloroethene	0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<25	0.5	<0.5
trans-1,3-Dichloropropene	1	<1	<5	<1	<1	<1	<50	<1	<1
Trichloroethene	1	0.21	180	33	34	<1	1900	1.9	<1
Trichlorofluoromethane	2	<2	<10	<2	<2	<2	<100	<2	<2
Vinyl chloride	2	0.87	5.3 JQ	1.3 JQ	1.3 JQ	<2	96 JQ	7.2	3.1
Xylenes (total)	1	<1	<5	<1	<1	<1	<50	<1	<1
Surrogate:									
1,2-Dichloroethane-d4	--	94	94	97	95	91	97	91	93
4-Bromofluorobenzene	--	88	89	85	88	87	84	86	88
Dibromofluoromethane	--	93	92	96	92	93	94	92	92
Toluene-d8	--	97	97	100	102	94	98	96	95

TABLE C-1

DATA SUMMARY TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-32A 10/3/2001	Sample AEHA-33A 10/3/2001	Sample AEHA-34A 10/2/2001	Sample DMW-7A 10/16/2001	Sample DMW-9A 10/16/2001	Sample MWA50-35 9/25/2001	Sample MWA50-36 9/25/2001	Sample MWA50-37 9/25/2001
FIXED BASE LABORATORY ANALYSIS:									
Anions - MCAWW 300.3A mg/L:									
Chloride	1	15.5	NA	NA	NA	7.1	20.9	NA	46.3
Nitrate	0.1	1.4	NA	NA	NA	0.43	<0.1	NA	<0.1
Sulfate	1	1.3	NA	NA	NA	8.4	27.9	NA	16.8
Dissolved Gases - RSK SOP-175 mg/L:									
Carbon dioxide	0.001	110 J	NA	NA	NA	NA	260	NA	86
Ethane	0.002	<0.002	NA	NA	NA	<0.002	0.0032	NA	0.0069
Ethene	0.001	<0.001	NA	NA	NA	<0.001	<0.001	NA	<0.001
Methane	0.001	0.003 JB	NA	NA	NA	0.0046	0.33	NA	6.8
Dissolved Hydrogen by Microseeps AM20GA nM/L:									
Hydrogen	0.03	6.1	NA	NA	NA	1.9	8.7	NA	6.4
Mercury - SW846 7470A (Dissolved) ug/L:									
Mercury	1	<1	<1	<1	<1 UL	<1 UL	<1	<1	<1
Mercury - SW846 7470A (Total) ug/L:									
Mercury	1	<1	<1	<1	<1 UL	<1 UL	<1	<1	<1
Metals - SW846 6010B (Dissolved) ug/L:									
Aluminum	200	126 JB	134 JB	<200 UJ	<200	118 JQ	37.8 JB	52.6 JB	55.5 JB
Antimony	5	<5 UJ	<5 UJ	<5 UJ	2.9 JQ	2.7 JQ	<5	<5	<5
Arsenic	5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	200	30.8 JQ	12.7 JQ	24.1 JQ	62 JQ	45.3 JQ	58.2 JQ	15.4 JQ	158 JQ
Beryllium	10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium	2	0.81 JQ	<2	<2	<2	<2	<2	<2	<2
Calcium	5000	940 JQ	1810	7920	1060 JQ	3740 JQ	30500	3000 JQ	119000
Chromium	10	<10	<10	<10	<10	<10	<10	<10	<10
Cobalt	30	<30	<30	2.1 JB	1.3 JB	<30	3.8 JQ	<30	<30
Copper	10	<10	<10	<10	<10	<10	<10	<10	<10
Iron	200	<200	<200	19400	<200	<200	31400	5940	975
Lead	3	<3	<3	<3	<3	<3	<3	<3	<3
Magnesium	5000	950 JQ	911	1220 JQ	836 JQ	1480 JQ	5230	437 JQ	134000
Manganese	20	17.6 JQ	28	235	21.8	26.4	224	22.8	595
Molybdenum	40	<40	<40	<40	<40	<40	<40	<40	2.9 JB
Nickel	100	<100	<100	<100	<100	3.1 JB	5.1 JQ	4 JQ	3.6 JQ
Potassium	5000	1800 JQ	1370 JQ	1280 JQ	1960 JQ	1580 JQ	2770 JQ	691 JB	13600
Selenium	5	<5	<5	<5	<5	<5	<5	4.7 JQ	<5
Silver	10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	5000	11300	2420 JQ	3880 JQ	4800 JQ	3340 JQ	20500	428000	147000
Vanadium	50	<50	<50	1 JB	<50	<50	<50	<50	6.3 JQ
Zinc	20	22.4	16.1 JQ	24.4 JB	<20	22.1	<20	<20	<20

TABLE C-1

DATA SUMMARY TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-32A 10/3/2001	Sample AEHA-33A 10/3/2001	Sample AEHA-34A 10/2/2001	Sample DMW-7A 10/16/2001	Sample DMW-9A 10/16/2001	Sample MWA50-35 9/25/2001	Sample MWA50-36 9/25/2001	Sample MWA50-37 9/25/2001
FIXED BASE LABORATORY ANALYSIS:									
Metals - SW846 6010B (Total) ug/L:									
Aluminum	200	238 JB	2920 JH	<200 UJ	<200	163 JQ	50.6 JB	759 JB	57.4 JB
Antimony	5	<5 UJ	<5 UJ	2.3 JQ	2.6 JQ	2.7 JQ	<5	<5	<5
Arsenic	5	<5	<5	4.1 JQ	<5	<5	<5	<5	<5
Barium	200	32.7 JQ	20.8 JQ	24.4 JQ	63.2 JQ	49.1 JQ	66.4 JQ	19.1 JQ	158 JQ
Beryllium	10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium	2	0.72 JQ	<2	<2	<2	<2	<2	<2	<2
Calcium	5000	949 JQ	2420 JQ	8290	1580 JQ	3940 JQ	34700	3150 JQ	115000
Chromium	10	<10	5.7 JQ	<10	<10	<10	<10	3 JQ	1.9 JQ
Cobalt	30	<30	1.4 JB	2.2 JB	<30	<30	41 JQ	<30	<30
Copper	10	7.1 JQ	7.8 JQ	<10	40	<10	<10	<10	<10
Iron	200	144 JQ	3810	20500	<200	92.7 JQ	35200	7250	1260
Lead	3	<3	4.9	<3	<3	<3	<3	<3	<3
Magnesium	5000	1010 JQ	1180	1270 JQ	856 JQ	1610 JQ	5960	470 JQ	130000
Manganese	20	18.8 JQ	34.9	234	22	27.8	252	23.8	542
Molybdenum	40	<40	<40	<40	<40	<40	<40	<40	3 JB
Nickel	100	<100	2.5 JB	2.6 JQ	<100	2.7 JB	63 JQ	3.9 JQ	5 JQ
Potassium	5000	1870 JQ	1750 JQ	1270 JQ	1980 JQ	1660 JQ	3150 JQ	771 JQ	12700
Selenium	5	<5	<5	<5	<5	<5	<5	4.9 JQ	<5
Silver	10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	5000	11500	5330	3810 JQ	4860 JQ	3700 JQ	23300	454000	137000
Vanadium	50	<50	5.7 JQ	1.1 JB	<50	<50	<50	2.2 JB	7 JQ
Zinc	20	20.7	39.9	18.6 JB	35.9	24.2	<20	15.7 JQ	<20
Thallium - SW846 7841 (Dissolved) ug/L:									
Thallium	2	<2 UJ	1.7 JB	<2 UJ	<2	<2	<2	<2	<2
Thallium - SW846 7841 (Total) ug/L:									
Thallium	2	2.1 JB	2.2 JB	<2 UJ	<2	<2	<2	<2	<2
Total Alkalinity - MCAWW 310.1 mg/L:									
Total Alkalinity	5	3.8 JB	NA	NA	NA	7.3 JB	120	NA	1100
Total Organic Carbon - SW846 9060 mg/L:									
Total Organic Carbon	1	<1 UJ	NA	NA	NA	0.5 JQ	5	NA	27
Total Sulfide - MCAWW 376.1 mg/L:									
Total Sulfide	1	1.5	NA	NA	NA	<1	<1	NA	<1

TABLE C-1

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OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-32A 10/3/2001	Sample AEHA-33A 10/3/2001	Sample AEHA-34A 10/2/2001	Sample DMW-7A 10/16/2001	Sample DMW-9A 10/16/2001	Sample MWA50-35 9/25/2001	Sample MWA50-36 9/25/2001	Sample MWA50-37 9/25/2001
FIXED BASE LABORATORY ANALYSIS:									
Volatile Organic Compounds - SW846 8260B ug/L:									
1,1,1,2-Tetrachloroethane	1	<4	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	1	<4	<1	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	1	<4	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	1	<4	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	1	0.73 JQ	<1	<1	0.18 JQ	<1	0.35 JQ	<1	1.2
1,1-Dichloroethene	1	1.3 JQ	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	1	<4	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	1	<4	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	1	<4	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	1	<4	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	1	<4	<1	0.65 JQ	0.17 JQ	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	2	<8	<2	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	1	<4	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	1	0.51 JQ	<1	<1	<1	<1	1.5	<1	0.21 JQ
1,2-Dichloroethane	1	0.97 JQ	<1	<1	<1	<1	<1	<1	0.92 JQ
1,2-Dichloroethene (total)	1	29	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	1	<4	<1	<1	<1	<1	<1	0.19 JQ	<1
1,3,5-Trimethylbenzene	1	<4	<1	0.24 JQ	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	1	<4	<1	<1	<1	<1	0.2 JQ	<1	<1
1,3-Dichloropropane	1	<4	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	1	0.85 JQ	<1	<1	<1	<1	1	<1	0.48 JQ
2,2-Dichloropropane	1	<4	<1	<1	<1	<1	<1	<1	<1
2-Butanone	10	<40	<10	<10	<10	<10	<10	<10	<10
2-Chlorotoluene	1	<4	<1	<1	<1	<1	<1	<1	<1
2-Hexanone	10	<40 UL	<10 UJ	<10 UJ	<10	<10	<10	<10	<10
4-Chlorotoluene	1	<4	<1	<1	<1	<1	<1	<1	<1
4-Methyl-2-pentanone	10	<40 UJ	<10 UJ	<10 UJ	<10	<10	<10	<10	<10
Acetone	10	<40 UL	<10	1.4 JQ	0.93 JB	0.57 JB	<10	<10	0.85 JQ
Benzene	1	<4	<1	0.45 JQ	<1	<1	<1	1.2	0.37 JQ
Bromobenzene	1	<4	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	1	<4	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	1	<4	<1	<1	0.32 JB	<1	<1	<1	<1
Bromoform	1	<4	<1	<1	<1	<1	<1	<1	<1
Bromomethane	2	<8	<2	<2	<2	<2	<2	<2	<2
Carbon disulfide	1	<4	<1	<1	<1	<1	0.27 JL	<1 UL	<1 UL
Carbon tetrachloride	1	<4	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	1	0.64 JQ	<1	<1	<1	<1	4.2	<1	2.3
Chloroethane	2	<8	<2	<2	<2	<2	<2	<2	<2
Chloroform	1	2.9 JQ	<1	0.25 JB	6.1 JB	<1	<1	<1	<1
Chloromethane	2	<8	<2	<2 UJ	<2 R	<2 R	<2 UL	<2 UL	<2 UL
cis-1,2-Dichloroethene	0.5	29	<0.5	<0.5	<0.5	<0.5	23	<0.5	7.7
cis-1,3-Dichloropropene	1	<4	<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	1	<4	<1	<1	<1	<1	<1	<1	<1
Dibromomethane	1	<4	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	2	<8	<2	<2	<2 UJ	<2 UJ	<2	<2	<2

TABLE C-1

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OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-32A 10/3/2001	Sample AEHA-33A 10/3/2001	Sample AEHA-34A 10/2/2001	Sample DMW-7A 10/16/2001	Sample DMW-9A 10/16/2001	Sample MWA50-35 9/25/2001	Sample MWA50-36 9/25/2001	Sample MWA50-37 9/25/2001
FIXED BASE LABORATORY ANALYSIS:									
Ethylbenzene	1	<4	<1	0.42 JQ	0.15 JQ	<1	<1	<1	<1
Hexachlorobutadiene	1	<4	<1	<1	<1	<1	<1 UJ	<1 UJ	<1 UJ
Isopropylbenzene	1	<4	<1	2.8	<1	<1	<1	<1	<1
m-Xylene & p-Xylene	1	<4	<1	<1	0.46 JQ	<1	<1	<1	<1
Methylene chloride	1	<4	<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	1	<4	<1	0.43 JQ	<1	<1	<1	<1	<1
n-Propylbenzene	1	<4	<1	1.1	<1	<1	<1	<1	<1
Naphthalene	1	<4 UJ	<1 UJ	3.4	<1	<1	<1	<1	2.1
o-Xylene	0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
p-Isopropyltoluene	1	<4	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	1	<4	<1	2	<1	<1	<1	0.1 JQ	<1
Styrene	1	<4	<1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	1	<4	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	1	6.2	<1	<1	0.35 JQ	0.23 JQ	6.3	<1	<1
Toluene	1	<4	<1	<1	0.39 JQ	<1	0.19 JQ	<1	0.38 JQ
trans-1,2-Dichloroethene	0.5	<2	<0.5	<0.5	<0.5	<0.5	0.32 JQ	<0.5	0.19 JQ
trans-1,3-Dichloropropene	1	<4	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	1	83	<1	<1	0.37 JQ	0.16 JQ	13	<1	2.9
Trichlorofluoromethane	2	<8	<2	<2 UJ	<2	<2	<2	<2	<2
Vinyl chloride	2	1.5 JQ	<2	<2	<2	<2	2.5	<2	5.4
Xylenes (total)	1	<4	<1	<1	0.46 JQ	<1	<1	<1	<1
Surrogate:									
1,2-Dichloroethane-d4	--	92	93	91	90	92	102	101	103
4-Bromofluorobenzene	--	87	88	89	86	87	97	96	97
Dibromofluoromethane	--	91	92	92	97	98	105	104	106
Toluene-d8	--	95	97	95	94	93	94	96	95

TABLE C-1

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OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample MWA50-38 9/25/2001	Sample USGS-A4 10/3/2001	Sample USGS-I4 10/8/2001	Sample USGS-J4 10/3/2001	Sample USGS-M4 9/28/2001
FIXED BASE LABORATORY ANALYSIS:						
Anions - MCAWW 300.3A mg/L:						
Chloride	1	NA	7.7	NA	7.6	NA
Nitrate	0.1	NA	0.07 JQ	NA	0.09 JQ	NA
Sulfate	1	NA	10.8	NA	2.4	NA
Dissolved Gases - RSK SOP-175 mg/L:						
Carbon dioxide	0.001	NA	88 J	NA	73 J	NA
Ethane	0.002	NA	<0.002	NA	<0.002	NA
Ethene	0.001	NA	<0.001	NA	<0.001	NA
Methane	0.001	NA	0.014	NA	0.00055 JB	NA
Dissolved Hydrogen by Microseeps AM20GA nM/L:						
Hydrogen	0.03	NA	NA	NA	NA	NA
Mercury - SW846 7470A (Dissolved) ug/L:						
Mercury	1	<1	<1	<1	<1	<1
Mercury - SW846 7470A (Total) ug/L:						
Mercury	1	<1	<1	<1	<1	<1
Metals - SW846 6010B (Dissolved) ug/L:						
Aluminum	200	44.7 JB	90.9 JB	92.1 JB	<200	<200 UJ
Antimony	5	<5	<5 UJ	<5	<5 UJ	2.6 JQ
Arsenic	5	<5	<5	<5	<5	<5
Barium	200	120 JQ	35.6 JQ	24 JQ	19 JQ	34.4 JQ
Beryllium	10	<10	<10	<10	<10	<10
Cadmium	2	<2	0.29 JQ	<2	<2	<2
Calcium	5000	1250 JQ	9800	701 JQ	2360 JQ	736 JQ
Chromium	10	<10	<10	<10	<10	<10
Cobalt	30	<30	3.1 JB	<30	6.5 JQ	<30
Copper	10	<10	<10	<10	<10	<10
Iron	200	<200	1990	<200	<200	<200
Lead	3	<3	<3	<3 UJ	<3	<3
Magnesium	5000	1240 JQ	1860 JQ	487 JQ	1060	580 JQ
Manganese	20	28.6	65.7	29.3	26.7	66.1
Molybdenum	40	<40	<40	<40	<40	<40
Nickel	100	<100	3.1 JB	<100	<100	<100
Potassium	5000	1770 JQ	3250 JQ	770 JB	1870 JQ	1280 JQ
Selenium	5	5.1	<5	<5	<5	<5
Silver	10	<10	<10	<10	<10	<10
Sodium	5000	3210 JQ	5590	4070 JQ	3500 JQ	3090 JQ
Vanadium	50	<50	<50	<50	<50	<50
Zinc	20	<20	35	<20	23.6	<20

TABLE C-1

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OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Sample MWA50-38 9/25/2001	Sample USGS-A4 10/3/2001	Sample USGS-I4 10/8/2001	Sample USGS-J4 10/3/2001	Sample USGS-M4 9/28/2001
FIXED BASE LABORATORY ANALYSIS:						
Metals - SW846 6010B (Total) ug/L:						
Aluminum	200	62 JB	3100	97 JB	19800	<200 UJ
Antimony	5	<5	<5 UJ	<5	2.8 JQ	<5 UJ
Arsenic	5	<5	<5	<5	9.5	<5
Barium	200	135 JQ	47.4 JQ	26.2 JQ	71.6 JQ	36.9 JQ
Beryllium	10	<10	<10	<10	<10	<10
Cadmium	2	<2	<2	<2	<2	<2
Calcium	5000	1250 JQ	9370	849 JQ	3830 JQ	625 JQ
Chromium	10	<10	4.6 JB	<10	33.6	<10
Cobalt	30	<30	2 JB	1.5 JQ	7.6 JQ	1.4 JB
Copper	10	<10	9 JQ	<10	20.3	<10
Iron	200	<200	8450	<200	40100	<200
Lead	3	<3	7.8	<3 UJ	14.7	<3
Magnesium	5000	1310 JQ	1810 JQ	531 JQ	2460 JQ	552 JQ
Manganese	20	31	63	32.7	71.2	67.2
Molybdenum	40	<40	<40	<40	<40	<40
Nickel	100	<100	4.6 JB	<100	8.6 JQ	<100
Potassium	5000	1930 JQ	3770 JQ	813 JQ	4370 JQ	1370 JQ
Selenium	5	<5	<5	4.9 JB	<5	<5
Silver	10	<10	<10	<10	<10	<10
Sodium	5000	3420 JQ	8350	4390 JQ	7110	3340 JQ
Vanadium	50	<50	7.5 JQ	<50	39.5 JQ	<50
Zinc	20	<20	75.7	<20	110	<20
Thallium - SW846 7841 (Dissolved) ug/L:						
Thallium	2	<2	<2 UL	<2	<2 UJ	<2 UJ
Thallium - SW846 7841 (Total) ug/L:						
Thallium	2	<2	<2 UJ	<2	<2 UJ	<2 UJ
Total Alkalinity - MCAWW 310.1 mg/L:						
Total Alkalinity	5	NA	17 JB	NA	6.4 JB	NA
Total Organic Carbon - SW846 9060 mg/L:						
Total Organic Carbon	1	NA	4	NA	2	NA
Total Sulfide - MCAWW 376.1 mg/L:						
Total Sulfide	1	NA	<1	NA	<1	NA

TABLE C-1

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OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Sample MWA50-38 9/25/2001	Sample USGS-A4 10/3/2001	Sample USGS-I4 10/8/2001	Sample USGS-J4 10/3/2001	Sample USGS-M4 9/28/2001
FIXED BASE LABORATORY ANALYSIS:						
Volatile Organic Compounds - SW846 8260B ug/L:						
1,1,1,2-Tetrachloroethane	1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	1	<1	<1	<1	<1	<1
1,1-Dichloroethane	1	<1	0.29 JQ	<1	<1	<1
1,1-Dichloroethene	1	<1	0.55 JQ	<1 UJ	<1	<1
1,1-Dichloropropene	1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	2	<2	<2	<2	<2	<2
1,2-Dibromoethane	1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	1	<1	0.25 JQ	<1	<1	<1
1,2-Dichloroethane	1	<1	0.46 JQ	<1	<1	<1
1,2-Dichloroethene (total)	1	NA	NA	NA	NA	NA
1,2-Dichloropropane	1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	1	<1	<1	<1	<1	<1
1,3-Dichloropropane	1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	1	<1	0.92 JQ	<1	<1	<1
2,2-Dichloropropane	1	<1	<1	<1	<1	<1
2-Butanone	10	<10	<10	<10	<10	<10
2-Chlorotoluene	1	<1	<1	<1	<1	<1
2-Hexanone	10	<10	<10 UJ	<10	<10 UJ	<10 UJ
4-Chlorotoluene	1	<1	<1	<1	<1	<1
4-Methyl-2-pentanone	10	<10	<10 UJ	<10	<10 UJ	<10 UJ
Acetone	10	<10	<10	0.61 JB	0.6 JQ	<10
Benzene	1	<1	<1	<1	<1	<1
Bromobenzene	1	<1	<1	<1	<1	<1
Bromochloromethane	1	<1	<1	<1	<1	<1
Bromodichloromethane	1	<1	<1	<1	<1	<1
Bromoform	1	<1	<1	<1	<1	<1
Bromomethane	2	<2	<2	<2	<2	<2
Carbon disulfide	1	<1 UL	<1	<1 R	<1	<1
Carbon tetrachloride	1	<1	<1	<1	<1	<1
Chlorobenzene	1	<1	1.6	<1	<1	<1
Chloroethane	2	<2	<2	<2	<2	<2
Chloroform	1	<1	0.39 JQ	0.2 JB	<1	0.16 JB
Chloromethane	2	<2 UL	<2	<2	<2	<2 UJ
cis-1,2-Dichloroethene	0.5	<0.5	23	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	1	<1	<1	<1	<1	<1
Dibromochloromethane	1	<1	<1	<1	<1	<1
Dibromomethane	1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	2	<2	<2	<2	<2	<2

TABLE C-1

DATA SUMMARY TABLE FOR GROUNDWATER - UPPER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample MWA50-38 9/25/2001	Sample USGS-A4 10/3/2001	Sample USGS-I4 10/8/2001	Sample USGS-J4 10/3/2001	Sample USGS-M4 9/28/2001
FIXED BASE LABORATORY ANALYSIS:						
Ethylbenzene	1	<1	<1	<1	<1	<1
Hexachlorobutadiene	1	<1 UJ	<1	<1	<1	<1
Isopropylbenzene	1	<1	<1	<1	<1	<1
m-Xylene & p-Xylene	1	<1	<1	<1	<1	<1
Methylene chloride	1	<1	<1	<1	<1	<1
n-Butylbenzene	1	<1	<1	<1	<1	<1
n-Propylbenzene	1	<1	<1	<1	<1	<1
Naphthalene	1	<1	<1 UJ	<1	<1 UJ	<1
o-Xylene	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
p-Isopropyltoluene	1	<1	<1	<1	<1	<1
sec-Butylbenzene	1	<1	<1	<1	<1	<1
Styrene	1	<1	<1	<1	<1	<1
tert-Butylbenzene	1	<1	<1	<1	<1	<1
Tetrachloroethene	1	<1	1.4	<1	<1	<1
Toluene	1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	1	<1	<1	<1	<1	<1
Trichloroethene	1	<1	28	<1	0.15 JQ	<1
Trichlorofluoromethane	2	<2	<2	<2	<2	<2 UJ
Vinyl chloride	2	<2	0.67 JQ	<2	<2	<2
Xylenes (total)	1	<1	<1	<1	<1	<1
Surrogate:						
1,2-Dichloroethane-d4	--	101	94	93	93	91
4-Bromofluorobenzene	--	93	87	92	88	89
Dibromofluoromethane	--	100	94	97	94	92
Toluene-d8	--	92	95	100	96	96

Notes:

J	Estimated
JB	Estimated; possibly biased high or false positive based on blank contamination
JH	Estimated; possibly biased high based on QC data
JL	Estimated; possibly biased lowbased on QC data
JQ	Estimated; Value is between reporting limit and detection limit
NA	Not Analyzed
R	Rejected
UJ	Undetected; Reported Detection Limit is imprecise
UL	Undetected; Data biased low - Reported Detection Limit is higher than indicated
(a)	Quantitation limits are ideal. Sample quantitation limits may vary due to sample volume/weight extracted and dilutions

PREPARED/DATE: RMB 12/16/01
CHECKED/DATE: JAH 12/18/01

TABLE C-2

DATA SUMMARY TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-18B 9/26/2001	Sample AEHA-21B 9/26/2001	Sample AEHA-23B 9/27/2001	Sample AEHA-24B 9/27/2001	Sample AEHA-25B 9/27/2001	Duplicate AEHA-25B 9/27/2001	Sample AEHA-26B 10/9/2001	Sample AEHA-27B 9/27/2001
FIXED BASE LABORATORY ANALYSIS:									
Anions - MCAWW 300.3A mg/L:									
Chloride	1	1.9	1.5	2.3	4.2	3.1	3.1	38.1	1.1
Nitrate	0.1	1.4	0.18	3.7	0.05 JQ	0.073 JQ	0.11	<0.1	0.32
Sulfate	1	28.4	6.5	6	11.5	10	9.9	46.7	14.7
Dissolved Gases - RSK SOP-175 mg/L:									
Carbon dioxide	0.001	24	31	37 J	28 J	36 J	41 J	4.9 J	7.5 J
Ethane	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ethene	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methane	0.001	0.01	0.0012	0.00084 JB	0.00096 JB	0.0015 JB	0.0017 JB	0.0021	0.0088
Dissolved Hydrogen by Microseeps AM20GA nM/L:									
Hydrogen	0.03	7.6	5	1.9	8.2	7.8 J	5.4 J	1.3	2.8
Mercury - SW846 7470A (Dissolved) ug/L:									
Mercury	1	<1	<1	<1	<1	<1	<1	<1	<1
Mercury - SW846 7470A (Total) ug/L:									
Mercury	1	<1	<1	<1	<1	<1	<1	<1	<1
Metals - SW846 6010B (Dissolved) ug/L:									
Aluminum	200	38.6 JB	<200	36.6 JB	42.3 JB	38.1 JB	87.7 JB	122 JB	444 JB
Antimony	5	<5	2.4 JB	<5	<5	<5	<5	<5	10.3
Arsenic	5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	200	19.3 JQ	10.9 JQ	16 JQ	16.7 JQ	15 JQ	15 JQ	51.6 JQ	344 JQ
Beryllium	10	<10	<10	<10	0.61 JB	0.66 JB	0.79 JB	<10	0.53 JB
Cadmium	2	2.3	1.9 JQ	<2	<2	<2	<2	<2	1.9 JB
Calcium	5000	13500	3650 JQ	7460	5390	4890 JQ	4420 JQ	15800	46000
Chromium	10	<10	<10	<10	<10	<10	<10	<10	<10
Cobalt	30	<30	<30	<30	<30	<30	<30	<30	<30
Copper	10	5.6 JQ	<10	<10	<10	<10	<10	<10	8.5
Iron	200	433	<200	628	294	479	637	365	597 J
Lead	3	<3	<3	<3	<3	<3	<3	<3 UJ	5.5 JB
Magnesium	5000	3020 JQ	1230 JQ	3690 JQ	3190 JQ	2340 JQ	2310 JQ	9390	1680 JQ
Manganese	20	77.6	29.5	69.5	33.4	23.3	23.6	57.5	108 JQ
Molybdenum	40	<40	<40	<40	<40	<40	<40	<40	<40
Nickel	100	3.3 JB	<100	<100	<100	<100	<100	<100	<100
Potassium	5000	4440 JQ	2390 JQ	3110 JQ	3470 JQ	3560 JQ	3460 JQ	8020	1600
Selenium	5	4.6 JQ	<5	<5	<5	<5	<5	<5	<5
Silver	10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	5000	5540	3280 JQ	3950 JQ	9450	8420	7940	74200	5010
Vanadium	50	<50	<50	0.98 JB	0.85 JB	<50	<50	<50	2.4 JB
Zinc	20	23.6	<20	<20	<20	<20	<20	14 JB	237 JB

TABLE C-2

DATA SUMMARY TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-18B 9/26/2001	Sample AEHA-21B 9/26/2001	Sample AEHA-23B 9/27/2001	Sample AEHA-24B 9/27/2001	Sample AEHA-25B 9/27/2001	Duplicate AEHA-25B 9/27/2001	Sample AEHA-26B 10/9/2001	Sample AEHA-27B 9/27/2001
FIXED BASE LABORATORY ANALYSIS:									
Metals - SW846 6010B (Total) ug/L:									
Aluminum	200	266 JB	147 JB	78.8 JB	176 JB	69.7 JB	82.7 JB	1090	725 JB
Antimony	5	<5	2.4 JB	<5	<5	<5	<5	<5	9.3
Arsenic	5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	200	20.6 JQ	14.7 JQ	21.1 JQ	20.5 JQ	14.2 JQ	14.8 JQ	57.4 JQ	30.2 JQ
Beryllium	10	<10	<10	<10	0.68 JB	0.75 JB	0.78 JB	<10	0.68 JB
Cadmium	2	2.7	2.1	<2	<2	<2	<2	1.4 JQ	0.31 JB
Calcium	5000	13800	3930 JQ	7530	5560	4510 JQ	4650 JQ	15900	45500
Chromium	10	<10	<10	<10	<10	<10	<10	<10	<10
Cobalt	30	<30	<30	<30	<30	<30	<30	<30	<30
Copper	10	8.1 JQ	<10	<10	<10	<10	<10	7.6 JQ	<10
Iron	200	657	226	1420	902	533	580	1210	<200 J
Lead	3	5.4	<3	<3	4.1	<3	<3	6.7 J	<3
Magnesium	5000	3070 JQ	1350 JQ	3730 JQ	3280 JQ	2190 JQ	2280 JQ	9450	1730 JQ
Manganese	20	78.5	50.2	73.9	38.1	21.8	22.9	67.2	9.8 JQ
Molybdenum	40	<40	<40	<40	<40	<40	<40	<40	<40
Nickel	100	3.9 JB	<100	<100	<100	<100	<100	<100	<100
Potassium	5000	4580 JQ	2600 JQ	3100 JQ	3450 JQ	3310 JQ	3450 JQ	7770	11500
Selenium	5	<5	<5	<5	<5	<5	<5	5.1 JB	5.9
Silver	10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	5000	5560	3480 JQ	3830 JQ	9550	7740	7950	73700	5070
Vanadium	50	1.4 JB	0.99 JB	<50	0.84 JB	0.88 JB	<50	1.8 JB	1.7 JB
Zinc	20	29.3	<20	<20	<20	<20	<20	90.4 JB	<20
Thallium - SW846 7841 (Dissolved) ug/L:									
Thallium	2	2.2 JB	<2	2.1	1.8 JB	<2	<2	<2	<2
Thallium - SW846 7841 (Total) ug/L:									
Thallium	2	<2	<2	2.4	1.7 JB	<2	<2	<2	<2
Total Alkalinity - MCAWW 310.1 mg/L:									
Total Alkalinity	5	22	18	25	32	27	27	110	130
Total Organic Carbon - SW846 9060 mg/L:									
Total Organic Carbon	1	6	0.9 JB	<1	<1	<1	<1	<1	0.6 JQ
Total Sulfide - MCAWW 376.1 mg/L:									
Total Sulfide	1	<1	3.2 JL	<1	<1	<1	<1	1.4	<1
Volatile Organic Compounds - SW846 8260B ug/L:									
1,1,1,2-Tetrachloroethane	1	<1	<1	<1	<1	<4	<4	<1	<1
1,1,1-Trichloroethane	1	<1	<1	<1	<1	<4	<4	<1	<1
1,1,2,2-Tetrachloroethane	1	<1	<1	<1	<1	<4	<4	<1	<1
1,1,2-Trichloroethane	1	<1	<1	<1	<1	<4	<4	<1	<1
1,1-Dichloroethane	1	<1	<1	<1	<1	<4	<4	<1	<1
1,1-Dichloroethene	1	<1	<1	<1	<1	<4	<4	<1 UJ	<1

TABLE C-2

DATA SUMMARY TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-18B 9/26/2001	Sample AEHA-21B 9/26/2001	Sample AEHA-23B 9/27/2001	Sample AEHA-24B 9/27/2001	Sample AEHA-25B 9/27/2001	Duplicate AEHA-25B 9/27/2001	Sample AEHA-26B 10/9/2001	Sample AEHA-27B 9/27/2001
FIXED BASE LABORATORY ANALYSIS:									
1,1-Dichloropropene	1	<1	<1	<1	<1	<4	<4	<1	<1
1,2,3-Trichlorobenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
1,2,3-Trichloropropane	1	<1	<1	<1	<1	<4	<4	<1	<1
1,2,4-Trichlorobenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
1,2,4-Trimethylbenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
1,2-Dibromo-3-chloropropane	2	<2	<2	<2	<2	<8	<8	<2	<2
1,2-Dibromoethane	1	<1	<1	<1	<1	<4	<4	<1	<1
1,2-Dichlorobenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
1,2-Dichloroethane	1	<1	<1	<1	<1	<4	<4	<1	<1
1,2-Dichloroethene (total)	1	NA	<1	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	1	<1	<1	<1	<1	<4	<4	<1	<1
1,3,5-Trimethylbenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
1,3-Dichlorobenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
1,3-Dichloropropane	1	<1	<1	<1	<1	<4	<4	<1	<1
1,4-Dichlorobenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
2,2-Dichloropropane	1	<1	<1	<1	<1	<4	<4	<1	<1
2-Butanone	10	<10	<10	<10 UL	<10 UL	<40 UL	<40 UL	<10	<10 UL
2-Chlorotoluene	1	<1	<1	<1	<1	<4	<4	<1	<1
2-Hexanone	10	<10	<10	<10 UL	<10 UL	<40 UL	<40 UL	<10	<10 UL
4-Chlorotoluene	1	<1	<1	<1	<1	<4	<4	<1	<1
4-Methyl-2-pentanone	10	<10	<10	<10 UL	<10 UL	<40 UL	<40 UL	<10	<10 UL
Acetone	10	<10	<10	<10 UL	<10 UL	<40 UL	<40 UL	<10	<10 UL
Benzene	1	<1	<1	<1	<1	<4	<4	<1	<1
Bromobenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
Bromochloromethane	1	<1	<1	<1	<1	<4	<4	<1	<1
Bromodichloromethane	1	<1	<1	<1	<1	<4	<4	<1	<1
Bromoform	1	<1	<1	<1	<1	<4	<4	<1	<1
Bromomethane	2	<2	<2	<2	<2	<8	<8	<2	<2
Carbon disulfide	1	<1 UL	<1 UL	<1	<1	<4	<4	<1 R	<1
Carbon tetrachloride	1	<1	<1	<1	<1	<4	<4	<1	<1
Chlorobenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
Chloroethane	2	<2	<2	<2	<2	<8	<8	<2	<2
Chloroform	1	<1	<1	<1	<1	<4	<4	<1	<1
Chloromethane	2	<2 UL	<2 UL	<2	<2	<8	<8	<2	<2
cis-1,2-Dichloroethene	0.5	<0.5	<0.5	1.9	4.1	6.9	6.6	<0.5	1.1
cis-1,3-Dichloropropene	1	<1	<1	<1	<1	<4	<4	<1	<1
Dibromochloromethane	1	<1	<1	<1	<1	<4	<4	<1	<1
Dibromomethane	1	<1	<1	<1	<1	<4	<4	<1	<1
Dichlorodifluoromethane	2	<2	<2	<2	<2	<8	<8	<2	<2
Ethylbenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
Hexachlorobutadiene	1	<1 UJ	<1 UJ	<1	<1	<4	<4	<1	<1
Isopropylbenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
m-Xylene & p-Xylene	1	<1	<1	<1	<1	<4	<4	<1	<1
Methylene chloride	1	<1	<1	<1	<1	<4	<4	<1	<1
n-Butylbenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
n-Propylbenzene	1	<1	<1	<1	<1	<4	<4	<1	<1

TABLE C-2

DATA SUMMARY TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-18B 9/26/2001	Sample AEHA-21B 9/26/2001	Sample AEHA-23B 9/27/2001	Sample AEHA-24B 9/27/2001	Sample AEHA-25B 9/27/2001	Duplicate AEHA-25B 9/27/2001	Sample AEHA-26B 10/9/2001	Sample AEHA-27B 9/27/2001
FIXED BASE LABORATORY ANALYSIS:									
Naphthalene	1	<1	<1	<1	<1	<4	<4	<1	<1
o-Xylene	0.5	<0.5	<0.5	<0.5	<0.5	<2	<2	<0.5	<0.5
p-Isopropyltoluene	1	<1	<1	<1	<1	<4	<4	<1	<1
sec-Butylbenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
Styrene	1	<1	<1	<1	<1	<4	<4	<1	<1
tert-Butylbenzene	1	<1	<1	<1	<1	<4	<4	<1	<1
Tetrachloroethene	1	<1	<1	<1	<1	<4	<4	<1	0.27 JQ
Toluene	1	<1	<1	<1	<1	<4	<4	<1	<1
trans-1,2-Dichloroethene	0.5	<0.5	<0.5	<0.5	<0.5	<2	<2	<0.5	<0.5
trans-1,3-Dichloropropene	1	<1	<1	<1	<1	<4	<4	<1	<1
Trichloroethene	1	<1	<1	0.71 JQ	4.4	100	100	<1	5.4
Trichlorofluoromethane	2	<2	<2	<2	<2	<8	<8	<2	<2
Vinyl chloride	2	<2	<2	0.17 JQ	0.31 JQ	<8	<8	<2	<2
Xylenes (total)	1	<1	<1	<1	<1	<4	<4	<1	<1
Surrogate:									
1,2-Dichloroethane-d4	--	97	99	94	94	95	92	89	94
4-Bromofluorobenzene	--	88	88	94	94	94	95	86	93
Dibromofluoromethane	--	99	101	96	96	95	95	92	97
Toluene-d8	--	91	94	99	101	101	100	96	100

TABLE C-2

DATA SUMMARY TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-28B 9/27/2001	Sample AEHA-30B 9/27/2001	Duplicate AEHA-30B 9/27/2001	Sample AEHA-31B 9/27/2001	Sample AEHA-32B 9/27/2001	Sample AEHA-33B 9/26/2001	Sample LAWMW-Q 9/28/2001	Sample USGS-B2 9/24/2001
FIXED BASE LABORATORY ANALYSIS:									
Anions - MCAWW 300.3A mg/L:									
Chloride	1	4	6.4	6.3	9.6	10.5	17.4	2.4	2.7
Nitrate	0.1	<0.1	<0.1	<0.1	<0.1	0.069 JQ	<0.1	<0.1	<0.1
Sulfate	1	11.9	48.4	48.8	16.2	11.6	20.5	6.7	9
Dissolved Gases - RSK SOP-175 mg/L:									
Carbon dioxide	0.001	31 J	50 J	50 J	56 J	42 J	37	26	60
Ethane	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ethene	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methane	0.001	0.001 JB	0.0068	0.0072	0.003 JB	0.029	0.014	0.0041	0.0092
Dissolved Hydrogen by Microseeps AM20GA nM/L:									
Hydrogen	0.03	2.1	2.1	2	7.8	1.9	6.6	2	8.2
Mercury - SW846 7470A (Dissolved) ug/L:									
Mercury	1	<1	<1	<1	<1	<1	<1	<1	<1
Mercury - SW846 7470A (Total) ug/L:									
Mercury	1	<1	<1	<1	<1	<1	<1	<1	<1
Metals - SW846 6010B (Dissolved) ug/L:									
Aluminum	200	75.7 JB	76.5 JB	82.8 JB	57 JB	54.1 JB	30.8 JB	<200 UJ	<200 UJ
Antimony	5	<5	<5	<5	<5	<5	<5	<5 UJ	3.4 JQ
Arsenic	5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	200	19.5 JQ	27.6 JQ	26 JQ	17.1 JQ	61 JQ	54.5 JQ	7.5 JB	111 JQ
Beryllium	10	0.86 JB	1 JB	1 JB	0.91 JB	0.74 JB	<10	<10	<10
Cadmium	2	<2	<2	<2	<2	0.37 JB	<2	<2	<2
Calcium	5000	4970 JQ	9970	9510	5470 JQ	11500	15500	6530	3210 JQ
Chromium	10	<10	<10	<10	<10	<10	<10	<10	<10
Cobalt	30	<30	<30	<30	<30	<30	<30	<30	<30
Copper	10	<10	<10	<10	<10	<10	<10	<10	<10
Iron	200	93.8 JQ	8760	8360	647	1700	1160	2130	546
Lead	3	<3	<3	<3	<3	<3	<3	<3	<3
Magnesium	5000	2840 JQ	4070 JQ	3890 JQ	3140 JQ	6670	8830	3490 JQ	1900 JQ
Manganese	20	26.8	142	136	36.1	118	108	130	37.4
Molybdenum	40	<40	<40	<40	<40	<40	<40	<40	<40
Nickel	100	<100	6 JQ	5.5 JQ	<100	<100	<100	<100	<100
Potassium	5000	3350 JQ	3680 JQ	3530 JQ	3410 JQ	3840 JQ	4410 JQ	8870	3150 JQ
Selenium	5	<5	<5	<5	<5	<5	4.8 JQ	<5	<5
Silver	10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	5000	12400	4890 JQ	4480 JQ	5700	9590	15800	6380	3440 JQ
Vanadium	50	<50	1.7 JB	2 JB	<50	0.83 JB	<50	<50	<50
Zinc	20	<20	<20	<20	<20	<20	<20	117	<20

TABLE C-2

DATA SUMMARY TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-28B 9/27/2001	Sample AEHA-30B 9/27/2001	Duplicate AEHA-30B 9/27/2001	Sample AEHA-31B 9/27/2001	Sample AEHA-32B 9/27/2001	Sample AEHA-33B 9/26/2001	Sample LAWMW-Q 9/28/2001	Sample USGS-B2 9/28/2001
FIXED BASE LABORATORY ANALYSIS:									
Metals - SW846 6010B (Total) ug/L:									
Aluminum	200	110 JB	155 JB	167 JB	66.5 JB	56.3 JB	244 JB	<200 UJ	<200 UJ
Antimony	5	<5	<5	<5	<5	<5	<5	3.2 JQ	<5 UJ
Arsenic	5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	200	21.3 JQ	28.4 JQ	29.7 JQ	18.2 JQ	60 JQ	54.5 JQ	10.3 JQ	13.2 JQ
Beryllium	10	0.89 JB	1.2 JB	1.2 JB	0.95 JB	0.71 JB	<10	<10	<10
Cadmium	2	<2	<2	<2	<2	0.34 JB	<2	<2	<2
Calcium	5000	4840 JQ	9900	10500	5590 JQ	11300	17100	6940	3420 JQ
Chromium	10	<10	<10	<10	<10	<10	<10	<10	<10
Cobalt	30	<30	<30	<30	<30	<30	<30	<30	<30
Copper	10	<10	<10	<10	<10	<10	4.6 JB	<10	<10
Iron	200	258	9060	9650	993	1620	1590	2440	1540
Lead	3	<3	<3	<3	<3	<3	3.5 JB	<3	<3
Magnesium	5000	2820 JQ	4040 JQ	4260 JQ	3230 JQ	6500	9480	3730 JQ	2020 JQ
Manganese	20	28.7	142	151	36.8	116	116	139	39
Molybdenum	40	<40	<40	<40	<40	<40	<40	<40	<40
Nickel	100	<100	5.9	6.4 JQ	<100	<100	2.5 JB	<100	<100
Potassium	5000	3350 JQ	3590 JQ	3810 JQ	3480 JQ	3780 JQ	4290 JQ	9990	3330 JQ
Selenium	5	<5	<5	<5	<5	<5	<5	<5	<5
Silver	10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	5000	12100	4630 JQ	4840 JQ	5790	9260	16000	6920	3590 JQ
Vanadium	50	<50	2.8 JB	2.3 JB	<50	<50	<50	<50	<50
Zinc	20	<20	<20	<20	<20	<20	14 JQ	124	123 JB
Thallium - SW846 7841 (Dissolved) ug/L:									
Thallium	2	<2	<2	<2	<2	<2	1.8 JB	<2 UJ	<2 UJ
Thallium - SW846 7841 (Total) ug/L:									
Thallium	2	<2	<2	<2	<2	<2	<2	<2 UJ	<2 UJ
Total Alkalinity - MCAWW 310.1 mg/L:									
Total Alkalinity	5	34	18	16 JB	21 JB	52	68	49	17 JB
Total Organic Carbon - SW846 9060 mg/L:									
Total Organic Carbon	1	<1	<1	<1	<1	<1	0.7 JB	<1	<1 UJ
Total Sulfide - MCAWW 376.1 mg/L:									
Total Sulfide	1	<1	<1	<1	<1	<1	<1	<1	<1
Volatile Organic Compounds - SW846 8260B ug/L:									
1,1,1,2-Tetrachloroethane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,1-Dichloroethane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,1-Dichloroethene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1

TABLE C-2

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OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-28B 9/27/2001	Sample AEHA-30B 9/27/2001	Duplicate AEHA-30B 9/27/2001	Sample AEHA-31B 9/27/2001	Sample AEHA-32B 9/27/2001	Sample AEHA-33B 9/26/2001	Sample LAWMW-Q 9/28/2001	Sample USGS-B2 9/28/2001
FIXED BASE LABORATORY ANALYSIS:									
1,1-Dichloropropene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	2	<2	<5.7	<5	<2	<2	<2	<2	<2
1,2-Dibromoethane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,2-Dichloroethane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,2-Dichloroethene (total)	1	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,3-Dichloropropane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
2,2-Dichloropropane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
2-Butanone	10	<10 UL	<29 UL	<25 UL	<10 UL	<10 UL	<10	<10	<10
2-Chlorotoluene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
2-Hexanone	10	<10 UL	<29 UL	<25 UL	<10 UL	<10 UL	<10	<10 UJ	<10 UJ
4-Chlorotoluene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
4-Methyl-2-pentanone	10	<10 UL	<29 UL	<25 UL	<10 UL	<10 UL	<10	<10 UJ	<10 UJ
Acetone	10	<10 UL	<29 UL	<25 UL	<10 UL	<10 UL	<10	0.76 JQ	1.7 JQ
Benzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Bromobenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Bromochloromethane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Bromodichloromethane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Bromoform	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Bromomethane	2	<2	<5.7	<5	<2	<2	<2	<2	<2
Carbon disulfide	1	<1	<2.9	<2.5	<1	<1	<1 UL	<1	<1
Carbon tetrachloride	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Chlorobenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Chloroethane	2	<2	<5.7	<5	<2	<2	<2	<2	<2
Chloroform	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Chloromethane	2	<2	<5.7	<5	<2	<2	<2 UL	<2 UJ	<2 UJ
cis-1,2-Dichloroethene	0.5	<0.5	61	64	<0.5	<0.5	<0.5	<0.5	1.7
cis-1,3-Dichloropropene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Dibromochloromethane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Dibromomethane	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Dichlorodifluoromethane	2	<2	<5.7	<5	<2	<2	<2	<2	<2
Ethylbenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Hexachlorobutadiene	1	<1	<2.9	<2.5	<1	<1	<1 UJ	<1	<1
Isopropylbenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
m-Xylene & p-Xylene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Methylene chloride	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
n-Butylbenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
n-Propylbenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1

TABLE C-2

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OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample AEHA-28B 9/27/2001	Sample AEHA-30B 9/27/2001	Duplicate AEHA-30B 9/27/2001	Sample AEHA-31B 9/27/2001	Sample AEHA-32B 9/27/2001	Sample AEHA-33B 9/26/2001	Sample LAWMW-Q 9/28/2001	Sample USGS-B2 9/24/2001
FIXED BASE LABORATORY ANALYSIS:									
Naphthalene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
o-Xylene	0.5	<0.5	<1.4	<1.2	<0.5	<0.5	<0.5	<0.5	<0.5
p-Isopropyltoluene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
sec-Butylbenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Styrene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
tert-Butylbenzene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Tetrachloroethene	1	<1	1.2 JQ	1.1 JQ	1.6	<1	<1	<1	1.1
Toluene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	0.5	<0.5	<1.4	<1.2	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Trichloroethene	1	<1	85	88	1.6	<1	<1	<1	25
Trichlorofluoromethane	2	<2	<5.7	<5	<2	<2	<2	<2 UJ	<2 UJ
Vinyl chloride	2	<2	4.8 JQ	5	<2	<2	<2	<2	<2
Xylenes (total)	1	<1	<2.9	<2.5	<1	<1	<1	<1	<1
Surrogate:									
1,2-Dichloroethane-d4	--	93	93	96	93	93	97	91	93
4-Bromofluorobenzene	--	92	94	92	91	94	86	89	89
Dibromofluoromethane	--	95	95	95	95	97	98	93	93
Toluene-d8	--	101	101	99	100	99	90	97	95

TABLE C-2

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OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample USGS-C2 9/28/2001	Sample USGS-F2 9/25/2001	Sample USGS-G3 10/8/2001	Sample USGS-H2 9/28/2001	Sample USGS-M2 9/28/2001	Sample USGS-N1 9/28/2001
FIXED BASE LABORATORY ANALYSIS:							
Anions - MCAWW 300.3A mg/L:							
Chloride	1	3.5	2.6	1.8	3.4	3.4	5.2
Nitrate	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfate	1	8.3	7.7	7.4	10.9	10.8	12.5
Dissolved Gases - RSK SOP-175 mg/L:							
Carbon dioxide	0.001	60	49	51 J	38	49	27
Ethane	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ethene	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methane	0.001	0.012	0.017	0.0012 JB	0.0028	0.0035	<0.001
Dissolved Hydrogen by Microseeps AM20GA nM/L:							
Hydrogen	0.03	1.4	5	2.2	1.3	1.3	1.6
Mercury - SW846 7470A (Dissolved) ug/L:							
Mercury	1	<1	<1	<1	<1	<1	<1
Mercury - SW846 7470A (Total) ug/L:							
Mercury	1	<1	<1	<1	<1	<1	<1
Metals - SW846 6010B (Dissolved) ug/L:							
Aluminum	200	<200 UJ	28.6 JB	69.2 JB	<200 UJ	<200 UJ	<200 UJ
Antimony	5	<5 UJ	<5	<5	3.3 JQ	<5 UJ	<5 UJ
Arsenic	5	<5	<5	<5	<5	<5	<5
Barium	200	14.8 JQ	45.4 JQ	7.7 JQ	14.9 JQ	10.6 JQ	14 JQ
Beryllium	10	<10	<10	<10	<10	<10	<10
Cadmium	2	<2	<2	<2	<2	<2	<2
Calcium	5000	5920	9240	5960	5560	4570 JQ	6450
Chromium	10	<10	<10	<10	<10	<10	<10
Cobalt	30	<30	<30	<30	<30	<30	<30
Copper	10	<10	<10	<10	<10	<10	<10
Iron	200	931	291	2530	705	223	931
Lead	3	<3	<3	<3 UJ	<3	<3	<3
Magnesium	5000	2580 JQ	1710 JQ	2850 JQ	2590 JQ	2720 JQ	3200 JQ
Manganese	20	56.6	22.3	111	57.4	40.2	67.6
Molybdenum	40	<40	<40	<40	<40	<40	<40
Nickel	100	<100	<100	<100	<100	<100	<100
Potassium	5000	4370 JQ	2630 JQ	3030 JQ	4690 JQ	3300 JQ	3790 JQ
Selenium	5	<5	<5	4.7 JB	<5	<5	<5
Silver	10	<10	<10	<10	<10	<10	<10
Sodium	5000	4680 JQ	3920 JQ	5520	5180	5370	12800
Vanadium	50	<50	<50	<50	<50	<50	<50
Zinc	20	182	<20	<20	192	<20	<20

TABLE C-2

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OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample USGS-C2 9/28/2001	Sample USGS-F2 9/25/2001	Sample USGS-G3 10/8/2001	Sample USGS-H2 9/28/2001	Sample USGS-M2 9/28/2001	Sample USGS-N1 9/28/2001
FIXED BASE LABORATORY ANALYSIS:							
Metals - SW846 6010B (Total) ug/L:							
Aluminum	200	<200 UJ	50.6 JB	85.3 JB	203 J	<200 UJ	<200 UJ
Antimony	5	3.2 JQ	<5	<5	<5 UJ	<5 UJ	<5 UJ
Arsenic	5	<5	<5	<5	<5	<5	<5
Barium	200	16.5 JQ	59.3 JQ	8.4 JQ	17.5 JQ	11.3 JQ	13.6 JQ
Beryllium	10	<10	<10	<10	<10	<10	<10
Cadmium	2	<2	<2	<2	<2	<2	<2
Calcium	5000	6470	11700	6710	5920	4580 JQ	5740
Chromium	10	<10	<10	<10	<10	<10	<10
Cobalt	30	<30	<30	<30	<30	<30	<30
Copper	10	<10	<10	<10	<10	<10	<10
Iron	200	1150	433	2620	1270	449	974
Lead	3	<3	<3	<3 UJ	<3	<3	<3
Magnesium	5000	2740 JQ	2060 JQ	3000 JQ	2770 JQ	2750 JQ	2810 JQ
Manganese	20	63	26.1	116	61.2	40.2	58.6
Molybdenum	40	<40	<40	<40	<40	<40	<40
Nickel	100	<100	<100	<100	<100	<100	<100
Potassium	5000	4600 JQ	3230 JQ	3130 JQ	4930 JQ	3270 JQ	3340 JQ
Selenium	5	<5	5.5	<5	<5	<5	<5
Silver	10	<10	<10	<10	<10	<10	<10
Sodium	5000	4960 JQ	4800 JQ	5800	5370	5240	11000
Vanadium	50	<50	<50	<50	<50	<50	0.92 JB
Zinc	20	192	<20	24.7 JB	201	<20	<20
Thallium - SW846 7841 (Dissolved) ug/L:							
Thallium	2	<2 UJ	<2	<2	<2 UJ	<2 UJ	<2 UJ
Thallium - SW846 7841 (Total) ug/L:							
Thallium	2	<2 UJ	<2	<2	<2 UJ	<2 UJ	<2 UJ
Total Alkalinity - MCAWW 310.1 mg/L:							
Total Alkalinity	5	31	42	28	26	25	48
Total Organic Carbon - SW846 9060 mg/L:							
Total Organic Carbon	1	<1 UJ	0.8 JB	<1	<1 UJ	<1 UJ	<1 UJ
Total Sulfide - MCAWW 376.1 mg/L:							
Total Sulfide	1	<1	<1	<1	<1	<1	1.2
Volatile Organic Compounds - SW846 8260B ug/L:							
1,1,1,2-Tetrachloroethane	1	<5	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	1	<5	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	1	<5	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	1	<5	<1	<1	<1	<1	<1
1,1-Dichloroethane	1	<5	<1	<1	<1	<1	<1
1,1-Dichloroethene	1	<5	<1	<1 UJ	<1	<1	<1

TABLE C-2

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OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

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FIXED BASE LABORATORY ANALYSIS:							
1,1-Dichloropropene	1	<5	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	1	<5	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	1	<5	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	1	<5	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	1	<5	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	2	<10	<2	<2	<2	<2	<2
1,2-Dibromoethane	1	<5	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	1	<5	<1	<1	<1	<1	<1
1,2-Dichloroethane	1	<5	<1	<1	<1	<1	<1
1,2-Dichloroethene (total)	1	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	1	<5	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	1	<5	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	1	<5	<1	<1	<1	<1	<1
1,3-Dichloropropane	1	<5	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	1	<5	<1	<1	<1	<1	<1
2,2-Dichloropropane	1	<5	<1	<1	<1	<1	<1
2-Butanone	10	<50	<10	<10	<10	<10	<10
2-Chlorotoluene	1	<5	<1	<1	<1	<1	<1
2-Hexanone	10	<50 UJ	<10	<10	<10 UJ	<10 UJ	<10 UJ
4-Chlorotoluene	1	<5	<1	<1	<1	<1	<1
4-Methyl-2-pentanone	10	<50 UJ	<10	<10	<10 UJ	<10 UJ	<10 UJ
Acetone	10	<50	<10	0.55 JB	<10	<10	<10
Benzene	1	<5	<1	<1	<1	<1	<1
Bromobenzene	1	<5	<1	<1	<1	<1	<1
Bromochloromethane	1	<5	<1	<1	<1	<1	<1
Bromodichloromethane	1	<5	<1	<1	<1	<1	<1
Bromoform	1	<5	<1	<1	<1	<1	<1
Bromomethane	2	<10	<2	<2	<2	<2	<2
Carbon disulfide	1	<5	<1 UL	<1 R	<1	<1	<1
Carbon tetrachloride	1	<5	<1	<1	<1	<1	<1
Chlorobenzene	1	<5	<1	<1	<1	<1	<1
Chloroethane	2	<10	<2	<2	<2	<2	<2
Chloroform	1	<5	<1	<1	<1	<1	<1
Chloromethane	2	<10 UJ	<2 UL	<2	<2 UJ	<2 UJ	<2 UJ
cis-1,2-Dichloroethene	0.5	10	<0.5	2.9	38	<0.5	<0.5
cis-1,3-Dichloropropene	1	<5	<1	<1	<1	<1	<1
Dibromochloromethane	1	<5	<1	<1	<1	<1	<1
Dibromomethane	1	<5	<1	<1	<1	<1	<1
Dichlorodifluoromethane	2	<10	<2	<2	<2	<2	<2
Ethylbenzene	1	<5	<1	<1	<1	<1	<1
Hexachlorobutadiene	1	<5	<1 UJ	<1	<1	<1	<1
Isopropylbenzene	1	<5	<1	<1	<1	<1	<1
m-Xylene & p-Xylene	1	<5	<1	<1	<1	<1	<1
Methylene chloride	1	<5	<1	<1	<1	<1	<1
n-Butylbenzene	1	<5	<1	<1	<1	<1	<1
n-Propylbenzene	1	<5	<1	<1	<1	<1	<1

TABLE C-2

DATA SUMMARY TABLE FOR GROUNDWATER - LOWER AQUIFER
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: / Sample Date:	Practical (a) Quantitation Limit	Sample USGS-C2 9/28/2001	Sample USGS-F2 9/25/2001	Sample USGS-G3 10/8/2001	Sample USGS-H2 9/28/2001	Sample USGS-M2 9/28/2001	Sample USGS-N1 9/28/2001
FIXED BASE LABORATORY ANALYSIS:							
Naphthalene	1	<5	<1	<1	<1	<1	<1
o-Xylene	0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5
p-Isopropyltoluene	1	<5	<1	<1	<1	<1	<1
sec-Butylbenzene	1	<5	<1	<1	<1	<1	<1
Styrene	1	<5	<1	<1	<1	<1	<1
tert-Butylbenzene	1	<5	<1	<1	<1	<1	<1
Tetrachloroethene	1	<5	<1	<1	<1	<1	<1
Toluene	1	<5	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	0.5	0.84 JQ	<0.5	<0.5	0.51	<0.5	<0.5
trans-1,3-Dichloropropene	1	<5	<1	<1	<1	<1	<1
Trichloroethene	1	150	0.35 JQ	17	28	<1	<1
Trichlorofluoromethane	2	<10 UJ	<2	<2	<2 UJ	<2 UJ	<2 UJ
Vinyl chloride	2	<10	<2	<2	<2	<2	<2
Xylenes (total)	1	<5	<1	<1	<1	<1	<1
Surrogate:							
1,2-Dichloroethane-d4	--	93	101	89	92	91	93
4-Bromofluorobenzene	--	88	92	87	90	89	89
Dibromofluoromethane	--	93	99	91	94	94	92
Toluene-d8	--	97	92	96	96	97	96

Notes:

J	Estimated
JB	Estimated; possibly biased high or false positive based on blank contamination
JH	Estimated; possibly biased high based on QC data
JL	Estimated; possibly biased low based on QC data
JQ	Estimated; Value is between reporting limit and detection limit
NA	Not Analyzed
R	Rejected
UJ	Undetected; Reported Detection Limit is imprecise
UL	Undetected; Data biased low - Reported Dectection Limit is higher than indicated
(a)	Quantitation limits are ideal Sample quantitation limits may vary due to sample volume/weight extracted and dilution

PREPARED/DATE: RMB 12/1/01
CHECKED/DATE: JKH 12/18/01

TABLE C-3

DATA SUMMARY TABLE FOR FIELD QUALITY CONTROL SAMPLES
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Trip Blank TRIP BLANK (TB-092501) 9/25/2001	Trip Blank QATB-092601 9/26/2001	Trip Blank TB-092701 9/27/2001	Trip Blank TB-092701-1 9/27/2001	Trip Blank TB-092801 9/28/2001	Trip Blank TB-10201 10/2/2001
Anions - MCAWW 300.3A mg/L:							
Chloride	1	NA	NA	NA	NA	NA	NA
Nitrate	0.1	NA	NA	NA	NA	NA	NA
Sulfate	1	NA	NA	NA	NA	NA	NA
Dissolved Gases - RSK SOP-175 mg/L:							
Carbon dioxide	0.001	NA	0.72	1 J	0.55 J	0.25	<0.17 UJ
Ethane	0.002	NA	<0.002	<0.002	<0.002	<0.002	<0.002
Ethene	0.001	NA	<0.001	<0.001	<0.001	<0.001	<0.001
Methane	0.001	NA	<0.001	0.00078 JB	0.00076 JB	<0.001	<0.001
Mercury - SW846 7470A (Dissolved) ug/L:							
Mercury	1	NA	NA	NA	NA	NA	NA
Mercury - SW846 7470A (Total) ug/L:							
Mercury	1	NA	NA	NA	NA	NA	NA
Metals - SW846 6010B (Dissolved) ug/L:							
Aluminum	200	NA	NA	NA	NA	NA	NA
Antimony	5	NA	NA	NA	NA	NA	NA
Arsenic	5	NA	NA	NA	NA	NA	NA
Barium	200	NA	NA	NA	NA	NA	NA
Beryllium	10	NA	NA	NA	NA	NA	NA
Cadmium	2	NA	NA	NA	NA	NA	NA
Calcium	5000	NA	NA	NA	NA	NA	NA
Chromium	10	NA	NA	NA	NA	NA	NA
Cobalt	30	NA	NA	NA	NA	NA	NA
Copper	10	NA	NA	NA	NA	NA	NA
Iron	200	NA	NA	NA	NA	NA	NA
Lead	3	NA	NA	NA	NA	NA	NA
Magnesium	5000	NA	NA	NA	NA	NA	NA
Manganese	20	NA	NA	NA	NA	NA	NA
Molybdenum	40	NA	NA	NA	NA	NA	NA
Nickel	100	NA	NA	NA	NA	NA	NA
Potassium	5000	NA	NA	NA	NA	NA	NA
Selenium	5	NA	NA	NA	NA	NA	NA
Silver	10	NA	NA	NA	NA	NA	NA
Sodium	5000	NA	NA	NA	NA	NA	NA
Vanadium	50	NA	NA	NA	NA	NA	NA
Zinc	20	NA	NA	NA	NA	NA	NA

TABLE C-3

DATA SUMMARY TABLE FOR FIELD QUALITY CONTROL SAMPLES
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Trip Blank TRIP BLANK (TB-092501) 9/25/2001	Trip Blank QATB-092601 9/26/2001	Trip Blank TB-092701 9/27/2001	Trip Blank TB-092701-1 9/27/2001	Trip Blank TB-092801 9/28/2001	Trip Blank TB-10201 10/2/2001
Metals - SW846 6010B (Total) ug/L:							
Aluminum	200	NA	NA	NA	NA	NA	NA
Antimony	5	NA	NA	NA	NA	NA	NA
Arsenic	5	NA	NA	NA	NA	NA	NA
Barium	200	NA	NA	NA	NA	NA	NA
Beryllium	10	NA	NA	NA	NA	NA	NA
Cadmium	2	NA	NA	NA	NA	NA	NA
Calcium	5000	NA	NA	NA	NA	NA	NA
Chromium	10	NA	NA	NA	NA	NA	NA
Cobalt	30	NA	NA	NA	NA	NA	NA
Copper	10	NA	NA	NA	NA	NA	NA
Iron	200	NA	NA	NA	NA	NA	NA
Lead	3	NA	NA	NA	NA	NA	NA
Magnesium	5000	NA	NA	NA	NA	NA	NA
Manganese	20	NA	NA	NA	NA	NA	NA
Molybdenum	40	NA	NA	NA	NA	NA	NA
Nickel	100	NA	NA	NA	NA	NA	NA
Potassium	5000	NA	NA	NA	NA	NA	NA
Selenium	5	NA	NA	NA	NA	NA	NA
Silver	10	NA	NA	NA	NA	NA	NA
Sodium	5000	NA	NA	NA	NA	NA	NA
Vanadium	50	NA	NA	NA	NA	NA	NA
Zinc	20	NA	NA	NA	NA	NA	NA
Thallium - SW846 7841 (Dissolved) ug/L:							
Thallium	2	NA	NA	NA	NA	NA	NA
Thallium - SW846 7841 (Total) ug/L:							
Thallium	2	NA	NA	NA	NA	NA	NA
Total Alkalinity - MCAWW 310.1 mg/L:							
Total Alkalinity	5	NA	NA	NA	NA	NA	NA
Total Organic Carbon - SW846 9060 mg/L:							
Total Organic Carbon	1	NA	0.8	<1	<1	<1	<1
Total Sulfide - MCAWW 376.1 mg/L:							
Total Sulfide	1	NA	NA	NA	NA	NA	NA

TABLE C-3

DATA SUMMARY TABLE FOR FIELD QUALITY CONTROL SAMPLES
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Trip Blank TRIP BLANK (TB-092501) 9/25/2001	Trip Blank QATB-092601 9/26/2001	Trip Blank TB-092701 9/27/2001	Trip Blank TB-092701-1 9/27/2001	Trip Blank TB-092801 9/28/2001	Trip Blank TB-10201 10/2/2001
Volatile Organic Compounds - SW846 8260B µg/L:							
1,1,1,2-Tetrachloroethane	1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	1	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	2	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	1	<1	<1	<1	<1	<1	<1
2,2-Dichloropropane	1	<1	<1	<1	<1	<1	<1
2-Butanone	10	<10	<10	<10 UL	<10 UL	<10	<10
2-Chlorotoluene	1	<1	<1	<1	<1	<1	<1
2-Hexanone	10	<10	<10	<10 UL	<10 UL	<10 UJ	<10 UJ
4-Chlorotoluene	1	<1	<1	<1	<1	<1	<1
4-Methyl-2-pentanone	10	<10	<10	<10 UL	<10 UL	<10 UJ	<10 UJ
Acetone	10	<10	<10	0.63 JB	<10 UL	<10	<10
Benzene	1	<1	<1	<1	<1	<1	<1
Bromobenzene	1	<1	<1	<1	<1	<1	<1
Bromochloromethane	1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	1	<1	<1	<1	<1	<1	<1
Bromoform	1	<1	<1	<1	<1	<1	<1
Bromomethane	2	<2	<2	<2	<2	<2	<2
Carbon disulfide	1	<1 UL	<1	<1	<1	<1	<1
Carbon tetrachloride	1	<1	<1	<1	<1	<1	<1
Chlorobenzene	1	<1	<1	<1	<1	<1	<1
Chloroethane	2	<2	<2	<2	<2	<2	<2
Chloroform	1	<1	<1	<1	<1	<1	<1
Chloromethane	2	<2 UL	<2	<2	<2	<2 UJ	<2
cis-1,2-Dichloroethene	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	1	<1	<1	<1	<1	<1	<1
Dibromomethane	1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	2	<2	<2	<2	<2	<2	<2

TABLE C-3

DATA SUMMARY TABLE FOR FIELD QUALITY CONTROL SAMPLES
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Trip Blank TRIP BLANK (TB-092501) 9/25/2001	Trip Blank QATB-092601 9/26/2001	Trip Blank TB-092701 9/27/2001	Trip Blank TB-092701-1 9/27/2001	Trip Blank TB-092801 9/28/2001	Trip Blank TB-10201 10/2/2001
Ethylbenzene	1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	1	<1 UJ	<1	<1	<1	<1	<1
Isopropylbenzene	1	<1	<1	<1	<1	<1	<1
m-Xylene & p-Xylene	1	<1	<1	<1	<1	<1	<1
Methylene chloride	1	0.45 JQ	0.57	<1	<1	<1	<1
n-Butylbenzene	1	<1	<1	<1	<1	<1	<1
n-Propylbenzene	1	<1	<1	<1	<1	<1	<1
Naphthalene	1	<1	<1	<1	<1	<1	<1 UJ
o-Xylene	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
p-Isopropyltoluene	1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	1	<1	<1	<1	<1	<1	<1
Styrene	1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	1	<1	<1	<1	<1	<1	<1
Toluene	1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	1	<1	<1	<1	<1	<1	<1
Trichloroethene	1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	2	<2	<2	<2	<2	<2 UJ	<2
Vinyl chloride	2	<2	<2	<2	<2	<2	<2
Xylenes (total)	1	<1	<1	<1	<1	<1	<1
Surrogate:							
1,2-Dichloroethane-d4	--	102	101	94	91	92	92
4-Bromofluorobenzene	--	90	89	92	92	90	88
Dibromofluoromethane	--	102	103	93	95	91	94
Toluene-d8	--	93	95	97	100	96	96

TABLE C-3

DATA SUMMARY TABLE FOR FIELD QUALITY CONTROL SAMPLES
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Trip Blank TB-100301 10/3/2001	Trip Blank TB-100301-2 10/3/2001	Trip Blank TB-100401 10/4/2001	Equipment Blank OU7EQB-1 10/5/2001	Trip Blank TB-100801-3 10/8/2001	Trip Blank TB-100901-2 10/9/2001	Trip Blank TB 101601 10/16/2001
Anions - MCAWW 300.3A mg/L:								
Chloride	1	NA	NA	NA	<1	NA	NA	NA
Nitrate	0.1	NA	NA	NA	<0.1	NA	NA	NA
Sulfate	1	NA	NA	NA	<1	NA	NA	NA
Dissolved Gases - RSK SOP-175 mg/L:								
Carbon dioxide	0.001	0.13 JB	0.11 JB	0.29 J	0.32 JB	0.085 JQ	0.32 J	0.58
Ethane	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ethene	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methane	0.001	0.0012 JB	0.0013	0.00091 JQ	0.00066 JB	0.00058 JQ	<0.001	<0.001
Mercury - SW846 7470A (Dissolved) ug/L:								
Mercury	1	NA	NA	NA	<1	NA	NA	NA
Mercury - SW846 7470A (Total) ug/L:								
Mercury	1	NA	NA	NA	<1	NA	NA	NA
Metals - SW846 6010B (Dissolved) ug/L:								
Aluminum	200	NA	NA	NA	<200	NA	NA	NA
Antimony	5	NA	NA	NA	<5	NA	NA	NA
Arsenic	5	NA	NA	NA	<5	NA	NA	NA
Barium	200	NA	NA	NA	<200	NA	NA	NA
Beryllium	10	NA	NA	NA	<10	NA	NA	NA
Cadmium	2	NA	NA	NA	<2	NA	NA	NA
Calcium	5000	NA	NA	NA	<5000	NA	NA	NA
Chromium	10	NA	NA	NA	<10	NA	NA	NA
Cobalt	30	NA	NA	NA	<30	NA	NA	NA
Copper	10	NA	NA	NA	<10	NA	NA	NA
Iron	200	NA	NA	NA	<200	NA	NA	NA
Lead	3	NA	NA	NA	<3	NA	NA	NA
Magnesium	5000	NA	NA	NA	<5000	NA	NA	NA
Manganese	20	NA	NA	NA	0.99 JB	NA	NA	NA
Molybdenum	40	NA	NA	NA	<40	NA	NA	NA
Nickel	100	NA	NA	NA	<100	NA	NA	NA
Potassium	5000	NA	NA	NA	<5000	NA	NA	NA
Selenium	5	NA	NA	NA	<5	NA	NA	NA
Silver	10	NA	NA	NA	<10	NA	NA	NA
Sodium	5000	NA	NA	NA	<5000	NA	NA	NA
Vanadium	50	NA	NA	NA	<50	NA	NA	NA
Zinc	20	NA	NA	NA	<20	NA	NA	NA

TABLE C-3

DATA SUMMARY TABLE FOR FIELD QUALITY CONTROL SAMPLES
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Trip Blank TB-100301 10/3/2001	Trip Blank TB-100301-2 10/3/2001	Trip Blank TB-100401 10/4/2001	Equipment Blank OU7EQB-1 10/5/2001	Trip Blank TB-100801-3 10/8/2001	Trip Blank TB-100901-2 10/9/2001	Trip Blank TB 101601 10/16/2001
Metals - SW846 6010B (Total) ug/L:								
Aluminum	200	NA	NA	NA	<200	NA	NA	NA
Antimony	5	NA	NA	NA	<5	NA	NA	NA
Arsenic	5	NA	NA	NA	<5	NA	NA	NA
Barium	200	NA	NA	NA	<200	NA	NA	NA
Beryllium	10	NA	NA	NA	<10	NA	NA	NA
Cadmium	2	NA	NA	NA	<2	NA	NA	NA
Calcium	5000	NA	NA	NA	<5000	NA	NA	NA
Chromium	10	NA	NA	NA	<10	NA	NA	NA
Cobalt	30	NA	NA	NA	<30	NA	NA	NA
Copper	10	NA	NA	NA	<10	NA	NA	NA
Iron	200	NA	NA	NA	<200	NA	NA	NA
Lead	3	NA	NA	NA	<3	NA	NA	NA
Magnesium	5000	NA	NA	NA	<5000	NA	NA	NA
Manganese	20	NA	NA	NA	1.7 JB	NA	NA	NA
Molybdenum	40	NA	NA	NA	<40	NA	NA	NA
Nickel	100	NA	NA	NA	<100	NA	NA	NA
Potassium	5000	NA	NA	NA	<5000	NA	NA	NA
Selenium	5	NA	NA	NA	<5	NA	NA	NA
Silver	10	NA	NA	NA	<10	NA	NA	NA
Sodium	5000	NA	NA	NA	<5000	NA	NA	NA
Vanadium	50	NA	NA	NA	<50	NA	NA	NA
Zinc	20	NA	NA	NA	<20	NA	NA	NA
Thallium - SW846 7841 (Dissolved) ug/L:								
Thallium	2	NA	NA	NA	<2	NA	NA	NA
Thallium - SW846 7841 (Total) ug/L:								
Thallium	2	NA	NA	NA	<2	NA	NA	NA
Total Alkalinity - MCAWW 310.1 mg/L:								
Total Alkalinity	5	NA	NA	NA	2.5 JB	NA	NA	NA
Total Organic Carbon - SW846 9060 mg/L:								
Total Organic Carbon	1	<1	<1	<1	<1	<1	<1	<1
Total Sulfide - MCAWW 376.1 mg/L:								
Total Sulfide	1	NA	NA	NA	<1	NA	NA	NA

TABLE C-3

DATA SUMMARY TABLE FOR FIELD QUALITY CONTROL SAMPLES
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Trip Blank TB-100301 10/3/2001	Trip Blank TB-100301-2 10/3/2001	Trip Blank TB-100401 10/4/2001	Equipment Blank OU7EQB-1 10/5/2001	Trip Blank TB-100801-3 10/8/2001	Trip Blank TB-100901-2 10/9/2001	Trip Blank TB 101601 10/16/2001
Volatile Organic Compounds - SW846 8260B ug/L:								
1,1,1,2-Tetrachloroethane	1	<1	<1	<1	<2	<1	<1	<1
1,1,1-Trichloroethane	1	<1	<1	<1	<2	<1	<1	<1
1,1,2,2-Tetrachloroethane	1	<1	<1	<1 UJ	<2 R	<1	<1	<1
1,1,2-Trichloroethane	1	<1	<1	<1	<2	<1	<1	<1
1,1-Dichloroethane	1	<1	<1	<1	<2	<1	<1	<1
1,1-Dichloroethene	1	<1	<1	<1	<2	<1 UJ	<1 UJ	<1
1,1-Dichloropropene	1	<1	<1	<1	<2	<1	<1	<1
1,2,3-Trichlorobenzene	1	<1	<1	<1	<2	<1	<1	<1
1,2,3-Trichloropropane	1	<1	<1	<1 UJ	<2	<1	<1	<1
1,2,4-Trichlorobenzene	1	<1	<1	<1	<2	<1	<1	<1
1,2,4-Trimethylbenzene	1	<1	<1	<1	<2	<1	<1	<1
1,2-Dibromo-3-chloropropane	2	<2	<2	<2	<4	<2	<2	<2
1,2-Dibromoethane	1	<1	<1	<1	<2	<1	<1	<1
1,2-Dichlorobenzene	1	<1	<1	<1	<2	<1	<1	<1
1,2-Dichloroethane	1	<1	<1	<1	<2	<1	<1	<1
1,2-Dichloropropane	1	<1	<1	<1	<2	<1	<1	<1
1,3,5-Trimethylbenzene	1	<1	<1	<1	<2	<1	<1	<1
1,3-Dichlorobenzene	1	<1	<1	<1	<2	<1	<1	<1
1,3-Dichloropropane	1	<1	<1	<1	<2	<1	<1	<1
1,4-Dichlorobenzene	1	<1	<1	<1	<2	<1	<1	<1
2,2-Dichloropropane	1	<1	<1	<1	<2	<1	<1	<1
2-Butanone	10	<10	<10	<10	<20	<10	<10	<10
2-Chlorotoluene	1	<1	<1	<1	<2	<1	<1	<1
2-Hexanone	10	<10 UJ	<10 UJ	<10	<20 UL	<10	<10	<10
4-Chlorotoluene	1	<1	<1	<1	<2	<1	<1	<1
4-Methyl-2-pentanone	10	<10 UJ	<10 UJ	<10	<20	<10	<10	<10
Acetone	10	<10	<10	<10	<20 UL	0.55 JQ	1.1 JQ	0.89 JQ
Benzene	1	<1	<1	<1	<2	<1	<1	<1
Bromobenzene	1	<1	<1	<1	<2	<1	<1	<1
Bromochloromethane	1	<1	<1	<1	<2	<1	<1	<1
Bromodichloromethane	1	<1	<1	<1	2.6 JB	1.6	<1	1.2
Bromoform	1	<1	<1	<1	<2	<1	<1	<1
Bromomethane	2	<2	<2	<2	<4	<2	<2	<2
Carbon disulfide	1	<1	<1	<1	<2	<1 R	<1 R	<1
Carbon tetrachloride	1	<1	<1	<1	<2	<1	<1	<1
Chlorobenzene	1	<1	<1	<1	<2	<1	<1	<1
Chloroethane	2	<2	<2	<2	<4	<2	<2	<2
Chloroform	1	<1	<1	<1	45 JB	18	<1	23
Chloromethane	2	<2	<2	<2	<4	<2	<2	<2 R
cis-1,2-Dichloroethene	0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	1	<1	<1	<1	<2	<1	<1	<1
Dibromochloromethane	1	<1	<1	<1	<2	0.34 JQ	<1	<1
Dibromomethane	1	<1	<1	<1	<2	<1	<1	<1
Dichlorodifluoromethane	2	<2	<2	<2	<4	<2	<2	<2 UJ

TABLE C-3

DATA SUMMARY TABLE FOR FIELD QUALITY CONTROL SAMPLES
OPERABLE UNIT 6
Technical Memorandum
First Quarterly Groundwater Sampling - September/October 2001
Defense Supply Center Richmond
Richmond, Virginia

Sample ID: Sample Date:	Practical (a) Quantitation Limit	Trip Blank TB-100301 10/3/2001	Trip Blank TB-100301-2 10/3/2001	Trip Blank TB-100401 10/4/2001	Equipment Blank OU7EQB-1 10/5/2001	Trip Blank TB-100801-3 10/8/2001	Trip Blank TB-100901-2 10/9/2001	Trip Blank TB 101601 10/16/2001
Ethylbenzene	1	<1	<1	<1	<2	<1	<1	<1
Hexachlorobutadiene	1	<1	<1	<1	<2	<1	<1	<1
Isopropylbenzene	1	<1	<1	<1	<2	<1	<1	<1
m-Xylene & p-Xylene	1	<1	<1	<1	<2	<1	<1	<1
Methylene chloride	1	<1	<1	<1	1.8 JB	0.43 JQ	<1	<1
n-Butylbenzene	1	<1	<1	<1	<2	<1	<1	<1
n-Propylbenzene	1	<1	<1	<1	<2	<1	<1	<1
Naphthalene	1	<1 UJ	<1 UJ	<1	<2	<1	<1	<1
o-Xylene	0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5
p-Isopropyltoluene	1	<1	<1	<1	<2	<1	<1	<1
sec-Butylbenzene	1	<1	<1	<1	<2	<1	<1	<1
Styrene	1	<1	<1	<1	<2	<1	<1	<1
tert-Butylbenzene	1	<1	<1	<1	<2	<1	<1	<1
Tetrachloroethene	1	<1	<1	<1	<2	<1	<1	<1
Toluene	1	<1	<1	<1	<2	<1	<1	<1
trans-1,2-Dichloroethene	0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	1	<1	<1	<1	<2	<1	<1	<1
Trichloroethene	1	<1	<1	<1	<2	<1	<1	<1
Trichlorofluoromethane	2	<2	<2	<2	<4	<2	<2	<2
Vinyl chloride	2	<2	<2	<2	<4	<2	<2	<2
Xylenes (total)	1	<1	<1	<1	<2	<1	<1	<1
Surrogate:								
1,2-Dichloroethane-d4	--	93	93	97	96	90	92	89
4-Bromofluorobenzene	--	88	88	85	89	90	88	89
Dibromofluoromethane	--	93	95	94	94	97	96	98
Toluene-d8	--	97	97	100	104	98	99	94

Notes:

J	Estimated
JB	Estimated; possibly biased high or false positive based on blank contamination
JH	Estimated; possibly biased high based on QC data
JL	Estimated; possibly biased low based on QC data
JQ	Estimated; Value is between reporting limit and detection limit
NA	Not Analyzed
R	Rejected
UJ	Undetected; Reported Detection Limit is miprecise
UL	Undetected; Data biased low - Reported Detection Limit is higher than indicated
(a)	Quantitation limits are ideal Sample quantitation limits may vary due to sample volume/weight extracted and dilutions

PREPARED/DATE: RMB 12/16/01
CHECKED/DATE: JAH 12/18/01