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April 1, 2013

Mr. Nan Gowda
United States Environmental Protection Agency
Region 5, Superfund Division
77 West Jackson Boulevard
Mail Code: (SRF-6J)
Chicago, Illinois 60604

Re: **Final Focused Feasibility Study, Revision 4 for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois**

Dear Mr. Gowda,

Please find enclosed one hard copy and one electronic copy of the above referenced document.

If you have any comments or questions, please contact me at (281) 285-4747.

Sincerely,

V. COCIANNI

Virgilio Cocianni
Remediation Manager

c: Chuck Beasley/U.S. Fish and Wildlife Services (2 hard copies, 2 electronic copies)
Paul Lake/Illinois Environmental Protection Agency (2 hard copies, 2 electronic copies)
Mike Powers/TechLaw, Inc (1 hard copy, 1 electronic copy)
Cathy Barnett/CH2M HILL (1 hard copy, 1 electronic copy)

Final

Focused Feasibility Study Revision 4 Plume 2 at PCB OU Site 33

Crab Orchard National Wildlife Refuge
Marion, Illinois

Prepared by CH2MHILL®

April 2013

Final Report

Focused Feasibility Study
Revision 4

Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge Marion, Illinois

Prepared for

Schlumberger Technology Corporation

April 2013

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Contents

Section **Page**

Acronyms and Abbreviations v

1. Introduction 1-1
1.1 Purpose and Approach 1-1
1.2 Background 1-1
1.3 Site-specific Changes since FFS Revision 3 1-4
1.3.1 ROD Amendment 1-4
1.3.2 Land Use Control Implementation 1-4
1.3.3 2009 PCB Contaminated Soil Removal Action 1-5
1.3.4 Supplemental Site Characterization Investigation 1-5
1.3.5 Groundwater Modeling 1-6

2. Cleanup Standards and Remedial Action Objectives 2-1
2.1 Cleanup Standards 2-1
2.1.1 Soil 2-1
2.1.2 Groundwater 2-1
2.2 Remedial Action Objectives 2-1
2.3 Practicality of Cleanup Standards 2-1

3. Identification and Screening of Technologies 3-1
3.1 General Response Actions and Remedial Technologies Identified and Screened for Revision 3 of the FFS 3-1
3.2 Remedial Alternatives Developed for Revision 3 of the FFS 3-1
3.3 Remedial Alternatives Developed for FFS Revision 4 3-1
3.3.1 Soil Mixing with Zero Valent Iron 3-2
3.3.2 Thermal Conductive Heating 3-2
3.4 Basis for Selected Target Treatment Zone 3-3

4. Development of Remedial Alternatives 4-1
4.1 Elements Common to Alternatives 4-1
4.1.1 Institutional Controls 4-1
4.1.2 Long-Term Management 4-1
4.2 Alternative 1—No Action 4-2
4.3 Alternative 2—Excavation and Long-Term Management 4-2
4.4 Alternative 3—Soil Mixing with Zero Valent Iron and Long-Term Management 4-3
4.5 Alternative 4—Source Area Thermal Conductive Heating and Long-Term Management 4-4
4.6 Alternative 5—Long-Term Management 4-5

5. Comparative Analysis of Alternatives 5-1
5.1 Evaluation Criteria 5-1
5.1.1 Threshold Criteria 5-1
5.1.2 Balancing Criteria 5-4
5.1.3 Modifying Criteria 5-5
5.2 Performance Monitoring 5-5
5.3 Comparative Analysis of Remedial Alternatives 5-6
5.3.1 Overall Protection of Human Health and Environment 5-6
5.3.2 Compliance with ARARs 5-6
5.3.3 Long-Term Effectiveness and Permanence 5-6
5.3.4 Reduction of Toxicity, Mobility, and Volume 5-7
5.3.5 Short-Term Effectiveness 5-7

Section **Page**

5.3.6 Implementability 5-7
5.3.7 Cost 5-8
5.4 Comparative Analysis Summary 5-8

6. References 6-1

Appendixes

A Supplemental Site Characterization Investigation Report
B Plume 2 Numerical Groundwater Modeling Technical Memorandum
C Cost Estimates

Tables

1-1 Site 33 Previous Investigations and Remedial Actions
2-1 Maximum Contaminant Levels and Maximum Contaminant Level Goals for Volatile Organic Compounds
3-1 Summary of Remedial Technologies Identified and Screened as Part of FFS Revision 3
5-1 Evaluation of Alternative 1—No Action
5-2 Evaluation of Alternative 2—Excavation and Long-Term Management
5-3 Evaluation of Alternative 3—Soil Mixing with Zero Valent Iron and Long-Term Management
5-4 Evaluation of Alternative 4—Thermal Conductive Heating and Long-Term Management
5-5 Evaluation of Alternative 5—Long-Term Management
5-6 ARARs for Remedial Alternatives
5-7 Comparative Analysis of Alternatives

Figures

1-1 CONWR Location Map
1-2 Site Location Map
3-1 Target Treatment Zones
4-1 Alternative 2—Excavation and Long-Term Management
4-2 Alternative 3—Soil Mixing with Zero Valent Iron and Long-Term Management
4-3 Conceptual Overview of Soil Mixing
4-4 Alternative 4—Thermal Conductive Heating and Long-Term Management
4-5 Conceptual Overview of Thermal Conductive Heating System

Acronyms and Abbreviations

ACL	Alternate Concentration Limit
ARARs	applicable or relevant and appropriate requirements
bgs	below ground surface
BHL	biodegradation half-life
CONWR	Crab Orchard National Wildlife Refuge
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COC	contaminant of concern
CSM	conceptual site model
cVOC	chlorinated volatile organic compound
DOI	Department of Interior
ESD	Explanation of Significant Differences
FFS	focused feasibility study
GDOTS	General Dynamics Ordinance and Tactical Systems
GHG	greenhouse gas
HAPs	hazardous air pollutants
IAC	Illinois Administrative Code
IOP	Illinois Ordnance Plant
LUC	land use control
MCL	maximum contaminant level
µg/L	microgram per liter
mg/kg	milligram per kilogram
MF2K	MODFLOW-2000
MPE	multi-phase extraction
NAAQS	national ambient air quality standards
NAPL	nonaqueous phase liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOx	nitrogen oxides
NSPS	New Source Performance Standards
PCB	polychlorinated biphenyl
PCB OU	PCB Areas Operable Unit
PM10	particulate matter less than 10 microns in diameter
RAO	remedial action objective

RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RTF	remediation timeframe
Sox	sulfur oxides
SVE	soil vapor extraction
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
USFWS	U.S. Fish and Wildlife Service
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
ZVI	zero valent iron

SECTION 1

Introduction

This document presents Revision 4 of a Focused Feasibility Study (FFS) for Plume 2 at PCB Areas Operable Unit (PCB OU) Site 33 at the Crab Orchard National Wildlife Refuge (CONWR). CONWR is located in southern Illinois, approximately 5 miles west of Marion in Williamson County (Figure 1-1). The refuge covers approximately 43,000 acres and is centered on Crab Orchard Lake. The western portion of the refuge is a recreational area, and the eastern portion is a wildlife sanctuary generally closed to the public. The land around the eastern portion of Crab Orchard Lake is used for agricultural and industrial purposes. Plume 2 is located in the industrial area south of Crab Orchard Lake near Buildings I-1-2 and I-1-3 (Figure 1-2).

1.1 Purpose and Approach

The purpose of Revision 4 of the FFS is to evaluate current alternatives for Plume 2 groundwater remediation. Selection and the development of the alternatives presented herein represent the culmination of decades of study at this site. The report is not intended to repeat information provided in previous documents. This report uses historical and new site data along with knowledge obtained from site studies and experiences with remedy implementation at Plumes 1 and 3 to aide in the selection of a groundwater remedy for Plume 2. The following approach was used to evaluate remedial alternatives:

- Review of existing site data and alternatives developed in previous feasibility studies, with emphasis on studies on the potential effectiveness of remedial alternatives
- Collection of additional site data as part of a supplemental site investigation to confirm or update the conceptual site model (CSM)
- Refinement of the areal extent and characteristics of the plume and the source area
- Development of a comprehensive groundwater model using available data for use in development and evaluation of remedial alternatives
- Determination of the optimum treatment zone based on the ability of the remedial approaches to affect the remedial treatment timeframe
- Evaluation of various alternatives for that treatment zone and incorporation of other elements necessary to protect human health and the environment as appropriate

1.2 Background

CONWR was placed on the National Priorities List in July 1987. The PCB OU contains four of the original study sites as defined in the remedial investigation of the CONWR Superfund Site. Two of the sites, Site 32 (Area 9 Landfill) and Site 33 (Area 9 Building Complex [Plumes 1, 2, and 3]), have been the focus of previous FFS documents and studies. Plume 2 of Site 33 is the focus of this FFS. A brief history of activities at Plume 2 is provided in Table 1-1.

TABLE 1-1
Site 33 Previous Investigations and Remedial Actions
Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Investigation or Action	Date	Description
Record of Decision (ROD) for PCB OU issued (USEPA 1990a)	1990	The Selected Remedy for the PCB OU included the following: • Excavation and treatment of polychlorinated biphenyl (PCB) contaminated soil and sediment • Onsite disposal of non-Resource Conservation and Recovery Act (RCRA) hazardous stabilized/fixed material in a Subtitle D landfill • Backfilling and placement of low-permeability caps and closure of areas where

TABLE 1-1
Site 33 Previous Investigations and Remedial Actions
Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Investigation or Action	Date	Description
		contamination is below excavation criteria • Environmental monitoring and maintenance during and after construction to ensure effectiveness of the remedial action
Consent Decree executed (USEPA 1991)	1992	The Consent Decree executed by U.S. Environmental Protection Agency (USEPA) and Schlumberger Industries, Inc., includes a scope of work for remedial design and action for the PCB OU. The scope of work specifies cleanup standards for PCB OU soil, sediment, groundwater, and surface water. The cleanup standards are based on risk assessments presented in the remedial investigation report (O'Brien & Gere 1988).
PCB Soil/Sediment Removal Action and Groundwater Characterization	1995–1998	During the PCB removal action, three excavated PCB source areas were further investigated at Sites 32 and 33, and volatile organic compounds (VOCs) were detected in groundwater. Additional groundwater characterization was performed in the third quarter of 1997. Results of this characterization indicated that three VOC plumes were present in the shallow aquifer (Plumes 1 through 3). Additional groundwater characterization was performed during the summer of 1998 to further delineate contaminant nature and extent in groundwater. Confirmatory investigation samples were collected from monitoring wells in December 1998.
Groundwater Investigation Report and FFS Revisions 0 and 1 (RMT 2000)	1999–2000	Groundwater investigations identified five separate source areas for the three previously identified VOC plumes in groundwater. Chlorinated VOCs (cVOCs) were the primary contaminants detected in groundwater, with trichloroethene (TCE) being the most prevalent. The vertical extent of VOCs in groundwater was primarily limited to the upper clay and upper sand layers. The FFS evaluated the following technologies for Sites 32/33: A. No Action B. Monitored natural attenuation C. Phytoremediation D. Enhanced in situ bioremediation E. Multiple-phase extraction (MPE) F. In situ physical/thermal removal A pilot test was conducted to evaluate dual-phase extraction, air sparge, and soil vapor extraction technologies. The pilot test concluded that these technologies alone were not feasible to remediate VOCs in groundwater. These technologies may be feasible when combined with another remedy.
Explanation of Significant Differences (USEPA 2000)	2000	An Explanation of Significant Differences (ESD) issued for the PCB OU specified the selected remedy to remove the TCE source in soil and mitigate further degradation of groundwater associated with Sites 32 and 33. The selected remedy consisted of installing MPE wells in each VOC source area, phytoremediation along the furthest downgradient extent of the VOC groundwater plume, and MNA.
Pre-Design Investigation and Reporting (RMT, 2001a, 2001b, 2001c, 2001d)	2000–2001	The pre-design investigation included the collection of soil samples from previously identified VOC source areas to better define source area nature and extent. Several monitoring wells were also installed and sampled. A pilot test was conducted to assess the efficiency of a MPE system. The investigation results indicated that the extent of the VOC source areas and mass was significantly greater than previously estimated. The pilot test indicated that MPE would be less effective in the upper clay than previously assumed at the time of the ESD. Investigation data and design plans from pre-design investigation were presented in the *Preliminary Design Report for the Groundwater Remedial Action (Revision 0)* (RMT 2001a). The following three addendums were prepared to support requests for additional information from U.S. Fish and Wildlife Service (USFWS) to support evaluation of the preliminary design: **Addendum 1** (RMT 2001b)—Modified to present the VOC mass present in each of the primary source areas and VOC mass removal expected using MPE.

TABLE 1-1
Site 33 Previous Investigations and Remedial Actions
Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Investigation or Action	Date	Description
		Addendum 2 (RMT 2001c)—Modified to present changes to source area treatment system design, provide simulations of effect over time of the proposed modifications on the downgradient plumes, and consider alternative technologies for application at Building I-1-2 and I-1-3 (Plume 2). The following alternate technologies were considered: • VOC source area in situ treatment: In Situ Oxidative Technologies, Ferox, Hydrogen Release Compound • VOC plume cutoff and in situ treatment: permeable reactive barrier with zero valent iron (ZVI), In Situ Oxidative Technologies, Hydrogen Release Compound Permeable reactive barrier with monitored natural attenuation was recommended for Buildings I-1-2 and I-1-3 (Plume 2). **Addendum 3** (RMT 2001d)—During discussion of Addendum 3, the difficulties in achieving desired level of effectiveness using MPE were acknowledged and considered significant enough to warrant re-evaluation of remedial alternatives for VOC source areas. All parties acknowledged that alternative re-evaluation should be documented in a revision of the FFS report. A new decision document issued by USEPA would be required following remedy selection.
Technical Supplement for Groundwater Remedial Alternatives (RMT 2002)	2002	Provided the following information: • Description of and details for specific remedial alternatives for each primary VOC source area • Cost estimates for the remedial alternatives • Screening and comparative analysis of the alternatives
FFS Revision 2 (RMT 2003a)	2003	The FFS Revision 2 included revised remedial alternatives as described in a January 2003 Draft *Summary of Final Revised Remedy Modifications for Sites 32/33* (RMT, 2003b). The FFS Revision 2 also accounted for modifications made to the alternatives to address USEPA comments from March 2003 and alternatives subsequently developed by Schlumberger and USFWS.
FFS Revision 3 (RMT 2004)	2003	The FFS Revision 3 included an updated review of remedial alternatives. Specifically, the following alternatives were evaluated for Plume 2: A. Limited Excavation (Building I-1-3) and MPE with Pneumatic Fracturing B. Permeable Reactive Barrier C. Alternate Concentration Limits (ACLs) D. Excavation (within 10 milligram per kilogram [mg/kg] VOC contour, to 10 feet depth) and ACLs E. Excavation (within 10 mg/kg VOC contour, to 10 feet depth), In Situ Reductive Dechlorination with Pneumatic Fracturing, and ACLs F. Electrical Resistive Heating Alternative F was selected as preferred method for Plume 2. Key stakeholders including the U.S. Department of Interior (DOI) and its tenant, General Dynamics Ordinance and Tactical Systems (GDOTS), expressed safety concerns with the proposed remedy. USEPA deferred a remedy for Plume 2 and issued a Record of Decision (ROD) to address two of the VOC source areas and associated groundwater plumes at Sites 32/33 (Plumes 1 and 3).
ROD amendment issued(USEPA 2007)	2007	The ROD amendment modified the previously selected remedy for cVOC-contaminated groundwater at Plumes 1 and 3 that were documented in the 1990 ROD and ESD. The ROD amendment does not affect the soils remedy and other requirements specified in the 1990 ROD. The ROD amendment does not include the remedy for Plume 2, but restates the remediation goals for Plumes 1, 2, and 3 that were defined in the 1990 ROD. The Plume 2 remedy was deferred to a separate ROD amendment after DOI's safety concerns were satisfied.

TABLE 1-1
Site 33 Previous Investigations and Remedial Actions
Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Investigation or Action	Date	Description
Environmental Land Use Control Plan for CONWR (USFWS 2008)	2008	Implements a ban on all production wells, residential use, and camping within the area of the former Illinois Ordnance Plant (IOP) (Figure 1-1). In addition to IOP-wide land use controls (LUCs), the following LUCs were implemented for Sites 32/33: • Limit access to personnel who need to use the site by restricting access to limit exposure to cVOC contamination and remaining PCB contamination. Restriction will remain in effect at least until all remediation is complete. • Site-specific personal protective equipment guidelines. • Prohibit digging or earthmoving on the repository.
Soil Removal Actions to Address USEPA Five-Year Review Recommendations (RMT 2010)	2009	Shallow soil was excavated from PCB hot spot areas identified by USFWS during preparation of the second 5-year review report for the PCB OU. One of these areas included excavation of approximately 3-acres to depths up to 6 feet below ground surface (bgs) east of Building I-1-3 and northeast of Building I-1-2.
First Amendment to Consent Decree (USEPA 2012)	2012	Court-ordered settlement documenting the agreement between USEPA and Schlumberger Industries to amend the 1990 ROD. The ROD Amendment (USEPA 2007) is incorporated into the first amendment of the consent decree.

1.3 Site-specific Changes since FFS Revision 3

Section 1.3 describes the changes that have occurred related to the site since FFS Revision 3 that impact decision making related to remedial alternatives for Plume 2.

1.3.1 ROD Amendment

The May 2007 ROD Amendment to the 1990 ROD modified the previously selected remedy for cVOC contaminated groundwater at Plumes 1 and 3 that were documented in the 1990 ROD and ESD. The ROD amendment does not affect the soils remedy and other requirements specified in the 1990 ROD. The ROD amendment also does not include the remedy for Plume 2, but re-states the remediation goals for Plumes 1, 2, and 3 that were defined in the 1990 ROD. The Plume 2 remedy was deferred to a separate ROD amendment that will be completed after DOI's safety concerns have been satisfied.

The ROD amendment documented that periodic air monitoring inside nearby buildings currently used by GDOTS and indoor air samples collected by Schlumberger at Buildings I-1-2 and I-1-3 have shown that concentrations of VOCs inside these buildings are within permissible environmental exposure standards adopted by Occupational Safety and Health Standards.

1.3.2 Land Use Control Implementation

In the ESD (USEPA 2000), USEPA recognized that restrictions upon groundwater use must be imposed, and that it will be at least several decades before the TCE contamination is reduced to levels that meet the cleanup standards specified in the ROD. Alternatives presented in FFS Revision 3 included a common component of institutional controls, in the form of a pending land use control plan for CONWR being prepared by USFWS, which would formally preclude the potable use of groundwater from the aquifers beneath Sites 32/33 within the VOC plume areas.

In 2008, LUCs were implemented to prohibit production wells, residential land use, and camping within the IOP boundary shown on Figure 1-1 (USFWS 2008). The IOP boundary encompasses Plume 2 and roughly at least a quarter of a mile beyond Plume 2 in each direction. Therefore, the groundwater restrictions USEPA identified in the ESD as necessary to impose as part of the remedy has already been implemented. The groundwater restrictions eliminate the drinking water pathway for Plume 2 groundwater as well as the potential for other exposures to groundwater since its use for agricultural, industrial, and commercial purposes is prohibited. The

residential land use restriction eliminates potential future residential risks to soil exposures. Therefore, soil exposure risks are limited to potential exposures to non-residential workers and construction workers.

1.3.3 2009 PCB Contaminated Soil Removal Action

Shallow soil was excavated over an approximate 3-acre area to depths up to 6 feet bgs east of Building I-1-3 and northeast of Building I-1-2 to remove PCBs from this hot spot area identified by USFWS during preparation of the second 5-year review report for the PCB OU (RMT 2010). The excavation areas also removed VOC-contaminated shallow soil.

Soil risks associated with VOC contamination are limited to potential exposures to non-residential workers and construction workers since residential land use and camping is prohibited. Soil concentrations a non-residential worker would be exposed to include the 0 to 2 foot soil interval and soil concentrations a construction worker would be exposed to include the 0 to 10 foot soil interval. The regional screening levels for TCE in industrial soil are 6.4 mg/kg for cancer risks and 20 mg/kg for noncancer health effects (USEPA 2011b). Soil concentrations that remain within the 0 to 10 foot interval after the removal action are below the regional screening levels for cancer and noncancer health effects for potential receptors. Figure 4-8 of Appendix A shows the extent of the 2009 excavation and shallow soil concentrations. Other soil VOC concentrations that remain within the 0 to 10 foot interval after the removal action are also below the regional screening levels for cancer and noncancer health effects for potential receptors.

Although it was not part of the investigation objectives, PCB samples were collected at select locations and depth intervals below 1 foot bgs during the supplemental site characterization investigation conducted in 2011 at the request of USEPA. Results showed no contamination was present above the USEPA-approved at-depth site soil criterion of 25 mg/kg total PCBs.

1.3.4 Supplemental Site Characterization Investigation

In September and October 2011, a supplemental site characterization investigation was performed to collect data to confirm or update the CSM related to VOCs present in soil and groundwater associated with Plume 2. The results of this investigation were used to support development and evaluation of the remedial alternatives presented in this FFS. Section 1.3.4 summarizes the investigation objectives, investigation findings, and an updated CSM. The supplemental site characterization investigation report, which provides more detail on the investigation activities and findings, is presented in Appendix A.

1.3.4.1 Investigation Objectives

The objectives established to meet the purpose of the investigation are as follows:

- Update VOC groundwater data for Plume 2 by sampling existing monitoring wells within the vicinity of Plume 2.
- Further investigate VOC contamination in groundwater in the Plume 2 source areas by collecting groundwater grab samples to evaluate contaminant transport through the hydrostratigraphic units.
- Identify the current characteristics of specific monitored natural attenuation and water quality parameters within Plume 2 to develop and evaluate remedial alternatives.
- Confirm groundwater flow characteristics by collecting groundwater levels from existing groundwater monitoring wells and piezometers and surface water levels from existing staff gauges.
- Further characterize the subsurface lithology and VOC concentrations in soil at potential source areas.

1.3.4.2 Investigation Findings

The supplemental site characterization investigation met the objectives defined in the work plan (CH2M HILL 2011). Data collected during the investigation changes certain aspects of the CSM presented in the *Groundwater Investigation Report and Focused Feasibility Study, Revision 1* (RMT 2000) and analysis provided in the Preliminary Design Report (RMT 2001a). The data collected during the supplemental site characterization investigation provides the additional information needed to move forward with the selection of a remedial alternative for Plume 2.

1.3.4.3 Updated CSM

The CSM presented in the Groundwater Investigation and Focused Feasibility Study Revision 1 (RMT 2000) and analysis provided in the Preliminary Design Report (RMT 2001) provides the following understanding of Plume 2:

- Shallow groundwater flow is generally towards Crab Orchard Lake, with discharge zones into swales and surface water bodies. The swales are typically dry except during wet weather events.
- Within the site area, downward hydraulic gradients indicate groundwater flow occurs primarily from the Upper Clay unit to the Upper Sand unit.
- The permeable Upper Sand unit is a primary pathway for lateral contaminant migration in groundwater.
- Soil results indicate that horizontal transport of contaminants is occurring in the Upper Clay and Upper Sand units.
- The Lower Clay unit retards horizontal and vertical migration of VOCs at depth near Building I-1-2, and contamination has moved downward within the Lower Clay near Building I-1-3.
- The presence of TCE daughter products within the upper strata indicates biodegradation is occurring, and data from the investigation suggests the rate of biodegradation is slow.

The supplemental site characterization investigation confirms the basic tenets of the original CSM, and provides the following additional insight into contaminant transport:

- The supplemental site characterization investigation confirmed the presence of a complex lithology within the study area, beyond the identification of larger stratigraphic units (for example, Upper Clay unit, etc.), that are likely to be influencing contaminant flow within the system, including the absence of a Lower Sand unit near Building I-1-2, and the presence and discontinuous nature of laminations/strata of variable permeability within the major units identified at the site, that are likely to have an influence on contaminant fate and transport. Such variation is entirely consistent with the glacial depositional environment present at the site.
- While the area of shallow contamination was obscured by historic excavation activities, contamination has migrated both laterally and vertically within the Upper Clay unit and from the Upper Clay unit into the Upper Sand unit.
- Contamination migration is influenced by the higher permeability of the Upper Sand unit, which acts as a preferential pathway (where it is present).
- Contamination continues to migrate laterally and vertically from the Upper Clay/Upper Sand to the Lower Clay. Lateral migration in the Lower Clay likely occurs through sand layers or other permeable features (such as fractures) within the clay matrix.
- Contamination that has migrated through the Lower Clay to the Lower Sand moves preferential through the Lower Sand in the direction of groundwater flow, which is evident in elevated concentrations observed in the Lower Sand on both sides of Building I-1-3.
- Lower Sand was not observed near Building I-1-2, but migration of contamination was observed under the building predominantly in the Upper Sand.
- The highest concentration of TCE detected in groundwater was in the source area, near Building I-1-2. TCE was detected at a concentration of 1,300,000 µg/L in the Lower Clay unit near the Lower Clay/Sandstone interface. Sample locations around this location show significantly lower concentrations of TCE.

1.3.5 Groundwater Modeling

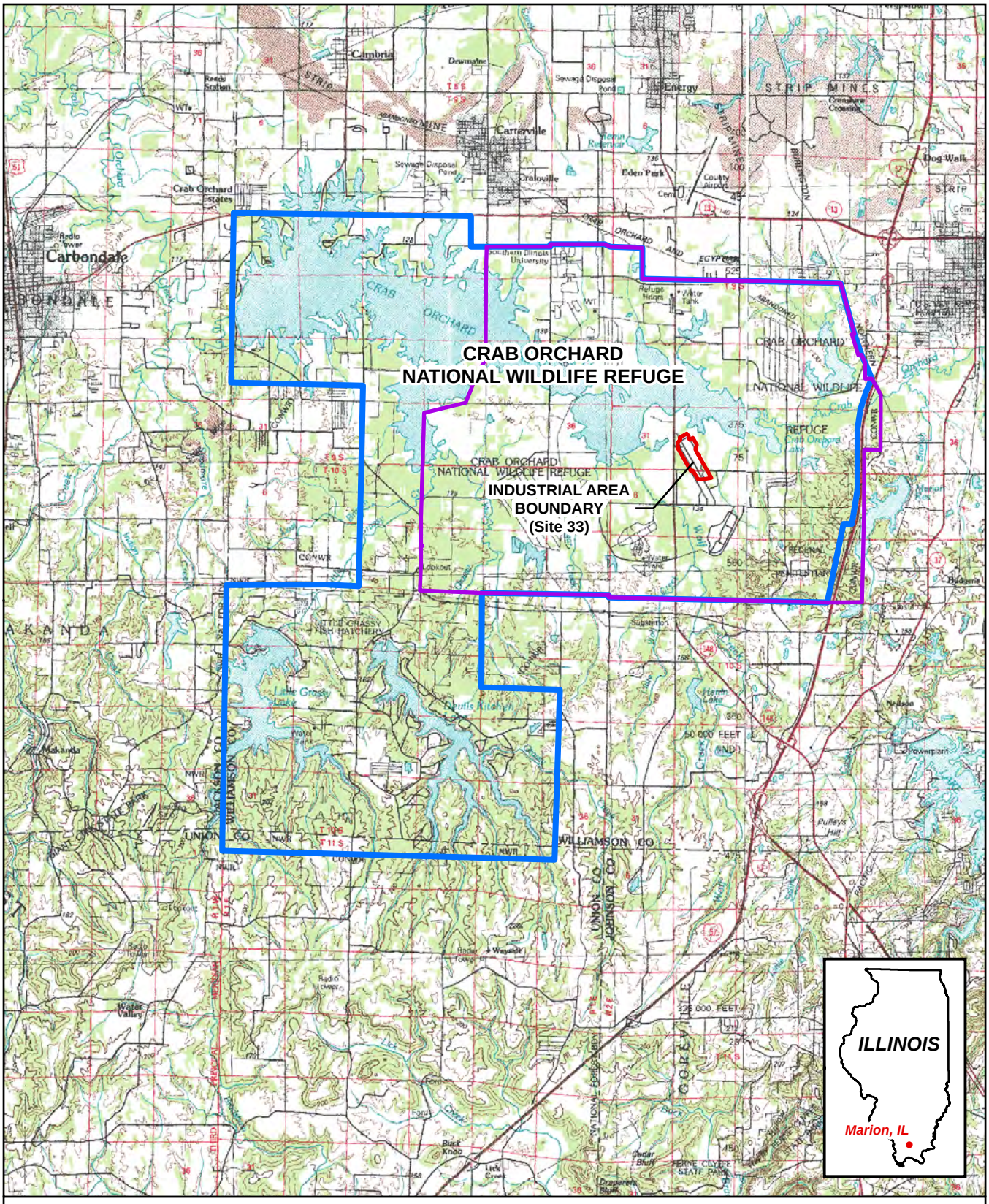
Numerical models were developed previously to support the development of feasibility studies focused on the Plumes 1 and 3 subarea of the industrial area (RMT 2000, 2003a, 2004 and ENVIRON 2010). The models were updated to include the Plume 2 subarea to support the development of Revision 4 of the FFS. The simulations focused on potential remedial alternatives associated with the Plume 2 subarea. TCE is the contaminant of

concern (COC) included in the numerical transport model, because it is the most common COC at the site, is present at the highest concentrations, and is the primary driver for environmental management of the site.

The groundwater flow model was developed with the MODFLOW-2000 (MF2K) code (Harbaugh et al. 2000) to solve the groundwater flow equations and establish a set of steady-state groundwater elevations and associated fluxes. The solute transport model was developed with the MT3DMS code (Zheng and Wang 1999), which was used in conjunction with MF2K to simulate the transport of TCE beneath the site. The modeling process includes running MF2K to establish a three-dimensional representation of the groundwater flow system, followed by running MT3DMS to retrieve the necessary hydraulic results from MF2K and solving the governing solute transport equations necessary to simulate TCE transport processes. Thus, both MF2K and MT3DMS are required to simulate solute transport.

The groundwater model was used to determine an appropriate area for active remediation. Superfund guidance indicates that remediation alternatives should strive to achieve cleanup within 100 years. The model was used to look at various treatment areas, including an extreme hypothetical scenario that addressed treatment of the entire plume. As described in detail in Section 3.4 and Appendix B, a target treatment zone that focuses on the area of highest contaminant concentrations near Building I-1-2 was selected as the best balance between achieving cleanup and practical implementation of remedies. The groundwater model was used to forecast a remediation timeframe (RTF) for each of the five remedial alternatives for the target treatment zone that focuses on the area of highest contaminant concentrations near Building I-1-2. The RTF is defined as the time required after Calendar Year 2011 for TCE concentrations in groundwater to decrease to below its maximum contaminant level (MCL) of 5 µg/L, the cleanup objective for groundwater at the site.

RTFs estimated with the latest solute transport model are longer than those estimated with previous solute transport models of the site. This is because the latest version of the solute transport model was updated to more accurately account for the latest understanding of the three-dimensional distribution of TCE in the subsurface and utilizes a more modern transport formulation that considers a wider range of subsurface transport processes. The latest version of the model includes the supplemental site characterization data, which indicate higher concentrations of TCE in deeper hydrostratigraphic units than previously considered. As described in Section 3.4 and Appendix B, treatment of the source area indicative of nonaqueous phase liquid (NAPL) would provide a significant benefit to remedy performance as compared to passive treatment alternatives. However, no additional benefit to remedy performance would arise from selection of a larger target treatment zone. Therefore, Appendix B does not include RTFs for the three target treatment zones, since the RTFs for treatment around SB-144 and the 10-mg/kg target treatment zones are virtually the same. Details of the Plume 2 numerical model construction, development, calibration, and application are provided in the Plume 2 Numerical Modeling Technical Memorandum (Appendix B).



Source: U.S.G.S 30 X 60 Minute Quadrangle
Carbondale, IL & MO Quadrangle, 1986
West Frankfort, IL, KY, & IN Quadrangle, 1987

LEGEND

- Crab Orchard National Wildlife Refuge
- Former Illinois Ordnance Plant Boundary (Groundwater Production Well Land Use Control Boundary)
- Industrial Area Boundary

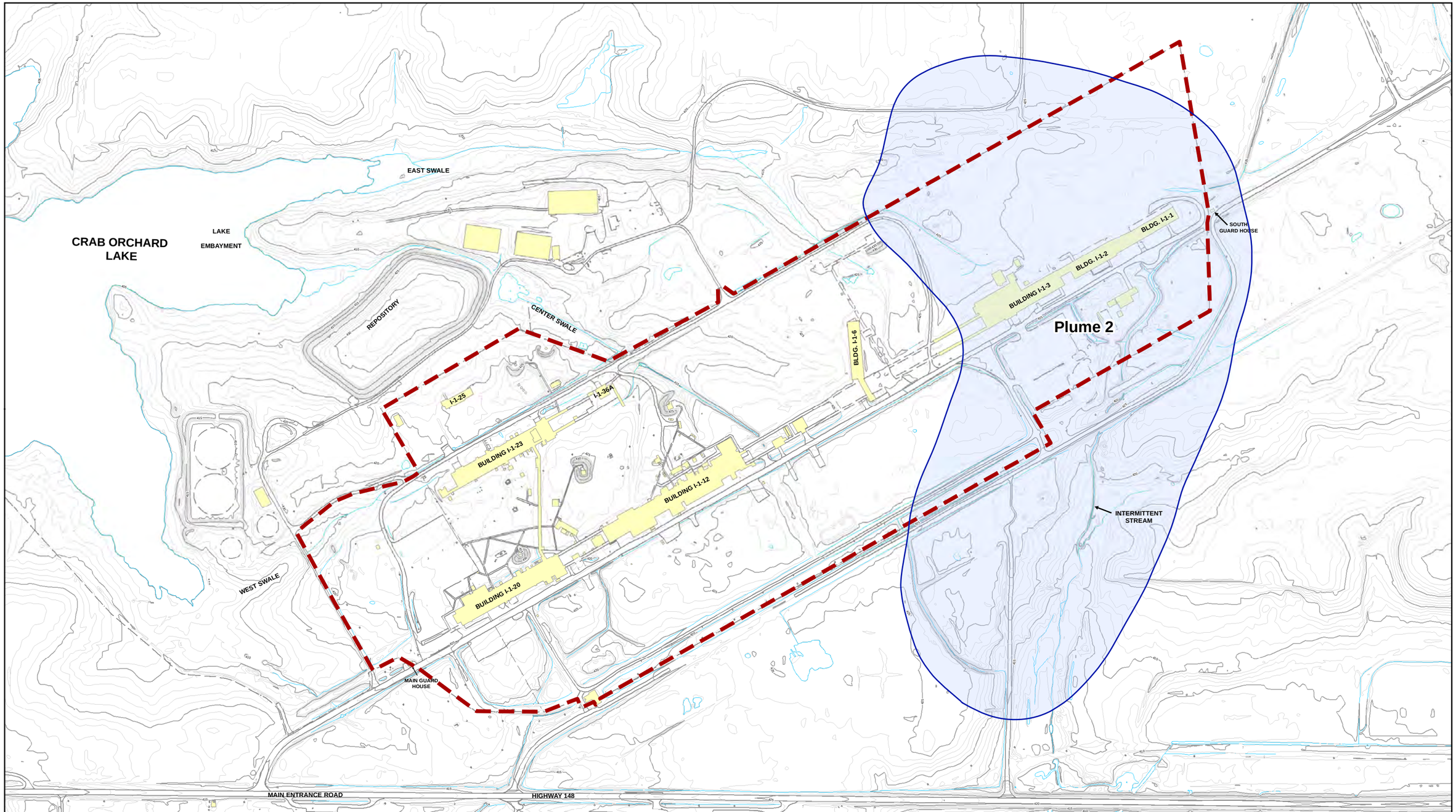
N

0 6,000 12,000 Feet

FIGURE 1-1
Crab Orchard National Wildlife Refuge
Location Map
Focused Feasibility Study Revision 4
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

CH2MHILL

RDD \\BALDUR\PROJ\CRAB_ORCHARD_423535\MAPFILES\FFS\FIG1-1_SITE_LOCATION_FFS.MXD MSCHROCK 1/1/2012 7:28:06 PM



N

0 200 400 Feet

LEGEND

- Industrial Area Boundary (Site 33)
- Buildings
- Groundwater Plume Extent (Plume 2)
- Surface Water
- Topographic Contour (Index)
- Topographic Contour (Intermediate)

Notes:

1. Topographic contours (one-foot interval) are from aerial photographs taken on February 28, 2001.
2. Plume 2 extent is based on the 5 µg/L trichloroethene concentration groundwater contour.

FIGURE 1-2
Site Location Map
Focused Feasibility Study Revision 4
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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SECTION 2

Cleanup Standards and Remedial Action Objectives

The First Amendment to Consent Decree (USEPA 2011a) includes the ROD amendment for the PCB OU (USEPA 2007). The ROD amendment specifies the cleanup standards for PCB OU and defines the remedial action objectives (RAOs). The cleanup standards applicable to Plume 2 and the RAOs are defined in this section.

2.1 Cleanup Standards

Cleanup standards have been set for the study sites comprising the PCB OU (USEPA 2007). The standards are based on the risk assessment performed in the remedial investigation report, which evaluates potential risk to human health and the environment. The standards were then further refined to reflect DOI's specific concerns for the protection of fish and wildlife at CONWR, and USEPA's policies in establishing cleanup standards. The cleanup standards applicable to Plume 2 are discussed in the following subsections.

2.1.1 Soil

The risk from all of the chemical contaminants present above naturally occurring background levels established for the site in the soil shall not exceed an excess cancer risk of one in one million (10^{-6}) or shall not exceed concentrations determined to produce any noncancer chronic health effects.

2.1.2 Groundwater

The groundwater will be monitored during and after construction of the remedial action. The monitoring results will be evaluated to assure that after completion of the remediation of the contaminated soils, the risk from all of the contaminants in the groundwater (measured at the source of contamination) above naturally occurring background levels shall not exceed any excess human health risk or any standard. If at any time, groundwater exceeds a 10^{-6} cumulative lifetime cancer risk, or MCLs for carcinogens, whichever is more stringent; and MCLs, (non-zero) maximum contaminant level goals, or a hazard index of 1.0, whichever is more stringent, for noncarcinogens, additional remedial work as determined by USEPA shall be performed. The federal MCLs and non-zero maximum contaminant level goals for VOCs are listed in Table 2-1.

2.2 Remedial Action Objectives

The RAOs are as follows:

- Restore contaminated groundwater at Sites 32/33 to Drinking Water Standards to the extent practicable
- Reduce or control, to the extent practicable, the impact of subsurface sources of VOCs on groundwater quality.

2.3 Practicality of Cleanup Standards

In the ESD (USEPA 2000), USEPA indicated it may be technically impossible to achieve MCLs throughout the aquifer given the nature of contaminants and the media in which they are present. USEPA indicated at the time, that they may seek a technical impracticality waiver, pursuant to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or seek an alternate groundwater standard pursuant to the State of Illinois Groundwater Standards (35 Illinois Administrative Code (IAC) Part 620) if the proposed remedy did not demonstrate that it would effectively treat the remaining contaminant levels.

The RTFs estimated with the latest Plume 2 solute transport model further supports the potential technical impracticality of achieving MCLs at the site because it more accurately accounts for the latest understanding of the three-dimensional distribution of TCE in the subsurface and utilizes a more modern transport formulation that considers a wider range of subsurface transport processes. In addition, the latest version of the model includes the supplemental site characterization data, which shows higher concentrations of TCE in deeper hydrostratigraphic units than in previous models.

The current Plume 2 groundwater model uses a dual-domain formulation of the solute transport equation. In contrast to the previous single-domain site models, the dual-domain formulation provides a reservoir of TCE mass within the immobile porosity that diffuses back into the mobile porosity when and where TCE concentrations in the immobile porosity are greater than those in the mobile porosity. As described in Appendix B, model results suggest that even if initial (2011) TCE concentrations within the entire mobile porosity of the 73-acre plume are zeroed out and initial TCE concentrations within the immobile porosity are reduced by a factor of 10, mobile-phase TCE concentrations greater than 5 µg/L could remain after 100 years. The results illustrate that the process of back-diffusion from the immobile porosity can sustain the TCE plume for a prolonged timeframe (greater than 100 years), even under an extreme hypothetical remediation scenario. This is because the initial TCE concentrations in the immobile porosity are still over 100,000 µg/L near Building I-1-2 in the extreme scenario. Given that portions of the plume are not accessible (such as the areas under active buildings), the large area of treatment that would be required, and limitations to treatment alternatives, achieving an RTF of 100 years or less may be impractical.

While it may be impractical to achieve MCLs, measures have been taken (as described in Section 1) to address site risks since alternatives were evaluated in Revision 3 of the FFS. LUCs have been implemented at the site to prohibit production wells, residential land use, and camping within the IOP boundary shown on Figure 1-1 (USFWS 2008). The groundwater restrictions eliminate the drinking water pathway for Plume 2 groundwater as well as the potential for other exposures to groundwater since its use for agricultural, industrial, and commercial purposes is prohibited. The residential land use restriction eliminates potential future residential risks to soil exposures. After the 2009 excavation was conducted, VOC concentrations in soil are below the regional screening levels (10^{-6} risk and hazard index of 1.0) for cancer and noncancer health effects for potential receptors. Therefore, several actions have already been completed to meet the intent, as much as practical, of the cleanup standards that were designed to achieve a condition of no significant risk within the area of Plume 2.

TABLE 2-1

Maximum Contaminant Levels and Maximum Contaminant Level Goals for Volatile Organic Compounds

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Volatile Organic Compound	MCL	MCLG
1,1,1-Trichloroethane	200	200
1,1,2,2-Tetrachloroethane	--	--
1,1,2-Trichloroethane	5	3
1,1-Dichloroethane	--	--
1,1-Dichloroethene	7	7
1,2-Dichloroethane	5	--
1,2-Dichloropropane	5	--
1,3-Dichloropropene	--	--
2-Butanone (MEK)	--	--
2-Hexanone	--	--
4-Methyl-2-Pentanone (MIBK)	--	--
Acetone	--	--
Benzene	5	--
Bromodichloromethane	80	--
Bromoform	80	--
Bromomethane	--	--
Carbon Disulfide	--	--
Carbon Tetrachloride	5	--
Chlorobenzene	100	--
Chloroethane	--	--
Chloroform	80	--
Chloromethane	--	--
cis-1,2-Dichloroethene	70	70
cis-1,3-Dichloropropene	--	--
Dibromochloromethane	80	--
Ethylbenzene	700	700
Methyl tert-Butyl Ether (MTBE)	--	--
Methylene Chloride	5	--
Styrene	100	100
Tetrachloroethene (PCE)	5	--
Toluene	1,000	1,000
Total Xylenes	10,000	10,000
trans-1,2-Dichloroethene	100	100
trans-1,3-Dichloropropene	--	--
Trichloroethene (TCE)	5	--
Vinyl Chloride	2	--

Notes:

MCL - maximum contaminant level

MCLG - maximum contaminant level goal

MCLs and MCLGs are reported in µg/L

Non-zero MCLGs reported

SECTION 3

Identification and Screening of Technologies

General response actions and remedial technologies are initially screened with respect to the site contaminants and site-specific conditions to determine which technologies should be carried forward for further evaluation as a remedial alternative and the areas and/or quantities of contaminated media to be treated. Information available at the time of screening is to be used primarily to identify and distinguish any differences among the various alternatives and to evaluate each alternative with respect to its effectiveness, implementability, and cost. Only the alternatives judged as the best or most promising on the basis of the evaluation factors were retained for further consideration and analysis. A remedial alternative may include a combination of technologies and a range of areas and quantities of contaminated media may be evaluated for a remedial alternative. Section 3 presents a summary of general response actions and remedial technologies screened and remedial alternatives developed as part of Revision 3 of the FFS, additional alternatives developed as part of Revision 4 of the FFS, and the basis for the target treatment zone selected for each alternative carried forward in Revision 4 of the FFS.

3.1 General Response Actions and Remedial Technologies Identified and Screened for Revision 3 of the FFS

General response actions and remedial technologies were identified and screened in detail for Site 33 as part of Revision 3 of the FFS (RMT 2004). General response actions evaluated included limited action, containment, removal, treatment, and disposal. For each general response action, remedial technologies and process options were screened on the basis of site-specific effectiveness, implementability, and comparative cost. Table 3-1 presents a summary of the general response actions, remedial technologies, and process options screened and considered acceptable for further consideration in Revision 3. It should be noted that the technologies presented in Table 3-1 were evaluated for Plumes 1, 2, and 3. For a more detailed presentation of the evaluation, refer to Table 5-2 in Revision 3 of the FFS.

3.2 Remedial Alternatives Developed for Revision 3 of the FFS

Technologies and process options determined acceptable for further consideration were retained as a component of a remedial alternative developed and evaluated in Revision 3 of the FFS. Remedial alternatives developed for Plume 2 included the following:

- Alternative A—Limited Excavation (Building I-1-3 hotspot) and MPE with Pneumatic Fracturing
- Alternative B—Permeable Reactive Barrier
- Alternative C—Alternate Concentration Limits
- Alternative D—Excavation (within 10 mg/kg VOC contour to 10 feet depth) and Alternate Concentration Limits
- Alternative E—Excavation (within 10 mg/kg VOC contour to 10 feet depth), In Situ Reductive Dechlorination with Pneumatic Fracturing, and Alternate Concentration Limits
- Alternative F—Electrical Resistive Heating

Components common to remedial alternatives included institutional controls with groundwater monitoring. Alternative F was recommended as the preferred remedial alternative and presented for public comment in the proposed plan and fact sheet submitted by USEPA. Key stakeholders expressed safety concerns associated with this technology, which resulted in the deferral of the Plume 2 remedy selection.

3.3 Remedial Alternatives Developed for FFS Revision 4

With exception of electrical resistive heating, remedial technologies included in Revision 3 of the FFS Plume 2 were screened again to evaluate implementability and effectiveness. The technologies considered acceptable would be included as part of a revised list of remedial alternatives for Plume 2. The following is a summary of the results:

- MPE would not effectively reduce source area concentrations to levels that would improve downgradient groundwater quality. Other technologies were determined more capable of achieving a higher percent source mass reduction than MPE was capable of achieving at the site.
- Permeable reactive barrier would not effectively reduce the overall RTF due to limiting site hydrogeologic characteristics (for example, flat gradient coupled with low hydraulic conductivities).
- In situ reductive dechlorination would provide limited source mass reduction because of the reduced effectiveness to inject a substrate into a clayey soil. Implementation of pneumatic fracturing could still result in limitations of the fracture distribution (that is, short circuiting into coarse-grained soil seams or preferential propagation along bedding planes), which would result in non-uniform delivery of the substrate throughout the targeted injection zone.
- Source area excavation was considered a feasible technology and recommended to be carried forward into a remedial alternative developed as part of Revision 4 of the FFS.

Since the time of FFS Revision 3, some in situ treatment technologies have evolved further and are proving increasingly effective at reducing COC mass in soil and groundwater. Additional in situ treatment technologies not included as part of remedial alternatives in Revision 3 but considered acceptable going forward in Revision 4 of the FFS include soil mixing and thermal conductive heating. The following sections provide a brief description of the soil mixing and thermal conductive heating technologies.

3.3.1 Soil Mixing with Zero Valent Iron

Shallow soil mixing with ZVI is an in situ technology that uses a large auger system, equipped with nozzles, to add a clay-granular ZVI slurry into the soil while mechanically breaking up and mixing the soil. Shallow soil mixing via the auger system, converts the source zone into a homogenous mixture of soil, clay, iron, and target contaminants by turning the auger while repeatedly cycling up and down throughout the mixing column. The ZVI degrades the chlorinated VOCs through chemical reduction and also promotes biological reduction. The clay promotes uniform distribution of the iron during the mixing process and reduces the hydraulic conductivity of the source zone, to minimize contaminant flux.

DuPont and the University of Waterloo (Wadley et al. 2005) pioneered this technology in the 1990s and early 2000s. In 2003, DuPont donated patents for the technology (Batchelor et al., 1998 and 2002) to Colorado State University.

The removal mechanism is primarily chemical. ZVI is a strong reducing agent that has been successfully used in many in situ applications to treat cVOCs in groundwater. The ZVI reacts with the cVOCs through electron transfer to reduce them to ethane and ethene while the ZVI is oxidized to ferrous iron. The dominant degradation pathway is the beta-elimination pathway that transforms parent compounds (such as TCE) to chloroacetylene and acetylene, unstable intermediates, which rapidly degrade to ethene. The second degradation pathway is hydrogenolysis, or sequential reductive dechlorination, where one chlorine atom is removed in each step (TCE degrades to cis-1,2-dichloroethene, then to vinyl chloride, and finally to ethene or ethane) (ITRC 2011). Treatment time can be as short as 1 to 2 months depending on site restoration requirements. Soil stabilization can take months to years after mixing has been completed.

3.3.2 Thermal Conductive Heating

Thermal conductive heating, also known as in situ thermal desorption, generates heat using electrical power, based on resistive principles. The process relies on the resistive properties of a metal rod, rather than the bulk soil, as with Electrical Resistive Heating. The metal rods are analogous to the heating elements contained in an electric oven. A typical heater assembly consists of a U-shaped metal rod approximately 0.5 inch in diameter that is installed in a section of sealed steel well casing. Ceramic insulators are used to electrically isolate the heating element from the steel casing. The application of electric power to the element causes the steel rod to heat resistively. Heat generated by the element is adsorbed by the well casing and ultimately transferred to the subsurface formation by conduction and convection.

The mechanisms of contaminant removal by thermal treatment are primarily physical. Contaminant removal is dominated by vaporization and steam distillation processes. Because heat propagation is the driving force for contaminant removal from groundwater and soil, the process is relatively unaffected by contaminant distribution, concentration, chemical structure, or toxicity. Although temperatures as high as 800 degrees Celsius can be achieved, a treatment temperature of 100 degrees Celsius is sufficient to accomplish steam distillation and effective removal of target VOCs present at the site. The boiling point of pure phase TCE under ambient conditions is approximately 87 degrees Celsius. Pure water under identical conditions boils at 100 degrees Celsius. However, when TCE and water are mixed, the vapor pressure of the combined system allows the mixture to boil at approximately 73 degrees Celsius. At higher temperatures, particularly in proximity to the subsurface heaters, cohesive and fine-grained soil can shrink and crack while drying, becoming more permeable and enhancing contaminant transport and subsurface extraction. In the post treatment stage, enhanced microbiological degradation has been observed at numerous sites where thermal treatment has been implemented.

Thermal conductive heating systems consist of heater assemblies installed within sealed steel well casings, electrical power distribution equipment, vapor and groundwater extraction wells, and an aboveground plant to treat extracted process vapor and fluids. Multiple heater assemblies are placed across the treatment zone at relatively close spacing (to ensure thorough conductive heating. Recovery wells are placed to capture groundwater and vapor mobilized during heating. The technology has been safely applied under structures and near underground utilities. The technology is patented with an exclusive license held by one company.

3.4 Basis for Selected Target Treatment Zone

A critical aspect of developing remedial alternatives for Plume 2 is identifying a three-dimensional target treatment zone where remediation efforts would be focused under implementation of an active remedial technology. The extent of Plume 2 that exceeds the MCL for TCE covers an area of approximately 73 acres.

The groundwater model considered the following four treatment zone scenarios to help define a range of potential treatment areas based on the characteristics of the groundwater plume:

(1) No active treatment of the groundwater plume. This scenario represents the time it would take to clean up the plume without implementing active remediation.

(2) Treatment of the source area indicative of NAPL around SB-144 near Building I-1-2 (estimated as roughly 500 square feet; Figure 3-1).

(3) Treatment of the source area near Buildings I-1-2 and I-1-3 (less than 0.5 acres in size). The target treatment zone for this scenario included areas and depth intervals with soil concentrations of at least 10 mg/kg of TCE, to be consistent with the target treatment zone for excavation presented in the FFS Revision 3.

(4) Treatment of the entire 73-acre plume. This hypothetical case, which represents a remediation scenario that would not be possible to implement, was evaluated to determine the extreme end of the range of calculable treatment times.

Treatment would be accomplished through active remedial technologies described herein, whereas the remaining plume area would be addressed by long-term management and rely on natural attenuation processes to remediate the impacted aquifer. This approach was taken because of the lack of risk under current site conditions, the focus of reducing the source term at the site, and the limitations the geology imposes on remediation technologies. The target treatment zones were evaluated using data collected in previous investigations, the data collected during the supplemental site characterization in 2011, and the Plume 2 numerical groundwater flow and solute transport models developed for the site and updated by CH2M HILL for Revision 4 of the FFS (Appendix B). RTFs were calculated for each alternative based on the assumption that the TCE biodegradation half-life (BHL) is between 10 and 20 years (Appendix B).

Modeling results for Scenario 1 indicate that a portion of the TCE plume could persist above the target cleanup levels beyond 500 years after 2011 if no active remediation is performed (Appendix B). The results also indicate that a

significant portion of the forecast RTF may be required to remediate the remaining 5 percent of the current TCE plume area because of matrix-diffusion of TCE from the immobile porosity.

The model forecasts essentially no difference in RTFs between Scenarios 2 and 3. For Scenario 2, the time to achieve cleanup standards ranges from 145 to 280 years, depending on the BHL used in the model), and for Scenario 3, the time ranges from 145 to 275 years. The similarity in the forecast RTFs results primarily from the relatively small sizes of the two simulated target treatment zones as compared to the overall size of the groundwater TCE plume. The model indicates that more costly active remediation of the larger target treatment zone, based on the soil concentration of TCE of 10 mg/kg, would not have an appreciable effect on the timeframe to achieve cleanup standards. Note that this relative performance would be expected to be similar regardless of values used in the model. That is, changing the BHL could change the result of the model. However, the relative performance between the two scenarios would be similar.

The results for Scenario 4, which represent a hypothetical and extreme remediation scenario, indicate that such an approach for the plume would not reduce the time to achieve cleanup standards below 100 years even for the lower range of BHLs considered (10 years).

Based on the analysis, Scenario 2, which addresses active remediation of the source area indicative of NAPL near SB-144, was selected for use in the detailed evaluation of remedial alternatives for this site. Scenario 1 was also carried forward in the detailed evaluation of remedial alternatives for the purpose of addressing the no-action and long-term management alternatives.

The model results are sensitive to the BHLs. While 10- and 20-year BHL simulations would be more consistent with the historical data of Plume 2, USEPA suggested that a broader range of 5 to 20 years appeared justified based on published data and requested that the model be rerun using a 5-year BHL simulation. While the 5-year BHL does not fit the historical data available for Plume 2 or the 10- and 20-year BHLs, additional simulations were performed in response to USEPA's request to investigate the effect of simulating a 5-year BHL.

Evaluation of the broader range of BHLs is presented in Attachment 1 of Appendix B. It compares Scenarios 1 through 3 for the 5-, 10-, and 20-year BHL. The extreme hypothetical remediation scenario (Scenario 4) evaluated in Appendix B was not rerun for the 5-year BHL. The model forecasts essentially no difference in RTFs between the 10 mg/kg TCE target treatment zone and the source area indicative of NAPL target treatment zone. The similarity in the RTFs results primarily from the relatively small size of the target treatment zones compared to the overall size of the groundwater TCE plume. Accordingly, treatment of the source area indicative of NAPL would provide a significant benefit to remedy performance as compared to passive treatment alternatives. However, no additional benefit to remedy performance would arise from selection of the larger target treatment zone.

For the remedial alternative simulations, RTFs range from 75 years (assuming a 5-year BHL) to 280 years (assuming a 20-year BHL). However, the comparison between forecast and detected TCE concentrations at wells in the Plume 2 subarea indicates that the 5-year BHL is likely overly optimistic. While the amount of actual data is limited, the forecast concentrations for the 10- and 20-year BHLs align more closely with the historical data.

The model also indicate that the RTFs estimated for treatment Alternatives 2, 3, and 4 do not vary between either remediating the source area indicative of NAPL (Scenario 2) or the much larger area of the 10-mg/kg target (Scenario 3), with the exception of the 20-year BHL simulation showing a marginal reduction of RTF of 5 years between Scenarios 2 and 3. Therefore, Appendix B does not include RTFs for the three target treatment zones included in remedial alternatives, since the RTFs for treatment around SB-144 and the 10 mg/kg target treatment zones are virtually the same.

The final treatment zone selected for use in detailed evaluation of Alternatives 2, 3, and 4 includes the source area indicative of NAPL around SB-144 near Building I-1-2 included in Scenario 2, plus two hot spot source areas (an area around SB-140/SB-126 and an area around SB-142) (Figure 3-1). While the groundwater modeling does not show a significant difference in RTFs between the Scenario 2 and 3 treatment zones, the two hot spot source areas were included to provide additional assurance that the most contaminated zones will be addressed.

TABLE 3-1

Summary of Remedial Technologies Identified and Screened as Part of FFS Revision 3

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

General Response Action	Technology	Process Option	Acceptable for Further Consideration?
No Action	None	None	**Yes.** Only as comparative baseline.
Limited Action	Onsite access restrictions	Fencing	No. However, temporary fencing likely appropriate as a component of remedial construction.
		Security	No. Not necessary based on potential hazards or risk to environment.
	Institutional controls	Property management	**Yes**
		Property acquisition	No. Property already owned by federal government.
	Monitoring	Monitored Natural Attenuation	**Yes**
Containment	Vertical barriers	Slurry walls	No. Not considered as a stand-alone technology.
		Sheet piling	No
		Injected screens	No
		Grout curtains	No
	Hydraulic containment	Interceptor trenches	No
		Extraction wells	**Yes**
	Surface cover	Low-permeability cap	**Yes**
Removal	Extraction	Vertical extraction wells	**Yes**
		Horizontal extraction wells	**Yes**
		Multiphase extraction (MPE)	**Yes**
		Dual-phase extraction	No
	Excavation	Excavation and disposal	**Yes**
Treatment	In situ treatment	Air sparging	No
		Steam sparging	No
		Permeable treatment walls/zones	**Yes**
		Thermally enhanced recovery	**Yes**
		Electro-osmotic recovery	No
		Chemical oxidation	No
		Co-metabolic biological treatment	No
		Enhanced bioremediation	**Yes**
		in situ recirculation wells	No
		Fracturing (pneumatic or hydraulic)	**Yes.** As a supplemental component to other technologies.
		Phytoremediation	**Yes**
		Monitored Natural Attenuation	**Yes**
	Ex situ treatment	Air stripping	**Yes**
		Activated carbon	**Yes**
		Thermal destruction	No
		Aerobic biological	No
		Anaerobic biological	No
		Chemical oxidation	No

TABLE 3-1

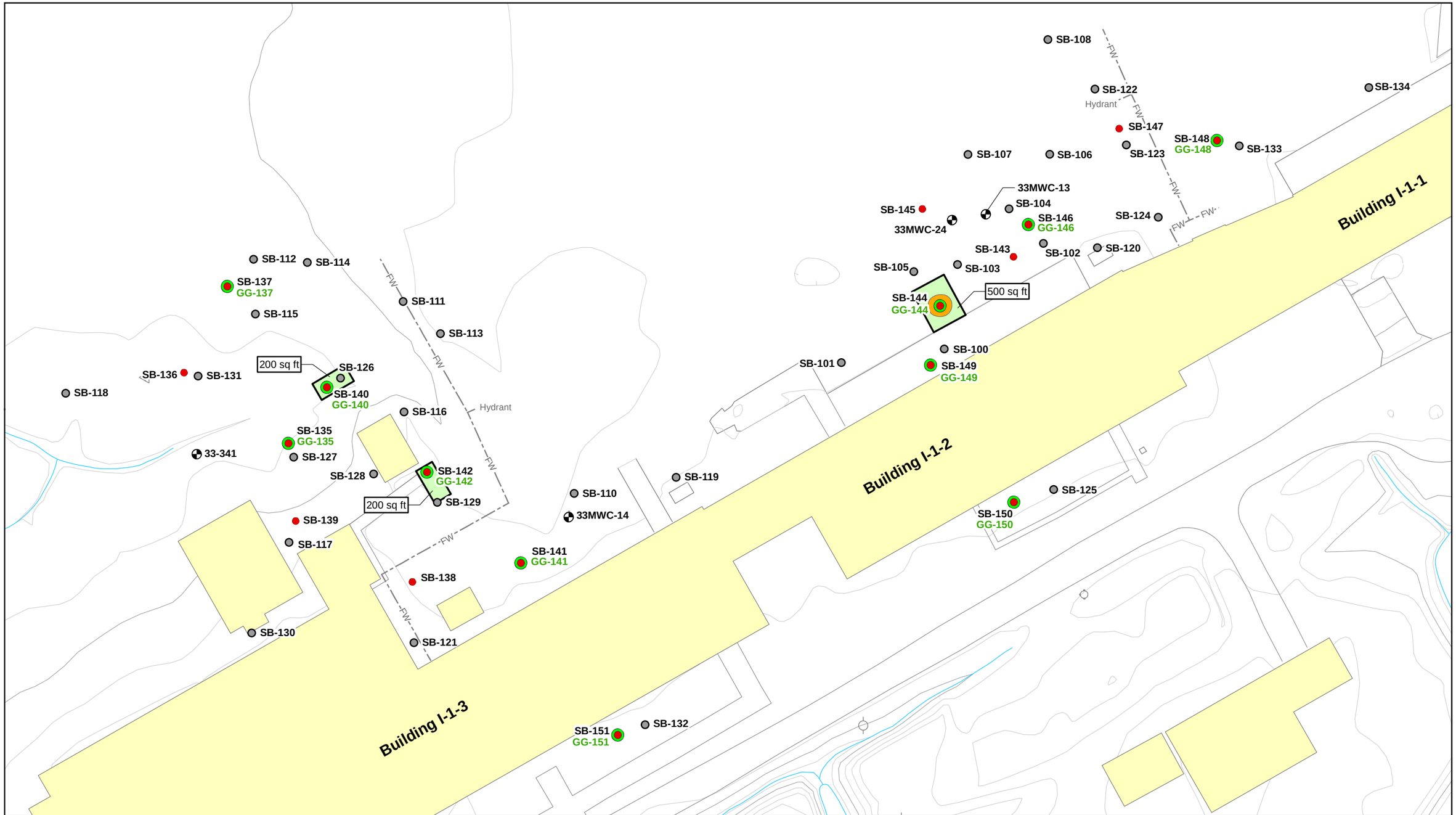
Summary of Remedial Technologies Identified and Screened as Part of FFS Revision 3

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

General Response Action	Technology	Process Option	Acceptable for Further Consideration?
Offsite disposal	Treated or untreated groundwater	Discharge to POTW	**Yes**
Onsite disposal	Treated groundwater	Injection wells	**Yes**
		Infiltration basin or trenches/drain field	No
		Discharge to surface water	**Yes**
		Non-potable service water	No
		Irrigation	**Yes**
	Untreated groundwater	Non-potable service water	No
		Discharge to surface water	No
		Irrigation	No

Notes:

Source: RMT, Inc. 2004. Focused Feasibility Study, Revision 3, Crab Orchard National Wildlife Refuge, PCB Operable Unit – Sites 32/33, Marion, Illinois.



LEGEND

- Groundwater Monitoring Well
- Historic Soil Boring
- Supplemental Investigation Soil Boring Location
- Supplemental Investigation Soil Boring Location with Co-located Grab Groundwater Sample
- Concrete Pads, Roads, and Walkways
- Surface Water
- Topographic Contour
- FW Fire Water Line
- Source Area Indicative of NAPL
- Target Treatment Zone
- Building

N

0 25 50 Feet

FIGURE 3-1
Target Treatment Zones
Focused Feasibility Study Revision 4
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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SECTION 4

Development of Remedial Alternatives

The following is a summary of remedial alternatives selected for detailed evaluation in this FFS.

- Alternative 1: No Action
- Alternative 2: Excavation and Long-Term Management
- Alternative 3: Soil Mixing with ZVI and Long-Term Management
- Alternative 4: Thermal Conductive Heating and Long-Term Management
- Alternative 5: Long-Term Management

Alternatives 2 through 4 include approaches that remove, treat, or destruct the mass of groundwater COCs within targeted treatment zones where a source area indicative of NAPL and two other hot spot source areas were encountered during the supplemental site characterization investigation. Natural attenuation will reduce sorbed and dissolved TCE mass in soil and groundwater, respectively, outside the source areas treated.

4.1 Elements Common to Alternatives

Section 4.2 presents a summary of elements common to alternatives evaluated in this FFS.

4.1.1 Institutional Controls

Institutional controls in place at CONWR are documented in the Environmental Land Use Control Implementation Plan (USFWS 2008). The plan prohibits installation of production wells and residential use and camping within the boundaries of the former Illinois Ordnance Plant at CONWR (Figure 1-1).

The objective of production well LUC is to prevent ingestion of potentially contaminated groundwater and induced migration of contaminated plumes. There are currently no production wells at CONWR, and potable water for CONWR is supplied by the City of Herrin, which has a reservoir for its source. All construction activities must be approved by CONWR, and staff members are aware of the well restriction. The Environmental Land Use Control Implementation Plan is provided to all lease and special permit holders and CONWR staff and volunteers. Hunters and other former Illinois Ordnance Plant users receive a briefing detailing the restrictions prior to accessing the area. The restriction can be removed for a specific location only by performing a groundwater investigation to confirm that the groundwater concentrations are within MCLs, Illinois Class I standards, and the Region 9 risk-based concentrations over an area sufficiently large such that pumping would not be influenced by nearby plumes. The restriction can be removed at sites with known exceedances only after the site groundwater is remediated to achieve the levels and confirmation that the levels have been achieved.

The objective of the residential use and camping restriction is to prevent potential unacceptable risks to residential users and campers. The restriction can be removed for a specific location only after an investigation of the location proposed for residential use or camping has been performed and a risk assessment shows risks are within acceptable levels for the proposed use scenario. Analytical sampling of all potentially affected media would be required. The sampling density and depths need to be sufficient to allow evaluation of residential exposure scenarios within individual half-acre parcels. A risk assessment for the proposed use scenarios would be needed. If the risk assessment shows unacceptable risk, remediation would be required before a restriction can be removed. The restriction can only be removed after all risks are shown to be at acceptable levels for the proposed use scenario.

The Environmental Land Use Control Implementation Plan has been implemented and is therefore applicable for all of the alternatives.

4.1.2 Long-Term Management

Alternatives 2 through 5 include a long-term management component to monitor changes in groundwater COC concentrations and manage any associated risks. For Alternatives 2 through 4, long-term management will commence following treatment. A select number of existing and newly installed monitoring wells (20 wells estimated total) will be sampled as part of the LTM program. Proposed monitoring wells include 7 existing well

locations and 13 well locations screened within the Upper Clay, Upper Sand, Lower Sand, and Lower Clay units, where present. Wells will monitor the source area, along the plume centerline, dowgradient of the plume, and upgradient of the TCE plume.

Annual sampling of the 20 monitoring wells will occur through the first 5-year review. Following the 5-year review, it is assumed that groundwater sampling will be performed to monitor natural attenuation of the dissolved TCE plume every 5 years until the RAOs have been achieved. The actual monitoring frequency will be determined during remedial design.

4.2 Alternative 1—No Action

Alternative 1 consists of taking no action. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) require that a no action alternative be retained throughout the feasibility study process as a baseline against which to compare the other approaches. With exception of the LUCs, no other mechanisms would be in place to prevent, monitor, or control exposure to contaminants.

4.3 Alternative 2—Excavation and Long-Term Management

Alternative 2 consists of excavating soil within the source area indicative of NAPL around SB-144 (approximately 33 feet bgs) and two hot spot source areas from ground surface to top of bedrock at approximately 48 feet bgs (the treatment area around SB-140/SB-126 and the treatment area around SB-142). Figure 4-1 presents the aerial extent of the target treatment zones and associated excavation footprints. At least a 99 percent source removal has routinely been demonstrated across the industry when excavation is implemented as the technology for source area removal. Therefore, it is reasonable to assume that excavation would remove 99 percent of the source within the target treatment zones.

To prevent structural damage, excavation activities will not be completed within 20 feet of Building I-1-2. Approximately 120 linear feet of soldier-pile and lagging shoring will be embedded into bedrock along the west excavation wall (approximately 33 feet bgs). The remaining excavation sidewalls will be excavated at a 1.5 to 1 slope. No utilities are present within the excavation area; however, monitoring wells 33MWC-13 and 33MWC-24 are located within the southeast portion of the proposed excavation area and will need to be abandoned prior to excavation. Approximately 174 linear feet of soldier-pile and lagging shoring will be embedded into bedrock along 2 sides of each of the 2 target treatment zones around SB-140/SB-126 and SB-142 because of encumbrances at the site that make it prohibitive to excavate a 1.5 to 1 slope. The remaining excavation sidewalls will be excavated at a 1.5 to 1 slope. The fire/water line within the excavation area of the source area hot spot around SB-142 will be abandoned and capped prior to excavation.

Excavated soil will be stockpiled, characterized, and transported offsite for disposal. For volume and cost estimating purposes, it has been assumed that soil from ground surface to 20 feet bgs will be non-hazardous, and soil from 20 feet bgs to the terminal depth of the excavations will be hazardous. The depths were selected based on soil sample data collected during previous investigations, which results in approximately an additional 12,100 cubic yards of nonhazardous soil and 4,600 cubic yards of hazardous soil being excavated and disposed of offsite at licensed disposal facilities.

Waste will be characterized in accordance with Title 40 *Code of Federal Regulations* (CFR) and for PCBs to determine whether Part 261 Subpart C and 40 CFR Part 761 are applicable. Waste characterization samples will be collected from stockpiled soil at a frequency of 1 sample per 500 cubic yards. Waste that fails the toxicity characteristic leaching procedure (TCLP) will be disposed of as hazardous waste. PCB wastes above concentrations of 50 parts per million will be disposed of in accordance with 40 CFR Part 761 Subpart D. While not expected because of data collected from the site, waste above TSCA criteria will be disposed of as appropriate. Non-hazardous soil will be transported to a RCRA Subtitle D landfill, and hazardous soil will be transported to the RCRA Subtitle C hazardous waste landfill for disposal. Hazardous soil not meeting land disposal restrictions will require treatment prior to disposal. The cost estimate assumes no treatment prior to disposal will be required.

Because the excavations will intercept the Upper Sand unit, excavation dewatering will be required to remove water infiltrating into the excavation from this unit. Excavation water will be pumped to storage tanks and

subsequently treated. For the purposes of the FFS, it has been assumed that carbon will be used to treat VOCs present in excavation water handled as part of this alternative. A detailed evaluation of the water treatment remedy will be required as part of the remedial design. Confirmation samples will be collected and analyzed for VOCs and PCBs prior to discharging the water. For the purposes of this FFS, it has been assumed that treated water can be discharged to the East Swale (Figure 1-2).

To promote biological degradation of residual TCE at the terminal depth of the excavations, the bottom 4 feet will be backfilled with a 50/50 blend of mulch and gravel. Approximately 195 cubic yards each of mulch and gravel will be required. The mulch-gravel mixture will be covered with a geotextile fabric to reduce fouling. Clean backfill from a local borrow source will be used to backfill the remainder of the excavation. The site will be graded and re-seeded following backfill of the excavations.

4.4 Alternative 3—Soil Mixing with Zero Valent Iron and Long-Term Management

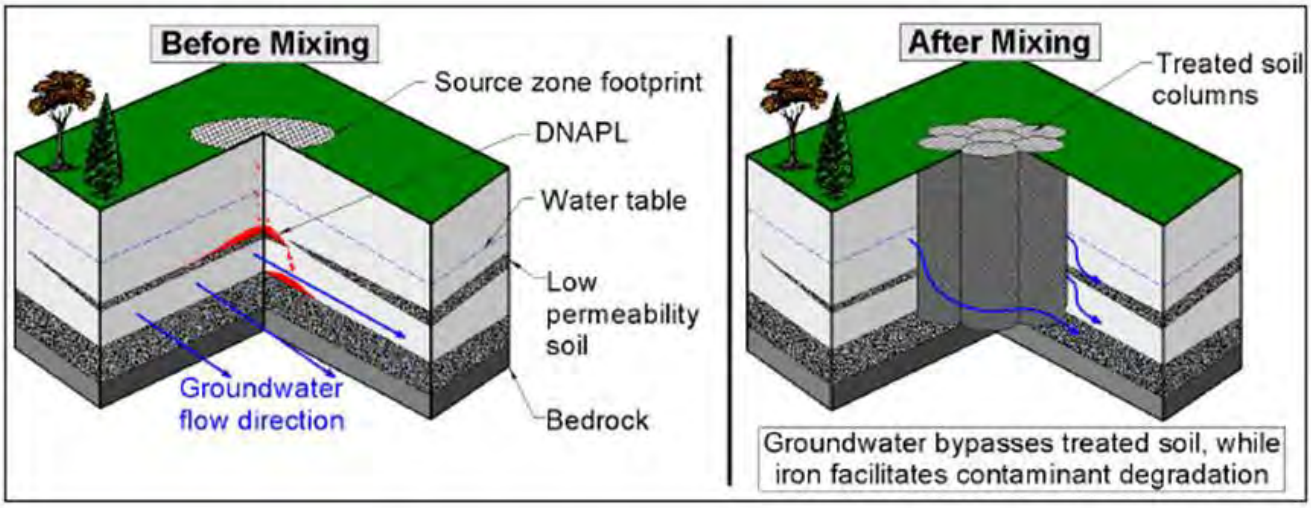
Alternative 3 consists of mixing soil with a clay and ZVI mixture to treat the source area indicative of NAPL around SB-144, the hot spot source area around SB-140/SB-126, and the hot spot source area around SB-142 (Figure 4-2). At least a 99 percent source removal has routinely been demonstrated across the industry when soil mixing with a clay and ZVI mixture is implemented as the technology for source area treatment. Therefore, it is reasonable to assume that soil mixing with a clay and ZVI mixture would remove 99 percent of the source within the target treatment zones. To minimize the effects of soil mixing activities on nearby structures, a minimum 20-foot offset will be maintained between the target treatment zone and Building I-1-2. No utilities or monitoring wells are present within the soil mixing target treatment zones.

Before soil mixing commences, the top 3 feet of soil within the proposed mixing area will be excavated to form a temporary impoundment for material handling and mixing operations. For the purposes of this FFS, it has been assumed that the excavated soil will be suitable for use to construct a berm around the mixing area to control surface water runoff and contain mixed materials and water generated during the mixing process.

During implementation, the soil mix rig will be tracked into position over a predesigned and surveyed grid network. To ensure uniform mixing and treatment within the soil mixing area, soil mixing columns typically overlap between 25 and 35 percent. The center-to-center distance between the columns will be spaced to account for overlap of adjacent columns. Assuming a 10-foot auger diameter, approximately 16 columns will be advanced to bedrock (approximately 33 feet bgs) within the source area indicative of NAPL around SB-144, and approximately 8 columns will be advanced to bedrock (approximately 48 feet bgs) in the hot spot source areas around SB-140/SB-126 and SB-142. A mix design of 2.5 percent ZVI and 1 percent bentonite has been assumed for the target treatment zone. A bench scale study is recommended to optimize the amount of ZVI and clay to be added during mixing. Based on this assumption, the total amount of ZVI required is estimated to be 46 tons, and the total amount of bentonite required is estimated to be 18 tons.

Following completion of soil mixing activities, the bermed soil will be regraded across the soil mixing area. Because of the time required for the mixed soil to stabilize, a chain link fence will be installed around the mixing area to prevent unauthorized persons and vehicles from passing across the structurally unstable soil.

FIGURE 4-3
Conceptual Overview of Soil Mixing



4.5 Alternative 4—Source Area Thermal Conductive Heating and Long-Term Management

Alternative 4 consists of implementing thermal conductive heating within the source area indicative of NAPL around SB-144, the hot spot source area around SB-140/SB-126, and the hot spot source area around SB-142 (Figure 4-4). At least a 99 percent source removal has routinely been demonstrated across the industry when thermal conductive heating is implemented as the technology for source area treatment. Therefore, it is reasonable to assume that thermal conductive heating would remove 99 percent of the source within the target treatment zones. As part of the alternative, a network of heater wells will be installed within the target treatment zone. The heater wells will vertically extend from approximately 8 to 5 feet into bedrock. The heater wells extend above the water table to heat the vadose zone and promote the upward vertical migration and capture of TCE volatilized in the saturated zone. If the zone above the water table is not heated, TCE condensation in the vadose zone could occur, resulting in incomplete remediation. To effectively treat the lower portion of the target treatment zone, the heater wells will extend into bedrock.

TCE volatilized by subsurface heating will be captured by a network of vertical soil vapor extraction (SVE) wells installed within the target treatment zone and screened across the vadose zone at depths ranging from near ground surface to the groundwater table. SVE wells will maintain a negative pressure (that is, capture zone) in soil above the groundwater table. Ancillary wells installed as part of this process include temperature and pressure monitoring wells. Temperature monitoring points will extend the full length of the heated vertical interval, and pressure monitoring wells will be installed in the vadose zone to ensure pneumatic capture of the treatment area is maintained during system operation. The following is a summary of the subsurface infrastructure proposed as part of this alternative:

- Heater wells—21
- Vertical SVE wells–12
- Temperature wells–8
- Pressure wells–8

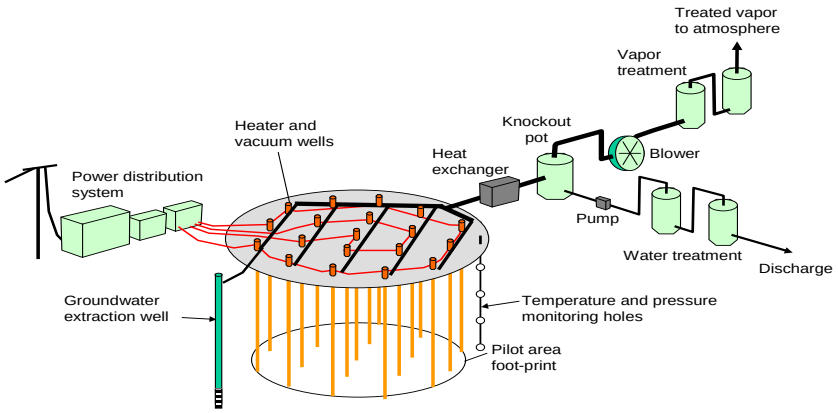
High subsurface temperatures that will result from the alternative require wells within and immediately surrounding the target treatment zone to be constructed of steel.

Soil vapor and condensate extracted by SVE wells in both target treatment zones will be treated by a process equipment package unit comprised of heat exchangers, vapor/liquid separators, and a vacuum blower. Ancillary equipment includes power distribution equipment for the heater wells and a control room trailer. Process vapor

will be treated using granular activated carbon prior to atmospheric discharge. Liquids recovered by the system will pass through an oil and water separator. Contaminated water generated as part of the condensate recovery process will be containerized for disposal. Process water will be further treated. Confirmation samples will be collected prior to discharging the water. For the purposes of this FFS, it has been assumed that treated water can be discharged to the East Swale.

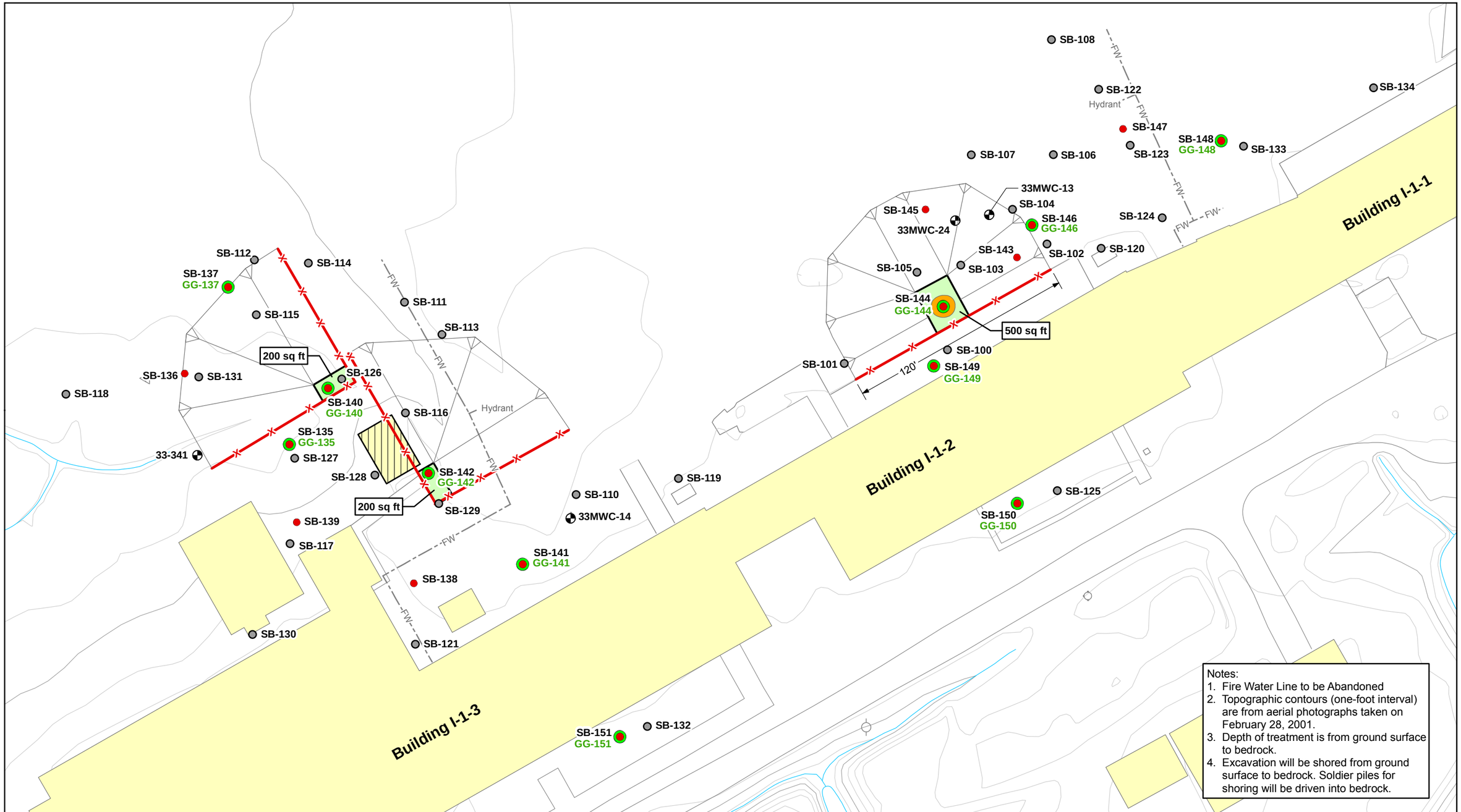
A conceptual layout of a thermal conductive heating system is presented in Figure 4-5. The process equipment will require installation of a new power feed from the closest available supply that can meet the system's power requirements. The power company (Ameren UE) indicated that electric service is not available to meet the 600-kilowatt power requirement. Therefore, it is assumed that a power drop and transformer will need to be installed to meet the power requirement.

FIGURE 4-5
Conceptual Overview of Thermal Conductive Heating System (From TerraTherm)



4.6 Alternative 5—Long-Term Management

Alternative 5 consists of implementing the groundwater sampling program specified in Section 4.1.2. The alternative assumes no source area soil removal or treatment and relies on natural attenuation to reduce TCE mass in soil and groundwater.



Notes:
1. Fire Water Line to be Abandoned
2. Topographic contours (one-foot interval) are from aerial photographs taken on February 28, 2001.
3. Depth of treatment is from ground surface to bedrock.
4. Excavation will be shored from ground surface to bedrock. Soldier piles for shoring will be driven into bedrock.

N

0 25 50 Feet

LEGEND

- Groundwater Monitoring Well
- Historic Soil Boring
- Supplemental Investigation Soil Boring Location
- Supplemental Investigation Soil Boring Location with Co-located Grab Groundwater Sample
- Concrete Pads, Roads, and Walkways
- Surface Water
- Topographic Contour
- FW Fire Water Line
- Slope Indicator (Slope = 1.5 : 1)
- Excavation Shoring
- Source Area Indicative of NAPL
- Target Treatment Zone
- Building
- Building to be Demolished

FIGURE 4-1
Alternative 2—Excavation and Long-Term Management
Focused Feasibility Study Revision 4
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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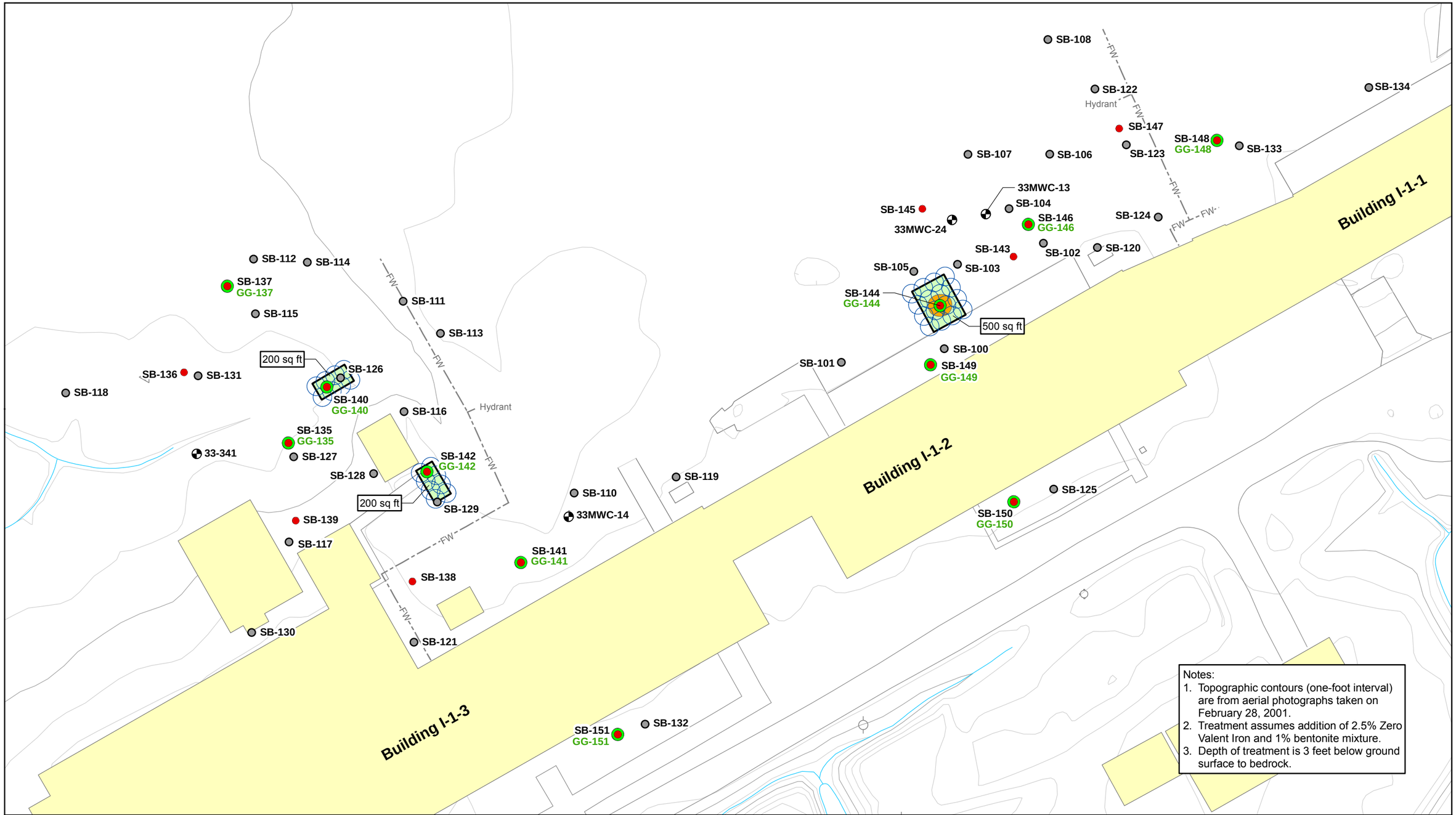

LEGEND

- Groundwater Monitoring Well
- Historic Soil Boring
- Supplemental Investigation Soil Boring
- Supplemental Investigation Soil Boring with Co-located Grab Groundwater Sample
- Building
- Concrete Pads, Roads, and Walkways
- Surface Water
- Topographic Contour
- FW Fire Water Line
- Source Area Indicative of NAPL
- Target Treatment Zone
- Soil Mixing Columns 10 foot diameter

N

0 25 50 Feet

FIGURE 4-2
Alternative 3—Soil Mixing with Zero Valent Iron and Long-Term Management
Focused Feasibility Study Revision 4
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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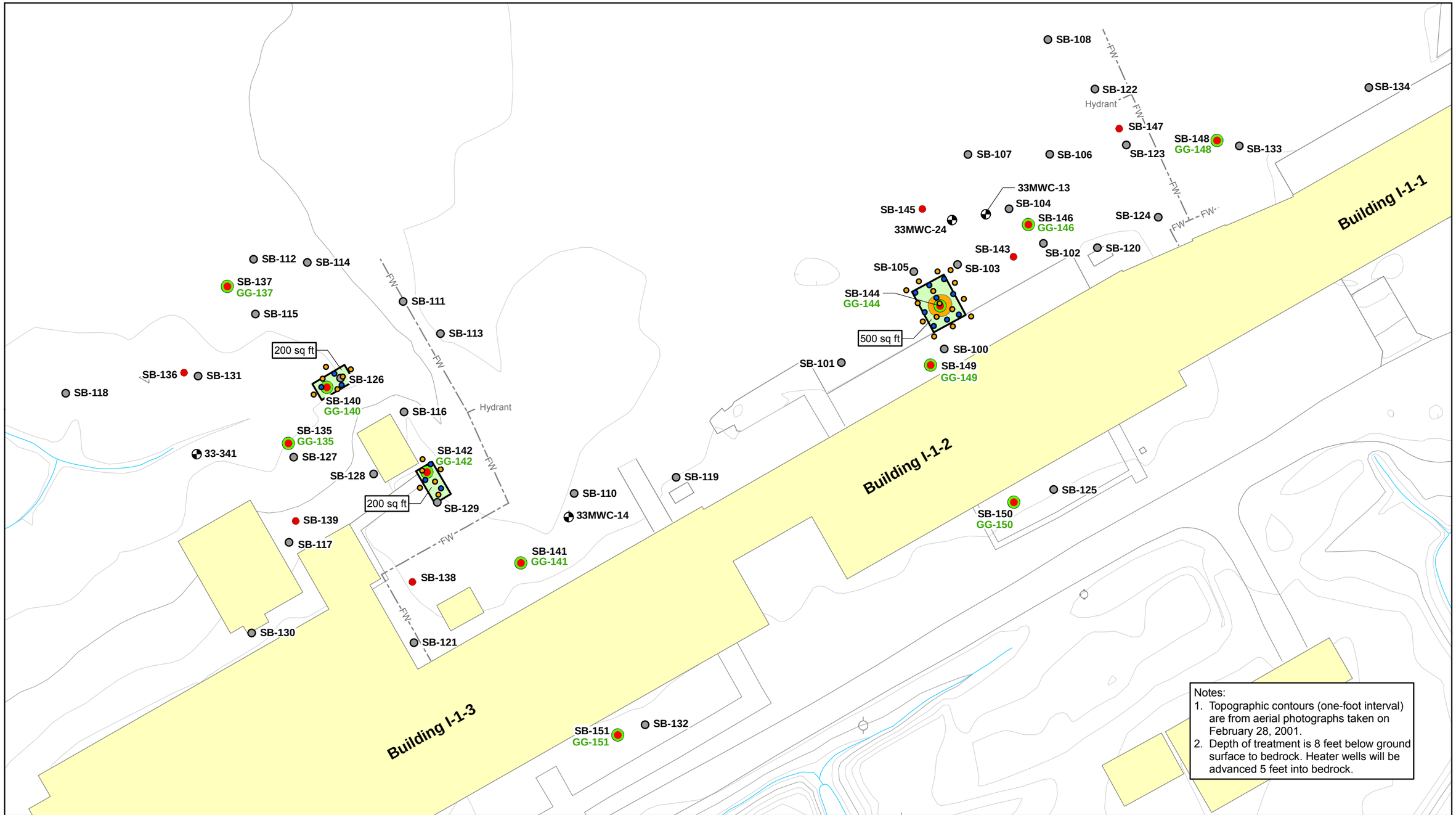

LEGEND

- Groundwater Monitoring Well
- Historic Soil Boring
- Supplemental Investigation Soil Boring
- Supplemental Investigation Soil Boring with Co-located Grab Groundwater Sample
- Building
- Concrete Pads, Roads, and Walkways
- Surface Water
- Topographic Contour
- FW Fire Water Line
- Source Area Indicative of NAPL
- Target Treatment Zone
- Heater Well
- SVE Well

N

0 25 50 Feet

FIGURE 4-4
Alternative 4—Thermal Conductive Heating and Long-Term Management
Focused Feasibility Study Revision 4
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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SECTION 5

Comparative Analysis of Alternatives

The comparative analysis presents the information needed to compare the remedial alternatives developed in this FFS. Tables 5-1 through 5-5 compare each alternative against the evaluation criteria presented in Section 5.

5.1 Evaluation Criteria

The evaluation criteria allow comparison of the relative performance of the alternatives and provide a means for identifying their relative advantages and disadvantages. In accordance with the NCP, remedial actions must accomplish the following:

- Be protective of human health and the environment
- Attain Applicable or Relevant and Appropriate Requirements (ARARs) or provide justification for waiving ARARs that cannot be achieved
- Be cost-effective
- Use permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable
- Satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element

Provisions of the NCP require that each alternative be evaluated against nine criteria listed in 40 CFR 300.430(e)(9). The criteria were published in the *Federal Register* for March 8, 1990 (USEPA 1990b), to provide grounds for comparing the relative performance of the alternatives and identifying their advantages and disadvantages. The approach is intended to provide sufficient information to adequately compare the alternatives and to select the most appropriate alternatives for implementation at the site as a remedial action. The following are the evaluation criteria:

1. Overall protection of human health and the environment
2. Compliance with ARARs
3. Long-term effectiveness and permanence
4. Reduction of toxicity, mobility, or volume through treatment
5. Short-term effectiveness
6. Implementability
7. Cost
8. State acceptance
9. Community acceptance

There are three types of evaluation criteria: threshold, balancing, and modifying.

5.1.1 Threshold Criteria

Threshold criteria must be met by a particular alternative for it to be eligible for selection as a remedial action. The two threshold criteria are overall protection of human health and the environment and compliance with ARARs.

5.1.1.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment is the primary requirement that remedial actions must meet under CERCLA. The evaluation criterion is an assessment of whether each alternative achieves and maintains adequate protection of human health and the environment. A remedy is protective if it adequately eliminates, reduces, or controls all current and potential risks posed by the site through each applicable exposure pathway.

5.1.1.2 Compliance with ARARs

Compliance with ARARs is one of the statutory requirements of remedy selection. The evaluation criterion is used to determine whether an alternative meets the federal, state, and local ARARs identified for the site. Evaluation of

this criterion includes identifying significant ARARs for each alternative and describing whether these can be met. If ARARs cannot be met, a waiver may be obtained when one of the six exceptions in the NCP occurs (see 40 CFR 300.430[f][1][ii][C] [1 to 6]). No federal, state, or local permits are required for onsite response actions conducted pursuant to CERCLA sections 104, 106, 120, 121, or 122. The exemption applies to all administrative requirements. However, the substantive requirements of applicable permits must be met.

ARARs presented in Revision 3 of the FFS are still applicable for the remedial alternatives evaluated in this FFS. The following is a summary of additional ARARs identified for the alternatives. In some cases, the regulatory acts or provisions are the same, but additional parts are referenced. For the purposes of this FFS, ARARs from Revision 3 of the FFS are not presented again in the summary below. Table 5-6 lists the ARARs presented in Revision 3 of the FFS and the ARARs presented herein, and describes how the ARAR is met for each alternative (if applicable).

Federal ARARs

Hazardous Materials Transportation Act

49 CFR 100 to 109 specifies requirements for the transportation of hazardous materials, specifically U.S. Department of Transportation requirements for labeling, packaging, shipping papers, and transport by rail, aircraft, vessel, and highway. This is an ARAR because the remedial alternatives evaluated in this FFS will require the offsite shipment of hazardous waste.

Clean Air Act

The Clean Air Act (40 CFR 51 to 99) is intended to protect the quality of air and promote public health. Title I of the Act directed the USEPA to publish national ambient air quality standards (NAAQS) for "criteria pollutants." The NAAQS Section 109 provides specific requirements for air emission including, but not limited to, particulates, VOCs, and hazardous air pollutants. USEPA also has provided national emission standards for hazardous air pollutants (HAPs) under Title III of the Clean Air Act. HAPs are those pollutants known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects and are designated hazardous substances under CERCLA. The Clean Air Act amendments of 1990 greatly expanded the role of National Emission Standards for HAPs by designating 179 new HAPs and directed the USEPA to attain maximum achievable control technology standards for emission sources. Such emission standards are potential ARARs for remedial alternatives producing air emissions or regulated HAPs.

The Act is considered an ARAR for remedial alternatives where discharge of vapors to atmosphere will occur through the handling or processing of contaminated media. IAC Title 35, Subtitle B: Air Pollution, discussed below, contains requirements that pertain to allowable emissions from construction activities. A plan to measure and mitigate air emissions during implementation of the selected remedial alternative will be required as part of the remedial design.

New Source Performance Standards.

New Source Performance Standards (NSPS) are technology-based standards that apply to specific categories of stationary sources. The NSPS apply to new, modified, and reconstructed facilities in specific source categories. The NSPS are developed and implemented by USEPA and delegated to the states. However, even when delegated to the states, USEPA retains authority to implement and enforce the NSPS. NSPS applicable to the remedial alternatives include 40 CFR 60 Subpart KB (volatile organic liquid storage vessels) and, depending on the construction equipment used, 40 CFR 60 Subpart IIII (stationary compression ignition internal combustion engines) or JJJJ (stationary spark ignition internal combustion engines).

Cultural Resources

The Native American Graves and Repatriation Act (43 CFR 10.4) addresses the protection of human remains, funerary objects, sacred objects, or objects of cultural patrimony for Native Americans. The

presence of archaeological resources is addressed by 43 CFR 7. If remediation activities disturb Native American graves or archeological resources, then the appropriate regulations would be ARARs.

State ARARs

Waste Disposal

35 IAC Parts 720 to 723, 725 to 727, and 729 addresses the hazardous waste disposal requirements under RCRA. The authority for implementation of RCRA in Illinois was given to the State of Illinois (Illinois EPA). ARARs required by the State of Illinois, which implements the RCRA requirements and standards, are listed below. The standards are applicable to hazardous waste generators, transporters, and operators or hazardous waste treatment storage and disposal facilities.

Hazardous Waste Operating Requirements. 35 IAC 721 is an ARAR for the requirements of identifying, listing, and managing hazardous waste. It states that soils must be managed as hazardous waste if they contain listed hazardous waste or are identified as characteristic hazardous waste. Management of treatment residuals may be subject to RCRA if residuals retain characteristics of hazardous waste.

Remediation Waste Staging Piles. If excavated soils fail the TCLP analysis for a hazardous waste characteristic, then the soil would need to be managed as a hazardous waste. If such soil were stockpiled on site (for example, while waiting for analytical results), the requirements for a RCRA remediation waste staging pile under 35 IAC 724.654 would be an ARAR.

Standards Applicable for Transporters of Hazardous Waste. 35 IAC 723 is an ARAR implementing requirements of the transport of hazardous waste, including the U.S. Department of Transportation regulations, manifests, record keeping, and discharge cleanup.

Solid Waste and Special Waste Hauling

Under 35 IAC Parts 807, 809, and 810, requirements are described for solid waste and special waste hauling. It states that special waste must be treated, stored, or disposed of at a facility permitted to manage special waste. The special waste classes and the method to determine whether the solid waste is a special waste, Class A (all non-Class B special wastes) or Class B (low or moderate hazard special wastes), are presented in these parts of IAC Title 35. RCRA hazardous waste is not included within the special waste classes. This is an ARAR for the disposal of solid waste and special waste resulting from the remedial alternatives. Contaminated soil from the remedial alternatives, which are not designated as a RCRA hazardous waste, would be required for evaluation to determine whether it is a Class A or B special waste. The potential offsite disposal of special waste must be conducted at a solid waste landfill permitted to receive that special waste class, unless the Illinois EPA specifically allows otherwise.

Stormwater Control

USEPA has delegated authority for stormwater programs required by 40 CFR 123.25 to Illinois Environmental Protection Agency. As part of implementing the stormwater program, Illinois Environmental Protection Agency has issued a Construction Stormwater General Permit for construction that disturbs one acre or more. The General Permit includes requirements to protect stormwater runoff from being contaminated by equipment and chemicals used on the site, and from sediments that may be transported in stormwater. The substantive requirements of the General Permit are ARARs, and the requirements include actions such as the development of a stormwater pollution prevention plan, the use of best management practices to keep runoff clean, and maintenance of best management practices until the site has been stabilized.

Air Pollution

35 IAC Subtitle B: Air Pollution is an ARAR for remedial alternatives that involve the creation of air emissions such as excavation activities (all alternatives) or creation of vapors (Alternative 4). This ARAR contains all of the State of Illinois regulations and specific requirements for allowable emissions of criteria pollutants from a range of air contaminant source categories and processes. It also describes the permits and emission standards enacted to protect air quality. The following ARARs are provided within Subtitle B:

Air Pollution, and also apply to the activities during the remedial alternatives that result in air emissions. Substantive requirements for air emission control must be followed:

Visible and Particulate Matter Emissions. Regulations containing specific requirements that pertain to allowable emissions of fugitive particulate matter are provided in 35 IAC Part 212. Dust control will be implemented to control visible particulate emissions during construction activities.

Odors. 35 IAC Part 245 contains regulations that specify how nuisance odors are detected. An objectionable odor nuisance exists on or adjacent to industrial premises when odor is detectable in the ambient air after it is diluted with 24 volumes of odor-free air as measured by a Scentometer. The potential for odors to meet these standards during the remedial alternatives s is present. Appropriate and necessary odor control will be implemented if it is determined that a nuisance odor exists.

Noise

35 IAC Parts 900, 901, and 910 provide the regulations containing specific requirements that pertain to nuisance noise levels and the sound emission standards and limitations. The remedial alternatives could potentially create nuisance noise levels, and therefore, will adhere to all appropriate and necessary noise level controls.

5.1.2 Balancing Criteria

The five balancing criteria weigh the tradeoffs among alternatives. The following subsections describe the five balancing criteria.

5.1.2.1 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence reflect the CERCLA emphasis on implementing remedies that will provide protection of human health and the environment in the long term. Under this evaluation criterion, results of a remedial alternative are evaluated in terms of the risk remaining at the site after RAOs are met. The primary focus of this evaluation is the extent and effectiveness of the actions or controls that may be required to manage the risk posed by the remedial alternative or by residual, untreated contamination.

Factors to be considered are magnitude of residual risk and adequacy and reliability of controls. Magnitude of residual risk is defined as the risk remaining from untreated waste or treatment residuals after remediation. Adequate and reliable controls are those that can be used to manage treatment residuals or residual contamination that remains at the site.

5.1.2.2 Reduction of Toxicity, Mobility, or Volume through Treatment

The evaluation criterion concerns the statutory preference for remedies that employ treatment to reduce the toxicity, mobility, or volume of the hazardous substances. The preference is satisfied when treatment is used to reduce the principal threats at a site through destroying toxic contaminants, reducing contaminant mobility, or reducing the total mass or total volume of contaminated media. The criterion is specific to evaluating only how the treatment reduces toxicity, mobility, or volume.

5.1.2.3 Short-Term Effectiveness

The criterion focuses on short-term impacts of the remedial alternatives by examining the effects of alternatives on human health and the environment between the time the remedy is implemented and RAOs are met. As outlined by USEPA (1988), the criterion includes four analysis factors: (1) protection of the community during remedial actions, (2) protection of workers during remedial actions, (3) environmental impacts, and (4) time until remedial response objectives are achieved.

Protection of the Community during Remedial Action

The factor addresses any risk that results from implementing the alternative, such as dust from excavation, transportation of hazardous materials, or air quality impacts from remedial operations that may affect human health.

Protection of Workers during Remedial Action

The factor assesses threats posed to workers and the effectiveness and reliability of protective measures that would be taken.

Environmental Impacts

The factor addresses the potential adverse impacts that may result from implementing and operating a remedial alternative and evaluates the reliability of available mitigation measures. Although protection of human health and the environment is a threshold criterion in the feasibility study process, the factor addresses the overall environmental impact of implementing the remedial alternative.

Sustainability

Sustainability is not one of the nine evaluation criteria. However, when comparing alternatives, opportunities for green and sustainable solutions are being considered to reduce the environmental footprint of remedy components and consider the overall net environmental and social (as worker safety) impact. A comparative sustainability analysis was prepared for Revision 4 of the FFS using SiteWise™ Version 2.0 (Battelle 2011).

SiteWise™ is a stand-alone qualitative tool that assesses the environmental footprint of remedial actions in terms of a consistent set of sustainability metrics: greenhouse gas (GHG) emissions, energy use, criteria air emissions (including nitrogen oxides [NOx], sulfur oxides [SOx], and particulate matter less than 10 microns in diameter [PM_{10}]), water consumption, and worker safety. SiteWise™ provides a comparative assessment of different remedial alternatives based on significant life-cycle impacts of each alternative, including material production (for example, steel, ZVI, etc.); transportation of equipment, personnel, and materials to and from the site; equipment use during implementation; and electricity use.

5.1.2.4 Implementability

The implementability criterion relates to the technical and administrative feasibility of executing an alternative and the availability of various services and materials required during its implementation. Technical feasibility includes construction, operation, reliability of technology, ease of undertaking additional remedial action, and monitoring. Administrative feasibility refers to the activities needed to coordinate with other offices and agencies (for example, local permits). Availability of services and materials includes the following: availability of adequate offsite treatment, storage capacity, and disposal services; necessary equipment and specialists; services and materials; and prospective technologies.

5.1.2.5 Cost

For the detailed cost analysis of alternatives, cost estimates were developed with an accuracy of -30 percent to +50 percent. The estimates were prepared in 2011 dollars and based on a conceptual design from information available at the time the FFS was prepared. Actual costs will depend on the final scope and design of the selected remedial action, the implementation schedule, competitive market conditions, and other variables. Most of the factors are not expected to affect the relative cost differences between alternatives. Present-worth analyses were conducted for remedial actions with more than a 1-year implementation time frame. A discount factor of 3.1 percent was used. Cost estimates for each alternative are provided in Appendix C.

5.1.3 Modifying Criteria

The modifying criteria are community and state acceptance. These are evaluated following public comment and are used to modify the selection of the recommended alternative. Community and state acceptance are not addressed in the FFS but will be addressed during the Proposed Plan phase of the CERCLA process for Plume 2.

5.2 Performance Monitoring

The performance of any of the proposed remedial alternatives is usually evaluated on a periodic basis (at least once every 5 years after initiating action or, if the operation is less than 5 years, at the end of remedial action) until it is determined that contaminants no longer pose a threat to human health and the environment. Based on each review, called a “5-year review,” a report is typically prepared that evaluates the performance of the system and recommends either operational changes, a significant modification of the remedy, or an application for ARAR waivers, if necessary. If a significant modification of the remedy is required, a ROD amendment or an ESD may be

necessary before it can be implemented. For example, if an innovative technology has been found to be applicable to the site, it may be included in the remedial action.

Performance monitoring and treatability studies would provide actual data regarding projected remediation periods and residual risks associated with the various remedial alternatives. Before obtaining these data, residual risk is very difficult to estimate.

5.3 Comparative Analysis of Remedial Alternatives

Based on the analysis of each remedial alternative to the evaluation criteria, an analysis is performed to compare the relative performance of the five alternatives in relation to each specific evaluation criterion.

5.3.1 Overall Protection of Human Health and Environment

All alternatives are protective of human health and the environment. Although LUCs are in place for CONWR prohibiting installation of production wells, Alternative 1 is not as protective as the remaining alternatives because it does not include source area treatment or long-term management of the dissolved TCE groundwater plume. Alternative 5 is not as protective as Alternatives 2 through 4 because it does not include source area treatment. Alternatives 2 through 4 are nearly equal in protecting human health and the environment through the use of source area treatment, long-term management, and LUCs.

5.3.2 Compliance with ARARs

Alternatives 2 through 5 comply with the action-, chemical-, and location-specific ARARs. Alternative 1 does not comply with the groundwater monitoring requirements of RCRA (40 CFR 264, Subpart F). The RTFs for Alternatives 2 through 5 (Section 5.3.3) are the range of RTFs estimated to achieve compliance with the chemical-specific ARAR, 35 IAC Part 620—Groundwater Quality, Subpart D, Section 620.410. With Alternative 1, the absence of groundwater monitoring precludes the ability to monitor changes in groundwater quality standards and the plume geometry relative to the LUC boundaries.

5.3.3 Long-Term Effectiveness and Permanence

Alternatives 1 and 5 will take much longer than the remaining alternatives to provide long-term effectiveness and permanence because high TCE concentrations detected at the soil and bedrock interface within the target treatment zones will continue to diffuse into groundwater. Alternatives 2 through 4 provide long-term effectiveness and permanence in a shorter duration through a combination of source area treatment and natural attenuation processes.

Numerical modeling was used to evaluate Alternatives 1 through 5 and to assess RTFs. An estimated TCE half life of 5, 10, and 20 years was assumed as part of the modeling effort to estimate a remedial timeframe range. Details of the modeling results are provided in Appendix B. Based on numerical modeling, the overall RTFs for each of the alternatives are as follows:

- Alternative 1—greater than 500 years
- Alternative 2—75 to 280 years
- Alternative 3—75 to 280 years
- Alternative 4—75 to 280 years
- Alternative 5—greater than 500 years

The size of the dissolved TCE plume is the driver for the overall RTF. Alternatives 2 through 4 assume an active source area RTF of less than 1 year. However, the active and overall RTFs are only an estimate. Variability in the site-specific geologic and hydrogeologic conditions and chemical fate and transport that cannot be completely accounted for in the modeling may affect the RTFs for each alternative.

Regardless as to whether source area treatment is implemented or not, computer modeling indicates dissolved TCE mass will slowly attenuate in groundwater outside the target treatment zone. With Alternatives 2 through 4, the numerical model estimates the leading edge of the plume will continue to expand downgradient in a similar

manner to Alternatives 1 and 5 until natural attenuation has sufficiently reduced TCE mass flux across the plume. When this occurs, the leading edge of the dissolved TCE plume will regress.

5.3.4 Reduction of Toxicity, Mobility, and Volume

The more active the treatment, the more reduction of toxicity, mobility, and volume is obtained. Although all alternatives rely on natural attenuation to reduce toxicity, mobility, and volume of sorbed and dissolved TCE mass, Alternatives 2 through 4 will reduce toxicity, mobility, and volume of TCE detected in the target treatment zones further than Alternatives 1 and 5. Because of benching and sloping required to reach the target excavation depth, Alternative 2 will result in the excavation and disposal of a larger volume of soil outside the limits of the target treatment zones containing TCE mass than the volume of soil targeted in situ by Alternatives 3 and 4. The modeling assumed 99 percent source removal within the target treatment zone within a 1-year active RTF for Alternatives 2 through 4.

5.3.5 Short-Term Effectiveness

Alternative 2 had the highest GHG, total energy, criteria air pollutants (NOx and PM_{10}), and accident risk footprints compared with Alternatives 3 and 4. Transportation of hazardous and non-hazardous soil from the site to landfills and backfill from borrow sources to the site were the major contributors to all footprints for Alternative 2. Assuming a soil bulk density of 1.69 tons per cubic yard and material will be transported in 20 ton loads, it would require approximately 2,069 truckloads to transport soil offsite (466 truckloads of hazardous soil and 1,603 truckloads of nonhazardous soil). Backfill would require 5 truckloads of mulch, 5 truckloads of gravel, and 1,397 truckloads of borrow soil. Alternative 2 poses the highest risk footprint to both onsite workers and the community because of the volume of traffic transporting hazardous and non-hazardous waste from the excavation area to disposal facilities.

Alternative 3 had the lowest footprints in all categories because of the relatively short duration of onsite work (2 weeks of onsite construction time compared with an estimated 29 weeks for Alternative 2 and an estimated 10 weeks for Alternative 4) and the relatively small amount of materials manufactured and transported to the site.

Alternative 4 had medium GHG, total energy, and NOx footprints and high water usage and SOx footprints primarily due to emissions and water use from electricity used to power the system. The estimated power usage for Alternative 4 is 1,083,000 kilowatt-hours.

Alternatives 2 through 4 could also result in the generation of nuisance noise and odors to facility workers in the immediate area.

5.3.6 Implementability

Alternatives 1 and 5 are easily implemented technically. All of the alternatives evaluated in this FFS are easily implemented administratively.

Alternative 2 is technically feasible for removal of source area soil. However the depth of this excavation and presence of site encumbrances makes this alternative more difficult to implement than the other alternatives. The proximity of Building I-1-2 to one of the excavation areas and the depth to bedrock in the other two excavation areas requires soldier piles to be drilled into bedrock and lagging shoring to support the excavation sidewall parallel to Building I-1-2 and to support the excavation on two sides in the other two areas. The excavation depth will require the remaining sidewalls to be benched and sloped in a manner that results in the over-excavation and disposal of a volume of soil outside the target treatment zone limits that would not require disposal or treatment under Alternatives 3 and 4. The target excavation depth extends well below the water table, presenting excavation stability hazards and technical challenges that could limit the feasibility to effectively complete the excavation to the target limits. Excavation activities associated with Alternative 2 will require more time to implement than soil mixing operations associated with Alternative 3 due to the logistics associated with excavating, handling, and transporting a large volume of soil.

Alternative 3 is technically feasible and not as logistically challenging as Alternatives 2 and 4 to implement. Soil mixing operations associated with Alternative 3 will require less time to implement than excavation activities associated with Alternative 2 and construction, operation, and maintenance activities associated with

Alternative 4. The soil within the mixing area could remain structurally unstable for months to years following completion of soil mixing activities. The soil mixing area will need to be fenced off to prevent unauthorized access to or constructing on top of the soil mixing area before the soil has had time to stabilize.

Alternative 4 is technically feasible to implement at this site. Unlike the other alternatives, Alternative 4 will require installation of a power drop and transformer. A minimum lead time of 2 to 3 months is recommended to coordinate installation of electric utilities. Unlike Alternatives 2 and 3, follow-on maintenance of the remediation system will be required. Following active treatment and shutting down the system, the subsurface will need a cooling period before the system can be decommissioned. After adequate time has passed, the process equipment will be demobilized and the associated infrastructure (for example, wells, etc.) will need to be abandoned.

5.3.7 Cost

A cost estimate with an accuracy of -30 percent to +50 percent has been prepared for Alternatives 2 through 5. Vendors were consulted as necessary to obtain unit rates for excavation, soil mixing, and thermal treatment activities. Present worth costs were calculated using a discount factor of 3.1 percent and account for capital costs to implement the alternative plus 30 years of long-term management costs. Capital costs and present worth costs are presented in Tables 5-1 through 5-5. A detailed summary of the cost estimates and present worth calculations for each alternative is provided in Appendix C.

5.4 Comparative Analysis Summary

Table 5-7 presents a summary of the comparative analysis for Alternatives 1 through 5. As shown in the table, Alternatives 2 through 5 meet the threshold criteria of protectiveness of human health and the environment and compliance with ARARs. Alternative 1 does not meet the threshold criteria. According to the provisions of the NCP, Alternatives 2 through 5 can be evaluated further using the balancing criteria, and Alternative 1 cannot be evaluated further.

Alternatives 2 through 4 are equivalent when evaluating the balancing criteria of long-term effectiveness and permanence and reduction in toxicity, mobility, and volume through treatment. Alternative 5 does not meet the reduction of toxicity, mobility, and volume criteria because the alternative does not include source area treatment. This results in the remedial timeframe for TCE to reach the MCL under Alternative 5 being significantly longer than the timeframes estimated for Alternatives 2 through 4.

The balancing criteria that differentiate Alternatives 2 through 4 are short-term effectiveness, implementability, and cost. Alternative 2 is the most difficult to implement of the three alternatives because of the logistics required to excavate, transport, and backfill soil to the required target treatment depth. Additionally, Alternative 2 poses the highest risk to workers and the community and results in the highest environmental footprint due to the large quantity of haul trucks required to transport hazardous and non-hazardous soil to licensed disposal facilities and backfill materials on public roads and highways. Alternatives 3 and 4 are equally complex in terms of implementability, but Alternative 4 requires installation of an electric utility line and maintenance of the process equipment during the time at which the thermal conductive heating system is operating. In terms of present value, Alternative 3 is less costly than Alternatives 2 and 4.

TABLE 5-7
Comparative Analysis of Alternatives
Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Remedial Alternatives	Protectiveness	Compliance with ARARs	Long-term Effectiveness and Permanence	Reduction in TMV through Treatment	Short-term Effectiveness	Implementability	Present Value Cost (millions of dollars)
Alternative 1: No Action	Yes	No	Yes	No	Yes	Easy	$0.00
Alternative 2: Excavation and Long-Term Management	Yes	Yes	Yes	Yes	Yes	Difficult	$9.96
Alternative 3: Soil Mixing with Zero Valent Iron and Long-Term Management	Yes	Yes	Yes	Yes	Yes	Moderate	$1.27
Alternative 4: Thermal Conductive Heating and Long-Term Management	Yes	Yes	Yes	Yes	Yes	Moderate	$3.96
Alternative 5: Long-Term Management	Yes	Yes	Yes	No	Yes	Easy	$0.34

ARAR = Applicable or Relevant and Appropriate Requirement

TMV = Toxicity, Mobility, and Volume

TABLE 5-1

Evaluation of Alternative 1—No Action

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
1. Overall protection of human health and the environment	This alternative will provide protectiveness through degradation of the TCE plume via natural attenuation. Existing LUCs implemented prohibit installation of production wells within the boundaries of the former IOP at CONWR.
2. Compliance with ARARs	Does not comply with the groundwater monitoring requirements of RCRA (40 CFR 264, Subpart F).
3. Long-term effectiveness and permanence	
(a) Magnitude of residual risks	Based on site soil and groundwater data, computer modeling indicates untreated NAPL and sorbed and dissolved TCE mass will persist in the source and dissolved portions of the plume, respectively. The leading edge of the plume will expand downgradient until natural attenuation has sufficiently reduced TCE mass flux across the plume, ultimately resulting in regression of the plume leading edge.
(b) Adequacy and reliability of controls	This alternative appears to be capable of meeting RAOs for the TCE plume. However, the alternative does not include monitoring to confirm controls (LUCs) are maintained until RAOs have been achieved
4. Reduction in TMV	
(a) Treatment process used and materials treated	Natural attenuation.
(b) Degree and quantity of TMV and volume reduction	Contaminant TMV of the TCE plume is expected to slowly decrease with time.
(c) Irreversibility of TMV reduction	Irreversible.
(d) Type and quantity of treatment residuals	None.
5. Short-term effectiveness	
(a) Protection of workers during remedial action	Not applicable.
(b) Protection of community during remedial action	Alternative is protective of community as the TCE plume is not expected to migrate beyond the IOP boundary. Existing LUCs implemented prohibit the use and installation of production wells within the IOP boundary.
(c) Environmental impacts of remedial actions	Not applicable.
(d) Time to reach RAOs	Groundwater modeling results estimate TCE degradation to MCLs will not occur for > 500 years (assuming a TCE half-life of both 10 and 20 years).
(e) Sustainability	Not applicable.

TABLE 5-1

Evaluation of Alternative 1—No Action

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
6. Implementability	
(a) Technical feasibility	Not applicable.
(b) Administrative feasibility	Not applicable.
(c) Availability of services and materials	Not applicable.
7. Costs	Capital Cost: $0 Present Worth Cost: $0

NOTES:

ARAR = Applicable or Relevant and Appropriate Requirement

CONWR = Crab Orchard National Wildlife Refuge

IOP = Illinois Ordnance Plant

LUC = Land Use Control

MCL = Maximum Contaminant Level

RAO = Remedial Action Objective

TCE = Trichloroethene

TMV = Toxicity, Mobility, and Volume

TABLE 5-2

Evaluation of Alternative 2—Excavation and Long-Term Management

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
1. Overall protection of human health and the environment	This alternative will provide protectiveness through NAPL zone soil removal and degradation of the dissolved TCE plume via natural attenuation. Existing LUCs implemented prohibit installation of production wells within the boundaries of the former IOP at CONWR.
2. Compliance with ARARs	Complies with ARARs
3. Long-term effectiveness and permanence	
(a) Magnitude of residual risks	Based on site soil and groundwater data, computer modeling indicates residual sorbed and dissolved TCE mass will slowly attenuate outside the target treatment zone. The leading edge of the plume will continue to expand downgradient until natural attenuation has sufficiently reduced TCE mass flux across the plume, which will ultimately result in regression of the leading edge of the plume. Untreated soil excavated from NAPL zone will be transported to an offsite disposal facility, thereby transferring risk from the site to the disposal facility.
(b) Adequacy and reliability of controls	This alternative appears to be capable of meeting RAOs for the TCE plume. LUCs will need to remain in place and monitoring will need to be conducted to confirm controls are maintained until RAOs have been achieved.
4. Reduction in TMV	
(a) Treatment process used and materials treated	Excavate soil from ground surface to bedrock (approximately 33 feet bgs) within the defined target treatment zone. Excavation of soil outside target treatment zone will be required to accomodate sloping of excavation sidewalls. Excavation will be backfilled with 4 feet of a mulch/gravel mixture to promote biodegradation of residual TCE at soil/bedrock interface. Following active remediation, natural attenuation will reduce residual TCE mass in the dissolved plume. Long-term groundwater monitoring will be performed to monitor changes in TCE concentrations and mass in the dissolved plume.
(b) Degree and quantity of TMV reduction	Contaminant TMV will be reduced in the NAPL zone via soil removal. Modeling estimates that soil removal in the NAPL zone will reduce the remediation timeframe by at least 220 to 355 years. A 99 percent effective source mass removal was assumed to model remedial timeframes.
(c) Irreversibility of TMV reduction	Excavation will permanently remove TCE mass from the NAPL zone. Back diffusion may occur between native soil containing residual TCE mass and clean backfill material.
(d) Type and quantity of treatment residuals	Remediation wastes generated during active remediation and groundwater sampling will be managed in accordance with ARARs. These wastes include excavated soil, excavation water, and purged groundwater.

TABLE 5-2

Evaluation of Alternative 2—Excavation and Long-Term Management

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
5. Short-term effectiveness	
(a) Protection of workers during remedial action	Workers may be exposed to vapors during the excavation and handling of contaminated soil that could require upgrade to higher levels of PPE. Additionally, there is inherent risk to workers in the presence of excavation and hauling equipment. Due to the size of the excavation areas, equipment and workers will be required to access the excavations; therefore, the excavations will need to be sloped and shored in accordance with OSHA regulations to protect workers and surrounding structures. The protection of workers will be achieved by developing a health and safety plan and implementing safe work procedures for excavation, injection, and groundwater sampling activities.
(b) Protection of community during remedial action	Disturbing and handling contaminated soil will volatilize VOCs and potentially produce odors down wind of excavation operations within the facility. Transportation of contaminated soil offsite and clean backfill onsite causes increased risks to the facility and surrounding community from the high volume of construction. Assuming soil bulk density is 1.69 tons per cubic yard and material will be transported in 20 ton loads, it would require approximately 664 truckloads to transport soil offsite (85 truckloads of hazardous soil and 579 truckloads of non-hazardous soil). Backfill would require 3 truckloads of mulch, 5 truckloads of gravel, and 656 truckloads of borrow soil. traffic.
(c) Environmental impacts of remedial actions	This alternative will produce the highest volume of contaminated soil to be disposed at offsite facilities. Groundwater removed during dewatering activities will be treated on site and discharged to the East Swale (unless a closer alternate discharge point is identified). Alternative 2 had the highest greenhouse gas, total energy, criteria air pollutants (NOx and PM¬10), and accident risk footprints compared with Alternatives 3 and 4.
(d) Time to reach RAOs	Groundwater modeling results estimate TCE degradation to MCLs will not occur for roughly 145 to 280 years (assuming a TCE half-life of 10 and 20 years, respectively).

TABLE 5-2

Evaluation of Alternative 2—Excavation and Long-Term Management

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
6. Implementability	
(a) Technical feasibility	Alternative 2 is technically feasible for removal of soil in the NAPL zone. However the depth of this excavation and presence of Building I-1-2 to the west makes this alternative more difficult to implement than the other alternatives. The proximity of Building I-1-2 to the excavation requires soldier piles to be drilled into bedrock and lagging shoring to support the excavation sidewall parallel to the building. The excavation depth will require the remaining sidewalls to be sloped in a manner that results in the over-excavation and disposal of soil outside the target treatment zone limits. The target depths extend well below the water table, presenting excavation stability hazards and technical challenges that could limit the feasibility to effectively excavate soil to the target limits.
(b) Administrative feasibility	Administratively feasible; alternative is anticipated to meet local, state, and federal requirements. Additionally, LUCs are already being implemented within the IOP boundary at CONWR.
(c) Availability of services and materials	Services and materials are readily available.
7. Costs	Capital Cost: $2,815,000 Present Worth Cost: $3,062,000

NOTES:

ARAR = Applicable or Relevant and Appropriate Requirement

RAO = Remedial Action Objective

TCE = Trichloroethene

TMV = Toxicity, Mobility, and Volume

TABLE 5-3

Evaluation of Alternative 3—Soil Mixing with Zero Valent Iron and Long-Term Management

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
1. Overall protection of human health and the environment	This alternative will provide protectiveness through NAPL zone soil treatment and degradation of the dissolved TCE plume via natural attenuation. Existing LUCs implemented prohibit installation of production wells within the boundaries of the former IOP at CONWR.
2. Compliance with ARARs	Complies with ARARs
3. Long-term effectiveness and permanence	
(a) Magnitude of residual risks	Based on site soil and groundwater data, computer modeling indicates residual sorbed and dissolved TCE mass will slowly attenuate outside the target treatment zone. The leading edge of the plume will continue to expand downgradient until natural attenuation has sufficiently reduced TCE mass flux across the plume, which will ultimately result in regression of the leading edge of the plume.
(b) Adequacy and reliability of controls	This alternative appears to be capable of meeting RAOs for the TCE plume. LUCs will need to remain in place and monitoring will need to be conducted to confirm controls are maintained until RAOs have been achieved.
4. Reduction in TMV	
(a) Treatment process used and materials treated	Implement ZVI soil mixing in the defined target treatment zone at depths ranging from 3 to 33 feet bgs (bedrock). Shallower soil will be excavated and bermed to form containment around the soil mixing area. ZVI will reduce VOC toxicity and volume in soil in the NAPL zone. The mixing process and addition of bentonite will convert the treatment area into a homogenous mass with low hydraulic conductivity, reducing the TCE mass flux into and out of the NAPL zone. Following active remediation, natural attenuation will reduce residual TCE mass in the dissolved plume. Long-term groundwater monitoring will be performed to monitor changes in TCE concentrations and mass in the dissolved plume.
(b) Degree and quantity of TMV and volume reduction	Contaminant TMV will be reduced in the NAPL zone via soil mixing. Modeling estimates that soil removal in the NAPL zone will reduce the remediation timeframe by at least 220 to 355 years. A 99 percent effective source mass removal was assumed to model remedial time frames.
(c) Irreversibility of TMV reduction	Irreversible. Permanent chemical destruction of VOCs occurs on contact during soil mixing.

TABLE 5-3

Evaluation of Alternative 3—Soil Mixing with Zero Valent Iron and Long-Term Management

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
(d) Type and quantity of treatment residuals	Remediation wastes generated during active remediation and groundwater sampling will be managed in accordance with ARARs. These wastes include groundwater driven off by soil mixing activities and purged groundwater.
5. Short-term effectiveness	
(a) Protection of workers during remedial action	Workers may be exposed to vapors during the soil mixing process that could require an upgrade to higher level PPE. Air emissions can be controlled by building a hood over the auger and capturing and treating vapors from the mixing area. Additionally, there is inherent risk to workers in the presence of the soil mixing equipment and tooling. Worker protection will be achieved by developing a health and safety plan and implementing safe work procedures for soil mixing and groundwater sampling activities.
(b) Protection of community during remedial action	Soil mixing will volatilize TCE and potentially produce odors down wind of excavation operations within the facility. The mixed area is highly unstable after mixing has been completed. To adequately protect facility personnel, a chain link fence will need to be established around the mixing area until the soil is considered stable enough for use.
(c) Environmental impacts of remedial actions	The mixing process and addition of ZVI-clay causes the soil to expand, which, if not properly managed, may overflow and impact clean ground surface outside the bermed areas. Proper design and construction of the bermed area will mitigate this scenario. Water generated by soil mixing activities will be treated on site and discharged to the East Swale (unless a closer alternate discharge point is identified). Alternative 3 has the lowest greenhouse gas, total energy, criteria air pollutants (NOx and PM¬10), and accident risk footprints compared with Alternatives 2 and 4.
(d) Time to reach RAOs	Groundwater modeling results estimate TCE degradation to MCLs will not occur for roughly 145 to 280 years (assuming a TCE half-life of 10 and 20 years, respectively).
6. Implementability	
(a) Technical feasibility	Soil mixing is technically feasible to treat VOCs.
(b) Administrative feasibility	Administratively feasible; alternative is anticipated to meet local, state, and federal requirements. Additionally, LUCs are already being implemented within the IOP boundary at CONWR.
(c) Availability of services and materials	Services and materials are readily available but there is a limited number of vendors who perform this work.

TABLE 5-3

Evaluation of Alternative 3—Soil Mixing with Zero Valent Iron and Long-Term Management

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
7. Costs	Capital Cost: $773,000 Present Worth Cost: $1,019,000

NOTES:

ARAR = Applicable or Relevant and Appropriate Requirement

RAO = Remedial Action Objective

TCE = Trichloroethene

TMV = Toxicity, Mobility, and Volume

TABLE 5-4

Evaluation of Alternative 4—Thermal Conductive Heating and Long-Term Management

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
1. Overall protection of human health and the environment	This alternative will provide protectiveness through NAPL zone soil treatment and degradation of the dissolved TCE plume via natural attenuation. Existing LUCs implemented prohibit installation of production wells within the boundaries of the former IOP at CONWR.
2. Compliance with ARARs	Complies with ARARs
3. Long-term effectiveness and permanence	
(a) Magnitude of residual risks	Based on site soil and groundwater data, computer modeling indicates residual sorbed and dissolved TCE mass will slowly attenuate outside the target treatment zone. The leading edge of the plume will continue to expand downgradient until natural attenuation has sufficiently reduced TCE mass flux across the plume, which will ultimately result in regression of the leading edge of the plume. NAPL skimmed off of condensate or groundwater extracted by the system will be containerized and transported to an offsite treatment and disposal facility.
(b) Adequacy and reliability of controls	This alternative appears to be capable of meeting RAOs for the TCE plume. LUCs will need to remain in place and monitoring will need to be conducted to confirm controls are maintained until RAOs have been achieved.
4. Reduction in TMV	
(a) Treatment process used and materials treated	Implement thermal conductive heating in the defined target treatment zone. Thermal conductive heating will result in the treatment of soil ranging in depth from approximately 8 to 38 feet bgs to provide effective remediation of the target treatment depths. Following active remediation, natural attenuation will reduce residual mass in the dissolved TCE plume. Long-term groundwater monitoring will be performed to monitor changes in TCE concentrations and mass in the dissolved plume.
(b) Degree and quantity of TMV and volume reduction	Contaminant TMV will be reduced in the NAPL zone via thermal conductive heating. Modeling estimates that soil removal in the NAPL zone will reduce the remediation timeframe by at least 220 to 355 years. A 99 percent effective source mass removal was assumed to model remedial time frames.
(c) Irreversibility of TMV reduction	Thermal conductive heating permanently removes TCE mass from the NAPL source area. However, following active remediation, back diffusion may occur between native soil outside the target remediation zone with residual TCE mass and treated soil within the target treatment zone.

TABLE 5-4

Evaluation of Alternative 4—Thermal Conductive Heating and Long-Term Management

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
(d) Type and quantity of treatment residuals	Remediation wastes generated during active remediation and groundwater sampling will be managed in accordance with ARARs. These wastes include soil cuttings from drilling activities and purged groundwater. Process vapor and liquids extracted from SVE wells will be treated using GAC prior to discharge. Spent GAC will be sent offsite either to be regenerated or disposed as waste.
5. Short-term effectiveness	
(a) Protection of workers during remedial action	Workers may be exposed to contaminated soil and groundwater during construction of the remediation system. During operation, workers could potentially be exposed to contaminated process vapor and liquids. The protection of workers will be achieved by developing a health and safety plan and implementing safe work procedures for construction and groundwater sampling activities.
(b) Protection of community during remedial action	During construction and system operation, establish exclusion zones, perform air monitoring, and manage remediation waste material to minimize exposure and protect persons present near the work area.
(c) Environmental impacts of remedial actions	Process vapor treated by the remediation system will be discharged to atmosphere. Water treated by the remediation system will be discharged to the East Swale (unless a closer alternate discharge point is identified). Alternative 4 has higher greenhouse gas, total energy, criteria air pollutants (NOx and PM¬10), and accident risk footprints compared to Alternative 3, but lower footprints in these categories than Alternative 2.
(d) Time to reach RAOs	Groundwater modeling results estimate TCE degradation to MCLs will not occur for roughly 145 to 280 years (assuming a TCE half-life of 10 and 20 years, respectively).
6. Implementability	
(a) Technical feasibility	Thermal conductive heating is technically feasible to treat VOCs. The local power company indicated a sufficiently sized power feed should be available for a 300 kilowatt demand, but the service may need to be temporarily upgraded to accommodate the additional load. Temporary power poles would need to be installed to run power above-ground to the treatment equipment. Following treatment, the power feed for the treatment system would need to be abandoned. On-site operation and maintenance of the remediation system will be required after implementation of the remedy for the duration during which the system is operated.
(b) Administrative feasibility	Administratively feasible; alternative is anticipated to meet local, state, and federal requirements. Additionally, LUCs are already being implemented within the IOP boundary at CONWR.

TABLE 5-4

Evaluation of Alternative 4—Thermal Conductive Heating and Long-Term Management

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
(c) Availability of services and materials	With exception of the power and sewer utilities, services and materials are readily available. A minimum 2 to 3 month lead time is required to coordinate and provide electric utility service. This method is patented and implemented by a single vendor.
7. Costs	Capital Cost: $2,669,000 Present Worth Cost: $2,915,000

NOTES:

ARAR = Applicable or Relevant and Appropriate Requirement

RAO = Remedial Action Objective

TCE = Trichloroethene

TMV = Toxicity, Mobility, and Volume

NAPL = Nonaqueous phase liquid

TABLE 5-5

Evaluation of Alternative 5—Long-Term Management

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
1. Overall protection of human health and the environment	This alternative will provide protectiveness through long-term monitoring of ongoing degradation of the dissolved TCE plume via natural attenuation. Existing LUCs implemented prohibit installation of production wells within the boundaries of the former IOP at CONWR.
2. Compliance with ARARs	Complies with ARARs
3. Long-term effectiveness and permanence	
(a) Magnitude of residual risks	Based on site soil and groundwater data, computer modeling indicates untreated NAPL and sorbed and dissolved TCE mass will persist in the source and dissolved portions of the plume, respectively. The leading edge of the plume will expand downgradient until natural attenuation has sufficiently reduced TCE mass flux across the plume, ultimately resulting in regression of the plume leading edge.
(b) Adequacy and reliability of controls	This alternative appears to be capable of meeting RAOs for the TCE plume. LUCs will need to remain in place and monitoring will need to be conducted to confirm controls are maintained until RAOs have been achieved.
4. Reduction in TMV	
(a) Treatment process used and materials treated	Natural attenuation.
(b) Degree and quantity of TMV and volume reduction	TMV of the TCE plume is expected to slowly decrease with time.
(c) Irreversibility of TMV reduction	Irreversible.
(d) Type and quantity of treatment residuals	Remediation wastes generated during groundwater sampling will be managed in accordance with ARARs. These wastes include soil cuttings from drilling activities and purged groundwater.
5. Short-term effectiveness	
(a) Protection of workers during remedial action	The protection of workers will be achieved by developing a health and safety plan and implementing safe work procedures for well construction and groundwater sampling activities.
(b) Protection of community during remedial action	Alternative is protective of community as the TCE plume is not expected to migrate beyond the IOP boundary. Existing LUCs implemented prohibit the use and installation of production wells within the IOP boundary.
(c) Environmental impacts of remedial actions	None
(d) Time to reach RAOs	Groundwater modeling results estimate TCE degradation to MCLs will not occur for > 500 years (assuming a TCE half-life of both 10 and 20 years).

TABLE 5-5

Evaluation of Alternative 5—Long-Term Management

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

Criteria	Alternative Evaluation
6. Implementability	
(a) Technical feasibility	Technically feasible.
(b) Administrative feasibility	Administratively feasible; LUCs are already being implemented within the IOP boundary at CONWR.
(c) Availability of services and materials	Services and materials are readily available.
7. Costs	Capital Cost: $94,000 Present Worth Cost: $340,000

NOTES:

ARAR = Applicable or Relevant and Appropriate Requirement

RAO = Remedial Action Objective

TCE = Trichloroethene

TMV = Toxicity, Mobility, and Volume

TABLE 5-6

ARARs for Remedial Alternatives

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

ARAR	Type	Alternative 1: No Action	Alternative 2: Excavation and LTM	Alternative 3: Soil Mixing with ZVI and LTM	Alternative 4: Thermal Conductive Heating and LTM	Alternative 5: LTM
35 IAC Part 620 - Groundwater Quality, Subpart D, Section 620.410, Class I - Groundwater Standards[1]	Chemical	Not Achieved-No Action	Achieve-Source area removal to achieve compliance with groundwater quality standards	Achieve-Source area hot spot in situ soil treatment to achieve compliance with groundwater standards	Achieve-Source area hot spot in situ soil treatment, to achieve compliance with groundwater standards	Achieve-Natural Attenuation
35 IAC Part 302, Subpart B - General Use Water Quality Standards, specifically Part 302.208 and 302.1210[1]	Chemical	Not Achieved-No Action	Achieve-Source area removal to achieve compliance with water quality standards	Achieve-Source area hot spot in situ soil treatment to achieve compliance with water quality standards	Achieve-Source area hot spot in situ soil treatment to achieve compliance with water quality standards	Achieve-Natural Attenuation
16 USC 666 (f) and (g)-Crab Orchard Enabling Legislation[2].	Location	Not an ARAR	Achieve-Through the classification of lands	Achieve-Through the classification of lands	Achieve- Through the classification of lands	Achieve- Through the classification of lands
16 USC 668 (dd)-National Wildlife Refuge Administration Act[2]	Location	Not an ARAR	Achieve-Through designation of the site as a wildlife refuge	Achieve-Through designation of the site as a wildlife refuge	Achieve-Through designation of the site as a wildlife refuge	Achieve-Through designation of the site as a wildlife refuge
16 USC 668(a)-Eagle Protection Act of 1940[2]	Location	Not an ARAR	Achieve-Field survey prior to implementing action	Achieve-Field survey prior to implementing action	Achieve-Field survey prior to implementing action	Not an ARAR
40 CFR 10.4 (b), (c) and (d)-Native American Graves Protection and Repatriation Regulations[3]	Location	Not An ARAR	Achieve-notification will be made, items secured and protected and proper disposition coordinated	Achieve-notification will be made, items secured and protected and proper disposition coordinated	Achieve-notification will be made, items secured and protected and proper disposition coordinated	Not an ARAR
16 USC 703-711 Migratory Bird Treaty Act of 1918, as amended[2]	Location	Not an ARAR	Achieve-Migratory Bird Survey conducted prior to implementing action	Achieve-Migratory Bird Survey conducted prior to implementing action	Achieve-Migratory Bird Survey conducted prior to implementing action	Not an ARAR
40 CFR 122.41 and 122.44-Clean Water Act[2]	Action	Not an ARAR	Achieve-effluent controls implemented including monitoring and measuring	Achieve-effluent controls implemented including monitoring and measuring	Achieve-effluent controls implemented including monitoring and measuring	Not an ARAR (since no site preparation)
35 IAC Part 304, Subpart A-General Effluent Standards, specifically 304.102 - .141, for discharges to waters of the state[1]	Action	Not an ARAR	Achieve-effluent controls implemented including monitoring and measuring	Achieve-effluent controls implemented including monitoring and measuring	Achieve-effluent controls implemented including monitoring and measuring	Not an ARAR (since no effluent discharges)
35 IAC Part 305-Monitoring and Reporting, specifically Parts 305.102-.103, for discharges to waters of the state [1]	Action	Not an ARAR	Achieve-effluent controls implemented including monitoring and measuring	Achieve-effluents will be monitored and measured	Achieve-effluents will be monitored and measured	Not an ARAR (since no effluent discharges)
35 IAC Part 306. Subpart A-Systems Reliability, specifically part 306.102[1]	Action	Not an ARAR	Not an ARAR as no water treatment works or associated facilities would be constructed	Achieve-water treatment works and associated facilities designed to meet operational standards	Achieve-water treatment works and associated facilities designed to meet operational standards	Not an ARAR (since no treatment system)
35 IAC Part 309, Subpart A-NPDES Permits[1]	Action	Not an ARAR	Not an ARAR (since no point source discharge)	Achieve-substantive controls for point source discharges	Achieve-substantive controls for point source discharges	Not an ARAR (since no point source discharge)
40 CFR 123.25-Storm Water Permits -Clean Water Act and Illinois Environmental Protection Act	Action	Not an ARAR	Achieve-implement erosion and sediment controls during land disturbing activities	Achieve-implement erosion and sediment controls during land disturbing activities	Achieve-implement erosion and sediment controls during land disturbing activities	Not an ARAR (since no land disturbing activities)
35 IAC Part 704-UIC Permit Program; 35 IAC Part 730-Underground Injection Control Operating Requirements[1]	Action	Not an ARAR	Not an ARAR (since no UIC)	Achieve-requirements implemented during the injection of zero valent iron (ZVI) during soil mixing	Not an ARAR (since no UIC)	Not an ARAR (since no UIC)
40 CFR 50.6 and 50.12-National Ambient Air Quality Standards (NAAQS)-Clean Air Act[2]	Action	Not an ARAR	Achieve-substantive controls implemented during excavation and backfilling	Achieve-substantive controls implemented during soil mixing and injection	Achieve-substantive controls implemented during collection of vapors during soil treatment	Not an ARAR (no excavation)
35 IAC Subtitle B-Air Pollution, Part 201-specifically Parts 201.141, .143, .152-.165, .207-.210, .261-.265, .282-.283, .310-.312[2, 3]	Action	Not an ARAR	Achieve-substantive controls implemented during excavation and backfilling	Achieve-substantive controls implemented during soil mixing and injection	Achieve-substantive controls implemented during collection of vapors during soil treatment	Not an ARAR (no construction or modifications)
40 CFR 51-99-Clean Air Act-including National Emission Standards for Hazardous Air Pollutants (NESHAPs)[3]	Action	Not an ARAR	Achieve-substantive controls implemented during excavation and backfilling	Achieve-substantive controls implemented during soil mixing, and injection	Achieve-substantive controls implemented during grading and collection of vapors during soil treatment	Not an ARAR (no excavation)

TABLE 5-6

ARARs for Remedial Alternatives

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

ARAR	Type	Alternative 1: No Action	Alternative 2: Excavation and LTM	Alternative 3: Soil Mixing with ZVI and LTM	Alternative 4: Thermal Conductive Heating and LTM	Alternative 5: LTM
35 IAC Part 212-Visible and Particulate Matter Emissions[3]	Action	Not an ARAR	Achieve-Dust controls will be implemented during construction activities	Achieve-Dust controls will be implemented during construction activities	Achieve-Dust controls will be implemented during construction activities	Not an ARAR (no construction activities)
35 IAC 235-Odor Control[3]	Action	Not an ARAR	Achieve-odor controls will be implemented if applicable	Achieve-odor controls implemented if applicable	Achieve-odor controls implemented if applicable	Not an ARAR (no construction activities)
35 IAC Parts 900, 901 and 910-Noise[3]	Action	Not an ARAR	Achieve-controls to comply with nuisance noise levels	Achieve-controls to comply with nuisance noise levels	Achieve-controls to comply with nuisance noise levels	Not an ARAR (no actions generating noise)
40 CFR 262.34 and 264 Subparts B, C, I, J and L-Resource Conservation and Recovery Act (RCRA), Subtitle C[2]	Action	Not an ARAR	Achieve-all waste to be characterized and managed in accordance with requirements	Achieve-all waste to be characterized and managed in accordance with requirements	Achieve-all waste to be characterized and managed in accordance with requirements	Achieve-all waste to be characterized and managed in accordance with requirements
35 IAC Part 722-Standards Applicable to Generators of Hazardous Waste[1]	Action	Not an ARAR	Achieve-characterize excavated material	Achieve -characterize excavated material or other wastes	Achieve-characterize excavated material or other wastes	Achieve-characterize waste materials
35 IAC Subtitle G-Waste Disposal, Specifically Parts 724 and 728[1]	Action	Not an ARAR	Achieve-during management of hazardous waste	Achieve-during management of hazardous waste	Achieve - during management of hazardous waste	Achieve- during management of hazardous waste
35 IAC Parts 720 to 723, 725 to 727, and 729-Hazardous Waste Management Requirements[3]	Action	Not an ARAR	Achieve-characterize all waste to identify and manage appropriately as hazardous wastes	Achieve-characterize all waste to identify and manage appropriately as hazardous wastes	Achieve-characterize all waste to identify and manage appropriately as hazardous wastes	Achieve-characterize all waste to identify and manage appropriately as hazardous wastes
35 IAC Part 808-Special Waste Classifications[1]	Action	Not an ARAR	Achieve-wastes will be characterized to determine if special wastes are generated	Achieve- wastes will be characterized to determine if special wastes are generated	Achieve-wastes will be characterized to determine if special wastes are generated	Achieve-wastes will be characterized to determine if special wastes are generated
40 CFR 268-RCRA Land Disposal Restrictions[2]	Action	Not an ARAR	Achieve-waste characterization will include LDR determination	Achieve-waste characterization will include LDR determination	Achieve-waste characterization will include LDR determination	Achieve-wastes generated during LTM will be characterized which will include LDR determination
40 CFR Part 264, Subpart G-Closure and Post-Closure-RCRA, Subtitle C[2]	Action	Not an ARAR	Achieve-excavation to continue until meets clean closure standard	Achieve-excavation to continue until meets clean closure standard	Achieve-excavation to continue until meets clean closure standard	Not an ARAR-no excavation
35 IAC Part 724 Design Requirements-Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities[2]	Action	Not an ARAR	Achieve-designs meet more stringent State requirements	Achieve-designs meet more stringent State requirements	Achieve-designs meet more stringent State requirements	Not an ARAR--no construction of an action
40 CFR 264.114-Disposal or Decontamination of Equipment-RCRA, Subtitle C[2]	Action	Not an ARAR	Achieve-equipment, structures and soils will be decontaminated or disposed of as a hazardous waste if they come into contact with hazardous waste	Achieve-equipment, structures and soils will be decontaminated or disposed of as a hazardous waste if they come into contact with hazardous waste	Achieve-equipment, structures and soils will be decontaminated or disposed of as a hazardous waste if they come into contact with hazardous waste	Achieve-equipment, structures and soils will be decontaminated or disposed of as a hazardous waste if they come into contact with hazardous waste
35 IAC Part 724, Decontamination[2]	Action	Not an ARAR	Achieve-equipment, structures and soils will be decontaminated or disposed of as a hazardous waste if they come into contact with hazardous waste	Achieve-equipment, structures and soils will be decontaminated or disposed of as a hazardous waste if they come into contact with hazardous waste	Achieve-equipment, structures and soils will be decontaminated or disposed of as a hazardous waste if they come into contact with hazardous waste	Achieve-equipment, structures and soils will be decontaminated or disposed of as a hazardous waste if they come into contact with hazardous waste
40 CFR Part 264, Subpart F-Groundwater Monitoring-RCRA, Subtitle C[2]	Action	Not an ARAR	Achieve - monitoring and maintenance	Achieve- monitoring and maintenance	Achieve- monitoring and maintenance	Achieve- monitoring and maintenance
40 CFR 241.204-Groundwater and Leachate Monitoring-Solid Waste Disposal Act as amended by RCRA Subtitle D[2]	Action	Not an ARAR	Achieve - monitoring and maintenance	Achieve - monitoring and maintenance	Achieve - monitoring and maintenance	Achieve - monitoring and maintenance
35 IAC Part 807-Groundwater and Leaching monitoring[2]	Action	Not an ARAR	Achieve - monitoring and maintenance	Achieve - monitoring and maintenance	Achieve - monitoring and maintenance	Achieve - monitoring and maintenance
35 IAC Parts 807, 809 and 810-Solid Waste and Special Waste Hauling[3]	Action	Not an ARAR	Achieve-waste will be characterized to determine if special wastes are generated	Achieve-wastes will be characterized to determine if special wastes are generated	Achieve-wastes will be characterized to determine if special wastes are generated	Achieve-wastes will be characterized to determine if special wastes are generated
40 CFR 761.65-Storage Requirements, Toxic Substances Control Act (TSCA)[2]	Action	Not an ARAR	Achieve-excavated material characterized, managed and stored	Achieve-excavated material characterized, managed and stored	Achieve-excavated material characterized, managed and stored	Not an ARAR-no excavated material

TABLE 5-6

ARARs for Remedial Alternatives

Focused Feasibility Study for Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge, Marion, Illinois

ARAR	Type	Alternative 1: No Action	Alternative 2: Excavation and LTM	Alternative 3: Soil Mixing with ZVI and LTM	Alternative 4: Thermal Conductive Heating and LTM	Alternative 5: LTM
40 CFR 761.79-Decontamination Standards and Procedures, TSCA[2]	Action	Not an ARAR	Achieve-equipment, structures and soils will be decontaminated or disposed of as a TSCA waste depending on the results of chemical analyses	Achieve-equipment, structures and soils will be decontaminated or disposed of as a TSCA waste depending on the results of chemical analyses	Achieve-equipment, structures and soils will be decontaminated or disposed of as a TSCA waste depending on the results of chemical analyses	Achieve-equipment, structures and soils will be decontaminated or disposed of as a TSCA waste depending on the results of chemical analyses
49 CFR 100-109-Hazardous Materials Transportation Act[3]	Action	Not an ARAR	Achieve-Labeling, packaging, shipping papers, and mode of transportation will meet USDOT requirements	Achieve-Labeling, packaging, shipping papers, and mode of transportation will meet USDOT requirements	Achieve-Labeling, packaging, shipping papers, and mode of transportation will meet USDOT requirements	Achieve-Labeling, packaging, shipping papers, and mode of transportation will meet USDOT requirements
EPA's Risk Assessment Guidance for Superfund[1]	Action	Not an ARAR	Achieve-used during risk assessment	Achieve-used during risk assessment	Achieve-used during risk assessment	Achieve-used during risk assessment
US EPA's Superfund Remedial Design and Remedial Action Guidance[1]	Action	Not an ARAR	Achieve-used during remedial alternative design and implementation	Achieve-used during remedial alternative design and implementation	Achieve-used during remedial alternative design and implementation	Not an ARAR since no Remedial Design or Remedial Action
US EPA's Technical Enforcement Guidance Document[1]	Action	Not an ARAR	Achieve-used by Regulatory Agencies	Achieve-used by Regulatory Agencies	Achieve-used by Regulatory Agencies	Achieve-used by Regulatory Agencies
USEPA's Design Standards for RCRA Subtitle D Landfills (including any proposed revisions available before the remedial design)[1]	Action	Not an ARAR	Achieve-design standards used during remedial design	Achieve-design standards used during remedial design	Achieve-design standards used during remedial design	Not an ARAR
State of Illinois Waste Management Facilities Design Criteria[1]	Action	Not an ARAR	Achieve-design standards used during remedial design	Achieve-design standards used during remedial design	Achieve-design standards used during remedial design	Not an ARAR
State of Illinois Monitoring Well Construction and Installation Criteria[1]	Action	Not an ARAR	Achieve-wells constructed and installed per state criteria	Achieve-wells constructed and installed per state criteria	Achieve-wells constructed and installed per state criteria	Achieve-wells constructed and installed per state criteria

[1] ARAR is from Revision 3, Focused Feasibility Study (FFS) for Crab Orchard National Wildlife Refuge, PCB OU, Sites 32/33, Marion Illinois, Final August 2004

[2] ARAR is from ROD for the PCB OU (per FFS Revision 3)

[3] ARAR is from FFS, Revision 4 Plume 2 at PCB OU Site 33, Crab Orchard, National Wildlife Refuge, Marion Illinois, July 2012

SECTION 6

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Appendix A
Supplemental Site Characterization Investigation Report

Final Report

Supplemental Site Characterization Investigation Report for Plume 2 at PCB OU Site 33 Crab Orchard National Wildlife Refuge

Prepared for

Schlumberger Technology Corporation

July 2012

CH2MHILL®

Contents

Acronyms and Abbreviations ..... **v**

1. Introduction **1-1**
1.1 Purpose and Scope 1-1
1.2 Investigation Objectives 1-1

2. Site Background and Setting **2-1**
2.1 Site Location and Description 2-1
2.2 Site Background 2-1
2.3 Site Setting 2-2
2.3.1 Surface Water Hydrology 2-2
2.3.2 Site Geology and Hydrogeology 2-3
2.3.3 Groundwater 2-3
2.3.4 Land Use 2-4
2.3.5 Groundwater Classification and Use 2-4

3. Investigation Activities **3-1**
3.1 Soil Investigation 3-1
3.1.1 Soil Boring Installation 3-1
3.1.2 Soil Sample Collection 3-1
3.2 Groundwater Investigation 3-1
3.2.1 Existing Monitoring Wells 3-2
3.3 Surface Water Investigation 3-5
3.4 Investigation-derived Waste Management 3-5
3.5 Data Validation and Evaluation 3-5

4. Investigation Findings **4-1**
4.1 Further Characterization of Subsurface Geology 4-1
4.1.1 Upper Clay Unit 4-1
4.1.2 Upper Sand Unit 4-1
4.1.3 Lower Clay Unit 4-2
4.1.4 Lower Sand Unit 4-2
4.1.5 Bedrock 4-3
4.2 Groundwater Flow Characteristics 4-3
4.3 Soil Results 4-4
4.3.1 Building I-1-2 4-4
4.3.2 Building I-1-3 4-5
4.4 Groundwater Results 4-6
4.4.1 Source Area Groundwater 4-6
4.4.2 Groundwater Results from Existing Monitoring Wells 4-7
4.5 Summary of Subsurface Geology Characterization 4-8
4.6 Conceptual Site Model 4-9

5. Summary and Conclusions **5-1**

6. References **6-1**

Appendixes

A Soil Boring Logs
B Groundwater Development and Sampling Forms
C Monitoring Well Survey Data
D Waste Profiles and Manifest
E Data Quality Evaluation Report and Laboratory Reports (Laboratory Reports included on CD)

Tables

3-1 Monitoring Well Inspection Form
3-2 Monitoring Well Construction Details and Groundwater Elevations
4-1 Soil Analytical Results
4-2 Grab Groundwater Analytical Results
4-3 Groundwater Analytical Results from Existing Monitoring Wells

Figures

1-1 Crab Orchard National Wildlife Refuge Location Map
1-2 Plume 2 Investigation Area
3-1 Source Area Soil and Groundwater Sample Locations
3-2 Groundwater Monitoring Well Sample Locations and Staff Gauge Locations
4-1 Cross Section Locations
4-2 Cross-Section A-A’
4-3 Cross-Section B-B’
4-4 Cross-Section C-C’
4-5 Cross-Section D-D’
4-6 Potentiometric Surface Map – Upper Clay Unit
4-7 Potentiometric Surface Map – Upper Sand Unit
4-8 TCE Concentrations in Soil in the Source Area
4-9 TCE Concentrations in Groundwater in the Source Area
4-10 cVOCs Detected in Groundwater Monitoring Wells

Acronyms and Abbreviations

amsl	above mean sea level
bgs	below ground surface
cm/sec	centimeters per second
CONWR	Crab Orchard National Wildlife Refuge
CSM	conceptual site model
cVOC	chlorinated volatile organic compound
1,1-DCE	1,1-dichloroethene
cis-1,2-DCE	cis-1,2-dichloroethene
trans-1,2-DCE	trans-1,2-dichloroethene
DO	dissolved oxygen
FFS	focused feasibility study
f_{oc}	fraction of organic carbon
GDOTS	General Dynamics-Ordnance and Tactical Systems
IEPA	Illinois Environmental Protection Agency
MCL	maximum contaminant level
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
MNA	monitored natural attenuation
MPE	multiple phase extraction
MS	matrix spike
MSD	matrix spike duplicate
NTU	nephelometric turbidity unit
ORP	oxidation reduction potential
PCB	polychlorinated biphenyl
PCB OU	PCB Areas Operable Unit
PCE	tetrachloroethene
PID	photoionization detector
PVC	polyvinyl chloride
RI	remedial investigation
ROD	Record of Decision
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Services
VOC	volatile organic compound
work plan	*Supplemental Site Characterization Investigation Work Plan for Plume 2 at PCB OU Site 33*

SECTION 1

Introduction

This investigation report presents the findings of the supplemental site characterization investigation for volatile organic compound (VOC) groundwater Plume 2 and the associated soil VOC source at Crab Orchard National Wildlife Refuge (CONWR) in Marion, Illinois (Figure 1-1). The investigation is an interim step in the selection of the remedial alternative for the plume, which is part of the PCB Areas Operable Unit (PCB OU). Plume 2 is located within an industrial area south of Crab Orchard Lake (Figure 1-2).

1.1 Purpose and Scope

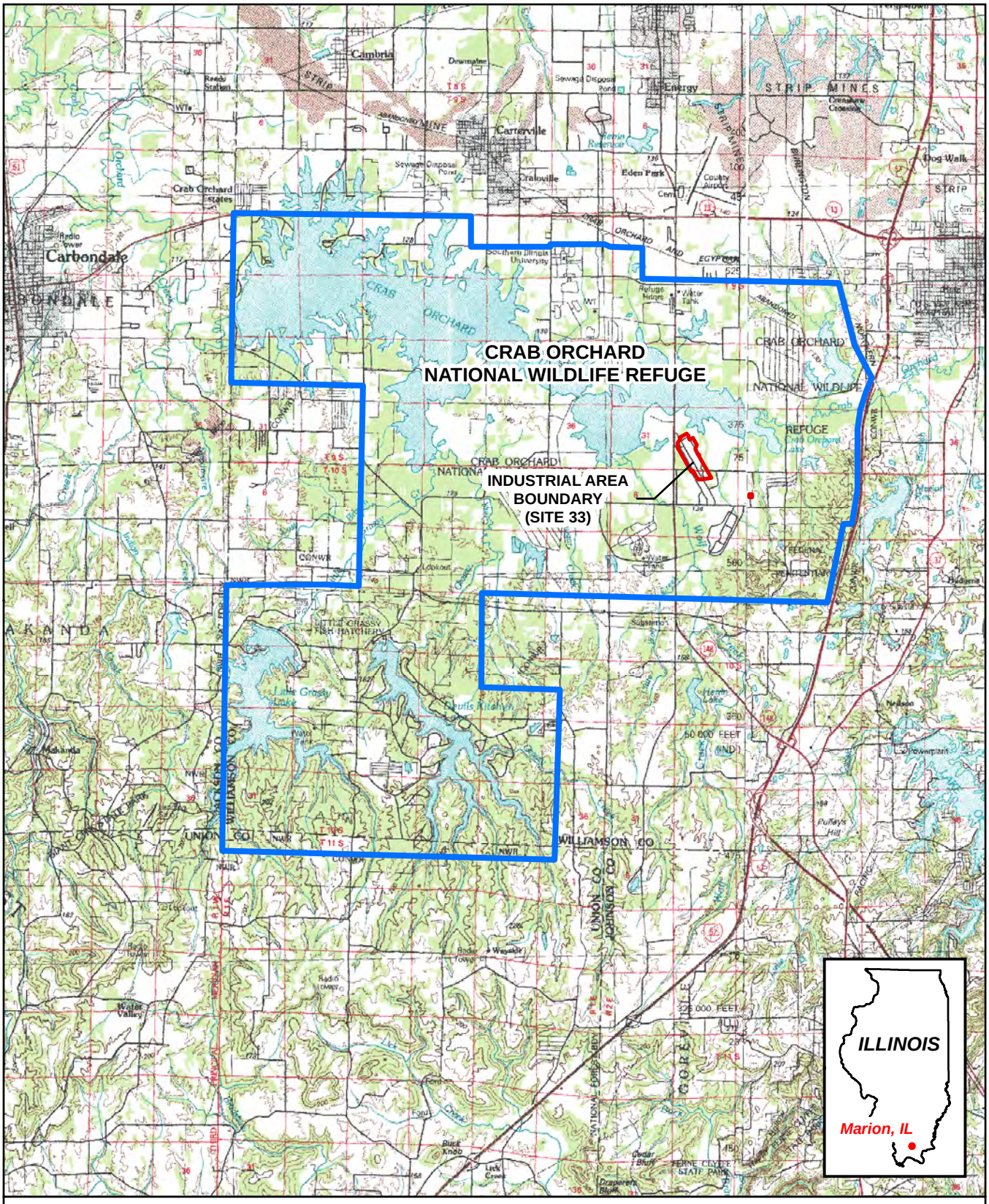
The purpose of the investigation was to collect sufficient data to update the conceptual site model (CSM) related to VOC contamination in groundwater and soil for Plume 2. The CSM will be used in support of the development of remedial action alternatives to address the VOCs in dissolved phase groundwater and its associated source.

Plume 2 emanates from two distinct source areas that are discussed separately in portions of this report—one near Building I-1-2 and one near Building I-1-3. The source areas are close together, but there is a physical gap of over 200 feet between the impacted zones. The gap coincides with a former manufacturing building that was located between Buildings I-1-2 and I-1-3. Previous investigations concluded that the releases that caused the VOC soil contamination occurred outside of the building rather than within or beneath it (RMT 2001).

1.2 Investigation Objectives

The following objectives were established to meet the purpose of the investigation:

1. Update VOC groundwater data for Plume 2 by sampling existing monitoring wells within the vicinity of Plume 2.
2. Further investigate VOC contamination in groundwater in the Plume 2 source areas by collecting groundwater grab samples to evaluate contaminant transport through the hydrostratigraphic units.
3. Identify the current characteristics of specific monitored natural attenuation (MNA) and water quality parameters within Plume 2 to develop and evaluate remedial alternatives.
4. Confirm groundwater flow characteristics by collecting groundwater levels from existing groundwater monitoring wells and piezometers and surface water levels from existing staff gauges.
5. Further characterize the subsurface lithology and VOC concentrations in soil at potential source areas.



Source: U.S.G.S 30 X 60 Minute Quadrangle
Carbondale, IL & MO Quadrangle, 1986
West Frankfort, IL, KY, & IN Quadrangle, 1987

LEGEND

- Crab Orchard National Wildlife Refuge
- Industrial Area Boundary

N

0 6,000 12,000 Feet

FIGURE 1-1
Crab Orchard National Wildlife Refuge
Location Map
Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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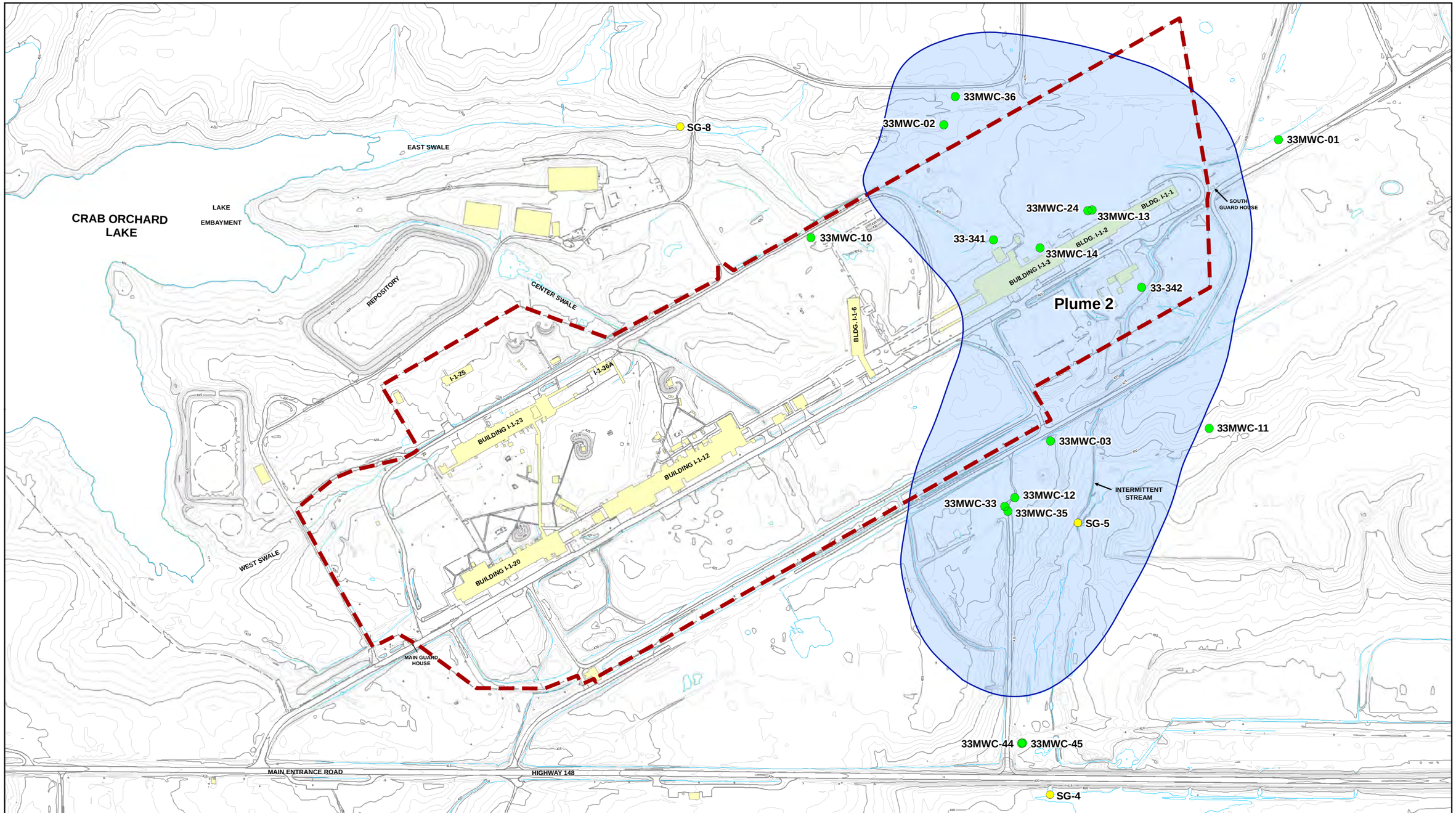
RDD \\BALDUR\PROJ\CRAB_ORCHARD_423535\MAPFILES\PLUME_2_SSCR\FIG1-1_SITE_LOCATION_SSCR.MXD MSCHROCK 12/29/2011 3:56:49 PM



LEGEND

- Industrial Area Boundary
- Buildings
- Groundwater Plume Extent (Plume 2)
- Surface Water
- Topographic Contour (Index)
- Topographic Contour (Intermediate)
- Monitoring Well Location
- Staff Gauge

0 200 400 Feet

Notes:

1. Topographic contours (one-foot interval) are from aerial photographs taken on February 28, 2001.
2. Plume 2 extent is based on the 5 µg/L trichloroethene concentration groundwater contour.

FIGURE 1-2
Plume 2 Investigation Area
Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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RDD \\BALDUR\PROJ\CRAB_ORCHARD_423535\MAPFILES\PLUME_2_SSCR\FIG1-2_INVESTIGATION_AREA_SSCR.MXD MSCHROCK 1/9/2012 12:45:48 PM

SECTION 2

Site Background and Setting

2.1 Site Location and Description

CONWR is located in southern Illinois, approximately 5 miles west of Marion, Illinois, primarily in Williamson County (Figure 1-1). CONWR currently covers an area of approximately 43,500 acres of forested land, pine plantations, and cultivated lands and is managed by U.S. Fish and Wildlife Service (USFWS). Three lakes are located within CONWR, including Crab Orchard Lake, a 9-mile-long, 7,000-acre manmade reservoir built in 1940. The western portion of the refuge around Crab Orchard Lake is a recreational area while the eastern portion is a wildlife sanctuary generally closed to the public. Land around the eastern portion of Crab Orchard Lake is used for agriculture and industrial purposes, including munitions manufacturing. Plume2 is located in the industrial area south of Crab Orchard Lake near Building I-1-1, I-1-2, and I-1-3 (RMT 2004).

2.2 Site Background

The PCB OU consists of four of the original study sites defined in the remedial investigation (RI) for the CONWR Superfund Site. One of the four sites, Site 33 (Area 9 Building Complex), is addressed in this report. Three groundwater contaminant plumes that contain chlorinated VOCs (cVOCs) have been identified as being sourced from Site 33, and are named Plume 1, Plume 2, and Plume 3. Plumes 1 and 3 emanate from the Building I-1-23 area. Plume 2, the focus of this investigation, is sourced near Buildings I-1-2 and I-1-3 (Figure 1-2).

As required in the Record of Decision (ROD) for the PCB OU issued by U.S. Environmental Protection Agency (USEPA) Region 5 in 1990, polychlorinated biphenyl (PCB) remedial actions were performed at Site 33 during late 1995 through June 1997. The actions included extensive excavation of soils containing elevated concentrations of PCBs throughout the Site 33 area. PCB-affected sediment was removed from a nearby embayment of Crab Orchard Lake. Additional soil excavation was conducted in 2009 in response to the USEPA 5-Year Review recommendations for Sites 32/33 (RMT 2010). The groundwater plumes were discovered through the investigations associated with the PCB releases.

A groundwater investigation report and focused feasibility study (FFS; RMT 2000a) was prepared. The reports summarized the results of the previous investigations and evaluated containment, removal, treatment, and disposal options to address the VOC plumes. The efforts included groundwater flow and contaminant transport modeling to estimate the anticipated cleanup times associated with the six proposed cleanup alternatives, which included the following:

- Alternative A—No Action
- Alternative B— MNA
- Alternative C—Phytoremediation
- Alternative D—In Situ Enhanced Bioremediation
- Alternative E—Multiple Phase Extraction (MPE)
- Alternative F—In Situ Physical/Thermal Removal

The document was revised to address agency comments and was reissued (Revision 1) and approved by USEPA.

In June 2000, USEPA issued an Explanation of Significant Differences for the PCB OU. The Explanation of Significant Differences specified the remedy selected for additional source removal to address trichloroethene (TCE) contamination in soil. The remedy would be a modified version of Alternative E, which added phytoremediation and MNA to MPE at each of the three VOC source areas.

A third phase of the investigation, a pre-design study, was planned in 2000 (RMT 2000b) and subsequently approved and implemented. The pre-design study focused on characterization of the aquifer physical parameters to better determine the design of MPE systems and to obtain soils data to evaluate the suitability of the sites to support tree growth. The pre-design study included pilot tests and detailed analyses on the nature and extent of groundwater contamination and also provided conceptual designs for the proposed remedies. The pre-design documents were subsequently amended to provide estimates of the residual contaminant mass and simulated removal estimates for the proposed remedies (RMT 2001).

The pre-design fieldwork determined that MPE may be inadequate to effectively remove the VOC mass from the Upper Clay unit without additional measures, which led to the evaluation of additional potential remedies with input from USEPA, the Illinois Environmental Protection Agency (IEPA), the USFWS, and Schlumberger. Results of the evaluations (RMT 2003), and subsequent revisions led to preparation of FFS Revision 3, which was issued in August 2004 (RMT 2004). FFS Revision 3 presented a detailed evaluation of the following remedial alternatives for Plume 2:

- No Action
- Alternative A—Limited Excavation and Multiphase Extraction with Pneumatic Fracturing
- Alternative B—Permeable Reactive Barrier
- Alternative C—Alternate Concentration Limits
- Alternative D—Excavation (within 10 milligrams per kilogram [mg/kg] VOC contour) and Alternate Concentration Limits
- Alternative E—Excavation (within 10 mg/kg VOC contour), in situ Reductive Dechlorination with Pneumatic Fracturing, and Alternate Concentration Limits
- Alternative F—Electrical Resistive Heating (within 10 mg/kg VOC contour) and Groundwater Monitoring

Alternative F was chosen as the preferred method and presented for public comment in a proposed plan and fact sheet published by USEPA in April 2006. Subsequently, untenable safety concerns were expressed by some key stakeholders, including the U.S. Department of the Interior and its tenant General Dynamics-Ordnance and Tactical Systems (GDOTS), which stores explosives in adjacent Buildings I-1-1, I-1-2, and I-1-3. Therefore, USEPA deferred a remedy for Plume 2. Because of the age of the data used in the remedy selection process, Schlumberger conducted the supplemental site characterization investigation, as described in Section 3, before proceeding with further study of remedial alternatives.

2.3 Site Setting

The site setting presented in the subsections below is based on the information presented in the *Preliminary Design Report for the Groundwater Remedial Action* (RMT 2001). The supplemental site characterization investigation findings that update the information in the subsections below are presented in Section 4 of this report.

2.3.1 Surface Water Hydrology

Surface water drainageways are present at several locations at the CONWR. Two of the drainageways are near Site 33 (Figure 1-2). An intermittent stream originates near monitoring well 33-342 and flows west toward Highway 148, and passes beneath Highway 148 through a culvert pipe. Staff gauges SG-4 and SG-5 are located along the intermittent stream to measure surface water elevations southwest of Site 33, roughly 600 feet from the industrial area boundary and on the western side of Highway 148, respectively (Figure 1-2). The East Swale runs northward along the entire eastern boundary of Sites 32/33 and discharges to Crab Orchard Lake. Staff gauge SG-8 is located along the Eastern Swale, roughly 800 feet from its upper reach to measure the surface water elevation in the swale that ultimately discharges to Crab Orchard Lake (Figure 1-2). The intermittent stream and swale are often dry in their upper reaches, except following rainfall events. The lower reaches appear to be receiving groundwater inflow and are likely continuously flowing (RMT 2001).

2.3.2 Site Geology and Hydrogeology

The geologic setting at Site 33 is highly heterogeneous and consists of clayey fill, interbedded clay of loess origin with fluvial sand and lacustrine silt, and underlain by glacial till and interbedded fluvial and glaciolacustrine clay.

There are four unconsolidated hydrostratigraphic units identified in the subsurface at Site 33: Upper Clay, Upper Sand, Lower Clay, and Lower Sand. The Lower Sand layer is not continuous beneath Site 33; when present, it lies directly above bedrock. When it is not present, the Lower Clay layer lies directly above bedrock, which is Pennsylvanian-age sandstone.

The following is a brief synopsis of geologic and hydrogeologic information that is found in detail in the Preliminary Design Report (RMT 2001).

2.3.2.1 Upper Clay Unit

The Upper Clay unit occurs from the ground surface to approximately 25 feet below ground surface (bgs). The clay is fairly featureless and massive with varying amounts of silt, small gravel, and sand that sometimes form thin (2- to 3-inch) lenses or seams. The clay is fractured throughout, but has low permeability overall. Some evidence of laminar bedding has been observed in borings. The Upper Clay unit is believed to be a weathered loess and/or glaciolacustrine deposit (RMT 2001).

2.3.2.2 Upper Sand Unit

The Upper Sand unit (where present) underlies the Upper Clay unit and measures up to 10 feet in thickness. The unit thins to the east and is absent near Building I-1-2. The Upper Sand unit is mostly poorly sorted, fine sand. The sand is clayey and silty with some rounded pebbles near the base of the unit. The Upper Sand unit is interpreted to have been deposited in glaciofluvial environments or is glacial outwash (RMT 2001).

2.3.2.3 Lower Clay Unit

An interval of clay underlies the upper sand beneath the plumes. The contact is gradational with some intervals of sand in the upper portion of the unit. The clay interval also contains abundant silt, but little sand and gravel. The gravel includes angular clasts of the underlying sandstone and coal. The Lower Clay unit is characterized as uniform in color (dark gray), composition, and texture (that is, massive with no sedimentary structure). The Lower Clay unit is interpreted as being representative of Illinoisan till (RMT 2001).

2.3.2.4 Lower Sand Unit

The Lower Sand unit, where present, occurs immediately above the bedrock surface. The top of the Lower Sand occurs at approximately 340 to 350 feet above mean sea level. This unit ranges from 10 to 20 feet thick in the northern portion of the site beneath Crab Orchard Lake to approximately 2 feet thick in the southwestern portion and is not present in the southern and southeastern portions where the bedrock surface rises above approximately 350 feet above mean sea level. The Lower Sand unit is consistently logged as a silty sand. Hydraulic conditions encountered during drilling in the Lower Sand unit caused sand to heave up inside the auger flights. As a result, few undisturbed soil samples have been obtained from this unit. The unit is consistent with a glacial outwash deposit (RMT 2001).

2.3.2.5 Bedrock

Bedrock encountered beneath the site primarily consists of Pennsylvanian-aged, fine-grained, micaceous sandstone. Bedrock may also include shale and minor limestone and coal. The bedrock aquifer is highly variable in terms of yield and water quality (USEPA 2007).

2.3.3 Groundwater

Wet conditions are often encountered at the surface near the buildings due to poor drainage and low permeability of the surface soil. The natural, undisturbed subsurface material, however, does not indicate saturated conditions for up to 20 feet unless an interval of sand or silt is encountered. The occurrence of sand or silt increases with depth, but typically such intervals are rare in the upper 20 feet, but are encountered more

often thereafter. The potentiometric surface is approximately 12 to 13 feet bgs. The mean permeability of the clayey soil is 4.6×10^{-5} centimeters per second.

Groundwater beneath the site generally flows northward toward Crab Orchard Lake, but shallow groundwater (Upper Clay/Upper Sand units) is affected locally by surface water drainageways and by the Area 9 Repository. Buildings I-1-1, I-1-2, and I-1-3 are located upon a groundwater divide and shallow groundwater flows away radially from a local groundwater high. The horizontal gradient is rather slight in the vicinity of Buildings I-1-1, I-1-2, and I-1-3, ranging from 0.003 to 0.006. There is an upward gradient in the shallower wells.

The groundwater plume and source areas are found within Quaternary-aged unconsolidated deposits that are approximately 30 to 50 feet thick beneath Site 33.

2.3.4 Land Use

The western portion of the CONWR around Crab Orchard Lake is open to the public for recreational purposes while the eastern portion of the CONWR is a wildlife sanctuary closed to general public access (RMT 2001). Some of the land south of Crab Orchard Lake is used for industrial purposes, as illustrated by the industrial area boundary shown on Figure 1-2. The highest Plume 2 concentrations and associated soil VOC source area are within this boundary.

2.3.5 Groundwater Classification and Use

Groundwater at the site is classified as Class I: Potable Resource Groundwater (35 Illinois Administrative Code Section 620.210) (RMT 2000a). An inventory of groundwater users was performed in the study area as part of the RI to identify the nature and location of private and commercial wells (O'Brien and Gere 1988). The survey results show that the closest private or commercial well at the time of survey was approximately ½ mile from the extent of Plume 2.The well appears to be within the boundaries of the CONWR and according to the refuge manager at the time of the survey, none of the groundwater wells within the boundaries of the CONWR were in use.

SECTION 3

Investigation Activities

Investigation activities conducted to meet the objectives defined in Section 1 are detailed in the following subsections.

3.1 Soil Investigation

The Plume 2 soil investigation was conducted to achieve investigation objective #5. The supplemental investigation soil boring locations are shown on Figure 3-1.

3.1.1 Soil Boring Installation

Seventeen soil borings were advanced for soil sample collection using an all-terrain hollow-stem auger drill rig with a 5-foot long, 2-inch-diameter Macro-Core Sampler to collect continuous discrete soil samples. The Macro-Core Sampler was advanced in 5-foot depth intervals. After advancement, the Macro-Core Sampler was removed from the subsurface and the soil sample was extracted from the sampler. A 5-foot long, 3.25-inch diameter hollow-stem auger was advanced to a depth equal to the base of the previously extracted soil sample to reduce overburden pressure and ensure borehole stability. The Macro-Core Sampler was then placed inside the hollow-stem auger and advanced past the previously installed auger to collect the next 5-foot soil sample. The process was repeated until borings were advanced to immediately above the bedrock surface. The boreholes were abandoned by filling the borehole to ground surface with high solids bentonite grout.

3.1.2 Soil Sample Collection

Soil was continuously logged to identify the lithologic characteristics of each hydrostratigraphic unit. Soil samples were continuously screened with a photoionization detector (PID) in 1-foot intervals from ground surface to the termination depth of the boring. Visual observations, PID readings, and depths of elevated soil VOC concentrations detected during previous investigations in nearby historical borings were used to select the discrete depth the soil sample was collected for VOC analysis within the hydrostratigraphic zone(s) defined for each boring in the *Supplemental Site Characterization Investigation Work Plan for Plume 2 at PCB OU Site 33* (work plan) (CH2M HILL 2011). Soil boring logs are provided in Appendix A.

Soil from each 1-foot screened interval was placed in a resealable plastic bag and placed on ice for each of the targeted hydrostratigraphic units defined for the boring in the work plan. A discrete soil sample was collected from the interval with the highest PID reading, if PID readings were greater than 30 parts per million. Otherwise, the discrete soil sample was collected from the historical soil sample interval. Discrete soil samples were collected from the bagged soil sample intervals using Terra Core soil sample kits. Terra Core sample kits were labeled, placed on ice in a cooler, and shipped to TestAmerica–Chicago for laboratory analysis. The laboratory analyzed the samples for VOCs using Method SW846-8260B.

A subset of the soil samples collected for VOC analysis was also analyzed for fraction of organic carbon (f_{oc}). Sample locations for f_{oc} analysis were selected to obtain a data set that included at least one value of this parameter for each geologic unit within the source area (Upper Clay, Upper Sand, Lower Sand, and Lower Clay). The data was collected to compute a solute distribution coefficient in the solute transport model (Appendix B of FFS Revision 4; CH2M HILL 2012).

Quality assurance/quality control samples included field duplicates, matrix spike (MS) /matrix spike duplicate (MSD) samples, and field blanks. A field duplicate and field blank were collected for at least every 10 field samples. One matrix spike and matrix spike duplicate sample was collected for at least every 20 field samples.

3.2 Groundwater Investigation

The Plume 2 groundwater investigation was conducted to achieve investigation objectives #1 through 4. Groundwater investigation activities are described in the subsections below.

3.2.1 Existing Monitoring Wells

3.2.1.1 Well Inspections and Water Level Measurements

A comprehensive well inspection was completed at the 16 existing Plume 2 monitoring wells as described below. Monitoring well locations are shown on Figure 3-2. Water level and total depth measurements were also collected from each well. The wells in the network were gauged within 24 hours of each other for development of current potentiometric surface maps.

Each monitoring well from which a groundwater quality sample was later collected was inspected. The monitoring well inspection form that provides the results of the field inspection is included in Table 3-1. The following items were inspected and procedures performed:

- **Protective Casing—**Inspected for the presence of a lockable protective cover, and determined if the physical condition of the casing was adequate and allowed for sampling. Inspected for a drain hole near the base of the casing. If clogged, an attempt was made to clean out the hole.
- **Surface Seal—**In general, the surface seal underlies a concrete pad that has been installed around the base of the protective casing with a lockable cover. The concrete pad was inspected for cracking or other conditions that may potentially allow surface water to enter the annular space between the protective casing and the well riser.
- **Degree of Mobility of Protective Casing—**The protective casing was attempted to be moved to determine if resetting of the casing was potentially required.
- **Permanent Legible Labels—**Each well was checked to determine if it had a permanent label indicating the well name/number. If the label was missing or not legible, a permanent marking device was used to relabel the well appropriately after confirming the identity of the well through the use of site maps, global positioning system (GPS), and depth-to-bottom measurements. It was noted whether a permanent legible label was present on the well inspection field form.
- **Lock—**Each well was checked to determine if it was secured with a similarly keyed lock. If an individual lock was damaged to the point that it is not functional, or if a lock from an unknown origin was in use, it was removed with a bolt cutter and replaced. Missing locks were noted and replaced with available locks.
- **Well Cap—**Prior to opening the well cap, the well was inspected for the presence of biting or stinging insects and/or poisonous plants. Each well was inspected for a polyvinyl chloride (PVC) slip-on cap or J-plug. Missing caps were replaced with one of similar size and type.
- **Well Plumbness Check (Ease of Inserting/Removing Bailer)—**Well plumbness was checked by inserting a 3-foot–long bailer to the bottom of the well to determine well condition.
- **Sediment in Well—**The potential presence of sediment in each well was checked based on a comparison of historical total depth measurements and current measurements obtained after the groundwater level measurement was collected. A groundwater-level indicator was lowered to the bottom of each well, and a depth measurement was recorded on the well inspection field form. The weighted water-level indicator was also used to feel the bottom of the well for softness that would indicate sedimentation as well as encumbrances. The measurement was then compared to historical total depth measurement to determine the depth of sediment that may be present in the well.

Two wells required repair followed by redevelopment. Wells 33-341 and 33-342 were determined to be older wells with completions that were compromised. Neither well was protected by bollards. Neither well had caps or j-plugs. Well 33-341 was bent at an approximate 25 degree angle and was therefore considered compromised. Both wells were missing locking lids on the completions and the PVC casing extended beyond the top of the completion. Well reconstruction and development activities are described in the following subsection.

The remaining wells within the network were in good condition with matching, keyed alike locks. Wells that did not have permanent ID tags affixed to the completion were clearly marked on PVC slip caps.

Many of the wells showed minor depth discrepancies between the installation data and observations during the well inspection. Some of the data indicates the wells are deeper than the depth recorded in the past, which suggests the historical data is inaccurate. The wells were resurveyed because of the depth discrepancies.

When total depth was measured, softness was not felt with the water level probe indicating that there was not a significant amount of sediment in the wells. Therefore, redevelopment of the remaining wells was not needed.

The stream gauges (Figure 3-2) were also inspected during this event. No water was noted in the stream channels where the stream gauges were located. Stream gauge SG-08 was unable to be located. The field team walked from an upstream starting point and proceeding downstream to attempt to locate SG-08 with a GPS unit. Even though the gauge was unable to be located due to excessive brush (and may no longer be installed), the entire stream channel was completely dry. Therefore, it was noted during the inspection that the stream gauges within the network were dry.

3.2.1.2 Well Reconstruction and Development

Based on well inspection findings, monitoring wells 33-341 and 33-342 were reconstructed to replace their existing surface completions.

The reconstruction of the surface completion at monitoring well 33-341 included the following:

- Removing the 4-inch circular steel surface protective casing from the monitoring well.
- Digging a 2-foot circular hole around the base of the monitoring well.
- Cutting off approximately 4.25 feet of damaged monitoring well riser.
- Installing an 8-inch circular flush-mount surface vault around the monitoring well riser.
- Installing a 2-foot circular concrete form around the flush-mount surface vault.
- Pouring concrete into the concrete form to create a concrete pad.

The reconstruction of the surface completion at monitoring well 33-342 included the following:

- Removing the 4 × 4-inch steel surface protective casing from the monitoring well
- Removing the top 6 inches of the well riser from the monitoring well
- Digging a 2-foot circular hole around the base of the monitoring well
- Installing a 2-foot concrete form around the base of the monitoring well
- Pouring concrete into the concrete form to create a concrete pad
- Re-installing the surface protective casing over the monitoring well riser and setting the casing into the newly poured concrete pad

Monitoring wells 33-341 and 33-342 were redeveloped as a precautionary measure since the well caps were not intact, leaving them open to the environment. The redevelopment occurred prior to sampling. The intent was to use a pump to surge and purge the well of sediment-laden water. However, a submersible pump could not be placed downhole within the well screen because of encumbrances shallower than the depth of the screen in both wells. The weighted water level was used to sound the bottom of the wells and was able to be lowered to the total depth of the wells. The encumbrances near the screens were not identified during the well inspection because the diameter of the water level meter was small enough to extend past the encumbrances with ease. The encumbrances were identified when attempting to place the submersible pump to the depth of the well screen. Therefore, the wells were redeveloped using 1-inch plastic bailer. USEPA provided approval of this field change prior to development. Groundwater parameters (pH, temperature, turbidity, and specific conductance) were recorded using a multi-sensor water quality and Hach turbidimeter. Groundwater parameters for both monitoring wells stabilized with the exception of turbidity, which remained well above 50 nephelometric turbidity units (NTUs). Development was complete after 10 well volumes were removed from each monitoring well. Well development forms are included in Appendix B.

3.2.1.3 Well Resurvey

Surveying activities were conducted to obtain horizontal coordinates and vertical elevations of the 16 existing Plume 2 monitoring wells since depth discrepancies between the installation data and observations during the well inspection were found. Surveyors licensed in the state of Illinois collected the horizontal coordinates, the ground surface elevation, and the top of casing elevation of each monitoring well. Horizontal control was referenced to the Illinois State Plane Coordinate System—East Zone, North American Datum of 1983, to an accuracy of 0.01 foot. Vertical control was referenced to the North American Vertical Datum of 1988, to an accuracy of 0.01 foot. The horizontal coordinates and vertical elevations surveyed are provided in Appendix C. Monitoring well construction details, and groundwater elevations are provided in Table 3-2. The table includes top of casing, ground elevations, and groundwater elevations based on the new survey data.

3.2.1.4 Groundwater Sampling

The 16 existing Plume 2 monitoring wells (Figure 3-2) were sampled during the supplemental site characterization investigation. Monitored groundwater parameters for sampled monitoring wells included water quality field parameters (pH, specific conductance, temperature, oxidation-reduction potential [ORP], dissolved oxygen [DO], and turbidity), and MNA parameters to support lines of evidence for biodegradation of chlorinated solvents. The additional MNA parameters included field measurements of carbon dioxide and dissolved iron, and laboratory measurements of dissolved gases (methane, ethane, and ethene), total organic carbon, total inorganic carbon, select metals (iron and manganese), alkalinity, chloride and sulfate, nitrite + nitrate, and nitrate.

The monitoring wells were sampled using low-flow sampling procedures. Prior to sample collection, each monitoring well was purged at a low pumping rate (between 100 and 500 milliliters per minute) using a nondedicated bladder pump and intake with dedicated discharge tubing (with the exception of 33-341 and 33-342 because of encumbrances described above). Monitoring wells 33-341 and 33-342 were purged and sampled using a peristaltic pump since a bladder pump could not be placed within the well screen of each of the wells. USEPA provided approval of the field change prior to sampling. The pumping rate for each monitoring well was dependent on the hydraulic properties of the formation for which the well was screened across, and was set at the highest flow rate attainable without creating drawdown greater than approximately 0.3 foot, or at a minimum of 100 milliliters per minute.

A multi-sensor water quality meter equipped with a flow-through cell was used to observe and record water quality field parameters. Water levels were also measured when water quality parameters were recorded. The monitoring wells were purged until pH, specific conductance, temperature, ORP, DO, and turbidity stabilized for at least three consecutive readings using the following criteria: pH ± 0.1 units; specific conductance ± 3 percent; temperature ± 3 percent, ORP ± 10 millivolts, DO <0.5 or ± 10 percent, and turbidity <5 or ± 10 percent. Water quality parameters and water level measurements were recorded at the start of purging and approximately every 5 minutes thereafter. Once field parameters were stabilized, the sample tubing was disconnected from the flow-through cell and groundwater was pumped into laboratory-supplied sample containers. The sample containers were then placed on ice in a cooler, and shipped to TestAmerica–Chicago for laboratory analysis. The laboratory analyzed the samples for VOCs using Method SW846-8260B. Groundwater sampling forms are included in Appendix B.

Quality assurance/quality control samples included field duplicates, MSD samples, and field blanks. A field duplicate and field blank were collected for at least every 10 field samples. One matrix spike and matrix spike duplicate sample was collected for at least every 20 field samples.

3.2.1.5 Grab Groundwater Sampling

Groundwater grab samples were collected for VOC analysis from select soil boring locations to augment the groundwater data that was collected from the existing site monitoring wells and to obtain groundwater data within the potential source areas from the Upper Clay, Upper Sand, Lower Clay, and the Lower Sand units. The groundwater grab sample locations are shown in Figure 3-1.

The lithology observed in the adjacent soil boring was used to determine the depths of groundwater grab sample collection. A discrete groundwater screen point sampling device was advanced down-hole to the targeted sample intervals for each groundwater grab sample location. The screen point sampling device was then opened to the

selected depth interval and polyethylene sampling tubing was lowered down through the hollow-stem drill rods and into the screen point sampling device to collect the groundwater sample. The groundwater grab samples were pumped through the open screen and plastic sampling tubing up to the surface using a peristaltic pump into laboratory-supplied sample containers. The sample containers were then placed on ice in a cooler, and shipped to TestAmerica–Chicago for laboratory analysis. The laboratory analyzed the samples for VOCs using Method SW846-8260B.

After sample collection, the screen point sampling device was removed from the borehole, decontaminated, and advanced to the next targeted sample depth interval for that location. If the target sample depth interval for the Upper Clay, Upper Sand, or Lower Clay unit (if Lower Sand was present) produced insufficient water for sample collection then the sampler was advanced down to the next target sample depth interval. The process was repeated for each target sample depth interval until the lowest hydrostratigraphic unit for that location was encountered. If a groundwater grab sample was unable to be collected from the lowest hydrostratigraphic unit using the discrete screen point sampling device then a temporary piezometer was installed within the hydrostratigraphic unit that was appropriate for meeting investigation objectives.

A temporary piezometer was installed for GG-148. The groundwater grab sample was later collected from the temporary piezometer in the same manner as the discrete groundwater screen point sampling device. The temporary piezometer was removed from the borehole and abandoned after sample collection.

3.3 Surface Water Investigation

No water was observed in the stream channels where the stream gauges were located. Stream gauge SG-08 was unable to be located due to excessive vegetation. Even though the stream gauge could not be located, a reconnaissance of the entire stream channel was performed and observed to be completely dry.

3.4 Investigation-derived Waste Management

Soil and aqueous waste generated from field investigation activities was properly contained, labeled, and temporarily stored at CONWR. Waste containers were sealed in 55-gallon steel drums approved by the U.S. Department of Transportation. The waste was consolidated into a central staging area designated by USFWS personnel.

A soil characterization sample was collected and analyzed for toxicity characteristic leaching procedure (TCLP) volatile organic compounds, TCLP semivolatile organic compounds, TCLP pesticides, TCLP herbicides, PCBs, TCLP metals, flashpoint, and pH. An aqueous characterization sample was collected and analyzed for TCLP volatile organic compounds, TCLP semivolatile organic compounds, TCLP pesticides, TCLP herbicides, PCBs, TCLP metals, ignitibility, and pH. Waste was transported and disposed of at the AES Environmental disposal facility in Calvert City, Kentucky, in accordance with applicable solid waste, hazardous waste, and water quality regulations. Appendix D contains the soil and aqueous waste profiles and the manifest.

Disposable sampling equipment, personal protective equipment, and miscellaneous trash were disposed of in solid waste containers at the conclusion field investigation activities.

3.5 Data Validation and Evaluation

All media samples collected during field investigation activities were analyzed by an offsite laboratory. CH2M HILL validated laboratory data generated by TestAmerica laboratories. The analytical data were validated in accordance with the review criteria and limits presented in the *USEPA's National Functional Guidelines for Organic and Inorganic Data Review* to confirm that data quality achieved the project's data quality objectives and that invalid data was not used for project decisions. Both the laboratory analytical data and the data quality evaluation report are provided in Appendix E.

The following data validation qualifiers were applied during the data validation process:

U The analyte was analyzed for but was not detected above the reported sample quantitation limit.

J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

R The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

UJ The analyte was analyzed for but not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Overall, the goal of the evaluation is to demonstrate that a sufficient number of representative samples were collected and that the resulting analytical data can be used to support the decision making process for the site. The following summary highlights the precision, accuracy, representativeness, comparability, and completeness findings for the sampling event:

- Precision was generally acceptable with the exception of a few analytes/compounds that were qualified as estimated due to field duplicate, laboratory duplicate, serial dilution and/or MS/MSD relative percent difference issues. Data users should consider the impact to any result that is qualified as it may contain a bias that could affect the decision making process.
- Accuracy was generally acceptable with several analytes being qualified as estimated nondetected and detected results due to calibration, laboratory control sample, MS/MSD, and or surrogate issues. The method/field/calibration blank samples were generally free of contamination with a few analytes being qualified as nondetected results due to low-level detections in the blanks.
- Representativeness of the data was verified through the sample collection, storage, and preservation procedures and the verification of holding-time compliance. The pH criterion of 2 or below was exceeded for 4 samples associated with the VOC analysis. All data were reported from analyses within the recommended holding time.
- Comparability of the data was verified using standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

TABLE 3-1

Monitoring Well Inspection Form

Supplemental Site Characterization Investigation Report for Plume 2 at PCB OU Site 33

Crab Orchard National Wildlife Refuge, Marion, Illinois

	Well Installation Data							Well Inspection Data											
Well ID	Northing	Easting	Installation Date	Top of Casing Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Well Depth (ft bgs)	Well Depth (ft btoc)	Depth to Water (ft btoc)	Total Depth (ft btoc)	Variance from Installation Data (ft)	Date Inspected	Protective Casing	Surface Seal	Protective Casing Degree of Mobility	Permanent Legible Label	Lock	Well Plumb	Sediment in Well	Notes
33-341	371803.15	787357.21	06/19/87	424.14	424.4	14	13.71	9.57	17.86	-4.1	8/31/2011	Yes	Poor	Poor	No	No	No	No	Looks to have been hit; bent at approximately 25 degrees.
33-342	371168.62	787154.04	06/19/87	430.79	427.7	20	23.13	16.69	23.8	-0.7	8/31/2011	Yes	Poor	Poor	No	No	No	No	
33MWC-01	370581.62	787786.54	01/19/95	431.04	428.4	19	21.68	16.57	21.82	-0.1	8/31/2011	Yes	Good	Good	No	Yes	Yes	No	
33MWC-02	372015.41	787849.98	01/21/95	424.08	421.7	19	21.33	11.96	21.68	-0.3	8/31/2011	Yes	Good	Good	No	Yes	Yes	No	
33MWC-03	371558.47	786495.72	01/20/95	428.46	426.3	20.5	22.63	16.77	22.7	-0.1	9/1/2011	Yes	Good	Good	No	Yes	Yes	No	Bollard bent.
33MWC-10	372585.01	787367.30	08/14/97	425.46	423.0	24.2	26.64	14.44	26.45	0.2	8/31/2011	Yes	Good	Good	Yes	Yes	Yes	No	
33MWC-11	370879.17	786550.70	08/19/97	425.04	422.3	19	21.73	14.29	21.35	0.4	8/31/2011	Yes	Good	Good	Yes	Yes	Yes	No	Located in the middle of farm field. May have access issues if field is planted. Access OK now.
33MWC-12	371711.94	786253.52	08/18/97	428.90	426.6	19.9	22.20	18.47	22.26	-0.1	9/1/2011	Yes	Good	Good	Yes	Yes	Yes	No	
33MWC-13	371380.52	787485.68	08/22/97	428.88	426.3	19.9	22.46	10.66	22.45	0.0	8/31/2011	Yes	Good	Good	Yes	Yes	Yes	No	
33MWC-14	371603.88	787323.53	08/21/97	428.83	426.3	24.7	27.20	11.01	27.09	0.1	8/31/2011	Yes	Good	Good	Yes	Yes	Yes	No	
33MWC-24	371398.59	787482.49	06/04/98	428.64	426.1	28	30.54	10.52	31.43	-0.9	8/31/2011	Yes	Good	Good	Yes	Yes	Yes	No	
33MWC-33	371754.67	786216.08	06/10/98	428.55	425.8	39.5	42.26	18.11	42.65	-0.4	9/1/2011	Yes	Good	Good	Yes	Yes	Yes	No	
33MWC-35	371741.46	786195.15	06/17/98	428.79	425.9	80	82.94	21.08	81.4	1.5	9/1/2011	Yes	Good	Good	Yes	Yes	Yes	No	
33MWC-36	371967.04	787971.45	06/16/98	423.13	420.5	30	32.59	11.13	33.4	-0.8	8/31/2011	Yes	Good	Good	Yes	Yes	Yes	No	
33MWC-44	371682.89	785201.62	10/11/00	414.62	411.6	20.2	23.17	11.08	23.3	-0.1	8/31/2011	Yes	Good	Good	Yes	Yes	Yes	No	
33MWC-45	371677.93	785203.02	10/10/00	413.87	411.5	37.8	40.13	9.87	40.49	-0.4	8/31/2011	Yes	Good	Good	Yes	Yes	Yes	No	

Notes:

Northings and eastings are in the North American Datum of 1983, State Plane Illinois East coordinate system

ft - feet

ft amsl - feet above mean sea level

ft bgs - feet below ground surface

ft btoc - feet below top of casing

TABLE 3-2

Monitoring Well Construction Details and Groundwater Elevations

Supplemental Site Characterization Investigation Report for Plume 2 at PCB OU Site 33

Crab Orchard National Wildlife Refuge, Marion, Illinois

Well ID	Designation	Unit Screened	TOC Elevation (ft amsl)	Ground Elevation (ft amsl)	Screen Length (ft)	Screen Interval (ft btoc)	Screen Interval (ft amsl)	Depth to Groundwater (ft btoc)	Groundwater Elevation (ft amsl)
33-341	Plume	Upper Clay	424.14	424.4	5	13 - 18	411.14 - 406.14	9.57	414.57
33-342	Plume	Upper Clay	430.79	427.7	5	19 - 24	411.79 - 406.79	16.69	414.10
33MWC-01	Boundary	Upper Clay	431.04	428.4	15	7 - 22	424.04 - 409.04	16.57	414.47
33MWC-02	Plume	Upper Clay	424.08	421.7	15	7 - 22	417.08 - 402.08	11.96	412.12
33MWC-03	Plume	Upper Clay/Upper Sand	428.46	426.3	15	8 - 23	420.46 - 405.46	16.77	411.69
33MWC-10	Sentinel	Upper Clay/Upper Sand	425.46	423.0	15	11 - 26	414.46 - 399.46	14.44	411.02
33MWC-11	Boundary	Upper Clay/Upper Sand	425.04	422.3	15	6 - 21	419.04 - 404.04	14.29	410.75
33MWC-12	Boundary	Upper Clay/Upper Sand	428.90	426.6	15	7 - 22	421.90 - 406.9	18.47	410.43
33MWC-13	Plume	Upper Clay	428.88	426.3	15	7 - 22	421.88 - 406.88	10.66	418.22
33MWC-14	Plume	Upper Clay/Upper Sand	428.83	426.3	15	12 - 27	416.83 - 401.83	11.01	417.82
33MWC-24	Plume	Upper Sand	428.64	426.1	5	26 - 31	402.64 - 397.64	10.52	418.12
33MWC-33	Plume	Upper Sand	428.55	425.8	10	32 - 42	396.55 - 386.55	18.11	410.44
33MWC-35	Boundary	Lower Sand	428.79	425.9	5	75 - 80	353.79 - 348.79	21.08	407.71
33MWC-36	Plume	Upper Sand	423.13	420.5	5	28 - 33	395.13 - 390.13	11.13	412.00
33MWC-44	Sentinel	Upper Clay	414.62	411.6	15	8 - 23	406.62 - 391.62	11.08	403.54
33MWC-45	Sentinel	Upper Sand	413.87	411.5	5	35 - 40	378.87 - 373.87	9.87	404.00

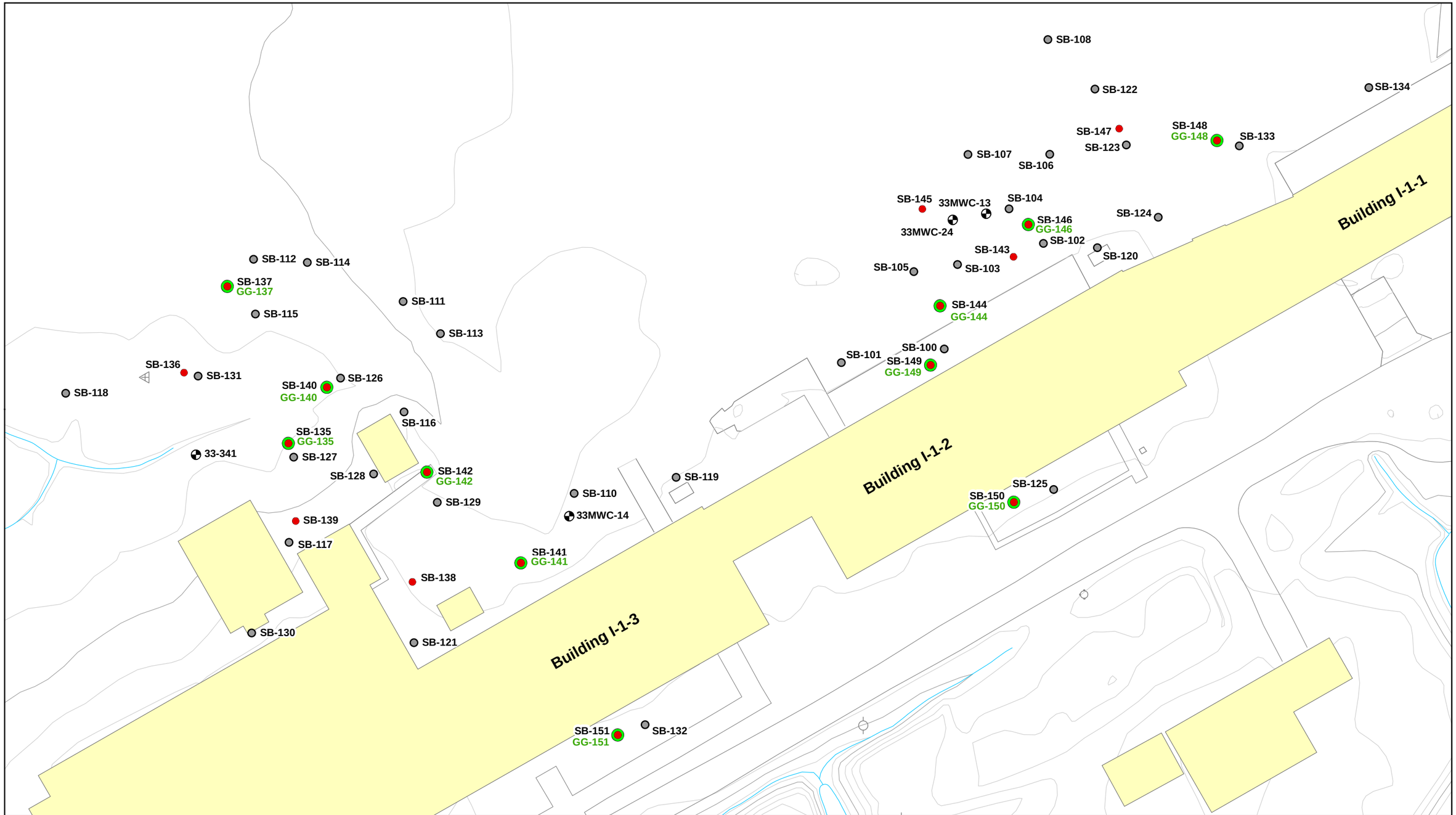
Notes:

amsl- above mean sea level

btoc - below top of casing

ft - feet

TOC - top of casing



N

0 25 50 Feet

LEGEND

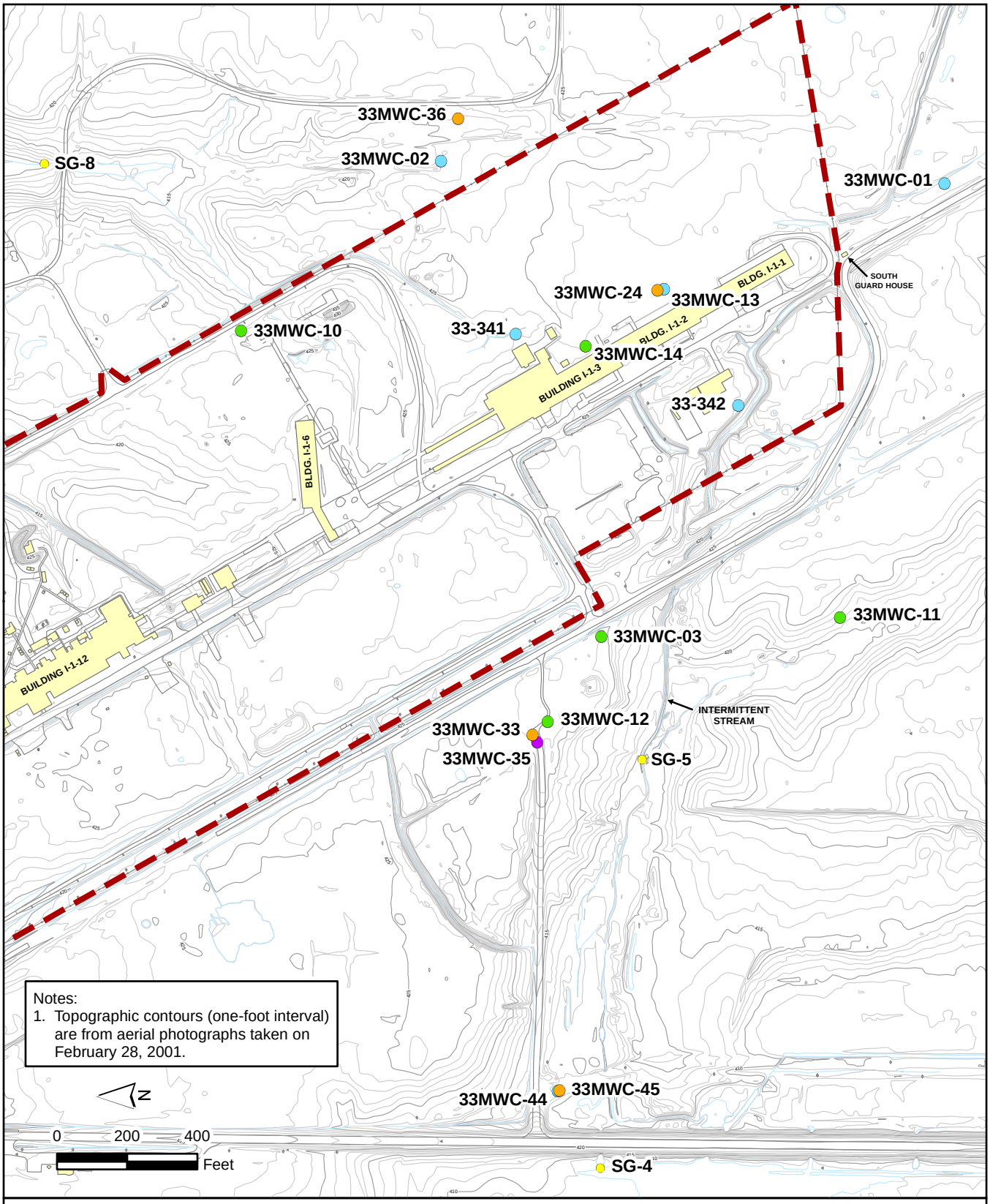
- Groundwater Monitoring Well
- Historic Soil Boring
- Supplemental Investigation Soil Boring
- Supplemental Investigation Soil Boring with Co-located Grab Groundwater Sample
- Buildings
- Concrete Pads, Roads, and Walkways
- Surface Water
- Topographic Contour

Notes:
1. Historic borings were collected from 09/12/2000 - 10/17/2000.
2. Supplemental investigation borings were collected from 9/13/2011 - 10/11/2011.
3. Topographic contours (one-foot interval) are from aerial photographs taken on February 28, 2001.

FIGURE 3-1
Source Area Soil and Groundwater Sample Locations
Supplemental Site Characterization Investigation Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

CH2MHILL

RDD \\BALDUR\PROJ\CRAB_ORCHARD_423535\MAPFILES\PLUME_2_SSCR\FIG3-1_SOIL_GWG_SAMP_LOCS_SSCR.MXD MSCHROCK 12/31/2011 8:39:56 PM



Notes:
1. Topographic contours (one-foot interval) are from aerial photographs taken on February 28, 2001.

LEGEND

Monitoring Well Locations

Unit Screened

- Upper Clay
- Upper Clay/Upper Sand
- Upper Sand
- Lower Sand
- Staff Gauge
- Industrial Area Boundary
- Buildings
- Concrete Pads, Roads, and Walkways
- Surface Water
- Topographic Contour

FIGURE 3-2
Groundwater Monitoring Well Sample Locations and Staff Gauge Locations
Supplemental Site Characterization Investigation Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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RDD \\BALDUR\PROJ\CRAB_ORCHARD_423535\MAPFILES\PLUME_2_SSCR\FIG3-2_MW_SAMP_LOCS_SSCR.MXD MSCHROCK 12/30/2011 11:45:58 PM

SECTION 4

Investigation Findings

Section 4 presents the findings of the supplemental site characterization investigation and the updated CSM.

4.1 Further Characterization of Subsurface Geology

The geologic setting of the Building I-1-2 and I-1-3 source areas was interpreted from soil boring logs from the pre-design study and the supplemental site characterization investigation. The lithologic descriptions were used to develop geologic cross sections of the Building I-1-2 and I-1-3 source areas to define the current understanding of the geologic units beneath these areas. Figure 4-1 identifies the geologic cross-section lines: A-A′ (Figure 4-2), B-B′ (Figure 4-3), C-C′ (Figure 4-4), and D-D′ (Figure 4-5).

Soil boring logs and geologic cross sections indicate the geology is composed of unconsolidated sediments and residuum that resides above shallow bedrock. The soil boring logs and geologic cross sections indicate there are four hydrostratigraphic units within the overburden: Upper Clay, Upper Sand, Lower Clay, and Lower Sand. Beneath the unconsolidated overburden lies Pennsylvanian-aged sandstone from the Tradewater Formation. The following subsections present a comprehensive discussion of each of the four hydrostratigraphic units and bedrock.

4.1.1 Upper Clay Unit

The Upper Clay unit is present from the ground surface to between approximately 17 to 26 feet bgs (approximately 400 to 410 feet above mean sea level [amsl]), with the exception of fill areas near ground surface as a result of excavation activities. The lean clay is predominately Brown (10YR 4/3) with some sporadic Light Gray (10YR 7/1) and Black (10YR 2/1) soil mottling; is typically firm to stiff; and exhibits low to medium plasticity. The lean clay is relatively featureless (although some evidence of laminar bedding has been observed in borings) and massive. The lean clay also contains varying amounts of silt, gravel, and sand that forms thin (2- to 3-inch) seams and (1- to 2-foot) mixed (that is, clayey sand, silty sand) discontinuous lenses. The clay is fractured throughout but has low permeability overall. Slug test data from monitoring well 33-341 indicates that the hydraulic conductivity of the unit within the potential source areas is on the order of 10^{-5} to 10^{-6} centimeters per second (cm/sec), which is consistent with silt or loess deposits. The general composition, structure, and hydraulic conductivity value of the Upper Clay unit indicates that the unit is likely a weathered loess deposit.

Overall, the physical characteristics of the Upper Clay unit observed during the supplemental site characterization investigation are consistent with the physical characteristics documented during the pre-design study. However, there is a substantial part of the shallow soil in the Building I-1-3 area that is fill material as a result of the excavation that occurred in 2009.

4.1.2 Upper Sand Unit

The Upper Sand unit (where present) underlies the Upper Clay unit. The Upper Sand is present at elevations between approximately 396 to 410 feet amsl and varies in thickness from 0.5 to 2 feet thick in the Building I-1-3 area and from 0 to 14 feet thick in the Building I-1-2 area. The unit pinches out east of Building I-1-2. The decreasing thickness of the unit east of the Building I-1-3 area indicates that the unit may pinch out laterally to the east-northeast.

The Upper Sand is predominately Brown (10YR 4/3) to Yellowish Brown (10YR 5/4) in color. The sand is typically well-graded, fine to coarse-grained sand (SW) in the southern portion of the Source Area near Building I-1-2 and very fine to fine-grained silty and clayey sand (SM or SC) in the northern portion of the Source Area near Building I-1-3. In some soil boring logs, sand grain size increases with depth indicating a coarsening downward sequence. Slug test data from monitoring well 33MWC-24 indicates that the hydraulic conductivity of the unit within the Source Area is on the order of 10^{-4} cm/sec, which is consistent with silty sands, clayey sands, and fine sand

deposits. The general composition, structure, and hydraulic conductivity value of the Upper Sand unit indicates that the unit is likely a glacial outwash deposit, which is consistent with the surface geology mapped by Illinois State Geological Survey.

Overall, the physical characteristics of the Upper Sand Unit observed during the supplemental site characterization investigation are consistent with the physical characteristics documented during the pre-design study. However, the depth, thickness, and presence of the unit varies slightly. The pre-design study concluded that the Upper Sand unit within Site 33 occurs at elevations between 380 and 400 feet amsl (RMT 2001). The supplemental characterization investigation shows that the Upper Sand unit in the Building I-1-2 and I-1-3 source area is present at elevations between 396 and 410 feet amsl. Additional lithologic data collected during the supplemental site characterization investigation results also indicate the presence of a continuous Upper Sand unit in the Building I-1-3 area that was not identified during the pre-design study.

4.1.3 Lower Clay Unit

The Lower Clay unit resides below the Upper Sand unit or Upper Clay unit (if the Upper Sand unit is not continuous in this area). The Lower Clay is present at elevations between approximately 375 to 406 feet amsl and varies in thickness from 9 to 28 feet thick in the Building I-1-3 source area to 3 to 8 feet thick in the Building I-1-2 source area. The thickness of the unit decreases to the south as the top of bedrock elevation increases towards ground surface.

The Lower Clay is typically either Brown (10YR 4/3) or Yellowish Brown (10YR 5/4) at the top of the unit and either Brown (10YR 4/3) or Gray (10YR 5/1) at the base of the unit. The lean clay is relatively featureless, massive, stiff to hard, and exhibits medium plasticity. The clay contains varying amounts of silt and sand that forms thin (2- to 4-inch) seams and (1- to 3-foot) mixed (that is, clayey sand, silty sand) discontinuous lenses. Small angular gravel clasts of the underlying sandstone, limestone, and coal are sporadically spread throughout the unit. Slug test data from outside of the Source Area indicates that the hydraulic conductivity of the unit is on the order of 10^{-6} cm/sec, which is consistent with clay deposits. The general composition, structure, and hydraulic conductivity value of the Lower Clay unit indicates that the unit is representative of Illinoisan glacial till.

Overall, the physical characteristics of the Lower Clay unit observed during the supplemental characterization investigation are consistent with the physical characteristics documented during the pre-design study. However, the depth and thickness varies slightly. The pre-design study indicated that the Lower Clay unit within Site 33 occurs at elevations between 340 and 380 feet amsl and has a relatively constant thickness of approximately 40 feet. The supplemental site characterization investigation indicated that the Lower Clay unit within the Building I-1-2 and I-1-3 source areas is present at elevations between 375 and 406 feet amsl. The supplemental site characterization investigation indicates that the unit near Building I-1-3 varies between 10 to 30-feet in thickness, and the thickness depends on the presence of the Lower Sand unit and elevated bedrock surfaces. The supplemental site characterization investigation indicates that the unit near Building I-1-2 varies between 3 to 9 feet in thickness, and the thickness depends on only the depth of elevated bedrock surfaces (since the Lower Sand unit is not present in this area).

4.1.4 Lower Sand Unit

The Lower Sand unit is only present in the in the Building I-1-3 area. The unit is present at elevations within the source areas between approximately 383 to 390 feet amsl and varies in thickness from 4 feet thick on the east side of the building and 7 feet thick immediately west side of the building. The unit pinches out between SB-141 and SB-142 on the east side Building I-1-3.

The Lower Sand is a mixture of Brown (10YR 4/3), Light Gray (10YR 7/1), and Gray (10YR 5/1) in color. The sand is composed of medium to coarse-grained sand (SP) and contains trace amounts of clay and silt. Slug test data from outside of the Source Area indicates that the hydraulic conductivity of the unit is on the order of 10^{-3} to 10^{-4} cm/sec, which is consistent with poorly-graded sand deposits. The general composition, structure, and hydraulic conductivity value of the Lower Sand unit indicates that the unit is likely either a glacial outwash deposit or a reworked deposit derived from the underlying sandstone bedrock.

The pre-design study concluded that the Lower Sand unit was not present in the Building I-1-2 and I-1-3 source areas. The sand and gravel layer defined during the pre-design study (RMT 2001) appears to be the Lower Sand unit. The lithology in SB-141 further substantiated that this is a continuous unit from SB-129 to the west side of Building I-1-3.

4.1.5 Bedrock

Bedrock beneath the overburden within the potential source areas is composed primarily of Pennsylvanian-aged sandstones from the Tradewater Formation. Soil borings from the supplemental characterization investigation first encountered highly weathered sandstone at the overburden/bedrock interface and then competent sandstone immediately below the weathered sandstone. The weathered sandstone is Brown (10YR 4/3) to Light Yellowish Brown (10YR 6/4) in color and is composed of fine- and medium-grained sands that are moderately cemented, highly micaeous, and exhibit thin laminar-bedding planes. The weathered sandstone is extremely friable near the overburden/bedrock interface and increases in strength with depth. Typically within less than 1 foot of the overburden/bedrock interface the sandstone transitions from Brown (10YR 4/3) to Light Gray (10YR 7/1), from moderately cemented to well-cemented, and from easily friable to hard and competent. The physical characteristics of sandstone identified in the soil boring logs within the potential source areas are similar to the physical characteristics of the Granger Sandstone Member of the Tradewater Formation.

Bedrock surface occurs at elevations within the potential source area between approximately 375 to 398 feet amsl. In the southern portion of the source area near Building I-1-1 and Building I-1-2 the top of bedrock surface ranges between 28 to 38 feet bgs. In the northern portion of the potential source areas near Building I-1-3 the top of the bedrock surface ranges between 38 to 49 feet bgs. Topographically, the top of the bedrock surface within the source area slopes downward to the north, east, and west.

Overall, the physical characteristics of the bedrock surface observed during the supplemental characterization investigation are consistent with the physical characteristics documented during the pre-design study. However, the physical characteristics of the sandstone beneath the source areas are consistent with the description listed on the Bedrock Geology of Crab Orchard Lake Quadrangle map for the Granger Member of the Tradewater Formation, rather than the Carbondale Formation cited in Preliminary Design Report.

4.2 Groundwater Flow Characteristics

As discussed in Section 2, the hydrostratigraphy of the site is generally divided into four zones: the Upper Clay unit, the Upper Sand unit, the Lower Clay unit, and the Lower Sand unit. Shallow groundwater (Upper Clay/Upper Sand units) beneath the broad Site 33 area is affected locally by surface water drainageways and by the Area 9 Repository. Figures 4-6 and 4-7 show the potentiometric surface observed in fall 2011 for the Upper Clay unit and the Upper Sand unit, respectively. The general flow directions in the Upper Clay and Upper Sand units are to the north, northwest, and west. Buildings I-1-1, I-1-2, and I-1-3 are located upon a groundwater divide and shallow groundwater flows away from a local groundwater high. A majority of the groundwater flow is westerly, influenced by the consistent presence and increased thickness of the Upper Sand in this direction. The potentiometric surface maps provided in the Preliminary Design Report (RMT 2001) indicated shallow groundwater (in the Upper Clay and Upper Sand units) flows radially from Buildings I-1-1, I-1-2, and I-1-3. However, the northeast component of groundwater flow in the Upper Clay and Upper Sand units was not observed during the supplemental site characterization investigation.

The potentiometric surface is not illustrated on a figure in this report for the Lower Clay and Lower Sand units because of the units monitoring wells are screened in the Plume 2 well network. The general flow direction for the Lower Clay and Lower Sand units is expected to be similar to that of the Upper Clay unit since these units are interconnected and have similar lithology.

The Preliminary Design Report indicated that the intermittent streams and East Swale downgradient of Plume 2 are often dry in their upper reaches, except following rainfall events, but that the lower reaches appear to be receiving groundwater inflow and are likely continuously flowing. The surface water investigation was performed during a dry period. Therefore, if water were present in the lower reaches, it would have demonstrated the groundwater-surface water interaction described in the Preliminary Design Report. However, no water was

observed in the stream channels where the stream gauges were located. This suggests that the nearest Plume 2 groundwater discharge to surface water is Crab Orchard Lake.

4.3 Soil Results

Soil sampling and analysis was conducted as part of the supplemental site characterization investigation to obtain additional and more recent data that represents the soil VOC concentrations in the Plume 2 source area. The goals of the soil investigation were as follows:

- Determine current soil VOC concentrations in the plume source areas.
- Define soil VOC concentrations within the source area.
- Identify how VOC contamination has migrated away from the source area.
- Determine changes in lithology as a result of investigating areas of the plume that have not been previously investigated (presented in more detail in Section 4.1 above).

Twenty-eight samples were collected and analyzed for VOCs: 11 in the Building I-1-2 area and 17 in the Building I-1-3 area. A subset of the soil samples collected was analyzed for the soil-specific transport parameter, f_{oc} to compute a solute distribution coefficient in the solute transport model. Six samples were collected for analysis of f_{oc}. The soil analytical results are provided Table 4-1.

Fourteen VOCs were detected in soil: 1,1,2-trichloroethane (1,1,2-TCA), 1,1-dichloroethane, 1,1-dichloroethene (1,1-DCE), acetone, chlorobenzene, chloroethane, cis-1,2-dichloroethene (cis-1,2-DCE), ethylbenzene, methylene chloride, tetrachloroethene (PCE), toluene, total xylenes, TCE, and vinyl chloride. The primary VOC detected in most samples during the previous investigation (Fall 2000) and the supplemental site characterization investigation (Fall 2011) was TCE. Figure 4-8 shows the TCE concentrations detected in soil during both investigations and the extent of contamination (with concentration contours) in each geologic unit.

The following discussion presents the results of the soil investigation with respect to the specific objectives of the investigation and how the current information compares to our previous understanding of the site characteristics.

4.3.1 Building I-1-2

The subsections below present the soil analytical results in each of the geologic units present beneath the Building I-1-2 area.

4.3.1.1 Upper Clay Unit

Shallow soil contamination (0 to 10 feet bgs) in the Upper Clay unit is limited to a relatively small area, likely due to historical removal of impacted shallow soil. The historical removal was conducted in the Building I-1-2 area in 1995 and is not shown in Figure 4-8 because documentation of the extent of the removal action is not available. The deeper part of the Upper Clay unit (from 10 feet to between 20 and 24 feet bgs) has a greater areal extent of contamination. Current soil results show high concentrations in the same area where the highest VOC concentrations were found in the Upper Clay unit historically (SB-102 and SB-104). TCE was detected at a concentration of 40 mg/kg in SB-146 from 15 to 16 feet bgs, whereas historical TCE concentrations in the area were detected at 5.4 mg/kg and 11 mg/kg at SB-102 and SB-104 from similar depth intervals.

TCE concentrations detected in SB-143 and SB-144 show elevated soil concentration in the Upper Clay northwest of the contamination found in 2000 in SB-102 (11 mg/kg at a depth of 10 to 12 feet bgs). TCE was detected at a concentration of 17 mg/kg in SB-143 from 15 to 16 feet bgs and at a concentration of 8.2 mg/kg in SB-144 from 11 to 12 feet bgs. The results show contamination extending in a general northwesterly direction from what was through to be the heart of the source area toward SB-100.

The low-level concentration of TCE detected at a concentration of 0.11 mg/kg in SB-145 from 11 to 12 feet bgs in the Upper Clay unit suggests that TCE has not migrated significantly northeast of SB-102 and SB-104. The low-level concentration of TCE of 0.005 mg/kg in SB-147 from 13 to 14 feet bgs in the Upper Clay unit suggests that TCE has also not migrated significantly northeast of SB-123, where TCE was detected at a concentration of 7.8 mg/kg from 12 to 14 feet bgs in the Upper Clay unit in 2000.

The data support the groundwater flow characteristics investigation findings that groundwater in the Upper Clay unit has a northwest flow component, but does not have a significant northeast flow component.

4.3.1.2 Upper Sand Unit

The Upper Sand unit was observed further east of Building I-1-2 (SB-144) than identified during the investigation conducted in 2000. The highest concentration of TCE detected within the unit was found in SB-149 on the east side of the building at a concentration of 270 mg/kg.

On the west side of the building, the latest contaminant concentration within the Upper Sand is roughly an order of magnitude higher than the concentration measured in 2000 in a nearby boring in this same area. TCE was detected at a concentration of 1.4 mg/kg in SB-125 in 2000, whereas the concentration of TCE in the Upper Sand unit in 2011 was 10 mg/kg in SB-150.

4.3.1.3 Lower Clay Unit

The supplemental site characterization investigation results show a slightly greater horizontal extent of contamination in the Lower Clay unit than the Upper Clay unit, and the contaminant concentrations are higher than the contamination in the Upper Clay unit. The second highest concentration of TCE detected in soil in the Building I-1-2 area, 97 mg/kg, was found at the Lower Clay/Sandstone interface in SB-144 on the east side of the building. TCE was not detected in the soil sample collected in the Lower Clay on the west side of the building during the supplemental investigation (SB-150 at a depth of 37 to 38 feet bgs). A low concentration of 0.035J mg/kg was detected in the historical boring SB-125 adjacent to SB-150.

TCE concentrations are similar in the southeast part of the Building I-1-2 source area to the 2000 investigation results. TCE was detected at a concentration of 13 mg/kg in SB-147 from 28 to 29 feet bgs, which was advanced 10 feet to the northeast of historical boring SB-123. The concentration of TCE in SB-123 from 28 to 30 feet bgs was 8.2 mg/kg. TCE was detected at a concentration of 14 mg/kg in SB-148 from 28 to 29 feet bgs, which was advanced 13 feet to the northeast of historical boring SB-133. The concentration of TCE in SB-133 from 26 to 28 feet bgs was 10 mg/kg.

4.3.2 Building I-1-3

The following subsections present the soil analytical results in each of the geologic units present beneath the Building I-1-3 area.

4.3.2.1 Upper Clay Unit

Shallow soil contamination (0 to 10 feet below ground) is relatively limited, similar to the shallow soil near Building I-1-2. Soil was removed in 2009 (after the pre-design study). The extent and depth of the excavation is shown in Figure 4-8. The removal activities include excavation of the sample with the highest concentration of TCE observed in 2000, a concentration of 82 mg/kg found at SB -126.

TCE was detected at a concentration of 1.4 mg/kg in SB-140 from 18 to 19 feet bgs, which is similar to the historical TCE concentration in nearby SB-126 of 0.63 mg/kg from 12 to 14 feet bgs.

Contamination does not appear to have migrated west of the main source area in the Upper Clay unit, as exhibited by low-level and nondetect concentrations in SB-138, SB-139, and SB-141. The concentration of TCE detected in SB-138 was 0.006 mg/kg from 11 to 12 feet bgs, which is lower than historical concentrations detected at similar depth intervals to the northeast and southeast of this location, in borings SB-128 and SB-129. The concentration of TCE detected in SB-129 was 0.012 mg/kg from 11 to 12 feet bgs, which is more than three orders of magnitude lower than the historical concentration detected in SB-127 from 14 to 16 feet bgs. TCE was not detected in SB-141 from 18 to 19 feet bgs, indicating that the TCE is not migrating in a southwesterly direction toward the building.

4.3.2.2 Upper Sand Unit

Additional lithologic data collected during the supplemental site characterization investigation results indicate the presence of a continuous Upper Sand unit in the Building I-1-3 area. A low-level TCE concentration of 0.097 mg/kg was detected within the Upper Sand unit on the west side of the building, in SB-151.

4.3.2.3 Lower Clay Unit

The supplemental site characterization investigation results show a greater horizontal extent of contamination in the Lower Clay unit than the Upper Clay unit and the contaminant concentrations are higher than the TCE contamination of soil currently in place in the Upper Clay unit.

The current TCE concentration near historical boring SB-126, which was in the area of highest VOC contamination in the Lower Clay unit, is similar to the concentration detected from 26 to 28 feet in SB-126. The TCE concentration in SB-140 was 18 mg/kg from 26 to 27 feet bgs.

The current TCE concentration in SB-135 was 30 mg/kg from 27 to 28 feet bgs. The concentration is similar to that of the TCE concentrations in the Upper Clay unit detected in historical boring SB-127.

Results from a soil sample collected from SB-136 at a depth of 28 to 29 feet bgs exhibited the same concentration of TCE (14 mg/kg) as soil taken from SB-131 in 2000 at a depth of 30 to 32 feet bgs. The new soil location is directly north of the old location, which indicates a significant change has not occurred in the area since the historical investigation.

The current TCE concentration in SB-137 of 46 mg/kg from 30 to 32 feet bgs is higher than concentrations previously measured in SB-115, located about 25 feet southwest of the new location. The TCE concentration in SB-115 from 30 to 32 feet bgs was 22 mg/kg.

The current TCE concentration in SB-138 of 11 mg/kg at the Lower Clay/Sandstone interface compared to the historical TCE concentration in SB-129 of 4.2 mg/kg from 40 to 42 feet bgs indicates TCE has migrated from the source area toward Building I-1-3 in the Lower Clay unit.

The TCE concentration in SB-139 of 8.3 mg/kg from 28 to 29 feet bgs shows some contamination has migrated away from the main source area by comparing this concentration to the TCE concentration in historical boring SB-127 of 27 mg/kg from 27 to 28 feet bgs, closer to the main source area.

The highest TCE concentrations in the Lower Clay unit were found in a sand lens within the Lower Clay unit in SB-142 from 35 to 36 feet bgs at a concentration of 170 mg/kg and in historical boring SB-126 from 40 to 42 feet bgs at a concentration of 150 mg/kg.

4.3.2.4 Lower Sand Unit

The sand and gravel layer defined during the pre-design study (RMT 2001) appears to be the Lower Sand unit. The lithology in SB-141 further substantiated that this is a continuous unit from SB-129 to the west side of Building I-1-3, where it is present in SB-151. TCE was detected in the Lower Sand unit at this location at a concentration of 13 mg/kg.

4.4 Groundwater Results

The following subsections present the groundwater analytical results from the source area and from existing monitoring wells encompassing the larger extent of the current groundwater contamination in Plume 2 defined by the 5 micrograms per liter (µg/L) TCE concentration contour, as shown in Figure 1-2.

4.4.1 Source Area Groundwater

Based on the soil chemistry data, it is evident that there are two separate VOC source areas. One source area is located directly east of Building I-1-2, just south of the former location of the manufacturing building. The second source is located just east of Building I-1-3, north of the former manufacturing building. The two source areas, although separate, form Plume 2. Therefore, the results of the groundwater data from the two areas are discussed together.

Twenty-two grab groundwater samples were collected from select soil boring locations to further characterize VOCs in groundwater in the Buildings I-1-2/I-1-3 source area. Grab groundwater analytical results compared against maximum contaminant levels (MCLs) are provided Table 4-2. In addition, four existing monitoring wells in the source area were sampled and analyzed for VOCs to obtain the current VOC concentrations in these wells. Groundwater analytical results from existing monitoring wells compared against MCLs are provided in Table 4-3.

Nine VOCs were detected in groundwater above MCLs in the source area; 1,1,1-trichloroethane, 1,1,2-TCA, 1,1-DCE, cis-1,2-DCE, PCE, toluene, trans-1,2-dichloroethene (trans-1,2-DCE), TCE, and vinyl chloride. The VOC with the highest concentration and most widespread distribution is TCE. Figure 4-9 shows the TCE concentrations detected in groundwater in the Buildings I-1-2/I-1-3 source area during the supplemental site characterization investigation.

Grab groundwater samples were collected from the Upper Clay unit, across the Upper Clay and Upper Sand units, the Upper Sand unit, the Lower Clay unit, sand lenses within the Lower Clay unit, and the Lower Sand unit. The pre-design study in 2000 only investigated groundwater within the Upper Clay and Upper Sand units in the source area. Grab groundwater results from the supplemental site characterization investigation show that the highest concentrations in the Building I-1-2 source area are in the Upper Sand and Lower Clay units near the building and the highest groundwater concentrations are in the Lower Clay and Lower Sand units in the Building I-1-3 source area.

The highest concentration of TCE detected in groundwater was in the source area at GG-144. TCE was detected at a concentration of 1,300,000 µg/L in the Lower Clay unit near the Lower Clay/Sandstone interface. The investigation results indicate that the source area hot spot was identified based on the other locations where borings were advanced to bedrock, and there was no indication that TCE is not present at concentrations near the same magnitude as found at GG-144. Therefore, the source area hot spot is assumed to be limited to this location and a small area around this location.

The presence of one or more degradation products (1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride) in the majority of groundwater samples collected from the source area indicate degradation of TCE is occurring in the source area. The range of detected concentrations of degradation products in the source area are as follows:

- 1,1-DCE: 2.3 to 18 µg/L
- cis-1,2-DCE: 4.5 J to 18,000 µg/L
- trans-1,2-DCE: 2 to 280 µg/L
- Vinyl chloride: 3 to 1,100 µg/L

4.4.2 Groundwater Results from Existing Monitoring Wells

Groundwater samples were collected from the 16 existing Plume 2 monitoring wells to evaluate the current VOC groundwater conditions encompassing the extent of Plume 2 since the most recent available data was collected more than 10 years ago. In addition, groundwater from existing groundwater monitoring wells was also analyzed by the laboratory for MNA parameters and field water quality parameters were collected to further evaluate if the conditions are favorable for natural attenuation. Groundwater analytical results from existing monitoring wells compared against MCLs are provided Table 4-3.

The 16 monitoring wells in Plume 2 are screened within the Upper Clay, Upper Sand, or Lower Sand unit. Each well is designated as one of the following types based on the current concentrations of cVOCs present in September 2011 groundwater sample results. Table 4-3 defines the well designations. Note: Groundwater monitoring well 33MWC-24 has been defined in previous documents as screened in the Upper Sand. Historical boring logs in the area and data collected in the supplemental investigation did not encounter the Upper Sand unit in this area of the site. The boring log for 33MWC-24 is not available for review. The historical designation of this well as an Upper Sand well has been carried through this document, however, it is likely that the well simply intercepted a sand lens within the Upper Clay unit and is not screened in the Upper Sand.

- **Plume Well:** A groundwater monitoring well exhibiting VOC concentrations above the MCLs
- **Sentinel Well:** A groundwater monitoring well situated between the contaminant plume and downgradient receptors (for example, Crab Orchard Lake, groundwater production well land use control boundary)

- **Boundary Well:** A groundwater monitoring well cross gradient or upgradient of the contaminant plume; may also include wells screened in the Upper Clay/Upper Sand or Lower Sand beneath an area of contamination confined in the Upper Clay

The following six VOCs were detected in groundwater above MCLs in existing Plume 2 monitoring wells in September 2011: 1,1-DCE, cis-1,2-DCE, PCE, trans-1,2-DCE, TCE, and vinyl chloride. The cVOCs detected in September 2011 were detected during previous sampling events. Figure 4-10 shows cVOCs detected in monitoring wells from 1995 to 2011.

The current groundwater plume extent (Figure 1-2) is the generalized two-dimensional TCE plume area defined by the 5 µg/L TCE concentration contour. The September 2011 TCE results were used to develop the current extent of the plume. The data were input into the groundwater model (Appendix B of FFS Revision 4; CH2M HILL 2012), and the model simulated this generalized plume extent for current conditions. The current area of the plume encompasses approximately 73 acres.

With the exception of 33-342, 33MWC-02, and 33MWC-13, TCE concentrations have remained relatively stable since 1995. TCE concentrations have increased at 33-342 from 450 µg/L to 1,600 µg/L since 1996. TCE concentrations have decreased at 33MWC-02 from 1087.5 µg/L to 430 µg/L since 1996 and at 33MWC-13 from 26,000 µg/L to 9,600 µg/L since 1997. The increasing trend in 33-342 is consistent with the predominant groundwater flow directions in the Upper Clay unit to the west and northwest. The decreasing TCE concentration in 33MWC-13 indicates TCE is migrating away from the Upper Clay in this area, which is to the northeast of the main source area. The decreasing TCE concentration in 33MWC-02 may be related to changes in groundwater flow direction in this area of the site.

The occurrence of biodegradation is typically indicated by the presence of TCE daughter products such as 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride. Increasing concentrations of cis-1,2-DCE, trans-1,2-DCE, and/or vinyl chloride at 33-342, 33MWC-13, 33MWC-24, and 33MWC-33 support that biodegradation may be occurring. MNA parameters analyzed from groundwater collected from monitoring wells do not provide lines of evidence that reductive dechlorination is the biodegradation mechanism.

Transport of contaminants to the north and south appears to be very limited in extent, as evidenced by nondetect cVOC concentrations at wells 33MWC-01 and 33MWC-10. The dimensions of the VOC plume are generally consistent with the groundwater flow directions observed at the site. The plume to the west of the building extends further from the source area than the plume to the east of the building, which is a result of the predominant flow directions and can be further explained by site geology. The Lower Sand unit is not present in the Building I-1-2 and the Upper Sand unit pinches out east of the building, limiting lateral transport. While the Lower Sand unit pinches out east of Building I-1-3, the Upper Sand was observed to be continuous in the Building I-1-3 area.

Sentinel and boundary wells bound the plume in the west, north, and south directions. While there are no existing wells that serve as a boundary well to the east, groundwater concentrations in the Upper Clay unit to the east (33MWC-02) are decreasing, and groundwater concentrations in the Upper Sand unit to the east (33MWC-36) are marginally above the MCL.

4.5 Summary of Subsurface Geology Characterization

The following summarizes the site-specific geologic findings of the supplemental investigation and how it compares to the historical understanding of the site-specific geology.

- Overall, the physical characteristics of the Upper Clay Unit observed during the supplemental site characterization investigation are consistent with the physical characteristics documented during the pre-design study. However, additional excavation has occurred near Building I-1-3 since FFS Revision 3 was written, which removed shallow surface contamination.
- The supplemental characterization investigation shows that the Upper Sand unit within the Building I-1-2 and I-1-3 source areas is present at elevations between 396 and 410 feet amsl where the layer was encountered. Additional lithologic data collected during the supplemental site characterization investigation results also

indicate the presence of a continuous Upper Sand unit in the Building I-1-3 area. The continuous layer near Building I-1-3 is fairly thin (0.5 to 2 feet thick).

- Overall, the physical characteristics of the Lower Clay unit observed during the supplemental characterization investigation are consistent with the physical characteristics documented during the pre-design study. However, the depth and thickness varies slightly. The supplemental site characterization investigation indicated that the Lower Clay unit within the Building I-1-2 and I-1-3 sources area is present at elevations between 375 and 406 feet amsl. The unit near Building I-1-3 varies between 10 to 30 feet in thickness, and the thickness depends on the presence of the Lower Sand Unit and elevated bedrock surfaces. The unit near Building I-1-2 varies between 3 to 9 feet in thickness, and the thickness depends on only the depth of elevated bedrock surfaces (since the Lower Sand unit is not present in this area).
- The pre-design study concluded that the Lower Sand unit was not present in the Building I-1-2 and I-1-3 source areas. The sand and gravel layer defined during the pre-design study (RMT 2001) appears to be the Lower Sand unit. The lithology in SB-141 further substantiated that this is a continuous unit from SB-129 to the west side of Building I-1-3.

4.6 Conceptual Site Model

The CSM presented in the Groundwater Investigation and Focused Feasibility Study Revision 1 (RMT 2000) and analysis provided in the Preliminary Design Report (RMT 2001) provides the following understanding of Plume 2:

- Shallow groundwater flow is generally towards Crab Orchard Lake, with discharge zones into swales and surface water bodies. The swales are typically dry except during wet weather events.
- Within the site area, downward hydraulic gradients indicate groundwater flow occurs primarily from the Upper Clay unit to the Upper Sand unit.
- The permeable Upper Sand unit is a primary pathway for lateral contaminant migration in groundwater.
- Soil results indicate that horizontal transport of contaminants is occurring in the Upper Clay and Upper Sand units.
- The Lower Clay unit retards horizontal and vertical migration of VOCs at depth near Building I-1-2, and contamination has moved downward within the Lower Clay near Building I-1-3.
- The presence of TCE daughter products within the upper strata indicates biodegradation is occurring, and data from the investigation suggests the rate of biodegradation is slow.

The supplemental site characterization investigation confirms the basic tenets of the original CSM, and provides some additional insight into contaminant transport:

- The supplemental site characterization investigation confirmed the presence of a complex lithology within the study area, beyond the identification of larger stratigraphic units (for example, Upper Clay unit, etc.), that are likely to be influencing contaminant flow within the system, including the absence of a Lower Sand unit near Building I-1-2, and the presence and discontinuous nature of laminations/strata of variable permeability within the major units identified at the site, that are likely to have an influence on contaminant fate and transport. Such variation is entirely consistent with the glacial depositional environment present at the site.
- While the area of shallow contamination was obscured by historical excavation activities, contamination has migrated both laterally and vertically within the Upper Clay unit and from the Upper Clay unit into the Upper Sand unit.
- Contamination migration is influenced by the higher permeability of the Upper Sand unit, which acts as a preferential pathway (where it is present).
- Contamination continues to migrate laterally and vertically from the Upper Clay/Upper Sand to the Lower Clay. Lateral migration in the Lower Clay likely occurs through sand layers or other permeable features (such as fractures) within the clay matrix.

- Contamination that has migrated through the Lower Clay to the Lower Sand moves preferential through the Lower Sand in the direction of groundwater flow, which is evident in elevated concentrations observed in the Lower Sand on both sides of Building I-1-3.
- Lower Sand was not observed near Building I-1-2, but migration of contamination was observed under the building predominantly in the Upper Sand.
- The highest concentration of TCE detected in groundwater was in the source area, near Building I-1-2. TCE was detected at a concentration of 1,300,000 µg/L in the Lower Clay unit near the Lower Clay/Sandstone interface. The investigation results indicate that the source area hot spot was identified based on the other locations where borings were advanced to bedrock, and there was no indication that TCE is not present at concentrations near the same magnitude. Therefore, the source area hot spot is assumed to be limited to this location and a small area around this location.

TABLE 4-1

Soil Analytical Results

Supplemental Site Characterization Investigation Report
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge, Marion, Illinois

Location	SB-143	SB-144		SB-145	SB-146	SB-147		SB-148	SB-149	SB-150	
Sample ID	**33-SB143-15**	**33-SB144-11**	**33-SB144-33**	**33-SB145-11**	**33-SB146-15**	**33-SB147-13**	**33-SB147-28**	**33-SB148-28**	**33-SB149-27**	**33-SB150-27**	**33-SB150-38**
Sample Depth (ft bgs)	**15 - 16**	**11 - 12**	**33 - 33.3**	**11 - 12**	**15 - 16**	**13 - 14**	**28 - 29**	**28 - 29**	**27 - 28**	**27 - 28**	**37 - 38**
Unit Sampled	**Upper Clay**	**Upper Clay**	**Lower Clay/SS**	**Upper Clay**	**Upper Clay**	**Upper Clay**	**Lower Clay**	**Lower Clay**	**Upper Sand**	**Upper Sand**	**Lower Clay**
Source Area	**Bldg I-1-2**	**Bldg I-1-2**	**Bldg I-1-2**	**Bldg I-1-2**	**Bldg I-1-2**	**Bldg I-1-2**	**Bldg I-1-2**	**Bldg I-1-2**	**Bldg I-1-2**	**Bldg I-1-2**	**Bldg I-1-2**
Sample Date	**10/12/2011**	**10/5/2011**	**10/5/2011**	**10/11/2011**	**10/5/2011**	**10/12/2011**	**10/12/2011**	**10/5/2011**	**10/5/2011**	**10/3/2011**	**10/3/2011**
Analyte											
Volatile Organic Compounds (VOCs) (mg/kg)											
1,1,1-Trichloroethane	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
1,1,2,2-Tetrachloroethane	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
1,1,2-Trichloroethane	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	**0.13 J**	< 0.037	< 0.0048
1,1-Dichloroethane	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
1,1-Dichloroethene	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
1,2-Dichloroethane	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
1,2-Dichloropropane	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
1,3-Dichloropropene	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
2-Butanone (MEK)	< 0.25	< 0.23	< 0.48	< 0.22	< 0.23	< 0.0049	< 0.24	< 0.22	< 0.96	< 0.18	< 0.0048
2-Hexanone	< 0.25	< 0.23	< 0.48	< 0.22	< 0.23	< 0.0049	< 0.24	< 0.22	< 0.96	< 0.18	< 0.0048
4-Methyl-2-Pentanone (MIBK)	< 0.25	< 0.23	< 0.48	< 0.22	< 0.23	< 0.0049	< 0.24	< 0.22	< 0.96	< 0.18	< 0.0048
Acetone	< 0.25	< 0.23	< 0.48	< 0.22	< 0.23	**0.0057 J**	< 0.24	< 0.22	< 0.96	< 0.18	**0.0058**
Benzene	< 0.012	< 0.011	< 0.024	< 0.011	< 0.012	< 0.0049	< 0.012	< 0.011	< 0.048	< 0.0092	< 0.0048
Bromodichloromethane	< 0.099	< 0.092	< 0.19	< 0.09	< 0.094	< 0.0049	< 0.096	< 0.089	< 0.38	< 0.074	< 0.0048
Bromoform	< 0.099	< 0.092	< 0.19	< 0.09	< 0.094	< 0.0049	< 0.096	< 0.089	< 0.38	< 0.074	< 0.0048
Bromomethane	< 0.099	< 0.092	< 0.19	< 0.09	< 0.094	< 0.0049	< 0.096	< 0.089	< 0.38	< 0.074	< 0.0048
Carbon Disulfide	< 0.25	< 0.23	< 0.48	< 0.22	< 0.23	< 0.0049	< 0.24	< 0.22	< 0.96	< 0.18	< 0.0048
Carbon Tetrachloride	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
Chlorobenzene	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
Chloroethane	< 0.099	< 0.092	< 0.19	< 0.09	< 0.094	< 0.0049	< 0.096	< 0.089	< 0.38	< 0.074	< 0.0048
Chloroform	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
Chloromethane	< 0.099	< 0.092	< 0.19	< 0.09	< 0.094	< 0.0049	< 0.096	< 0.089	< 0.38	< 0.074	< 0.0048
cis-1,2-Dichloroethene	**0.53**	**0.31**	< 0.095	< 0.045	**1.5**	**0.091**	**0.4**	**2.6**	< 0.19	**0.038**	< 0.0048
cis-1,3-Dichloropropene	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
Dibromochloromethane	< 0.099	< 0.092	< 0.19	< 0.09	< 0.094	< 0.0049	< 0.096	< 0.089	< 0.38	< 0.074	< 0.0048
Ethylbenzene	< 0.012	< 0.011	**0.061**	< 0.011	< 0.012	< 0.0049	< 0.012	< 0.011	< 0.048	< 0.0092	< 0.0048
Methyl tert-Butyl Ether (MTBE)	< 0.099	< 0.092	< 0.19	< 0.09	< 0.094	< 0.0049	< 0.096	< 0.089	< 0.38	< 0.074	< 0.0048
Methylene Chloride	< 0.25	< 0.23	< 0.48	< 0.22	< 0.23	< 0.0049	< 0.24	< 0.22	< 0.96	< 0.18	< 0.0048
Styrene	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
Tetrachloroethene (PCE)	< 0.049	< 0.046	**0.036 J**	< 0.045	< 0.047	< 0.0049	**0.039 J**	< 0.045	< 0.19	**0.012 J**	< 0.0048
Toluene	< 0.012	< 0.011	**0.089**	< 0.011	< 0.012	< 0.0049	< 0.012	< 0.011	**0.29**	< 0.0092	< 0.0048
Total Xylenes	< 0.025	< 0.023	**0.31**	< 0.022	< 0.023	< 0.0097	< 0.024	< 0.022	**0.16**	< 0.018	< 0.0097
trans-1,2-Dichloroethene	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
trans-1,3-Dichloropropene	< 0.049	< 0.046	< 0.095	< 0.045	< 0.047	< 0.0049	< 0.048	< 0.045	< 0.19	< 0.037	< 0.0048
Trichloroethene (TCE)	**17**	**8.2**	**97**	**0.11**	**40**	**0.0047 J**	**13**	**14**	**270**	**10**	< 0.0048
Vinyl Chloride	< 0.012	< 0.011	< 0.024	< 0.011	**0.024**	**0.003 J**	**0.039**	**0.041**	< 0.048	< 0.0092	< 0.0048
General Chemistry (PERCENT)											
Fraction of Organic Carbon	- -	- -	- -	**0.56**	- -	- -	- -	- -	**0.64**	- -	**0.84**

Notes:

ft bgs - feet below ground surface

"--" - Not analyzed

J - The analyte was positively identified:
the associated numerical value is the
approximate concentration of the analyte in the sample.

< - The analyte was analyzed for, but was not
detected above the reported sample quantitation limit.

mg/kg - milligrams per kilogram

Bold indicates the analyte was detected

SS - Sandstone

* - Soil sample was collected from a sand lens within the
Upper or Lower Clay Unit.

TABLE 4-1

Soil Analytical Results

Supplemental Site Characterization Investigation Report
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge, Marion, Illinois

Location	SB-135		SB-136	SB-137	SB-138			SB-139		SB-140		SB-141	SB-142		SB-151		
Sample ID	**33-SB135-9**	**33-SB135-27**	**33-SB136-28**	**33-SB137-31**	**33-SB138-11**	**33-SB138-29**	**33-SB138-38**	**33-SB139-11**	**33-SB139-28**	**33-SB140-18**	**33-SB140-26**	**33-SB141-18**	**33-SB142-35**	**33-SB142-41**	**33-SB151-27**	**33-SB151-32**	**33-SB151-38**
Sample Depth (ft bgs)	**9 - 10**	**27 - 28**	**28 - 29**	**31 - 32**	**11 - 12**	**29 - 30**	**38 - 39**	**11 - 12**	**28 - 29**	**18 - 19**	**26 - 27**	**18 - 19**	**35 - 36**	**41 - 42**	**27 - 28**	**32 - 33**	**38 - 39**
Unit Sampled	**Upper Clay**	**Lower Clay**	**Lower Clay**	**Lower Clay**	**Upper Clay**	**Lower Clay**	**Lower Clay/SS**	**Upper Clay**	**Lower Clay**	**Upper Clay**	**Lower Clay**	**Upper Clay**	**Lower Clay***	**Lower Clay**	**Upper Sand**	**Lower Clay**	**Lower Sand**
Source Area	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**	**Bldg I-1-3**
Sample Date	**10/4/2011**	**10/4/2011**	**9/13/2011**	**10/5/2011**	**10/10/2011**	**10/10/2011**	**10/10/2011**	**10/11/2011**	**10/11/2011**	**10/4/2011**	**10/4/2011**	**10/4/2011**	**10/4/2011**	**10/4/2011**	**10/3/2011**	**10/3/2011**	**10/3/2011**
Analyte																	
Volatile Organic Compounds (VOCs) (mg/kg)																	
1,1,1-Trichloroethane	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
1,1,2,2-Tetrachloroethane	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
1,1,2-Trichloroethane	- -	**0.023 J**	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	**0.027 J**	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
1,1-Dichloroethane	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	**0.036**	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
1,1-Dichloroethene	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	**0.055**	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
1,2-Dichloroethane	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
1,2-Dichloropropane	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
1,3-Dichloropropene	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
2-Butanone (MEK)	- -	< 0.22	< 0.21	< 0.23	< 0.0043	< 0.3	< 0.23	< 0.0045	< 0.22	< 0.24	< 0.22	< 0.23	< 0.52	< 0.0041	< 0.0039	< 0.22	< 0.22
2-Hexanone	- -	< 0.22	< 0.21	< 0.23	< 0.0043	< 0.3	< 0.23	< 0.0045	< 0.22	< 0.24	< 0.22	< 0.23	< 0.52	< 0.0041	< 0.0039	< 0.22	< 0.22
4-Methyl-2-Pentanone (MIBK)	- -	< 0.22	< 0.21	< 0.23	< 0.0043	< 0.3	< 0.23	< 0.0045	< 0.22	< 0.24	< 0.22	< 0.23	< 0.52	< 0.0041	< 0.0039	< 0.22	< 0.22
Acetone	- -	< 0.22	< 0.21	< 0.23	**0.008**	< 0.3	< 0.23	< 0.0045	< 0.22	< 0.24	< 0.22	< 0.23	< 0.52	**0.0037 J**	< 0.0039	< 0.22	< 0.22
Benzene	- -	< 0.011	< 0.011	< 0.011	< 0.0043	< 0.015	< 0.012	< 0.0045	< 0.011	< 0.012	< 0.011	< 0.011	< 0.026	< 0.0041	< 0.0039	< 0.011	< 0.011
Bromodichloromethane	- -	< 0.088	< 0.085	< 0.091	< 0.0043	< 0.12	< 0.094	< 0.0045	< 0.086	< 0.094	< 0.089	< 0.092	< 0.21	< 0.0041	< 0.0039	< 0.089	< 0.088
Bromoform	- -	< 0.088	< 0.085	< 0.091	< 0.0043	< 0.12	< 0.094	< 0.0045	< 0.086	< 0.094	< 0.089	< 0.092	< 0.21	< 0.0041	< 0.0039	< 0.089	< 0.088
Bromomethane	- -	< 0.088	< 0.085	< 0.091	< 0.0043	< 0.12	< 0.094	< 0.0045	< 0.086	< 0.094	< 0.089	< 0.092	< 0.21	< 0.0041	< 0.0039	< 0.089	< 0.088
Carbon Disulfide	- -	< 0.22	< 0.21	< 0.23	< 0.0043	< 0.3	< 0.23	< 0.0045	< 0.22	< 0.24	< 0.22	< 0.23	< 0.52	< 0.0041	< 0.0039	< 0.22	< 0.22
Carbon Tetrachloride	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
Chlorobenzene	- -	< 0.044	< 0.042	< 0.046	< 0.0043	**0.075**	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	**0.0016 J**	< 0.044	< 0.044
Chloroethane	- -	< 0.088	< 0.085	< 0.091	< 0.0043	< 0.12	< 0.094	**0.0025 J**	< 0.086	< 0.094	< 0.089	< 0.092	< 0.21	< 0.0041	< 0.0039	< 0.089	< 0.088
Chloroform	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
Chloromethane	- -	< 0.088	< 0.085	< 0.091	< 0.0043	< 0.12	< 0.094	< 0.0045	< 0.086	< 0.094	< 0.089	< 0.092	< 0.21	< 0.0041	< 0.0039	< 0.089	< 0.088
cis-1,2-Dichloroethene	- -	**3.4**	**1.2**	**1.3**	**0.038**	**0.091**	**0.44**	**0.041**	**2.7**	**3.6**	**2.5**	< 0.046	**1.3**	**0.022**	**0.011**	< 0.044	**0.28**
cis-1,3-Dichloropropene	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
Dibromochloromethane	- -	< 0.088	< 0.085	< 0.091	< 0.0043	< 0.12	< 0.094	< 0.0045	< 0.086	< 0.094	< 0.089	< 0.092	< 0.21	< 0.0041	< 0.0039	< 0.089	< 0.088
Ethylbenzene	- -	< 0.011	< 0.011	< 0.011	< 0.0043	< 0.015	< 0.012	< 0.0045	< 0.011	< 0.012	**0.018**	< 0.011	< 0.026	< 0.0041	< 0.0039	< 0.011	< 0.011
Methyl tert-Butyl Ether (MTBE)	- -	< 0.088	< 0.085	< 0.091	< 0.0043	< 0.12	< 0.094	< 0.0045	< 0.086	< 0.094	< 0.089	< 0.092	< 0.21	< 0.0041	< 0.0039	< 0.089	< 0.088
Methylene Chloride	- -	< 0.22	< 0.21	< 0.23	**0.0051**	< 0.3	< 0.23	< 0.0045	< 0.22	< 0.24	< 0.22	< 0.23	< 0.52	< 0.0041	< 0.0039	< 0.22	< 0.22
Styrene	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
Tetrachloroethene (PCE)	- -	**0.12**	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	**0.18**	< 0.046	< 0.1	< 0.0041	**0.002 J**	< 0.044	< 0.044
Toluene	- -	< 0.011	< 0.011	< 0.011	< 0.0043	< 0.015	< 0.012	< 0.0045	< 0.011	< 0.012	< 0.011	< 0.011	< 0.026	< 0.0041	< 0.0039	< 0.011	< 0.011
Total Xylenes	- -	< 0.022	< 0.021	< 0.023	< 0.0086	< 0.03	< 0.023	< 0.009	< 0.022	< 0.024	< 0.022	< 0.023	< 0.052	< 0.0083	< 0.0078	< 0.022	< 0.022
trans-1,2-Dichloroethene	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
trans-1,3-Dichloropropene	- -	< 0.044	< 0.042	< 0.046	< 0.0043	< 0.059	< 0.047	< 0.0045	< 0.043	< 0.047	< 0.045	< 0.046	< 0.1	< 0.0041	< 0.0039	< 0.044	< 0.044
Trichloroethene (TCE)	- -	**30**	**14**	**46**	**0.0061**	**1**	**11**	**0.012**	**8.3 J**	**1.4**	**18**	< 0.011	**170**	**0.42**	**0.097**	**2 J**	**13**
Vinyl Chloride	- -	**0.13**	**0.07**	**0.029**	**0.0091**	< 0.015	< 0.012	< 0.0045	**0.14**	**0.016**	**0.078**	< 0.011	< 0.026	< 0.0041	< 0.0039	< 0.011	< 0.011
General Chemistry (PERCENT)																	
Fraction of Organic Carbon	**0.53**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**0.53**	**0.26**

Notes:

ft bgs - feet below ground surface

"--" - Not analyzed

J - The analyte was positively identified:
the associated numerical value is the
approximate concentration of the analyte in the sample.

< - The analyte was analyzed for, but was not
detected above the reported sample quantitation limit.

mg/kg - milligrams per kilogram

Bold indicates the analyte was detected

SS - Sandstone

* - Soil sample was collected from a sand lens within the
Upper or Lower Clay Unit.

TABLE 4-2

Grab Groundwater Analytical Results

Supplemental Site Characterization Investigation Report
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge, Marion, Illinois

	Location	GG-144	GG-146		GG-148	GG-149		GG-150			GG-137	GG-135	GG-140	GG-141		GG-142		GG-151	
	Sample ID	33-GG144-30	33-GG146-17.5	33-GG146-26	33-GG148-22.5	33-GG149-22	33-GG149-29	33-GG150-18	33-GG150-23	33-GG150-34	33-GG137-29.5	33-GG135-34	33-GG140-34	33-GG141-21	33-GG141-38	33-GG142-20	33-GG142-35	33-GG151-28	33-GG151-38
	Sample Depth (ft bgs)	30 - 33	15.5 - 17.5	25 - 27	20 - 25	21 - 23	28.5 - 30.5	18 - 19	23 - 24	34 - 38	29 - 30	34 - 35	33 - 35	20 - 22	36 - 39	19 - 21	34 - 36	27 - 29	37 - 39
	Unit Screened	Lower Clay	Upper Clay	Lower Clay	Upper Clay	Upper Sand	Upper Sand	Upper Sand	Upper Sand	Lower Clay	Lower Clay	Lower Clay	Lower Clay*	Upper Sand	Lower Sand	Upper Clay	Lower Clay*	Upper Sand/ Lower Clay	Lower Sand
	Source Area	Bldg I-1-2	Bldg I-1-2	Bldg I-1-2	Bldg I-1-2	Bldg I-1-2	Bldg I-1-2	Bldg I-1-2	Bldg I-1-2	Bldg I-1-2	Bldg I-1-3	Bldg I-1-3	Bldg I-1-3	Bldg I-1-3	Bldg I-1-3	Bldg I-1-3	Bldg I-1-3	Bldg I-1-3	Bldg I-1-3
	Sample Date	10/6/2011	10/6/2011	10/6/2011	10/11/2011	10/6/2011	10/6/2011	10/10/2011	10/10/2011	10/10/2011	10/12/2011	10/11/2011	10/12/2011	10/7/2011	10/7/2011	10/7/2011	10/7/2011	10/10/2011	10/10/2011
Analyte	**MCL**																		
Volatile Organic Compounds (VOCs) (µg/L)																			
1,1,1-Trichloroethane	200	**270 J**	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
1,1,2,2-Tetrachloroethane	--	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
1,1,2-Trichloroethane	5	**220 J**	**64**	< 20	**120**	< 20	**110**	< 1	< 10	< 1	< 10	**68**	< 500	< 20	< 10	< 20	**170**	< 2	< 10
1,1-Dichloroethane	--	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
1,1-Dichloroethene	7	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
1,2-Dichloroethane	5	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
1,2-Dichloropropane	5	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
1,3-Dichloropropene	--	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
2-Butanone (MEK)	--	< 2500	< 250	< 100	< 500	< 100	< 500	< 5	< 50	< 5	< 50	< 100	< 2500	< 100	< 50	< 100	< 500	< 10	< 50
2-Hexanone	--	< 2500	< 250	< 100	< 500	< 100	< 500	< 5	< 50	< 5	< 50	< 100	< 2500	< 100	< 50	< 100	< 500	< 10	< 50
4-Methyl-2-Pentanone (MIBK)	--	**1200 J**	< 250	< 100	< 500	< 100	< 500	< 5	< 50	< 5	< 50	< 100	< 2500	< 100	< 50	< 100	< 500	< 10	< 50
Acetone	--	< 2500	< 250	< 100	< 500	< 100	< 500	**11 J**	< 50	**8.4 J**	**210**	**270**	< 2500	< 100	< 50	< 100	< 500	< 10	< 50
Benzene	5	< 250	< 25	< 10	< 50	< 10	< 50	< 0.5	< 5	< 0.5	< 5	< 10	< 250	< 10	< 5	< 10	< 50	< 1	< 5
Bromodichloromethane	80	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
Bromoform	80	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
Bromomethane	--	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
Carbon Disulfide	--	< 2500	< 250	< 100	< 500	< 100	< 500	< 5	< 50	< 5	< 50	< 100	< 2500	< 100	< 50	< 100	< 500	< 10	< 50
Carbon Tetrachloride	5	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
Chlorobenzene	100	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	**46**	**9.8 J**	< 20	< 100	**5**	< 10
Chloroethane	--	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
Chloroform	80	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	**11 J**	< 500	< 20	< 10	< 20	< 100	< 2	< 10
Chloromethane	--	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
cis-1,2-Dichloroethene	70	**330 J**	**3,800**	**440**	**29,000**	**190**	**140**	**4.5 J**	**79 J**	< 1	**880**	**6,800**	**18,000**	**17 J**	**1,200**	**2,700**	**8,000**	**140**	**420 J**
cis-1,3-Dichloropropene	--	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
Dibromochloromethane	80	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
Ethylbenzene	700	**170 J**	< 25	< 10	< 50	< 10	< 50	< 0.5	< 5	< 0.5	< 5	< 10	< 250	< 10	< 5	< 10	< 50	< 1	< 5
Methyl tert-Butyl Ether (MTBE)	--	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
Methylene Chloride	5	< 2500	< 250	< 100	< 500	< 100	< 500	< 5	< 50	< 5	< 50	< 100	< 2500	< 100	< 50	< 100	< 500	< 10	< 50
Styrene	100	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
Tetrachloroethene (PCE)	5	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	**6.7 J**	**18 J**	< 500	**120**	**63 J**	**5,700**	< 100	**6**	< 10
Toluene	1,000	**1,100**	< 25	< 10	< 50	< 10	**40 J**	**0.45 J**	< 5	< 0.5	< 5	< 10	< 250	< 10	< 5	< 10	< 50	< 1	< 5
Total Xylenes	10,000	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
trans-1,2-Dichloroethene	100	< 500	**51**	**11 J**	**280**	< 20	< 100	< 1	< 10	< 1	**9.2 J**	**86**	< 500	< 20	**13**	**17 J**	< 100	**2**	< 10
trans-1,3-Dichloropropene	--	< 500	< 50	< 20	< 100	< 20	< 100	< 1	< 10	< 1	< 10	< 20	< 500	< 20	< 10	< 20	< 100	< 2	< 10
Trichloroethene (TCE)	5	**1,300,000 J**	**54,000**	**7,500**	**58,000**	**17,000**	**63,000**	**67 J**	**4,300 J**	**30 J**	**5,700**	**8,800**	**170,000**	**960**	**4,300**	**2,700**	**79,000**	**710**	**3,000 J**
Vinyl Chloride	2	< 250	**62**	**18**	**1,100**	**15**	**32 J**	< 0.5	< 5	< 0.5	**18**	**100**	**520**	< 10	**5**	**97**	**93**	**3**	< 5

Notes:

ft bgs - feet below ground surface

J - The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

< - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ - The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

µg/L - micrograms per liter

Bold indicates the analyte was detected

Shading indicates result exceeded the MCL

* - Groundwater sample was collected from a sand lens within the Lower Clay Unit.

TABLE 4-3

Groundwater Analytical Results from Existing Monitoring Wells

Supplemental Site Characterization Investigation Report for Plume 2 at PCB OU Site 33

Crab Orchard National Wildlife Refuge, Marion, Illinois

	Location	33-341	33-342	33MWC-01	33MWC-02	33MWC-03	33MWC-10	33MWC-11	33MWC-12	33MWC-13	33MWC-14	33MWC-24
	Sample ID	GW-33-341-092211	GW-33-342-092211	GW-33MWC-01-092111	GW-33MWC-02-092011	GW-33MWC-03-092111	GW-33MWC-10-091911	GW-33MWC-11-092111	GW-33MWC-12-092111	GW-33MWC-13-091911	GW-33MWC-14-091911	GW-33MWC-24-091911
	Sample Depth (ft btoc)	13 - 18	19 - 24	7 - 22	7 - 22	8 - 23	11 - 26	6 - 21	7 - 22	7 - 22	12 - 27	26 - 31
	Unit Screened	Upper Clay	Upper Clay	Upper Clay	Upper Clay	Upper Clay/ Upper Sand	Upper Clay/ Upper Sand	Upper Clay/ Upper Sand	Upper Clay/ Upper Sand	Upper Clay	Upper Clay/ Upper Sand	Upper Sand
	Designation	Plume	Plume	Boundary	Plume	Plume	Sentinel	Boundary	Boundary	Plume	Plume	Plume
	Sample Date	9/22/2011	9/22/2011	9/21/2011	9/20/2011	9/21/2011	9/19/2011	9/21/2011	9/21/2011	9/19/2011	9/19/2011	9/19/2011
Analyte	**Screening Level**											
Volatile Organic Compounds (VOCs) (µg/L)												
1,1,1-Trichloroethane	200	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
1,1,2,2-Tetrachloroethane	--	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
1,1,2-Trichloroethane	5	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
1,1-Dichloroethane	--	**1.7**	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
1,1-Dichloroethene	7	**18**	< 5	< 1	< 1	< 1	< 1	< 1	< 1	**4.2 J**	< 1	< 10
1,2-Dichloroethane	5	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
1,2-Dichloropropane	5	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
1,3-Dichloropropene	--	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
2-Butanone (MEK)	--	< 5	< 25	< 5	< 5	< 5	< 5	< 5	< 5	< 50	< 5	< 50
2-Hexanone	--	< 5	< 25	< 5	< 5	< 5	< 5	< 5	< 5	< 50	< 5	< 50
4-Methyl-2-Pentanone (MIBK)	--	< 5	< 25	< 5	< 5	< 5	< 5	< 5	< 5	< 50	< 5	< 50
Acetone	--	< 5	< 25	< 5	< 5	< 5	< 5	< 5	< 5	< 50	< 5	< 50
Benzene	5	< 0.5	< 2.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 5
Bromodichloromethane	80	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
Bromoform	80	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
Bromomethane	--	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
Carbon Disulfide	--	< 5	< 25	< 5	< 5	< 5	< 5	< 5	< 5	< 50	< 5	< 50
Carbon Tetrachloride	5	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
Chlorobenzene	100	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	**1.3**	< 10
Chloroethane	--	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
Chloroform	80	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
Chloromethane	--	< 1	< 5	< 1	< 1	**0.94 J**	< 1	< 1	< 1	< 10	< 1	< 10
cis-1,2-Dichloroethene	70	**180**	**230 J**	< 1	**120**	**34**	< 1	< 1	< 1	**1900**	**26**	**760**
cis-1,3-Dichloropropene	--	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
Dibromochloromethane	80	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
Ethylbenzene	700	< 0.5	< 2.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 5
Methyl tert-Butyl Ether (MTBE)	--	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
Methylene Chloride	5	< 5	< 25	< 5	< 5	< 5	< 5	< 5	< 5	< 58	< 5	< 50
Styrene	100	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
Tetrachloroethene (PCE)	5	< 1	< 5	< 1	< 1	**7.2**	< 1	< 1	< 1	**6.9 J**	**140**	**39**
Toluene	1,000	< 0.5	< 2.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 5
Total Xylenes	10,000	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
trans-1,2-Dichloroethene	100	**2.3**	**2.7 J**	< 1	< 1	< 1	< 1	< 1	< 1	**4.4 J**	< 1	< 10
trans-1,3-Dichloropropene	--	< 1	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 10
Trichloroethene (TCE)	5	**640**	**1,600 J**	< 0.5	**430**	**350**	< 0.5	< 0.5	< 0.5	**9600**	**61**	**2000**
Vinyl Chloride	2	**25**	**3.5 J**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**9.6**	< 0.5	**39**
Monitored Natural Attenuation Parameters (µg/L)												
Ethane	--	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1
Ethene	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	**0.85 J**
Methane	--	**89**	**8.5**	**1.2**	< 0.46	**0.79**	**0.35 J**	**0.49 J**	**0.48 J**	**1.2**	**5.7**	**140**
Monitored Natural Attenuation Parameters (mg/L)												
Chloride	--	**40**	**86**	**4.9**	**1100**	**22**	**6.6**	**51**	**1.1**	**35**	**14**	**37**
Iron	--	**12**	**0.33**	**1.3**	**3.7**	**0.46**	**0.49**	**0.71 J**	**0.82**	**0.24**	**0.38**	**0.2**
Manganese	--	**0.82**	**0.04**	**0.023**	**0.92**	**0.0084 J**	**0.017**	**0.011**	**0.029**	**0.026**	**0.057**	**0.027**
Nitrogen, Nitrate (as N)	--	< 0.1	< 0.1	< 0.1	< 0.1	**0.5**	**3.8**	**5.2**	**0.53**	**0.091 J**	< 0.1	**0.72**
Nitrogen, Nitrate-Nitrite	--	< 0.1	< 0.1	< 0.1	< 0.1	**0.5**	**3.8**	**5.2**	**0.53**	**0.095 J**	< 0.1	**0.72**
Nitrogen, Nitrite (as N)	--	< 0.0027	< 0.02	< 0.02	< 0.007	< 0.02	**0.0034 J**	< 0.0043	< 0.02	**0.0036 J**	**0.0021 J**	**0.0032 J**
Sulfate	--	**62**	**320**	**43**	**720**	**190**	**55**	**460**	**21**	**260**	**72**	**170**
Total Alkalinity	--	**68**	**420**	**280**	**410**	**310**	**220**	**330**	**110**	**290**	**180**	**390**
Total Inorganic Carbon	--	**15**	**46**	**41**	**47**	**44**	**52**	**40**	**18**	**57**	**38**	**78**
Total Organic Carbon	--	**5.2**	**4.2**	**2.6**	< 4	**3**	**4.7**	**2.4**	**4**	**7**	**3.3**	**5.2**

Notes:

ft btoc - feet below top of casing

J - The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

< - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

µg/L - micrograms per liter

Bold indicates the analyte was detected

Shading indicates result exceeded the MCL

TABLE 4-3

Groundwater Analytical Results from Existing Monitoring Wells

Supplemental Site Characterization Investigation Report for Plume 2 at PCB OU Site 33

Crab Orchard National Wildlife Refuge, Marion, Illinois

	Location	33MWC-33	33MWC-35	33MWC-36	33MWC-44	33MWC-45
	Sample ID	GW-33MWC-33-092111	GW-33MWC-35-092211	GW-33MWC-36-092011	GW-33MWC-44-092211	GW-33MWC-45-092211
	Sample Depth (ft btoc)	32 - 42	75 - 80	28 - 33	8 - 23	35 - 40
	Unit Screened	Upper Sand	Lower Sand	Upper Sand	Upper Clay	Upper Sand
	Designation	Plume	Boundary	Plume	Sentinel	Sentinel
	Sample Date	9/21/2011	9/22/2011	9/20/2011	9/22/2011	9/22/2011
Analyte	**Screening Level**					
Volatile Organic Compounds (VOCs) (µg/L)						
1,1,1-Trichloroethane	200	< 2	< 1	< 1	< 1	< 1
1,1,2,2-Tetrachloroethane	--	< 2	< 1	< 1	< 1	< 1
1,1,2-Trichloroethane	5	< 2	< 1	< 1	< 1	< 1
1,1-Dichloroethane	--	< 2	< 1	< 1	< 1	< 1
1,1-Dichloroethene	7	**2.3**	< 1	< 1	< 1	< 1
1,2-Dichloroethane	5	< 2	< 1	< 1	< 1	< 1
1,2-Dichloropropane	5	< 2	< 1	< 1	< 1	< 1
1,3-Dichloropropene	--	< 2	< 1	< 1	< 1	< 1
2-Butanone (MEK)	--	< 10	< 5	< 5	< 5	< 5
2-Hexanone	--	< 10	< 5	< 5	< 5	< 5
4-Methyl-2-Pentanone (MIBK)	--	< 10	< 5	< 5	< 5	< 5
Acetone	--	< 10	**6.1**	< 5	< 5	< 5
Benzene	5	< 1	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	80	< 2	< 1	< 1	< 1	< 1
Bromoform	80	< 2	< 1	< 1	< 1	< 1
Bromomethane	--	< 2	< 1	< 1	< 1	< 1
Carbon Disulfide	--	< 10	< 5	< 5	< 5	< 5
Carbon Tetrachloride	5	< 2	< 1	< 1	< 1	< 1
Chlorobenzene	100	< 2	< 1	< 1	< 1	< 1
Chloroethane	--	< 2	< 1	< 1	< 1	< 1
Chloroform	80	< 2	< 1	< 1	< 1	< 1
Chloromethane	--	< 2	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	70	**480**	< 1	**10**	< 1	< 1
cis-1,3-Dichloropropene	--	< 2	< 1	< 1	< 1	< 1
Dibromochloromethane	80	< 2	< 1	< 1	< 1	< 1
Ethylbenzene	700	< 1	< 0.5	< 0.5	< 0.5	< 0.5
Methyl tert-Butyl Ether (MTBE)	--	< 2	< 1	< 1	< 1	< 1
Methylene Chloride	5	< 10	< 5	< 5	< 5	< 5
Styrene	100	< 2	< 1	< 1	< 1	< 1
Tetrachloroethene (PCE)	5	**14**	< 1	< 1	< 1	< 1
Toluene	1,000	< 1	< 0.5	< 0.5	< 0.5	< 0.5
Total Xylenes	10,000	< 2	< 1	< 1	< 1	< 1
trans-1,2-Dichloroethene	100	**920**	< 1	< 1	< 1	< 1
trans-1,3-Dichloropropene	--	< 2	< 1	< 1	< 1	< 1
Trichloroethene (TCE)	5	**1900**	< 0.5	**8.6**	< 0.5	< 0.5
Vinyl Chloride	2	**12**	< 0.5	< 0.5	< 0.5	< 0.5
Monitored Natural Attenuation Parameters (µg/L)						
Ethane	--	< 1.1	**1.3 J**	< 1.1	< 1.1	< 1.1
Ethene	--	< 1	< 1	< 1	< 1	< 1
Methane	--	**8.3**	**72 J**	< 0.65	< 0.71	**770**
Monitored Natural Attenuation Parameters (mg/L)						
Chloride	--	**130**	**280**	**19**	**130**	**240**
Iron	--	**2.2**	**0.27 J**	**0.082 J**	**0.14 J**	**5**
Manganese	--	**0.89**	**0.0065 J**	**0.12**	**0.48**	**0.084**
Nitrogen, Nitrate (as N)	--	< 0.1	< 0.1	**0.24**	**0.23**	< 0.1
Nitrogen, Nitrate-Nitrite	--	< 0.1	< 0.1	**0.25**	**0.26**	< 0.1
Nitrogen, Nitrite (as N)	--	< 0.0062	< 0.0036	< 0.013	**0.027**	< 0.0023
Sulfate	--	**570**	**7.2**	**93**	**280**	< 0.34
Total Alkalinity	--	**410**	**280**	**330**	**360**	**450**
Total Inorganic Carbon	--	**59**	**5.6**	**43**	**59**	**48**
Total Organic Carbon	--	**4.1**	**13**	< 2.6	**11**	**5.5**

Notes:

ft btoc - feet below top of casing

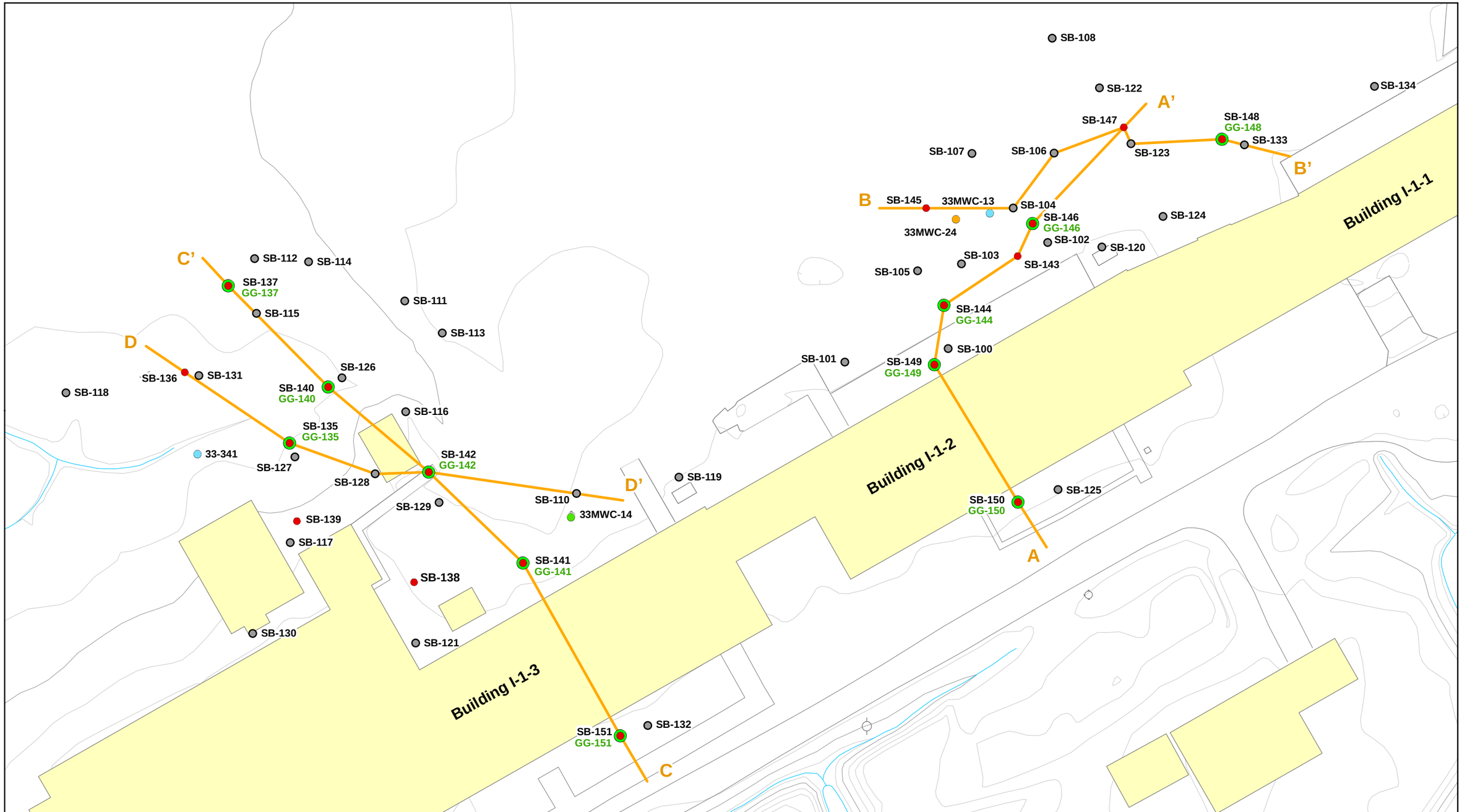
J - The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

< - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

µg/L - micrograms per liter

Bold indicates the analyte was detected

Shading indicates result exceeded the MCL



LEGEND

Monitoring Well Locations
Unit Screened
- Upper Clay
- Upper Clay/Upper Sand
- Upper Sand
- Lower Sand

- Historic Soil Boring
- Supplemental Investigation Soil Boring
- Supplemental Investigation Soil Boring with Co-located Grab Groundwater Sample
- Cross-Section Location
- Buildings

- Concrete Pads, Roads, and Walkways
- Surface Water
- Topographic Contour

N

0 25 50 Feet

FIGURE 4-1
Cross-Section Locations
Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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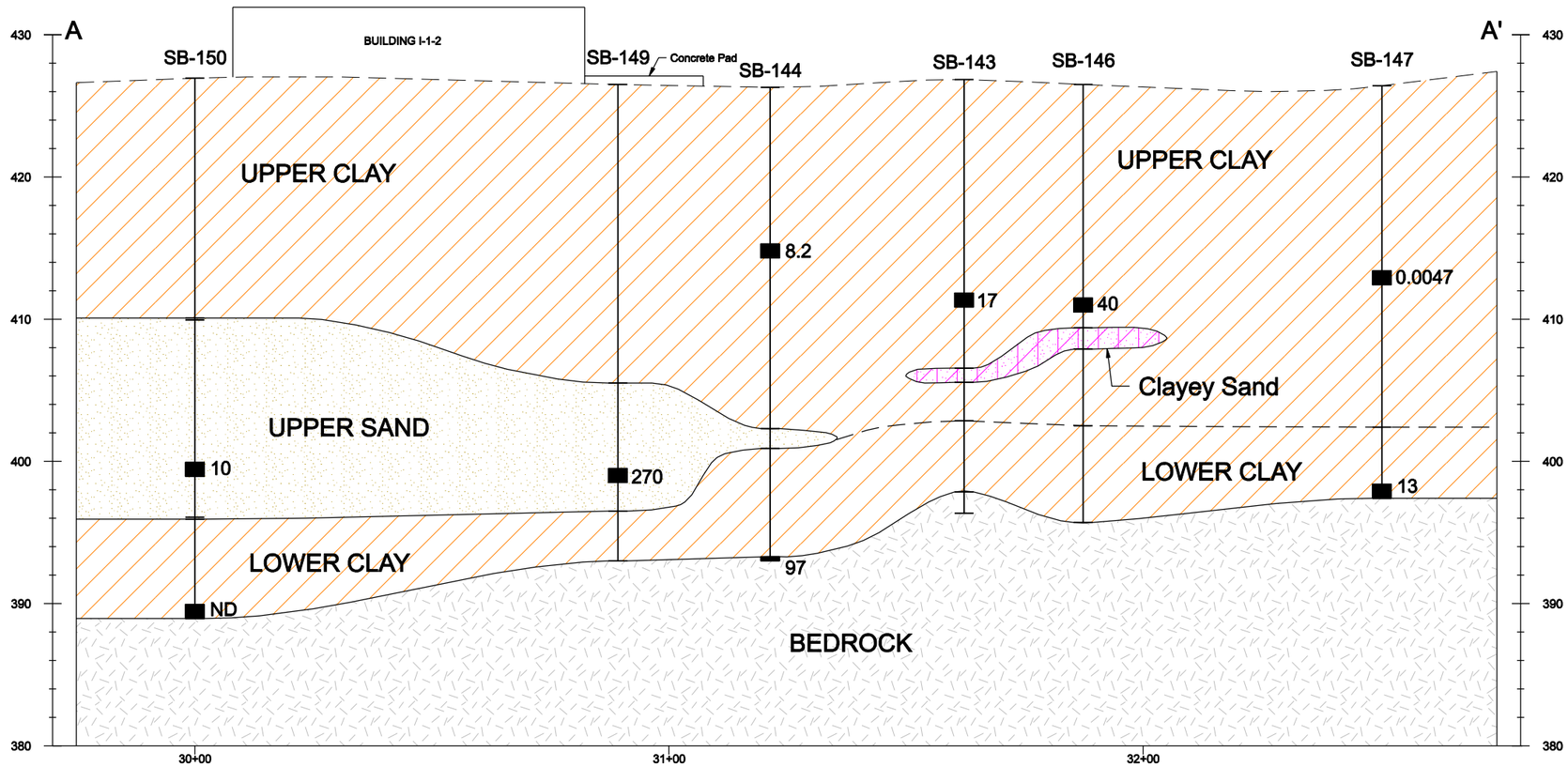
RDD \\BALDUR\PROJ\CRAB_ORCHARD_423535\MAPFILES\PLUME_2_SSCR\FIG4-1_X-SECTION_LOCS_SSCR.MXD MSCHROCK 12/31/2011 8:41:52 PM



GEOLOGIC NOTES:

1. UPPER CLAY - CONSISTS OF A BROWN TO LIGHT GRAY LEAN CLAY WITH VARYING AMOUNTS SILT, SAND, AND GRAVEL. DISCONTINUOUS SILT AND SAND SEAMS AND LENSES ARE PRESENT WITHIN THE UPPER CLAY UNIT.
2. UPPER SAND - CONSISTS OF A BROWN TO YELLOWISH BROWN SAND. COMPOSITION OF THE UPPER SAND IS HIGHLY VARIABLE AND RANGES FROM A CLAYEY SAND TO COARSE-GRAINED SAND.
3. LOWER CLAY - CONSISTS OF A BROWN TO GRAY LEAN CLAY. DISCONTINUOUS SILT AND SAND SEAMS AND LENSES ARE COMMON IN THE MIDDLE AND UPPER PORTIONS OF THE UNIT AND SMALL GRAVEL-SIZE ANGULAR CLASTS OF THE UNDERLYING SANDSTONE, LIMESTONE, AND COAL BEDROCK UNITS ARE SPORADICALLY EMBEDDED THROUGHOUT THE UNIT.
4. LOWER SAND - CONSISTS OF BROWN TO GRAY SAND. COMPOSITION OF THE LOWER SAND RANGES BETWEEN A MEDIUM TO A COARSE-GRAINED SAND. UNIT CONTAINS TRACE AMOUNTS OF CLAY AND SILT.

LEGEND

0 5 10 15
Vertical Scale (in Feet)

0 15 30 45
Horizontal Scale (in Feet)

CLAY

SAND

SAND LENS WITH CLAY/SILT

BEDROCK

0.42 TCE CONCENTRATION (mg/kg)

ND TCE NOT DETECTED

SB- SUPPLEMENTAL INVESTIGATION BORING

FIGURE 4-2
Cross Section A-A'
Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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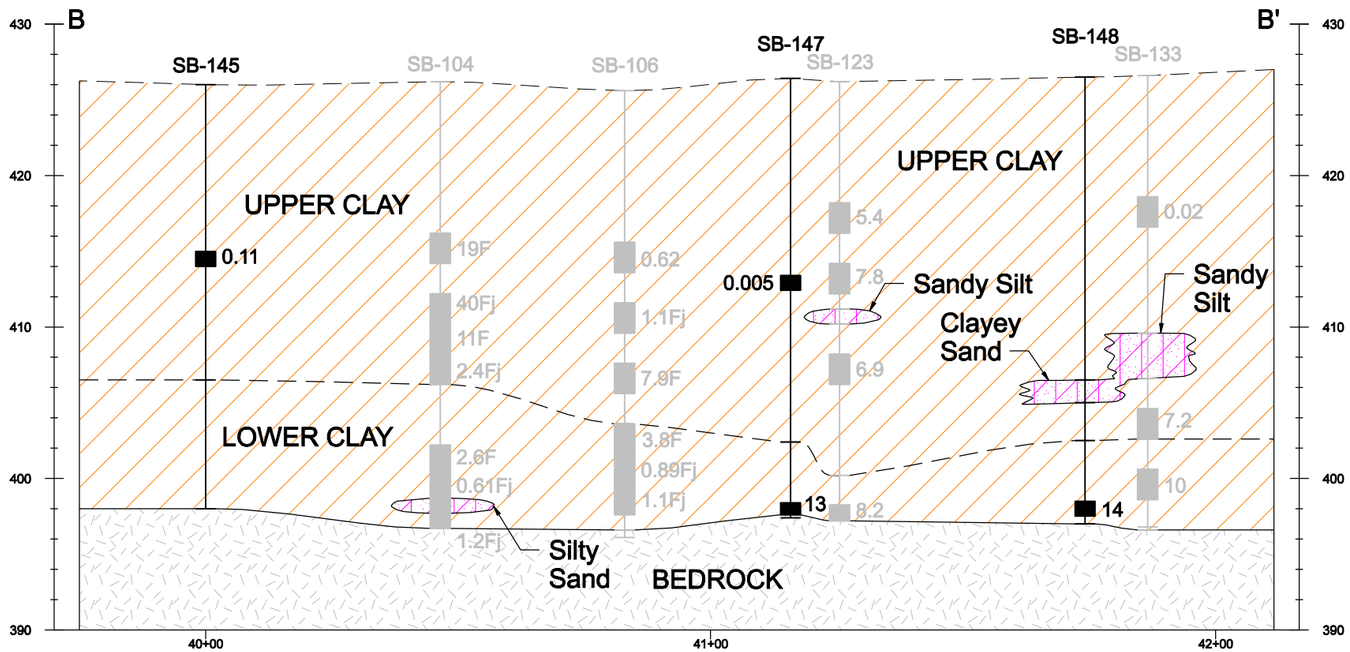
423535

FILENAME: 005-C-2103_423535.dgn PLOT DATE: 12/29/2011



GEOLOGIC NOTES:

1. UPPER CLAY - CONSISTS OF A BROWN TO LIGHT GRAY LEAN CLAY WITH VARYING AMOUNTS SILT, SAND, AND GRAVEL. DISCONTINUOUS SILT AND SAND SEAMS AND LENSES ARE PRESENT WITHIN THE UPPER CLAY UNIT.
2. UPPER SAND - CONSISTS OF A BROWN TO YELLOWISH BROWN SAND. COMPOSITION OF THE UPPER SAND IS HIGHLY VARIABLE AND RANGES FROM A CLAYEY SAND TO COARSE-GRAINED SAND.
3. LOWER CLAY - CONSISTS OF A BROWN TO GRAY LEAN CLAY. DISCONTINUOUS SILT AND SAND SEAMS AND LENSES ARE COMMON IN THE MIDDLE AND UPPER PORTIONS OF THE UNIT AND SMALL GRAVEL-SIZE ANGULAR CLASTS OF THE UNDERLYING SANDSTONE, LIMESTONE, AND COAL BEDROCK UNITS ARE SPORADICALLY EMBEDDED THROUGHOUT THE UNIT.
4. LOWER SAND - CONSISTS OF BROWN TO GRAY SAND. COMPOSITION OF THE LOWER SAND RANGES BETWEEN A MEDIUM TO A COARSE-GRAINED SAND. UNIT CONTAINS TRACE AMOUNTS OF CLAY AND SILT.

NOTES:

1. F - INDICATES THAT THE RESULT IS BASED ON GC/FID ANALYSIS PERFORMED IN THE ON-SITE MOBILE LABORATORY.
2. FJ - INDICATES THAT THE RESULT IS BASED ON GC/FID ANALYSIS PERFORMED IN THE ON-SITE MOBILE LABORATORY AND THE REPORTED CONCENTRATION IS APPROXIMATE BECAUSE SPECIFIC QC CRITERIA ARE OUTSIDE THE ESTABLISHED CONTROL LIMITS.

LEGEND

0 5 10 15
Vertical Scale (in Feet)

0 15 30 45
Horizontal Scale (in Feet)

CLAY
SAND
SAND LENS WITH CLAY/SILT
BEDROCK

0.42 TCE CONCENTRATION (mg/kg)
ND TCE NOT DETECTED
SB- SUPPLEMENTAL INVESTIGATION BORING
SB- HISTORIC BORING

FIGURE 4-3
Cross Section B-B'
Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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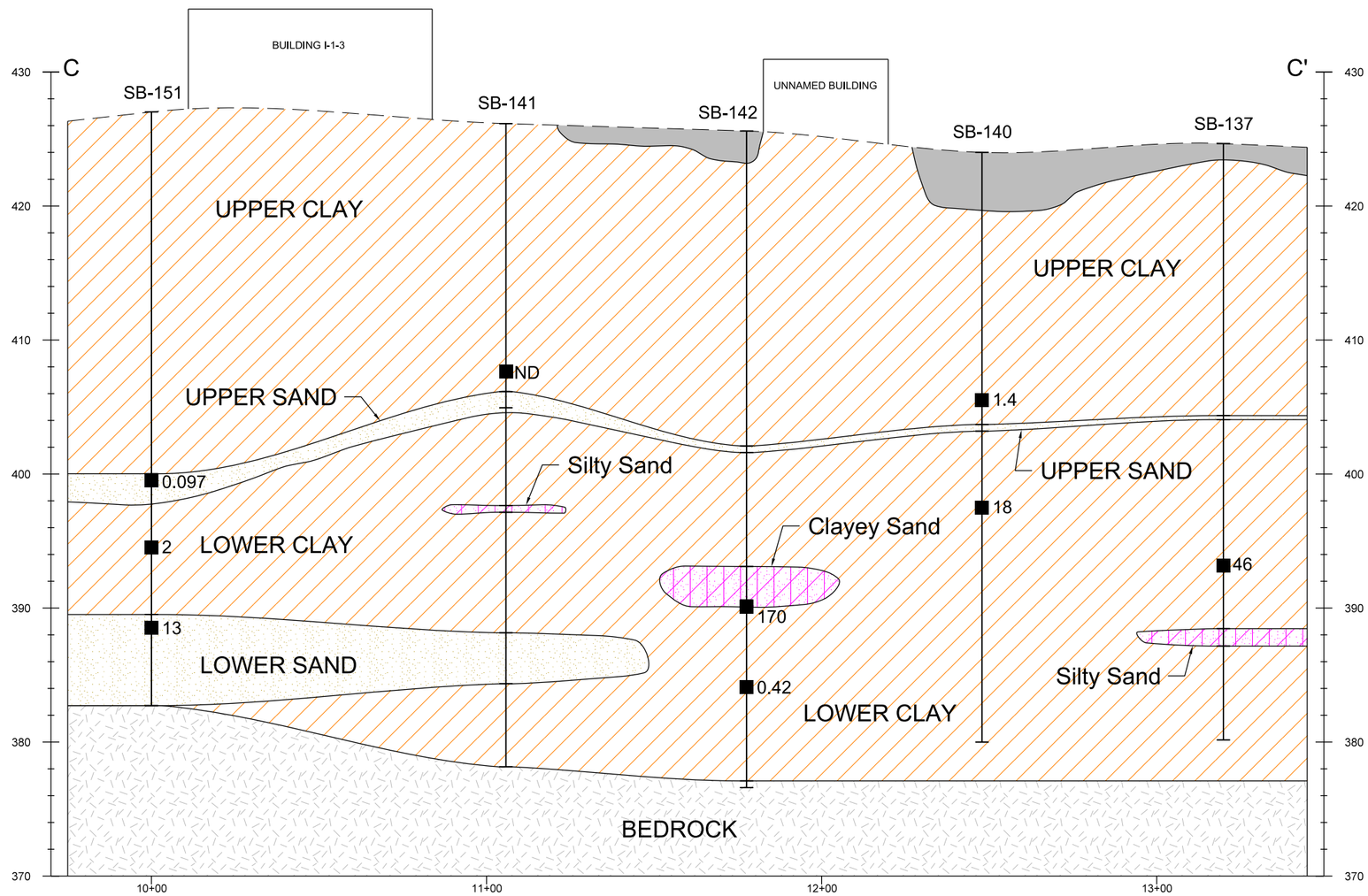
FILENAME: 005-C-2104_423535.dgn PLOT DATE: 12/29/2011



GEOLOGIC NOTES:

1. UPPER CLAY - CONSISTS OF A BROWN TO LIGHT GRAY LEAN CLAY WITH VARYING AMOUNTS SILT, SAND, AND GRAVEL. DISCONTINUOUS SILT AND SAND SEAMS AND LENSES ARE PRESENT WITHIN THE UPPER CLAY UNIT.
2. UPPER SAND - CONSISTS OF A BROWN TO YELLOWISH BROWN SAND. COMPOSITION OF THE UPPER SAND IS HIGHLY VARIABLE AND RANGES FROM A CLAYEY SAND TO COARSE-GRAINED SAND.
3. LOWER CLAY - CONSISTS OF A BROWN TO GRAY LEAN CLAY. DISCONTINUOUS SILT AND SAND SEAMS AND LENSES ARE COMMON IN THE MIDDLE AND UPPER PORTIONS OF THE UNIT AND SMALL GRAVEL-SIZE ANGULAR CLASTS OF THE UNDERLYING SANDSTONE, LIMESTONE, AND COAL BEDROCK UNITS ARE SPORADICALLY EMBEDDED THROUGHOUT THE UNIT.
4. LOWER SAND - CONSISTS OF BROWN TO GRAY SAND. COMPOSITION OF THE LOWER SAND RANGES BETWEEN A MEDIUM TO A COARSE-GRAINED SAND. UNIT CONTAINS TRACE AMOUNTS OF CLAY AND SILT.

LEGEND

0 5 10 15
Vertical Scale (in Feet)

0 20 40 60
Horizontal Scale (in Feet)

CLAY

SAND

SAND LENS WITH CLAY/SILT

BEDROCK

APPROXIMATE EXTENT OF 2009 EXCAVATION

0.42 TCE CONCENTRATION (mg/kg)

ND TCE NOT DETECTED

SB- SUPPLEMENTAL INVESTIGATION BORING

FIGURE 4-4
Cross Section C-C'
Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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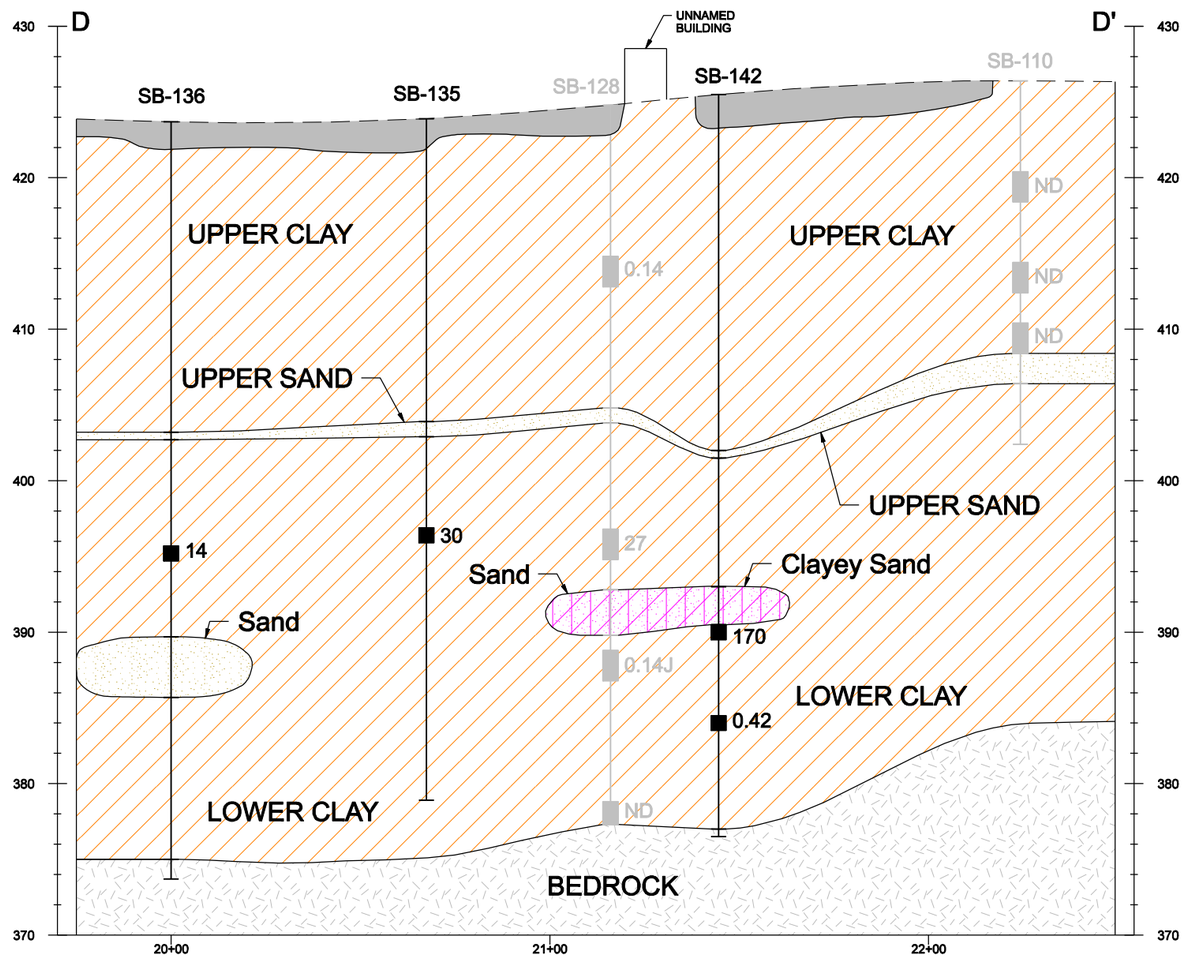
423535

FILENAME: 005-C-2101_423535.dgn PLOT DATE: 2012\01\06



GEOLOGIC NOTES:

1. UPPER CLAY - CONSISTS OF A BROWN TO LIGHT GRAY LEAN CLAY WITH VARYING AMOUNTS SILT, SAND, AND GRAVEL. DISCONTINUOUS SILT AND SAND SEAMS AND LENSES ARE PRESENT WITHIN THE UPPER CLAY UNIT.
2. UPPER SAND - CONSISTS OF A BROWN TO YELLOWISH BROWN SAND. COMPOSITION OF THE UPPER SAND IS HIGHLY VARIABLE AND RANGES FROM A CLAYEY SAND TO COARSE-GRAINED SAND.
3. LOWER CLAY - CONSISTS OF A BROWN TO GRAY LEAN CLAY. DISCONTINUOUS SILT AND SAND SEAMS AND LENSES ARE COMMON IN THE MIDDLE AND UPPER PORTIONS OF THE UNIT AND SMALL GRAVEL-SIZE ANGULAR CLASTS OF THE UNDERLYING SANDSTONE, LIMESTONE, AND COAL BEDROCK UNITS ARE SPORADICALLY EMBEDDED THROUGHOUT THE UNIT.
4. LOWER SAND - CONSISTS OF BROWN TO GRAY SAND. COMPOSITION OF THE LOWER SAND RANGES BETWEEN A MEDIUM TO A COARSE-GRAINED SAND. UNIT CONTAINS TRACE AMOUNTS OF CLAY AND SILT.

LEGEND

CLAY	
SAND	
SAND LENS WITH CLAY/SILT	
BEDROCK	
APPROXIMATE EXTENT OF 2009 EXCAVATION	
0.42	TCE CONCENTRATION (mg/kg)
ND	TCE NOT DETECTED
SB-	SUPPLEMENTAL INVESTIGATION BORING
SB-	HISTORIC BORING

0 5 10 15
Vertical Scale (in Feet)

0 20 40 60
Horizontal Scale (in Feet)

423535

FILENAME: 005-C-2102_423535.dgn PLOT DATE: 12/29/2011

FIGURE 4-5
Cross Section D-D'
Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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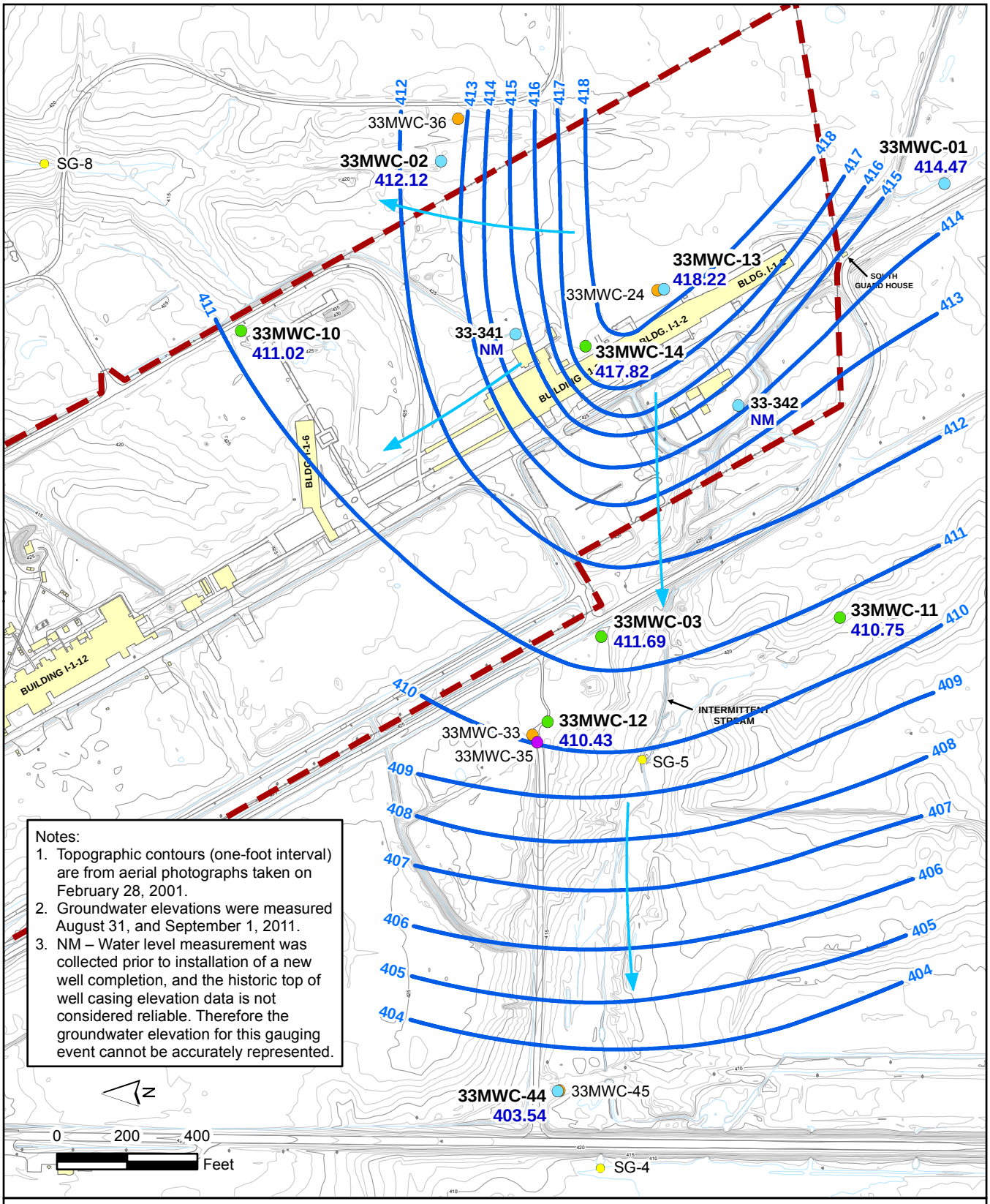


Notes:
1. Topographic contours (one-foot interval) are from aerial photographs taken on February 28, 2001.
2. Groundwater elevations were measured August 31, and September 1, 2011.
3. NM – Water level measurement was collected prior to installation of a new well completion, and the historic top of well casing elevation data is not considered reliable. Therefore the groundwater elevation for this gauging event cannot be accurately represented.

LEGEND

Monitoring Well Locations

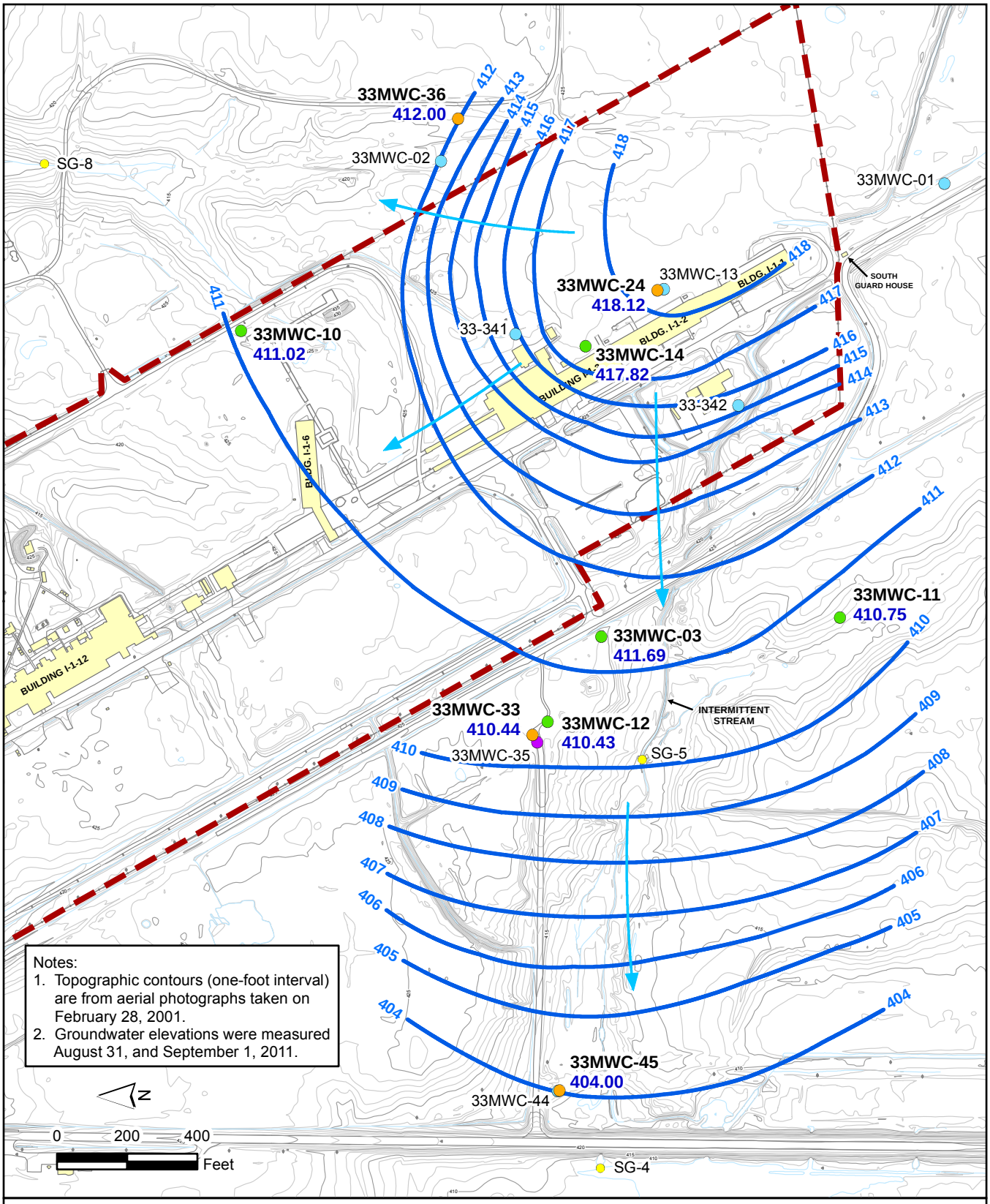
Unit Screened

- Upper Clay
- Upper Clay/Upper Sand
- Upper Sand
- Lower Sand
- Staff Gauge
- Industrial Area Boundary
- Groundwater Elevation Contour (1 foot interval)
- Inferred Groundwater Elevation Contour (1 foot interval)
- Buildings
- Concrete Pads, Roads, and Walkways
- Surface Water
- Topographic Contour
- Groundwater Flow Direction

FIGURE 4-6
Potentiometric Surface Map
– Upper Clay Unit
Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

CH2MHILL

RDD \\BALDUR\PROJ\CRAB_ORCHARD_423535\MAPFILES\PLUME_2_SSCR\FIG4-6_POTSURF_OCT11_UCLAY_SSCR.MXD MSCHROCK 12/30/2011 11:54:16 AM



LEGEND

Monitoring Well Locations

Unit Screened

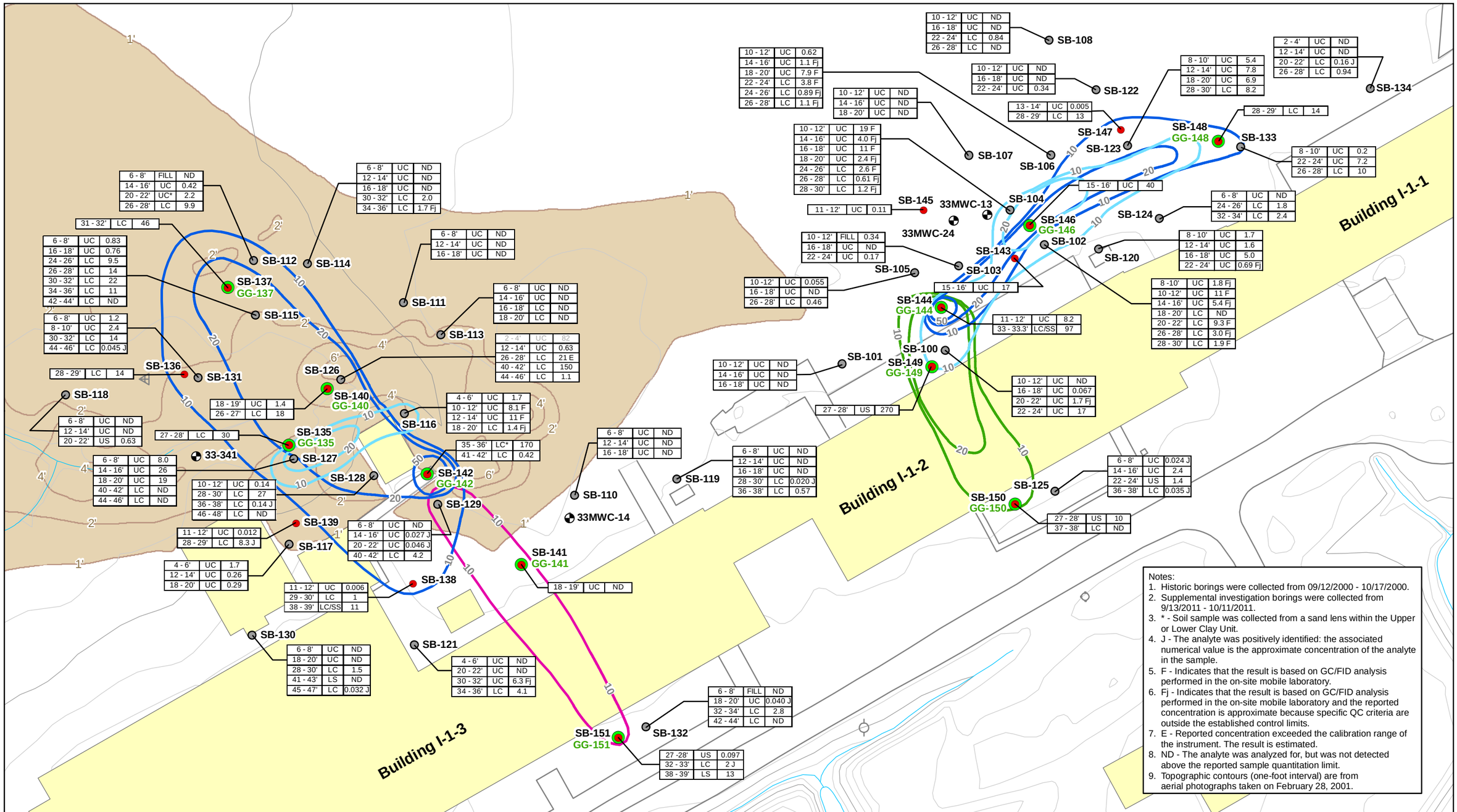
- Upper Clay
- Upper Clay/Upper Sand
- Upper Sand
- Lower Sand
- Staff Gauge
- Industrial Area Boundary
- Groundwater Elevation Contour (1 foot interval)
- Inferred Groundwater Elevation Contour (1 foot interval)
- Buildings
- Concrete Pads, Roads, and Walkways
- Surface Water
- Topographic Contour
- Groundwater Flow Direction

FIGURE 4-7
Potentiometric Surface Map
– Upper Sand Unit

Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

CH2MHILL

RDD \\BALDUR\PROJ\CRAB_ORCHARD_423535\MAPFILES\PLUME_2_SSCR\FIG4-7_POTSURF_OCT11_USAND_SSCR.MXD MSCHROCK 12/31/2011 12:03:37 AM



Notes:
1. Historic borings were collected from 09/12/2000 - 10/17/2000.
2. Supplemental investigation borings were collected from 9/13/2011 - 10/11/2011.
3. * - Soil sample was collected from a sand lens within the Upper or Lower Clay Unit.
4. J - The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
5. F - Indicates that the result is based on GC/FID analysis performed in the on-site mobile laboratory.
6. Fj - Indicates that the result is based on GC/FID analysis performed in the on-site mobile laboratory and the reported concentration is approximate because specific QC criteria are outside the established control limits.
7. E - Reported concentration exceeded the calibration range of the instrument. The result is estimated.
8. ND - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
9. Topographic contours (one-foot interval) are from aerial photographs taken on February 28, 2001.

LEGEND

- Groundwater Monitoring Well
- Historic Soil Boring
- Supplemental Investigation Soil Boring
- Supplemental Investigation Soil Boring with Co-located Grab Groundwater Sample
- Buildings
- Concrete Pads, Roads, and Walkways
- Surface Water
- Topographic Contour
- Approximate Extent and Depth of 2009 Excavation
- TCE in the Upper Clay Unit; 10, and 20 mg/kg Contours
- TCE in the Lower Clay Unit; 10, 20, and 50 mg/kg Contours
- TCE in the Upper Sand Unit; 10 and 20 mg/kg Contours
- TCE in the Lower Sand Unit; 10 mg/kg Contour

N

0 25 50 Feet

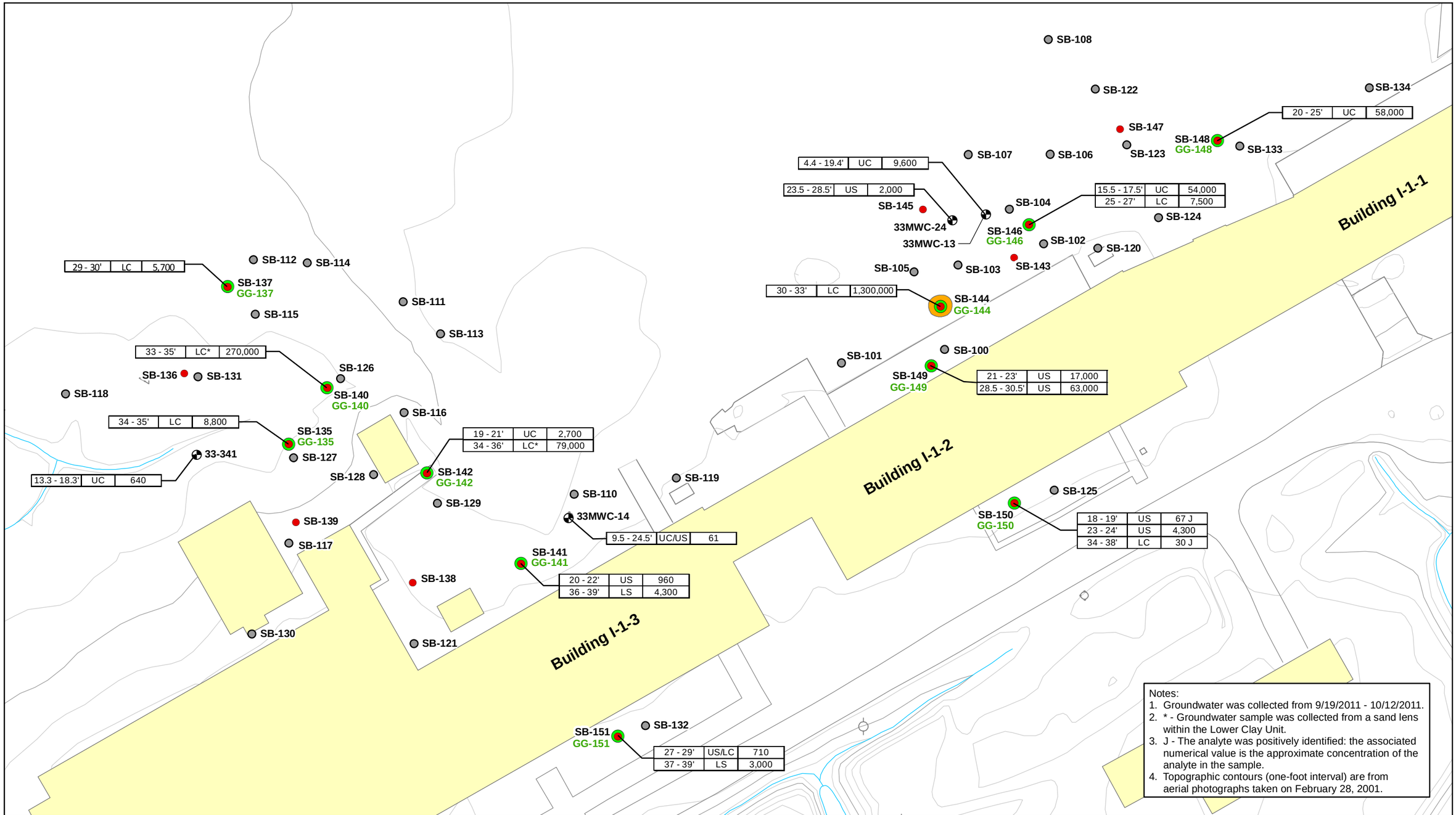
Depth Interval (ft bgs)	Unit Screened	Result (mg/kg)
Upper Depth - Lower Depth	UC - Upper Clay LC - Lower Clay US - Upper Sand LS - Lower Sand SS - Sandstone	TCE Concentration in Soil

Gray results (SB-126) indicate soil at the specified depth was removed during the 2009 excavation and backfilled with clean soil.

FIGURE 4-8
TCE Concentrations in Soil in the Source Area
Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

CH2MHILL

RDD \\BALDUR\PROJ\CRAB_ORCHARD_423535\MAPFILES\PLUME_2_SSCR\FIG4-8_TCE_SOIL_SSCR.MXD MSCHROCK 1/8/2012 10:14:27 PM



Notes:
1. Groundwater was collected from 9/19/2011 - 10/12/2011.
2. * - Groundwater sample was collected from a sand lens within the Lower Clay Unit.
3. J - The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
4. Topographic contours (one-foot interval) are from aerial photographs taken on February 28, 2001.

LEGEND

- Groundwater Monitoring Well
- Historic Soil Boring
- Supplemental Investigation Soil Boring
- Supplemental Investigation Soil Boring with Co-located Grab Groundwater Sample
- Source Area Hot Spot
- Buildings
- Concrete Pads, Roads, and Walkways
- Surface Water
- Topographic Contour

N

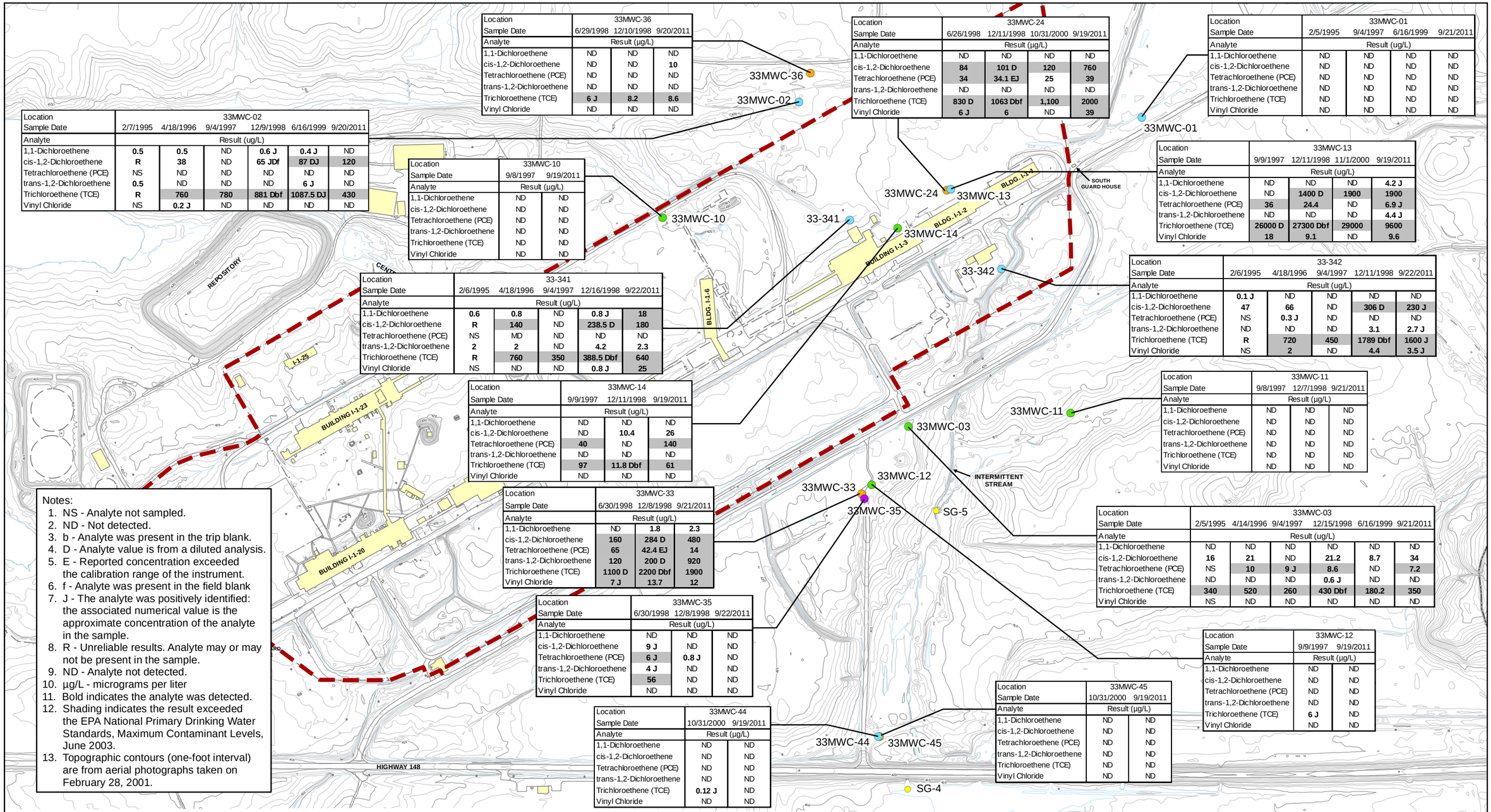
0 25 50 Feet

Sample Depth (ft bgs)	Unit Screened	Result (ug/L)
Upper Depth - Lower Depth	UC - Upper Clay LC - Lower Clay US - Upper Sand LS - Lower Sand	TCE Concentration in Groundwater

FIGURE 4-9
TCE Concentrations in Groundwater in the Source Area
Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

CH2MHILL

RDD \\BALDUR\PROJ\CRAB_ORCHARD_423535\MAPFILES\PLUME_2_SSCR\FIG4-9_TCE_GW_SSCR.MXD MSCHROCK 6/6/2012 12:07:20 AM



Location	33MWC-36		
Sample Date	6/29/1998	12/10/1998	9/20/2011
Analyte	Result (µg/L)		
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	**10**
Tetrachloroethene (PCE)	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
Trichloroethene (TCE)	**6 J**	**8.2**	**8.6**
Vinyl Chloride	ND	ND	ND

Location	33MWC-24			
Sample Date	6/26/1998	12/11/1998	10/31/2000	9/19/2011
Analyte	Result (µg/L)			
1,1-Dichloroethene	ND	ND	ND	ND
cis-1,2-Dichloroethene	**84**	**101 D**	**120**	**760**
Tetrachloroethene (PCE)	**34**	**34.1 EJ**	**25**	**39**
trans-1,2-Dichloroethene	ND	ND	ND	ND
Trichloroethene (TCE)	**830 D**	**1063 Dbf**	**1,100**	**2000**
Vinyl Chloride	**6 J**	**6**	ND	**39**

Location	33MWC-01			
Sample Date	2/5/1995	9/4/1997	6/16/1999	9/21/2011
Analyte	Result (ug/L)			
1,1-Dichloroethene	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND
Tetrachloroethene (PCE)	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND
Trichloroethene (TCE)	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND

Location	33MWC-02					
Sample Date	2/7/1995	4/18/1996	9/4/1997	12/9/1998	6/16/1999	9/20/2011
Analyte	Result (ug/L)					
1,1-Dichloroethene	**0.5**	**0.5**	ND	**0.6 J**	**0.4 J**	ND
cis-1,2-Dichloroethene	**R**	**38**	ND	**65 JDf**	**87 DJ**	**120**
Tetrachloroethene (PCE)	NS	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	**0.5**	ND	ND	ND	**6 J**	ND
Trichloroethene (TCE)	**R**	**760**	**780**	**881 Dbf**	**1087.5 DJ**	**430**
Vinyl Chloride	NS	**0.2 J**	ND	ND	ND	ND

Location	33MWC-13			
Sample Date	9/9/1997	12/11/1998	11/1/2000	9/19/2011
Analyte	Result (ug/L)			
1,1-Dichloroethene	ND	ND	ND	**4.2 J**
cis-1,2-Dichloroethene	ND	**1400 D**	**1900**	**1900**
Tetrachloroethene (PCE)	**36**	**24.4**	ND	**6.9 J**
trans-1,2-Dichloroethene	ND	ND	ND	**4.4 J**
Trichloroethene (TCE)	**26000 D**	**27300 Dbf**	**29000**	**9600**
Vinyl Chloride	**18**	**9.1**	ND	**9.6**

Location	33MWC-10	
Sample Date	9/8/1997	9/19/2011
Analyte	Result (µg/L)	
1,1-Dichloroethene	ND	ND
cis-1,2-Dichloroethene	ND	ND
Tetrachloroethene (PCE)	ND	ND
trans-1,2-Dichloroethene	ND	ND
Trichloroethene (TCE)	ND	ND
Vinyl Chloride	ND	ND

Location	33-341				
Sample Date	2/6/1995	4/18/1996	9/4/1997	12/16/1998	9/22/2011
Analyte	Result (ug/L)				
1,1-Dichloroethene	**0.6**	**0.8**	ND	**0.8 J**	**18**
cis-1,2-Dichloroethene	**R**	**140**	ND	**238.5 D**	**180**
Tetrachloroethene (PCE)	NS	MD	ND	ND	ND
trans-1,2-Dichloroethene	**2**	**2**	ND	**4.2**	**2.3**
Trichloroethene (TCE)	**R**	**760**	**350**	**388.5 Dbf**	**640**
Vinyl Chloride	NS	ND	ND	**0.8 J**	**25**

Location	33-342				
Sample Date	2/6/1995	4/18/1996	9/4/1997	12/11/1998	9/22/2011
Analyte	Result (ug/L)				
1,1-Dichloroethene	**0.1 J**	ND	ND	ND	ND
cis-1,2-Dichloroethene	**47**	**66**	ND	**306 D**	**230 J**
Tetrachloroethene (PCE)	NS	**0.3 J**	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	**3.1**	**2.7 J**
Trichloroethene (TCE)	**R**	**720**	**450**	**1789 Dbf**	**1600 J**
Vinyl Chloride	NS	**2**	ND	**4.4**	**3.5 J**

Location	33MWC-14		
Sample Date	9/9/1997	12/11/1998	9/19/2011
Analyte	Result (ug/L)		
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	**10.4**	**26**
Tetrachloroethene (PCE)	**40**	ND	**140**
trans-1,2-Dichloroethene	ND	ND	ND
Trichloroethene (TCE)	**97**	**11.8 Dbf**	**61**
Vinyl Chloride	ND	ND	ND

Location	33MWC-11		
Sample Date	9/8/1997	12/7/1998	9/21/2011
Analyte	Result (µg/L)		
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
Tetrachloroethene (PCE)	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
Trichloroethene (TCE)	ND	ND	ND
Vinyl Chloride	ND	ND	ND

Location	33MWC-33		
Sample Date	6/30/1998	12/8/1998	9/21/2011
Analyte	Result (ug/L)		
1,1-Dichloroethene	ND	**1.8**	**2.3**
cis-1,2-Dichloroethene	**160**	**284 D**	**480**
Tetrachloroethene (PCE)	**65**	**42.4 EJ**	**14**
trans-1,2-Dichloroethene	**120**	**200 D**	**920**
Trichloroethene (TCE)	**1100 D**	**2200 Dbf**	**1900**
Vinyl Chloride	**7 J**	**13.7**	**12**

Location	33MWC-03					
Sample Date	2/5/1995	4/14/1996	9/4/1997	12/15/1998	6/16/1999	9/21/2011
Analyte	Result (ug/L)					
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	**16**	**21**	ND	**21.2**	**8.7**	**34**
Tetrachloroethene (PCE)	NS	**10**	**9 J**	**8.6**	ND	**7.2**
trans-1,2-Dichloroethene	ND	ND	ND	**0.6 J**	ND	ND
Trichloroethene (TCE)	**340**	**520**	**260**	**430 Dbf**	**180.2**	**350**
Vinyl Chloride	NS	ND	ND	ND	ND	ND

Location	33MWC-35		
Sample Date	6/30/1998	12/8/1998	9/22/2011
Analyte	Result (ug/L)		
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	**9 J**	ND	ND
Tetrachloroethene (PCE)	**6 J**	**0.8 J**	ND
trans-1,2-Dichloroethene	**4 J**	ND	ND
Trichloroethene (TCE)	**56**	ND	ND
Vinyl Chloride	ND	ND	ND

Location	33MWC-12	
Sample Date	9/9/1997	9/19/2011
Analyte	Result (µg/L)	
1,1-Dichloroethene	ND	ND
cis-1,2-Dichloroethene	ND	ND
Tetrachloroethene (PCE)	ND	ND
trans-1,2-Dichloroethene	ND	ND
Trichloroethene (TCE)	**6 J**	ND
Vinyl Chloride	ND	ND

Location	33MWC-45	
Sample Date	10/31/2000	9/19/2011
Analyte	Result (µg/L)	
1,1-Dichloroethene	ND	ND
cis-1,2-Dichloroethene	ND	ND
Tetrachloroethene (PCE)	ND	ND
trans-1,2-Dichloroethene	ND	ND
Trichloroethene (TCE)	ND	ND
Vinyl Chloride	ND	ND

Location	33MWC-44	
Sample Date	10/31/2000	9/19/2011
Analyte	Result (µg/L)	
1,1-Dichloroethene	ND	ND
cis-1,2-Dichloroethene	ND	ND
Tetrachloroethene (PCE)	ND	ND
trans-1,2-Dichloroethene	ND	ND
Trichloroethene (TCE)	**0.12 J**	ND
Vinyl Chloride	ND	ND

Notes:
1. NS - Analyte not sampled.
2. ND - Not detected.
3. b - Analyte was present in the trip blank.
4. D - Analyte value is from a diluted analysis.
5. E - Reported concentration exceeded the calibration range of the instrument.
6. f - Analyte was present in the field blank
7. J - The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
8. R - Unreliable results. Analyte may or may not be present in the sample.
9. ND - Analyte not detected.
10. µg/L - micrograms per liter
11. Bold indicates the analyte was detected.
12. Shading indicates the result exceeded the EPA National Primary Drinking Water Standards, Maximum Contaminant Levels, June 2003.
13. Topographic contours (one-foot interval) are from aerial photographs taken on February 28, 2001.

N

0 200 400
Feet

LEGEND

Monitoring Well Locations

Unit Screened
- Upper Clay
- Upper Clay/Upper Sand
- Upper Sand
- Lower Sand

- Staff Gauge
- Buildings
- Industrial Area Boundary
- Surface Water
- Topographic Contour

FIGURE 4-10
cVOCs Detected in Groundwater Monitoring Wells
Supplemental Site Characterization Investigation
Report for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

CH2MHILL

RDD \\BALDUR\PROJ\CRAB_ORCHARD_423535\MAPFILES\PLUME_2_SSCR\FIG4-10_CVOCS_GW_SSCR.MXD MSCHROCK 1/9/2012 9:56:23 AM

SECTION 5

Summary and Conclusions

The supplemental site characterization investigation report met the objectives defined in the work plan (CH2M HILL 2011). Data collected during the investigation changes certain aspects of the CSM presented in the Preliminary Design Report (RMT 2001). The data collected during the supplemental site characterization investigation report provides the additional information needed to move forward with the selection a remedial alternative at Plume 2 of Site 33.

The following are key findings from the investigation that impact the development of remedial alternatives for Plume 2:

- The size of the groundwater plume is slightly larger than previously identified but the overall geometry is similar.
- A source area hot spot was observed near Building I-1-2. The extent of the hot spot was defined by information collected in adjacent borings.
- Contamination is present within and below the Lower Clay in parts of both source areas.
- The Lower Sand unit was observed on both sides of Building I-1-3. This unit appears to act as a preferential pathway for groundwater contaminant migration under the building. The Lower Sand unit is not present near building I-1-2.
- A layer of Upper Sand was observed on both sides of Building I-1-2, which also appears to act as a preferential pathway for groundwater contaminant migration under the building.

SECTION 6

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Appendix A
Soil Boring Logs

PROJECT NUMBER	BORING NUMBER:
423535	SB-135 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL
ELEVATION : 427 ft amsl (approximate)
DRILLING CONTRACTOR : Terra Drill, Driller: Joe Brown
DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical
WATER LEVELS : Not Applicable
START : 10/4/11 13:22
END : 10/4/11 14:00
LOGGER : Carrie Wallestad

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0	4.0	Macro Run 1	0.0 0.0 0.0 1.0 NA	0.0-2.0' - Lean Clay (CL), Brown (7.5YR 5/4), Slightly Moist, Stiff, Color Mottling 2.0-4.0' - Lean Clay (CL), Brown (7.5YR 6/4), Slightly Moist, Firm, Color Mottling, Increase in Organics 4.0-5.0' - No Recovery at Surface		
5	5.0	5.0	Macro Run 2	64.7 1.8 50.4 69.4 204.2	5.0-10.0' - Lean Clay (CL), Yellowish Brown (10YR 6/4), Slightly Moist, Firm, Some Color Mottling		Sample collected @ 17:00 Sample ID: 33-SB135-9
10	10.0	5.0	Macro Run 3	90.5 120.7 84.0 146.6 67.3	10.0-15.0' - Lean Clay (CL), Yellowish Brown (10YR 6/4), Slightly Moist, Firm, Some Color Mottling, Increased Organics from 12.0-13.0'		
15	15.0	5.0	Macro Run 4	72.5 53.8 124.5 104.5 38.6	15.0-17.8' - Lean Clay (CL), Yellowish Brown (10YR 6/4), Slightly Moist, Firm, Some Color Mottling 17.8-18.0' - Lean Clay (CL), Yellowish Bown (10YR 5/4), Moist, Soft, Increased Silt Content		
20	20.0	5.0	Macro Run 5	49.9 49.1 33.3 15.3 15.1	18.0-20.0' - Lean Clay (CL), Light Yellowish Brown (10YR 6/4), Slightly Moist, Firm 20.0-21.0' - Lean Clay with Sand (CL), Light Yellowish Brown (10YR 6/4), Wet, Soft, <10% Fine Grain Sand 21.0-23.0' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Firm		Sample collected @ 17:08 Sample ID: 33-SB135-21
25	25.0	5.0	Macro Run 6	43.5 88.8 152.6 56.7 36.0	23.0-23.2' - Clayey Sand (SC), Yellowish Brown (10YR 5/4), Saturated, Loose, Well-Graded Fine to Coarse Grain Sand with <10% Gravel up to 1/4" in size 23.2-25.0' - Lean Clay (CL), Light Yellowish Brown (10YR 6/4), Wet, Firm, Increasing Silt with Depth, <5% Fine Grain Sand		
30	30.0	5.0	Macro Run 7	24.9 28.7 18.1 14.6 3.6	25.0-30.0' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff, Trace Gray Silt within Lean Clay 30.0-32.0' - Lean Clay (CL), Light Brownish Gray (10YR 6/2), Slightly Moist, Stiff 32.0-34.0' - Lean Clay (CL), Light Yellowish Brown (10YR 6/4), Slightly Moist, Stiff, Gray Sandstone Lense at 33' about 1/4" thick		
35	35.0	5.0	Macro Run 8	0.5 0.5 0.7 0.7 0.4	34.0-35.0' - Lean Clay (CL), Gray (10YR 5/1), Moist, Firm, Trace Angular Sand and Gravel 35.0-40.0' - Lean Clay (CL), Gray (10YR 5/1), Moist, Firm, Trace Angular Sand and Gravel		
40	40.0	3.0	Macro Run 9	1.0 0.7 1.9	40.0-43.0' - Lean Clay (CL), Gray (10YR 5/1), Moist, Firm, Trace Angular Sand and Gravel 43.0-45.0' - No Recovery at Surface		Driller Note: Bottom of boring at 45.0' bgs
45	45.0						

PROJECT NUMBER	BORING NUMBER:
423535	SB-136 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL
ELEVATION : 427 ft amsl (approximate)
DRILLING CONTRACTOR : PSC, Driller: Jerry Hancock
DRILLING EQUIPMENT AND METHOD : Geoprobe Rig 6620, DPT, 4 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical
WATER LEVELS : Not Applicable
START : 9/13/11 08:30
END : 9/14/11 10:00
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0	4.0	Macro Run 1	0.1 0.8 4.2 1.2 NA	0.0-0.5' - Lean Clay with Silt and Sand (CL), Brown (10YR 4/3), Dry 0.5-4.0' - Lean Clay (CL), Light Gray transitioning to Brown (10YR 7/1 to 10YR 4/3), Moist		
5	5.0				4.0-5.0' - No Recovery at Surface		
		5.0	Macro Run 2	5.6 6.0 7.4 10.1 NA	5.0-7.0' - Lean Clay (CL), Brown (10YR 4/3), Moist, Silt Content Increases with Depth 7.0-10.0' - Silt (ML), Brown (10YR 4/3), Moist to Wet		
10	10.0						
		5.0	Macro Run 3	6.9 14.5 6.0 19.0 9.8	10.0-15.0' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Moist, Firm, Black Organic Staining throughout run		
15	15.0						
		5.0	Macro Run 4	30.4 9.6 11.6 11.9 7.9	15.0-20.0' - Silt with Lean Clay (ML), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Moist from 15.0-17.0' and Wet from 17.0'-20.0', Some Black Organic Staining throughout run		
20	20.0						
		5.0	Macro Run 5	2.5 10.4 8.9 15.6 24.0	20.0-20.5' - Silt with Lean Clay (ML), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Moist from 15.0-17.0' and Wet from 17.0'-20.0', Some Black Organic Staining throughout run 20.5-21.0' - Sand (SP), Brown (10YR 4/3), Saturated, Non Plastic		
25	25.0						
		5.0	Macro Run 6	19.5 32.9 48.5 7.8 21.9	21.0-24.8' - Silt (ML), Brown (10YR 4/3), Saturated, Non Plastic 24.8-25.0' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Moist 25.0-30.0' - Silt (ML), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Slightly Moist, Firm, Color Transitions back and forth throughout run, Gravel Clast sporadically spaced within Silt up to 1/2" in size throughout run		Sample collected @ 14:00 Sample ID: 33-SB136-28
30	30.0						
		4.0	Macro Run 7	8.9 2.0 1.9 4.1 2.1	30.0-34.0' - Silt (ML), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Slightly Moist, Firm, Gravel Clast up to 1/4" in size throughout run		
35	35.0						
	37.5	2.5	Macro Run 8	1.9 0.8 45.8	34.0-35.0' - Sand (SP), Brown (10YR 4/3), Top 6" Saturated, Bottom 6" Moist to Wet, Fine Grain Sand, Gravel Clast throughout run up to 1/4" in size		
40	40.0	2.5	Macro Run 8.5	2.0 1.6 2.8	35.0-37.5' - Sand (SP), Brown (10YR 4/3), Wet to Saturated, Medium to Fine Grain Sand, Gravel Clasts up to 1/2" in size and Sandstone Clast up to 2" in size throughout run		Driller Note: PVC sample tube clogged in steel sampler casing Stop drilling @ 1030 on 09/13/2011 Continue drilling @ 0910 on 09/14/2011
		5.0	Macro Run 9	0.4 0.0 0.3 0.0 0.0	37.5-38.0' - Sand (SP), Brown (10YR 4/3), Wet, Medium Grain Sand, Gravel Clast throughout run up to 1/4" in size, Sand becomes Coarser with depth 38.0-40.0' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Wet, Firm, Top 1' Very Little Silt within Lean Clay, Bottom 1' Little Silt within Lean Clay, Trace Gravel Clast within Lean Clay		
45	45.0						
		5.0	Macro Run 10	0.0 0.0 0.0 0.0 0.0			
50	50.0						

PROJECT NUMBER	BORING NUMBER:
423535	SB-136 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 427 ft amsl (approximate)
DRILLING CONTRACTOR : PSC, Driller: Jerry Hancock

DRILLING EQUIPMENT AND METHOD : Geoprobe Rig 6620, DPT, 4 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 9/13/11 08:30
END : 9/14/11 10:00
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
55					40.0-45.0' - Lean Clay (CL), Top 2.5' Light Gray to Brown (10YR 7/1 to 10YR 4/3), Bottom 2.5' Light Blueish Gray (10YR), Moist, Firm, Trace Gravel Clast within Lean Clay up to 1/4" in size, Light Blueish Gray Sandstone pieces up to 2" in diameter in bottom of run		Driller Note: Bottom of boring at 50' bgs
60					45.0-48.7' - Lean Clay (CL), Top 2.5' Light Gray to Brown (10YR 7/1 to 10YR 4/3), Bottom 2.5' Light Blueish Gray (10YR), Moist, Firm, Trace Gravel Clast within Lean Clay up to 1/4" in size, Light Blueish Gray Sandstone pieces up to 2" in diameter in bottom of run		
65					48.7-50.0' - Highly Weathered Shale, Light Bllueish Gray (Gley 2 5/1)		
70							
75							
80							
85							
90							
95							
100							

PROJECT NUMBER	BORING NUMBER:
423535	SB-137 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 424.66 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Joe Brown

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/5/11 14:59
END : 10/5/11 15:56
LOGGER : Carrie Wallestad

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0.0	3.7	Macro Run 1		0.0 0.0 3.1 NA NA	0.0-3.7' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Moist, Soft, Medium Plasticity, Little Black Staining throughout run		
5 5.0	5.0	Macro Run 2		5.8 6.9 13.6 11.5 9.0	3.7-5.0' - No Recovery at Surface 5.0-8.5' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Moist, Soft, Medium Plasticity, Little Black Staining throughout run		Sample collected @ 16:00 Sample ID: 33-SB137-4
10 10.0	4.5	Macro Run 3		9.7 19.0 44.0 16.3 13.1	8.5-8.7' - Silt with Lean Clay (ML), Gray to Brown (10YR 5/1 to 10YR4/3), Moist, Loose 8.7-10.0' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Moist, Soft, Medium Plasticity, Little Black Staining throughout run 10.0-14.5' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Moist, Firm, Medium Plasticity, Little Black Staining throughout run, Trace Fine Grain Sand		
15 14.5	5.0	Macro Run 4		59.0 10.1 22.5 50.4 20.5	14.5-15.5' - Lean Clay (CL), Light Gray (10YR 7/1), Moist, Firm, Medium Plasticity, Increased Silt Content 15.5-19.5' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Slightly Moist, Firm, Trace Fine Grain Sand		
20 19.5	4.8	Macro Run 5		37.2 50.3 44.0 49.0 NA	19.5-20.3' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Slightly Moist, Firm, Trace Fine Grain Sand 20.3-20.6' - Silty Sand (SM), Brown (10YR 4/3), Wet, Loose, Fine Grain Sand 20.6-21.7' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Slightly Moist, Soft, Trace Fine Grain Sand		Sample collected @ 16:10 Sample ID: 33-137-20
25 24.5	5.0	Macro Run 6		107.8 21.2 17.3 30.3 18.0	21.7-22.4' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Wet, Soft, High Silt Content 22.4-24.5' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Moist, Soft to Firm, Firmness Increases with Depth		
30 29.5	5.0	Macro Run 7		150.0 120.0 101.5 75.0 3.8	24.5-29.5' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Slightly Moist, Stiff, Sporadic Gravel Clasts up to 1/4" in size throughout run, Trace Charcoal 29.5-34.5' - Lean Clay (CL), Brown (10YR 4/3), Slightly Moist, Stiff to Hard, Very Little Silt, Trace Sporadic Fine Grain Sand Seams, Trace Charcoal		Sample collected @ 15:45 Sample ID: 33-SB137-31
35 34.5	5.0	Macro Run 8		42.0 98.0 21.8 1.2 1.0	34.5-36.2' - Lean Clay (CL), Brown (10YR 4/3), Slightly Moist, Stiff to Hard, Very Little Silt, Trace Sporadic Fine Grain Sand Seams, Trace Charcoal 36.2-37.5' - Silty Sand (SM), Brown (10YR 4/3), Dry, Loose, Fine Grain Sand with Sporadic Gravel Clasts up to 1/4" throughout run 37.5-39.5' - Lean Clay (CL), Brown (10YR 4/3), Moist, Stiff		
40 39.5	5.0	Macro Run 9		1.7 2.4 0.4 0.2 0.1	39.5-40.2' - Lean Clay (CL), Brown (10YR 4/3), Moist, Stiff 40.2-44.5' - Lean Clay (CL), Medium Gray (10YR 5/1), Moist, Frim, Trace Light Gray Fine Grain Sand Seams, Trace Gravel up to 1/4" in size		Driller Note: Bottom of boring at 44.5' bgs
44.5							

PROJECT NUMBER	BORING NUMBER:
423535	SB-137 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 424.66 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Joe Brown

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/5/11 14:59
END : 10/5/11 15:56
LOGGER : Carrie Wallestad

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
45							
50							
55							
60							
65							
70							
75							
80							
85							

PROJECT NUMBER	BORING NUMBER:
423535	SB-138 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL
ELEVATION : 426.76 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper
DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical
WATER LEVELS : Not Applicable
START : 10/10/11 15:00
END : 10/10/11 16:30
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0 – 4.0	1.9	Macro Run 1	0.0 0.0 NA NA	0.0-1.9' - Lean Clay (CL), Brown (10YR 4/3), Moist, Soft, Trace Sand 1.9-4.0' - No Recovery, Sandy Gravel did not make into Macro Sampler, Cobbles 2" to 3" in Diameter		
5	4.0 – 9.0	4.8	Macro Run 2	0.0 0.5 0.0 0.0 0.0	4.0-4.9' - Lean Clay (CL), Brown (10YR 4/3), Moist, Soft, High Sand Content 4.9-8.8' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Slightly Moist, Firm, Medium Plasticity, Water Content Increases with Depth, Silt Content Decreases with Depth		
10	9.0 – 14.0	4.9	Macro Run 3	0.0 0.0 0.0 0.0 0.0	9.0-13.9' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Slightly Moist, Firm, Medium Plasticity, Water Content Increases with Depth, Silt Content Decreases with Depth		Collect sample @ 16:05 Sample ID: 33-SB138-11
15	14.0 – 19.0	5.0	Macro Run 4	0.1 0.0 0.1 0.0 0.0	14.0-19.0' - Lean clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Slightly Moist, Firm, Medium Plasticity, Water Content Increases with Depth, Silt Content Decreases with Depth, Last 0.5' increase water and softness		
20	19.0 – 24.0	4.5	Macro Run 5	3.9 0.8 0.9 0.7 NA	19.0-22.3' - Lean Clay (CL), Brown (10YR 4/3), Wet, Soft, Medium Plasticity, Some Light Gray Mottling, Little Silt 22.3-23.3' - Silty Sand (SM), Brown (10YR 4/3), Wet to Saturated, Soft, Loose		
25	24.0 – 29.0	5.0	Macro Run 6	7.8 4.6 3.1 0.6 0.6	23.3-23.5' - Lean Clay (CL), Brown (10YR 4/3), Wet, Soft, Medium Plasticity, Some Light Gray Mottling, Little Silt 23.5-24.0' - No Recovery at Surface 24.0-24.4' - Lean Clay (CL), Slightly Moist to Moist, Firm 24.4-25.0' - Sandy Lean Clay (CL), Brown (10YR 4/3), Moist, Firm, Medium Plasticity		
30	29.0 – 34.0	5.0	Macro Run 7	2.8 0.8 4.7 5.3 5.0	25.0-25.4' - Sand (SP), Fine to Coarse Grain Sand, Gravel Clast within Sand up to 1/4" in size at top and increases with Depth 25.4-29.0' - Lean Clay (CL), Brown (10YR 4/3), Sporadic Gravel Clast within Lean Clay between 1/4" to 1/2" in size 29.0-34.0' - Lean Clay (CL), Brown (10YR 4/3), Slightly Moist, Firm, Low Plasticity, Sporadic Gravel Clast within up to 1/4" in size Lean Clay		Collect sample @ 16:45 Sample ID: 33-SB138-29
35	34.0 –	4.2	Macro Run 8	8.2 9.8 48.5	34.0-36.3' - Lean Clay (CL), Brown (10YR 4/3), Slightly Moist, Firm, Low Plasticity, Sporadic Gravel Clast within Lean Clay up to 1/4" in size 36.3-38.3' - Highly Weathered Sandstone, Brown (10YR 4/3), Fine to Medium Grain, Gravel Clast Cemented within Sandstone		

PROJECT NUMBER	BORING NUMBER:
423535	SB-138 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 426.76 ft amsl DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler ORIENTATION: Vertical

WATER LEVELS : Not Applicable START : 10/10/11 15:00 END : 10/10/11 16:30 LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	39.0						Collect sample @ 17:00 Sample ID: 33-SB138-38 Geologist Note: Highly weathered sandstone pulverized into Sand by Hammer Driller Note: Hit Refusal at 38.3' bgs
40							
45							
50							
55							
60							
65							
70							
75							

PROJECT NUMBER	BORING NUMBER:
423535	SB-139 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL
ELEVATION : 425.02 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper
DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical
WATER LEVELS : Not Applicable
START : 10/11/11 08:20
END : 10/11/11 10:00
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0	3.5	Macro Run 1	0.0 0.0 0.3 NA	0.0-1.9' - Lean Clay (CL), Brown (10YR 4/3), Moist, Soft, Low Plasticity 1.9-3.5' - Lean Clay (CL), Light Gray (10YR 7/1), Slightly Moist, Firm, Low Plasticity		
	4.0				3.5-4.0' - No Recovery at Surface		
5		5.0	Macro Run 2	1.6 1.1 0.6 0.9 0.0	4.0-4.4' - Lean Clay (CL), Light Gray (10YR 7/1), Slightly Moist, Firm, Low Plasticity 4.4-6.4' - Silt with Little Lean Clay (ML), Brown and Light Gray (10YR 4/3 and 10YR 7/1), Black Staining throughout run 6.4-9.0' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Slightly Moist, Firm, Medium Plasticity		
	9.0						
10		4.7	Macro Run 3	0.2 0.2 0.1 0.3 0.0	9.0-14.0' - Lean Clay (CL), Brown and Light Gray (10YR 4/3 and 10YR 7/1), Slightly Moist, Firm, Low Plasticity, Sporadic Black Staining throughout run		Sample collected @ 10:20 Sample ID: 33-SB139-11
	14.0						
15		5.0	Macro Run 4	0.3 0.9 0.2 0.4 0.0	14.0-19.0' - Lean Clay (CL), Brown and Light Gray (10YR 4/3 and 10YR 7/1), Moist, Firm, Low Plasticity, Sporadic Black Staining throughout run		
	19.0						
20		5.0	Macro Run 5	0.3 0.3 2.8 7.0 1.7	19.0-21.6' - Lean Clay (CL), Brown (10YR 4/3), Moist, Soft, Medium Plasiticy 21.6-22.0' - Silty Sand (SM), Light Gray (10YR 7/1), Moist, Little Lean Clay 22.0-24.0' - Lean Clay (CL), Brown (10YR 4/3), Slightly Moist, Firm, Low Plasticity		
	24.0						
25		4.3	Macro Run 6	18.0 28.0 31.0 28.0 NA	24.0-28.3' - Lean Clay (CL), Brown (10YR 4/3), Wet, Firm, Medium Plasticity, Sporadic Gravel Clasts up to 1/2" in size throughout run		
	29.0				28.3-29.0' - No Recovery at Surface		Sample collected @ 10:30 and 10:35 Sample ID: 33-SB139-28, 33-FDUP-006
30		5.0	Macro Run 7	4.5 5.8 30.0 14.6 30.0	29.0-34.0' - Lean Clay (CL), Brown (10YR 4/3), Wet, Firm, Medium Plasticity, Sporadic Gravel Clasts up to 1/2" in size throughout run		
	34.0						
35		3.8	Macro Run 8	8.0 9.0 8.0	34.0-35.1' - Lean Clay (CL), Brown (10YR 4/3), Wet, Firm, Medium Plasticity, Sporadic Gravel Clasts up to 1/2" in size throughout run 35.1-35.9' - Clayey Sand (SC), Brown (10YR 4/3), Wet to Moist		
	37.0						

PROJECT NUMBER	BORING NUMBER:
423535	SB-139 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 425.02 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/11/11 08:20
END : 10/11/11 10:00
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
					35.9-37.0' - Highly Weathered Sandstone, Brown (10YR 4/3), Fine to Medium Grain Sand Moderately Cemented		Driller Note: Hit Refusal at 37.0' bgs
40							
45							
50							
55							
60							
65							
70							

PROJECT NUMBER	BORING NUMBER:
423535	SB-140 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL
ELEVATION : 424 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper
DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical
WATER LEVELS : Not Applicable
START : 10/4/11 13:05
END : 10/4/11 14:00
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0 – 4.0	1.8	Macro Run 1	0.0 0.0 NA NA	0.0-1.8' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Moist, Firm, Some Color Mottling 1.8-4.0' - No Recovery even with catcher in hole		
5	4.0 – 9.0	1.7	Macro Run 2	0.9 8.4 NA NA NA	4.0-5.3' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Moist to Wet, Soft, Some Color Mottling 5.3-5.7' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Moist, Firm, Some Color Mottling 5.7-9.0' - No Recovery at Surface		
10	9.0 – 14.0	5.0	Macro Run 3	11.0 5.6 10.0 2.8 8.5	9.0-14.0' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Slightly Moist, Firm, Medium Plasticity, Some Black Staining throughout run		
15	14.0 – 19.0	5.0	Macro Run 4	13.0 2.0 2.8 25.2 1.6	14.0-19.0' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Slightly Moist to Moist, Soft to Firm, Medium Plasticity, Some Black Staining throughout run		Collect sample @ 16:47 Sample ID: 33-SB140-18
20	19.0 – 24.0	4.4	Macro Run 5	10.2 4.6 5.3 14.6 NA	19.0-20.3' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Moist to Wet, Soft to Firm, Medium Plasticity, Some Black Staining throughout run 20.3-20.8' - Silty Sand (SM), Brown (10YR 4/3), Wet to Saturated, Loose, Some Gravel Clast up to 1/4" in size		
25	24.0 – 29.0	5.0	Macro Run 6	6.5 250.5 122.0 34.0 22.5	20.8-23.4' - Lean Clay (CL), Brown (10YR 4/3), Moist to Wet, Medium Plasticity, Trace Fine Grain Sand 23.4-24.0' - No Recovery at Surface 24.0-29.0' - Lean Clay (CL), Brown (10YR 4/3), Dry, Firm, Moist from 26.0-26.5' and 27.0-27.3'		Collect sample @ 16:53 Sample ID: 33-SB140-26
30	29.0 – 34.0	4.1	Macro Run 7	43.0 15.3 27.7 27.4	29.0-34.0' - Lean Clay (CL), Brown (10YR 4/3), Moist to Wet, Firm, Medium Plasticity, Trace Sand		
35	34.0 – 39.0	5.0	Macro Run 8	156.0 103.0 52.0 60.0 32.0	34.0-34.2' - Lean Clay (CL), Brown (10YR 4/3), Moist to Wet, Firm, Medium Plasticity, Trace Sand		
40	39.0 – 44.0	5.0	Macro Run 9	30.5 1.3 18.0 4.4 3.8	34.2-39.0' - Lean Clay (CL), Medium Gray (10YR 5/1), Slightly Moist to Moist, Plastic, Embedded Gravel Clasts up to 1/4" in size and Sandstone Clast up to 3/4" in size throughout run		

PROJECT NUMBER	BORING NUMBER:
423535	SB-140 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 424 ft amsl DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler ORIENTATION: Vertical

WATER LEVELS : Not Applicable START : 10/4/11 13:05 END : 10/4/11 14:00 LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
45					39.0-44.0' - Lean Clay (CL), Medium Gray (10YR 5/1), Slightly Moist to Moist, Plastic, Less Gravel Clast within unit and No Weathered Sandstone Pieces within unit		Driller Note: Stop drilling at 44.0' bgs
50							
55							
60							
65							
70							
75							
80							
85							

PROJECT NUMBER	BORING NUMBER:
423535	SB-141 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL
ELEVATION : 426.15 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper
DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical
WATER LEVELS : Not Applicable
START : 10/4/11 08:15
END : 10/4/11 10:20
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0 – 4.0	2.8	Macro Run 1	0.0 0.0 0.0 NA	0.0-1.3' - Silt (ML), Brown (10YR 4/3), Slightly Moist, Firm, Some Gray Mottling 1.3-2.5' - Silt (ML), Brown (10YR 4/3), Dry, Firm, Some Gray Mottling 2.5-2.8' - Silt with Little Lean Clay (ML), Light Gray (10YR 5/1), Some Color Mottling		
5	4.0 – 9.0	4.9	Macro Run 2	0.0 0.6 3.8 5.7 3.7	2.8-4.0' - No Recovery at Surface 4.0-6.5' - Silt with Very Little Lean Clay (ML), Light Gray (10YR 7/1), Slightly Moist, Firm 6.5-9.0' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Moist, Medium Plasticity		Geologist Note: slight odor
10	9.0 – 14.0	2.4	Macro Run 3	84.0 63.0 NA NA NA	9.0-11.4' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR7/1), Slightly Moist, Firm, Medium Plasticity 11.4-14.0' - No Recovery at Surface		Geologist Note: strong odor
15	14.0 – 19.0	5.0	Macro Run 4	28.2 17.1 35.5 122.0 7.0	14.0-19.0' - Lean Clay (CL), Brown (10YR 4/3), Moist from 14.0-17.5' and Wet from 17.5-18.5', Firm to Stiff, Medium Plasticity, Black Staining throughout run		Geologist Note: extremely strong odor Collect Sample @ 10:50 Sample ID: 33-SB141-18
20	19.0 – 24.0	3.9	Macro Run 5	82.0 21.0 3.2 4.2 NA	19.0-20.0' - Lean Clay (CL), Brown (10YR 4/3), Moist to Wet, Firm to Stiff, Medium Plasticity, Black Staining throughout run 20.0-21.2' - Silty Sand with Little Lean Clay (SM), Brown (10YR 4/3), Wet to Saturated, Loose, Very Fine Grain Sand		
25	24.0 – 29.0	5.0	Macro Run 6	7.1 15.3 8.3 10.2 4.7	21.2-22.3' - Lean Clay (CL), Brown (10YR 4/3), Wet to Saturated, Medium Plasticity 22.3-22.9' - Lean Clay (ML), Brown (10YR 4/3), Moist 22.9-24.0' - No Recovery at Surface 24.0-28.5' - Lean Clay (CL), Brown (10YR 4/3), Moist to Wet, Firm, Low Plasticity		
30	29.0 – 34.0	4.4	Macro Run 7	15.2 10.2 2.7 4.9 NA	28.5-29.0' - Silty Sand with Some Lean Clay (SM), Brown (10YR 4/3), Saturated 29.0-34.0' - Sandy Lean Clay (CL), Brown to Gray (10YR 4/3 to 10YR 5/1), Wet to Saturated, Stiff, Low Plasticity, Sporadic Gray Fine Grain Sand Seams		
35	34.0 – 39.0	5.0	Macro Run 8	3.4 4.5 2.8 2.4 0.0	34.0-38.0'- Sandy Lean Clay (CL), Brown to Gray (10YR 4/3 to 10YR 5/1), Moist to Wet, Firm to Stiff, Sporadic Gravel Clasts up to 1/4" in size throughout run 38.0-40.5' - Poorly-Graded Sand (SP), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Wet to Saturated, Loose, Medium to Coarse Grain Sand		
40	39.0 – 44.0	4.0	Macro Run 9	0.2 0.0 0.0 0.0 0.0	40.5-41.8' - Clayey Sand (SC), Brown to Medium Gray (10YR 4/3 to 10YR 5/1), Moist to Wet, Medium Grain Sand 41.8-43.0' - Lean Clay (CL), Gray (10YR 5/1), Sporadic Gravel Clast within Lean Clay		
45	44.0 – 49.0	4.0	Macro Run 10	0.0 0.0 0.0 0.0	43.0-44.0' - No Recovery at Surface 44.0-48.0' - Lean Clay (CL), Gray (10YR 5/1), Less Sporadic Gravel Clast within Lean Clay		Driller Note: Stop drilling at 49' bgs

PROJECT NUMBER	BORING NUMBER:
423535	SB-141 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 426.15 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/4/11 08:15
END : 10/4/11 10:20
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
50							
55							
60							
65							
70							
75							
80							
85							
90							
95							

PROJECT NUMBER:	BORING NUMBER:
423535	SB-142 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 426 ft amsl DRILLING CONTRACTOR : Terra Drill, Driller: Joe Brown

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler

WATER LEVELS : Not Applicable START : 10/4/11 08:40 END : 10/4/11 10:22 LOGGER : Carrie Wallestad

DEPTH BELOW EXISTING GRADE ()	INTERVAL ()	RECOVERY (in)	#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0	3.5	Macro Run 1		**Fat Clay (CH)** 0.0-3.5" - yellowish brown, (10YR 5/4), some, moist, soft, 0.0-3.5' - Fat Clay (CH), Yellowish Brown (10YR 5/4), Moist, Soft, Some Color Mottling, <5% Fine Grain Sand		0.0 0.0 0.0 0.0 NA
5	5.0				3.5-5' - 3.5-5.0' - No Recovery at Surface		
		5	Macro Run 2		**Lean Clay (CL)** 5.0-10.0" - yellowish brown, (10YR 5/4), some, slightly moist, stiff, 5.0-10.0' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff, Some Color Mottling		0.0 0.0 0.0 0.0 0.0
10	10.0						
		5	Macro Run 3		**Clay With Silt (CL)** 10.0-13.0" - yellowish brown, (10YR 5/4), some, slightly moist, stiff, 10.0-13.0' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff, Some Color Mottling		1.7 0.8 1.0 12.6 0.4
15	15.0				**Clay With Silt (CL)** 14.0-15.0" - yellowish brown, (10YR 5/4), slightly moist, stiff, 13.0-15.0' - Lean Clay (CL), Yellowish Brown (10YR 5/6), Slightly Moist, Stiff, About 20% Charcoal/Organics		7.8 11.0 7.0 11.6 6.6
		5	Macro Run 4		15-20' - Same as 14.0-15.0 except 15.0-20.0' - Lean Clay (CL), Yellowish Brown (10YR 5/6), Slightly Moist, Stiff, <10% Charcoal/Organics		
20	20.0						
		5	Macro Run 5		**Silty Clay (CL)** 20.0-21.0" - yellowish brown, (10YR 5/4), moist, stiff to firm, 20.0-21.0' - Lean Clay (CL), Yellowish Brown (10YR 5/6), Moist, Soft to Firm, Increased Silt Content		108.0 1.7 2.4 8.5 11.6
25	25.0				21-23.5' - Same as 14.0-15.0 except 21.0-23.5' - Lean Clay (CL), Yellowish Brown (10YR 5/6), Slightly Moist, Stiff		
		5	Macro Run 6		**Sandy Clay (CL)** 23.5-24.0" - yellowish brown, (10YR 5/4), moist, soft, fine grained, 23.5-24.0' - Sandy Clay (CL), Yellowish Brown (10YR 5/6), Moist, Soft, Poorly-Graded Fine Grain Sand		29.4 21.2 41.1 89.5 26.3
30	30.0						
		5	Macro Run 7		**Silty Clay (CL)** 24.0-25.0" - yellowish brown, (10YR 5/4), moist, firm, 24.0-25.0' - Lean Clay (CL), Yellowish Brown (10YR 5/6), Moist, Firm		10.5 13.0 111.0 58.7 47.7
35	35.0				**Clay With Silt (CL)** 25.0-27.5" - yellowish brown, (10YR 5/4), slightly moist, stiff, 25.0-27.5' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff		Sample collected @ 10:41 Sample ID: 33-SB142-35
		1.5	Macro Run 8		**Silty Clay (CL)** 27.5-30.0" - yellowish brown, (10YR 5/4), slightly moist, stiff, 27.5-30.0' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff		81.0 78.2 NA NA NA
40	40.0						
		5	Macro Run 9		**Clay With Silt (CL)** 30.0-32.5" - dark yellowish brown, (10YR 4/4), slightly moist, stiff, 30.0-32.5' - Lean Clay (CL), Dark Yellowish Brown (10YR 4/4), Slightly Moist, Stiff		1.3 7.4 1.7 1.3 1.3
45	45.0				**Sandy Clay (CL)** 32.5-33.0" - yellowish brown, (10YR 5/4), wet to saturated, firm, fine grained, 32.5-33.0' - Sandy Lean Clay (CL), Yellowish Brown (10YR 5/4), Saturated, Firm, Poorly-Graded Fine Grain Sand		Sample collected @ 10:50 Sample ID: 33-SB142-41
		4	Macro Run 10				
	49.0						

PROJECT NUMBER: 423535	BORING NUMBER: SB-142	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 426 ft amsl DRILLING CONTRACTOR : Terra Drill, Driller: Joe Brown

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler

WATER LEVELS : Not Applicable START : 10/4/11 08:40 END : 10/4/11 10:22 LOGGER : Carrie Wallestad

DEPTH BELOW EXISTING GRADE ()	INTERVAL ()	RECOVERY (in)	#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
50					**Silt With Clay (ML)** 33.0-34.5" - brown, (10YR 5/3), slightly moist, stiff, 33.0-34.5' - Silt with Little Lean Clay (ML), Brown (10YR 5/3), Slightly Moist, Stiff		5.4 5.8 1.9 0.8 Driller Note: Hit Refusal at 49.0' bgs
55					**Clayey Sand (SC)** 34.5-35.0" - yellowish brown, (10YR 5/4), saturated, loose, medium grained, 34.5-35.0' - Clayey Sand (SC), Yellowish Brown (10YR 5/4), Saturated, Loose, Poorly-Graded Medium Grain Sand		
60					**Sandy Silt (ML)** 35.0-35.5" - yellowish brown, (10YR 5/4), saturated, soft, fine grained, 35.0-35.5' - Sandy Silt (ML), Yellowish Brown (10YR 5/4), Saturated, Soft, Poorly-Graded Fine Grain Sand		
					Silty Clay (CL) 35.5-36.5" - yellowish brown, (10YR 5/4), slightly moist, stiff, 35.5-36.5' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff		
65					**Silty Clay (CL)** 40.0-45.0" - dark gray, (10YR 4/1), moist, firm, 40.0-45.0' - Lean Clay (CL), Dark Gray (10YR 4/1), Moist, Firm, <5% Angular Medium to Coarse Grain Sand		
70					45-48.5' - Same as 40.0-45.0' except 45.0-48.5' - Lean Clay (CL), Dark Gray (10YR 4/1), Moist, Firm, <5% Angular Medium to Coarse Grain Sand		
					Weathered Sandstone 48.5-49.0" - gray, (10YR 5/1), fine grained, 48.5-49.0' - Weathered Sandstone, Gray (10YR 5/1), Fine Grain Sand, High Mica Content		
75					Bottom of Boring at 49.0 ft bgs on 10/4/11 10:22		
80							
85							
90							
95							

PROJECT NUMBER	BORING NUMBER:
423535	SB-143 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL
ELEVATION : 426 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper
DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical
WATER LEVELS : Not Applicable
START : 10/12/11 08:45
END : 10/12/11 09:35
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0 – 4.0	3.1	Macro Run 1	0.0 0.0 0.0 NA	0.0-3.1' - Lean Clay (CL), Yellowish Brown (10YR 5/8), Moist, Soft to Firm, Medium Plasticity, Trace Sand 3.1-4.0' - No Recovery at Surface		
5	4.0 – 9.0	3.4	Macro Run 2	0.4 0.5 5.5 NA NA	4.0-6.0' - Lean Clay (CL), Brown (10YR 4/3), Slightly Moist to Moist, Firm, Low Plasticity, High Silt content 6.0-7.4' - Lean Clay (CL), Reddish Yellow (7.5YR 6/8), Moist, Soft, Medium Plasticity 7.4-9.0' - No Recovery at Surface		
10	9.0 – 14.0	3.4	Macro Run 3	14.5 3.7 33.4 NA NA	9.0-10.1' - Lean Clay (CL), Reddish Yellow (7.5YR 6/8), Moist, Soft, Medium Plasticity 10.1-10.7' - Silt with Trace Sand (ML), Brown (10YR 4/3), Moist to Wet, Soft, Extremely Fine Grain Sand 10.7-12.4' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Moist, Soft, Medium Plasticity		
15	14.0 – 19.0	5.0	Macro Run 4	65 24.9 38.7 26.8 43.3	14.0-19.0' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Moist, Soft, Medium Plasticity		Sample collected @ 09:45, 09:55 Sample ID: 33-SB143-15, 33-FDUP-007
20	19.0 – 24.0	4.1	Macro Run 5	10.8 12.1 18.7 5.8 NA	19.0-20.3' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Moist, Soft, Medium Plasticity 20.3-21.3' - Sandy Lean Clay (CL), Brown (10YR 4/3), Moist to Wet, Soft, Medium Plasticity 21.3-23.1' - Lean Clay (CL), Brown to Yellowish Brown (10YR 4/3 to 10YR 5/8), Slightly Moist to Moist, Firm, Low Plasticity 23.1-24.0' - No Recovery at Surface		
25	24.0 – 29.0	5.0	Macro Run 6	13.9 19.2 13.0 10.6 0.6	24.0-29.0' - Lean Clay (CL), Yellowish Brown (10YR 5/8), Dry to Slightly Moist, Firm to Stiff, Sporadic Gravel Clast within Lean Clay up to 1/4" in size		
30	29.0 – 30.5	1.5	Macro Run 7	8.0	29.0-30.5' - Highly Weathered Sandstone, Brown (10YR 4/3), Fine to Medium Grain Sand, Competent Sandstone at 30.5'		Driller Note: Hit Refusal at 30.5' bgs

PROJECT NUMBER	BORING NUMBER:
423535	SB-143 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 426 ft amsl DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler ORIENTATION: Vertical

WATER LEVELS : Not Applicable START : 10/12/11 08:45 END : 10/12/11 09:35 LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
35							
40							
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50							
55							
60							

PROJECT NUMBER	BORING NUMBER:
423535	SB-144 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL
ELEVATION : 426 ft amsl (approximate)
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper
DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical
WATER LEVELS : Not Applicable
START : 10/5/11 08:20
END : 10/5/11 10:00
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0 – 4.0	3.2	Macro Run 1	0.0 0.0 0.0 NA	0.0-1.2' - Lean Clay (CL), Brown (10YR 4/3), Slightly Moist, Firm, Medium Plasticity 1.2-2.6' - Silt (ML), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Dry, Firm to Stiff 2.6-3.2' - Lean Clay (CL), Brown (10YR 4/3), Slightly Moist, Firm, Medium Plasticity 3.2-4.0' - No Recovery at Surface		
5	4.0 – 9.0	3.9	Macro Run 2	0.1 0.1 0.3 0.3 NA	4.0-7.9' - Lean Clay (CL), Brown (10YR 4/3), Moist, Firm, Medium Plasticity 7.9-9.0' - No Recovery at Surface		
10	9.0 – 14.0	3.2	Macro Run 3	14.2 84.0 52.0 NA NA	9.0-12.2' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Slightly Moist, Firm, Soft at 0.6-11.2', Moist and Some Black Coal/Organics 12.2-14.0' - No Recovery at Surface		Geologist Note: Slight Odor Sample collected @ 09:55, 10:00 Sample ID: 33-SB144-11, 33-FDUP-003
15	14.0 – 19.0	5.0	Macro Run 4	70.0 46.7 38.7 11.4 6.8	14.0-19.0' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Slightly Moist, Firm, Medium Plasticity, Some Black Organic Staining throughout run		
20	19.0 – 24.0	5.0	Macro Run 5	18.6 63.0 68.6 14.1 15.2	19.0-24.0' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Slightly Moist, Firm, Medium Plasticity, Some Black Organic Staining throughout run, Moist to Wet and Soft at 21.3-21.6', Moist to Wet and Soft at 22.1-22.0'		
25	24.0 – 29.0	5.0	Macro Run 6	2.7 10.1 31.0 18.4 17.2	24.0-24.3' - Poorly-Graded Sand (SP), Brown (10YR 4/3), Wet to Saturated, Loose, Fine to Medium Grain Sand 24.3-25.4' - Clayey Sand (SC), Brown (10YR 4/3), Wet to Saturated, Soft, Slightly Loose, Fine Grain Sand 25.4-29.0' - Lean Clay with Trace Sand Seams (CL), Yellowish Brown (10YR 5/8), Slightly Moist, Firm		
30		4.3	Macro Run 7	15.5 36.0 30.3 130.4	29.0-33.0' - Silt with little Lean Clay (ML), Brown (10YR 4/3), Moist to Wet, Firm, Non Plastic		

PROJECT NUMBER	BORING NUMBER:
423535	SB-144 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 426 ft amsl (approximate)
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/5/11 08:20
END : 10/5/11 10:00
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	34.0				33.0-33.3' - Weathered Sandstone, Brown (10YR 4/3)		Sample collected @ 10:10 Sample ID: 33-SB144-33 Driller Note: Hit Refusal at 33.3' bgs
35							
40							
45							
50							
55							
60							
65							

PROJECT NUMBER	BORING NUMBER:
423535	SB-145 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL
ELEVATION : 426 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper
DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical
WATER LEVELS : Not Applicable
START : 10/11/11 13:00
END : 10/11/11 13:45
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0	3.2	Macro Run 1	0.0 0.0 0.0 NA	0.0-2.0' - Silt (ML), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Dry, Soft to Firm		
					2.0-3.2' - Lean Clay (CL), Light Gray (10YR 7/1), Slightly Moist, Firm, Low Plasticity		
	4.0				3.2-4.0' - No Recovery at Surface		
5		3.8	Macro Run 2	0.4 0.9 0.6 NA NA	4.0-6.8' - Lean Clay (CL), Light Gray and Brown (10YR 7/1 and 10YR 4/3), Dry, Soft, Low Plasticity		Collected sample @ 14:05 Sample ID: 33-SB145-04
					6.8-7.8' - Silt with Sand (ML), Light Brown (10YR 4/3), Moist, Soft, Loose		
	9.0				7.8-9.0' - No Recovery at Surface		
10		4.3	Macro Run 3	0.0 0.0 0.0 0.0 NA	9.0-10.0' - Silt with Sand (ML), Light Brown (10YR 4/3), Moist, Soft, Loose		
					10.0-13.3' - Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3), Slightly Moist, Firm to Stiff, Low Plasticity		Collected sample @ 14:00 Sample ID: 33-SB145-11
	14.0				13.3-14.0' - No Recovery at Surface		
15		5.0	Macro Run 4	0.0 0.0 0.0 0.0 0.0	14.0-19.0' - Lean Clay (CL), Light Brown (10YR 4/3), Slightly Moist, Firm, Medium Plasticity, Sporadic Black staining throughout run		
	19.0				19.0-19.5' - Lean Clay (CL), Light Brown (10YR 4/3), Slightly Moist, Firm, Medium Plasticity, Sporadic Black staining throughout run		
20		5.0	Macro Run 5	0.6 0.0 0.0 0.1 0.2	19.5-24.0' - Lean Clay (CL), Brown to Light Brown (10YR 4/3), Gravel Clast 1/8" to 1/2" in diameter sporadically spread throughout run		
	24.0						
25		5.0	Macro Run 6	2.6 1.5 3.4 1.2	24.0-28.0' - Lean Clay (CL), Brown to Light Brown (10YR 4/3), Gravel Clast 1/8" to 1/2" in diameter sporadically spread throughout run		Geologist Note: material stretched (clay) which accounts for extra recovery Geologist Note: sandstone mostly pulverized by drilling method Driller Note: Hit Refusal at 28.0' bgs
	28.0				28.0' - Highly Weathered Sandstone, Brown (10YR 4/3), Fine to Medium Grain Weakly Cemented Sand		

PROJECT NUMBER	BORING NUMBER:
423535	SB-146 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL
ELEVATION : 427 ft amsl (approximate)
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper
DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical
WATER LEVELS : Not Applicable
START : 10/5/11 11:15
END : 10/5/11 12:05
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0	3.2	Macro Run 1	0.0 0.0 0.0 NA	0.0-3.2' - Silt with Very Little Lean Clay (ML), Yellowish Brown (10YR 5/8), Slightly Moist, Firm to Stiff, Low Plasticity		
	4.0				3.2-4.0' - No Recovery at Surface		
5		4.2	Macro Run 2	0.0 1.9 17.3 53.0 NA	4.0-8.2' - Lean Clay (CL), Reddish Yellow (7.5YR 6/8), Slightly Moist at top and Moist at bottom of run, Firm at top and Soft at bottom of run		
	9.0				8.2-9.0' - No Recovery at Surface		
10		2.5	Macro Run 3	70 163 NA NA NA	9.0-11.5' - Lean Clay (CL), Light Gray and Brown (10YR 7/1 and 10YR 4/3), Moist, Soft to Firm, Medium Plasticity, Black Staining at 11.3'		
	14.0				11.5-14.0' - No Recovery at Surface		
15		4.6	Macro Run 4	166 80 59 38 NA	14.0-17.1' - Lean Clay (CL), Light Gray and Brown (10YR 7/1 and 10YR 4/3), Mostly Moist, Soft to Firm, Wet from 15.4-15.6'		Sample collected @ 12:45 Sample ID: 33-SB146-15
	19.0				17.1-18.0' - Silty Sand (SM), Yellowish Brown (10YR 5/8), Wet to Saturated, Soft, Very Fine Grain Sand, Little Lean Clay present with Silty Sand		
					18.0-19.5' - Clayey Sand (SC), Yellowish Brown (10YR 5/8), Moist, Firm, Very Fine Grain Sand		
20		5.0	Macro Run 5	16 13 13.4 38 19.8	19.5-24.0' - Lean Clay (CL), Yellowish Brown (10YR 5/8), Moist, Firm to Stiff, Medium Plasticity		
	24.0						
25		5.0	Macro Run 6	16.1 4.8 3.0 0.7 1.8	24.0-29.0' - Lean clay (CL), Brown (10YR 4/3), Mostly Dry to Barely Moist, Stiff to Hard, Trace Gravel Clast and Sand Seams, Silty Sand at 26.2-26.4', Dry, Loose		
	29.0						
30		2.2	Macro Run 7	9.1 0.5	29.0-30.8' - Lean clay (CL), Brown (10YR 4/3), Mostly Dry to Barely Moist, Stiff to Hard, Trace Gravel Clast and Sand Seams, Weathered Sandstone at 30.8' bgs		Driller Note: Hit Refusal at 30.8' bgs
	30.8						

PROJECT NUMBER	BORING NUMBER:
423535	SB-147 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 426.41 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/12/11 10:55
END : 10/12/11 11:55
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0	2.1	Macro Run 1	0.0 0.0 NA NA	0.0-1.0' - Silt (ML), Brown (10YR 4/3), Soft, Loose 1.0-2.1' - Lean Clay (CL), Brown (10YR 4/3), Moist, Soft, Medium Plasticity 2.1-4.0' - No Recovery at Surface		
	4.0	3.3	Macro Run 2	0.0 0.3 0.2 NA NA	4.0-4.7' - Lean Clay (CL), Brown (10YR 4/3), Moist, Soft, Medium Plasticity 4.7-5.4' - Lean Clay with Gravel (CL), Brown (10YR 4/3), Slightly Moist, Firm 5.4-7.3' - Lean Clay (CL), Yellowish Brown to Light Gray (10YR 5/8 to 10YR 7/1), Slightly Moist to Moist, Firm, Medium Plasticity 7.3-9.0' - No Recovery at Surface		Collect sample @ 11:30 Sample ID: 33-SB147-5.5, 33-SB147-5.5-MS, 33-SB-147-5.5-MSD
5	9.0	4.7	Macro Run 3	0.0 0.1 0.2 0.1 NA	9.0-13.7' - Lean Clay (CL), Yellowish Brown to Light Gray (10YR 5/8 to 10YR 7/1), Slightly Moist, Firm, Low Plasticity, Black staining through out run		Sample collected @ 11:45 Sample ID: 33-SB147-13
10	14.0	5.0	Macro Run 4	0.5 6.5 4.7 1.8 2.3	13.7-14.0' - No Recovery at Surface 14.0-19.0' - Lean Clay (CL), Yellowish Brown to Light Gray (10YR 5/8 to 10YR 7/1), Slightly Moist (some minor Moist sections within run), Firm, Low Plasticity, Black staining through out run		
15	19.0	4.8	Macro Run 5	3.5 0.3 3.3 2.0 4.5	19.0-23.6' - Lean Clay (CL), Yellowish Brown to Light Gray (10YR 5/8 to 10YR 7/1), Slightly Moist (some minor Moist sections within run), Firm, Low Plasticity, Black staining through out run		
20	24.0	5.0	Macro Run 6	9.0 13.1 16.2 16.4 NA	23.6-23.8' - Sandy Clay (CL), Brown (10YR 4/3), Moist to Wet, Soft, Medium Plasticity 24.0-28.8' - Lean Clay (CL), Brown (10YR 4/3), Dry to Moist, Firm to Stiff, Small 1/8" to 1/4" Gravel Clast within Lean Clay		Sample collected @ 12:00 Sample ID: 33-SB147-28
25	29.0						

PROJECT NUMBER	BORING NUMBER:
423535	SB-147 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 426.41 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/12/11 10:55
END : 10/12/11 11:55
LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
30					28.8-29.0' - Highly Weathered Sandstone, Brown (10YR 4/3) Wet, Fine to Medium Grain weakly cemented Sand		Driller Note: Hit Refusal at 29.0' bgs
35							
40							
45							
50							
55							

PROJECT NUMBER	BORING NUMBER:
423535	SB-148 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL
ELEVATION : 427 ft amsl (approximate)
DRILLING CONTRACTOR : Terra Drill, Driller: Joe Brown
DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical
WATER LEVELS : Not Applicable
START : 10/5/11 11:15
END : 10/5/11 12:15
LOGGER : Carrie Wallestad

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0	4.5	Macro Run 1	0.0 0.4 0.5 0.3 0.4	0.0-1.0' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Moist, Firm 1.0-2.0' - Lean Clay (CL), Yellowish Brown (10YR 5/6), Slightly Moist, Stiff, Limestone Gravel up to 1" in size 2.0-3.0' - Silt (ML), Yellowish Brown (10YR 5/4), Dry, Stiff, High number of organic roots present 3.0-4.5' - Fat Clay (CH), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff, High number of organic roots present		
5	5.0	5.0	Macro Run 2	4.3 5.1 7.2 8.4 10.4	4.5-5.0' - No Recovery at Surface 5.0-7.5' - Fat Clay (CH), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff 7.5-8.0' - Lean Clay (CL), Light Yellowish Brown (10YR 6/4), Moist, Soft 8.0-10.0' - Lean Clay (CL), Light Yellowish Brown (10YR 6/4), Slightly Moist, Stiff		
10	10.0	5.0	Macro Run 3	13.6 7.1 16.9 14.4 7.1	10.0-15.0' - Lean Clay (CL), Light Yellowish Brown (10YR 6/4), Slightly Moist, Stiff, Coal present within Lean Clay from 14.0-15.0'		
15	15.0	5.0	Macro Run 4	18.5 86.6 60.4 30.6 64.8	15.0-15.5' - Lean Clay (CL), Light Yellowish Brown (10YR 6/4), Slightly Moist, Stiff 15.5-17.5' - Lean Clay (CL), Pale Brown (10YR 6/3), Moist, Soft, Some Color Mottling 17.5-18.0' - Lean Clay (CL), Yellowish Brown (10YR 5/6), Slightly Moist, Stiff 18.0-20.0' - Lean Clay with Sand (CL), Yellowish Brown (10YR 5/6), Moist, Firm, About 10-15% Fine Grain Sand		
20	20.0	4.0	Macro Run 5	11.3 4.5 21.1 39.5 NA	20.0-20.5' - Sandy Clay (CL), Yellowish Brown (10YR 5/6), Saturated, Soft, High percentage Fine Grain Sand 20.5-21.0' - Lean Clay with Sand (CL), Yellowish Brown (10YR 5/6), Moist, Firm, About 10-15% Fine Grain Sand 21.0-21.5' - Sandy Clay (CL), Yellowish Brown (10YR 5/6), Saturated, Soft, High percentage Fine Grain Sand 21.5-24.0' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff		
25	25.0		Macro Run 6	20.9 47.3 11.4 84.3 22.4	24.0-25.0' - No Recovery at Surface 25.0-26.0' - Lean Clay (CL), Brown (7.5YR 5/4), Moist, Firm, <10% Fine Grain Sand 26.0-27.5' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Moist, Stiff, 1/2" Clayey Gravel and Well-Graded Sand at 27.5'		Sample collected @ 12:25 Sample ID: 33-SB148-28
	29.5						

PROJECT NUMBER	BORING NUMBER:
423535	SB-148 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 427 ft amsl (approximate)
DRILLING CONTRACTOR : Terra Drill, Driller: Joe Brown

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/5/11 11:15
END : 10/5/11 12:15
LOGGER : Carrie Wallestad

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
30					27.5-29.5' - Clay with Sand (CL), Brown (10YR 5/3), Slightly Moist, Stiff, <10% Fine Grain Sand, Trace Gravel up to 1/2" in size		Driller Note: Hit Refusal at 29.5' bgs
35							
40							
45							
50							
55							

PROJECT NUMBER	BORING NUMBER:
423535	SB-149 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 427 ft amsl (approximate)
DRILLING CONTRACTOR : Terra Drill, Driller: Joe Brown

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Samplers
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/5/11 08:31
END : 10/5/11 09:21
LOGGER : Carrie Wallestad

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0 0.3	0.0	Macro Run 0		0.0-0.3' - Concrete		
		2.5	Macro Run 1	0.0 0.0 0.0 NA NA	0.3-1.3' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Moist, Firm, Color Mottling 1.3-2.3' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Moist, Soft, Color Mottling 2.3-2.5' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff, Color Mottling 2.5-5.0' - No Recover at Surface		
5	5.0						
		5.0	Macro Run 2	0.0 0.0 0.0 0.0 0.0	5.0-10.0' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff, Color Mottling		
10	10.0						
		3.5	Macro Run 3	0.0 0.0 0.0 0.0 NA	10.0-13.5' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff, Color Mottling 13.5-15.0' - No Recovery at Surface		
15	15.0						
		4.0	Macro Run 4	0.0 0.0 0.2 24.0 NA	15.0-17.0' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Slightly Moist, Stiff, Color Mottling 17.0-19.0' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Moist, Firm, About 5-10% Fine-Grain Sand 19.0-20.0' - No Recovery at Surface		
20	20.0						
		5.0	Macro Run 5	62.9 68.6 37.2 48.2 10.8	20.0-21.0' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Moist, Firm, About 5-10% Fine-Grain Sand 21.0-22.0' - Sandy Lean Clay (CL), Yellowish Brown (10YR 5/4), Moist, Firm, About 25% Well-Graded Sand, <10% Gravel up to 1" in size 22.0-25.0' - Sandy Lean Clay (CL), Dark Yellowish Brown (10YR 4/4), Slightly Moist, Stiff, Color Mottling, About 5% Rounded to Angular Gravel Clast within Sandy Clay		
25	25.0						
	27.0	2.0	Macro Run 6	124.3 397.5	25.0-27.0' - Sandy Lean Clay (CL), Dark Yellowish Brown (10YR 4/4), Slightly Moist, Stiff, Color Mottling, About 5% Rounded to Angular Gravel Clast within Sandy Clay, 2" Sandstone Cobble		Driller Note: Blocked shoe resulting in sample core loss
30	33.5	5.0	Macro Run 7	569.4 242.3 142.9 31.2 0.9	27.0-29.0' - Lean Clay (CL), Dark Yellowish Brown (10YR 4/4), Slightly Moist, Stiff, Trace Fine-Grain Sand 29.0-30.0' - Silty Sand (SM), Dark Yellowish Brown (10YR 4/4), Saturated, Loose, Fine-Grain Poorly-Graded Sand 30.0-33.5' - Lean Clay (CL), Dark Gray (10YR 4/1), Slightly Moist, Stiff, About 5% Angular Sand and Gravel		Sample collected @ 10:00 Sample ID: 33-SB149-27 Sample collected @ 10:06 Sample ID: 33-SB149-29

PROJECT NUMBER	BORING NUMBER:
423535	SB-149 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 427 ft amsl (approximate)
DRILLING CONTRACTOR : Terra Drill, Driller: Joe Brown

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Samplers
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/5/11 08:31
END : 10/5/11 09:21
LOGGER : Carrie Wallestad

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
35					33.5' - Sandstone, Gray, Fine Grain Cemented Sands (High Mica Content)		Driller Note: Hit Refusal at 33.5' bgs
40							
45							
50							
55							
60							
65							

PROJECT NUMBER	BORING NUMBER:
423535	SB-150 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 427.07 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Joe Brown

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Samplers
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/3/11 12:48
END : 10/3/11 14:58
LOGGER : Carrie Wallestad

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0	3.5	Macro Run 1	0.0 0.0 0.0 NA NA	0.0-1.5' - Lean Clay (CL), Brown (7.5YR 5/3), Moist, Dry 1.5-3.0' - Limestone Gravel and Sand (fill), Moist near bottome and Dry above 3.0-3.5' - Lean Clay (CL), Brown (7.5YR 5/3), Moist, Firm, Color Mottling 3.5-5.0' - No Recovery at Surface		
5	5.0	4.0	Macro Run 2	0.0 0.0 0.0 0.0 NA	5.0-9.0' - Lean Clay (CL), Brown (7.5YR 5/3), Moist, Firm, Color Mottling 9.0-10.0' - No Recovery at Surface		
10	10.0	5.0	Macro Run 3	0.0 0.0 0.0 0.0 0.0	10.0-11.5' - Lean Clay (CL), Brown (7.5YR 5/3), Moist, Firm, Color Mottling 11.5-13.0' - Lean Clay (CL), Light Brown (7.5YR 6/3), Moist, Stiff, Rounded Sandstone clast about 1" in size 13.0-15.0' - Lean Clay (CL), Brown (7.5YR 4/4), Moist, Stiff		
15	15.0	5.0	Macro Run 4	0.0 0.0 0.0 0.0 0.0	15.0-17.0' - Lean Clay (CL), Brown (7.5R 4/4), Moist, Stiff 17.0-17.5' - Sandy Clay (CL), Yellowish Brown (10YR 5/6), Saturated, Soft, <20% Very Fine Grain Sand 17.5-18.0' - Lean Clay (CL), Brown (7.5YR 4/4), Moist, Stiff		Driller Note: Water @ 15.0'
20	20.0	5.0	Macro Run 5	0.0 0.0 1.7 5.7 2.2	18.0-19.0' - Clayey Sand (SC), Yellowish Brown (10YR 5/6), Saturated, Loose, Sandstone Clast partly rounded up to 1/4" 19.0-20.0' - Sandy Lean Clay (CL), Light Brownish Gray (10YR 6/2), Moist, Firm, Well Sorted Sand 20.0-23.0' - Well-Graded Sand with Silt (SW-SM), Brown (7.5YR5/6), Saturated, Loose, Fine to Coarse Grain Sands		
25	25.0	5.0	Macro Run 6	7.5 1.4 2.4 0.6 0.7	23.0-23.5' - Lean Clay (CL), Yellowish Brown (10YR 5/4), Moist 23.5-25.0' - Poorly-Graded Sand (SP), Brown (7.5YR 5/4), Moist to Saturated, Loose, <10% rounded gravel up to 1/2" in size 25.0-26.0' - Well-Graded Sand (SW), Yellowish Brown (10YR 5/6), Saturated, Loose, Fine to Medium Grain Sand, <5% Sandstone Clast up to 1" in size		Sample collected @ 14:35 Sample ID: 33-SB150-27
30	30.0	4.0	Macro Run 7	1.5 0.0 0.0 0.0 NA	26.0-28.5' - Well-Graded Sand (SW), Yellowish Brown (10YR 5/6), Saturated, Loose, Medium to Coarse Grain Sand, <10% Gravel up to 1/4" in size 28.5-31.0' - Silty Sand (SM), Yellowish Brown (10YR 5/6), Saturated, Firm, Fine Grain Sand, Poorly-Graded 31.0-34.0' - Fat Clay (CH), Dark Gray (10YR 4/1), Moist, Firm, Trace Gravel up to 1/4" in size		
35	35.0	3.0	Macro Run 8	0.0 0.0 0.0 NA	34.0-35.0' - No Recovery at Surface 35.0-37.0' - Lean Clay (CL), Dark Gray (10YR 4/1), Moist, Firm, Trace Gravel up to 1/4" in size		
	38.0						

PROJECT NUMBER	BORING NUMBER:
423535	SB-150 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation
LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 427.07 ft amsl
DRILLING CONTRACTOR : Terra Drill, Driller: Joe Brown

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Samplers
ORIENTATION: Vertical

WATER LEVELS : Not Applicable
START : 10/3/11 12:48
END : 10/3/11 14:58
LOGGER : Carrie Wallestad

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	PID TEST RESULTS (ppm)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
					37.0-38.0' - Fat Clay (CH), Dark Gray (10YR 4/1), Moist, Firm, Trace Gravel up to 1/4" in size		Sample collected @ 15:41 Sample ID: 33-SB150-38
40					38.0' - Sandstone, Gray (10YR 6/1), Fine Grain, Cemented Sands (High Mica Content)		Driller Note: Hit Refusal at 38.0' bgs
45							
50							
55							
60							
65							
70							
75							

PROJECT NUMBER:	BORING NUMBER:
423535	SB-151 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 427.02 ft amsl DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler

WATER LEVELS : Not Applicable START : 10/3/11 12:48 END : 10/3/11 15:30 LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE ()	INTERVAL ()	RECOVERY (in)	#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0.0	4	Macro Run 1		**Silty Lean Clay (CL)** 0.0-2.4" - light brown, (10YR 4/3), dry, 0.0-2.4' - Lean Clay (CL), Brown (10YR 4/3), Dry, Weak, Non Plastic		0.0 0.1 0.0 0.0
	4.0				**Limestone (fill) Within Silty Lean Clay (CL)** 2.4-3.2" - light gray and light brown, (10YR 4/3 and 10/YR51), 2.4-3.2' - Limestone (fill) within Lean Clay (CL), Light Gray to Brown (10YR 7/1 to 10YR 4/3)		0.0 0.0
5		5	Macro Run 2		**Silty Lean Clay (CL)** 3.2-4.0" - light brown, (10YR 4/3), some, dry, stiff, 3.2-4.0' - Lean Clay (CL), Light Brown (10YR 4/3), Dry, Stiff, Some Color Mottling		0.0 0.0 0.0
	9.0				**Silt (ML)** 4.0-5.7" - light brown and light gray, (10YR 4/3 and 10/YR51), dry, 4.0-5.7' - Silt (ML), Brown and Light Gray (10YR 4/3 and 10YR 7/1), Non Plastic, Weak		0.0 0.0 0.0
10		5	Macro Run 3		**Silty Lean Clay (CL)** 5.7-9.0" - yellowish brown, (10YR 5/8), slightly moist to dry, firm, 5.7-9.0' - Lean Clay (CL), Yellowish Brown (10YR 5/8), Slightly Dry to Moist, Firm		0.0 0.0
	14.0				**Silty Lean Clay (CL)** 9.0-13.0" - light brown to light gray, (10YR 4/3 and 10/YR51), firm, 9.0-13.0' - Lean Clay (CL), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Firm, High Silt Content, Black staining @ 13.0'		0.0 0.0 0.0
15		5	Macro Run 4		13.0-14.0" - 13.1-14.0' - Material fell downhole during recovery		0.0 0.0
	19.0				**Silty Lean Clay (CL)** 14.0-19.0" - light yellowish brown, (10YR 5/8), slightly moist, firm, 14.0-19.0' - Lean Clay (CL), Yellowish Brown (10YR 5/8), Slightly Moist, Firm, Silt Content increases with depth		0.1 0.0 0.0 0.0
20		5	Macro Run 5		**Silty Lean Clay (CL)** 19.0-24.0" - light yellowish brown, (10YR 5/8), 19.0-24.0' - Lean Clay (CL), Yellowish Brown (10YR 5/8), Firm from 19.0-20.0' and Stiff from 20.0-24.0', Trace 1/2" gravel clast spread throughout run, Fine Grain Sand within Lean Clay at 22.3-22.35'		0.0 0.0 0.0 0.0 0.0 Collect sample @ 14:10 Sample ID: 33-SB151-27
	24.0				**Silty Lean Clay (CL)** 24.0-27.0" - light yellowish brown and light gray, (10YR 5/8 and 10YR 7/1), dry, stiff to hard, 24.0-27.0' - Lean Clay (CL), Yellowish Brown and Light Gray (10YR 5/8 and 10YR 7/1), Dry, Stiff to Hard		0.1 1.5 3.0 0.0
25		5	Macro Run 6		**Silty Sand (SM)** 27.0-29.0" - reddish yellow, dry, fine to medium grained, 27.0-29.0' - Silty Sand (SM), Reddish Yellow (7.5R 6/8), Dry, Stiff, Fine to Medium Grain Sand		0.1 Collect sample @ 14:15 Sample ID: 33-SB151-32, 33-SB151-32MS, and 33-SB151-32MSD
	29.0				**Silty Lean Clay (CL)** 29.0-34.0" - light yellowish brown, (10YR 5/8), dry, stiff to hard, 29.0-34.0' - Lean Clay (CL), Yellowish Brown (10YR 5/8), Dry, Stiff to Hard, Trace Fine to Medium Grain Sand, Trace 1/2" gravel clast spread throughout run		6.3 0.5 2.8 18.0 34.1
30		5	Macro Run 7		**Silty Lean Clay (CL)** 34.0-37.5" - light yellowish brown, (10YR 5/8), moist to wet, firm to stiff, 34.0-37.5' - Lean Clay (CL), Yellowish Brown (10YR 5/8), Moist to Wet, Firm to Stiff, Trace gravel clasts spread throughout run		Collect sample @ 15:40 Sample ID: 33-SB151-38 3.8 0.0
	34.0						
35		5	Macro Run 8				
	39.0						
40		2.5	Macro Run 9				
	44.0 44.3						

PROJECT NUMBER:	BORING NUMBER:
423535	SB-151 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Plume 2 Supplemental Site Characterization Investigation LOCATION : Crab Orchard National Wildlife Refuge - Marion, Williamson County, IL

ELEVATION : 427.02 ft amsl DRILLING CONTRACTOR : Terra Drill, Driller: Matt Cooper

DRILLING EQUIPMENT AND METHOD : Hollow Stem Auger "ATV" Drill Rig, 3 1/4" Augers and 5' Macro Sampler

WATER LEVELS : Not Applicable START : 10/3/11 12:48 END : 10/3/11 15:30 LOGGER : Jayson Burkard

DEPTH BELOW EXISTING GRADE ()	INTERVAL ()	RECOVERY (in)	#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
45		0.3	Macro Run 10		**Silty Sand (SM)** 37.5-38.0" - light brown, (10YR 4/3), slightly moist, firm to stiff, 37.5-38.0' - Silty Sand (SM), Brown (10YR 4/3), Slightly Moist, Firm to Stiff		Driller Note: Hit Refusal at 44.3' bgs 0.0
50					**Sand (SP)** 38.0-39.0" - light brown to light gray, (10YR 4/3 to 10YR 7/1), moist to wet, loose, fine to medium grained, 38.0-40.0' - Sand (SP), Brown to Light Gray (10YR 4/3 to 10YR 7/1), Moist to Wet, Loose, Wet to Saturated from 39.0-40.0'		
55					**Sand And Gravel (SW)** 40.0-40.5" - light yellowish brown to medium gray, (10YR 4/3 to 10YR 7/1), wet to saturated, medium to coarse grained, 40.0-40.5' - Sand and Gravel (SW), Yellowish Brown to Gray (10YR 5/8 to 10YR 5/1), Wet to Saturated, Medium to Coarse Grain Sand		
60					**Silty Sand (SM)** 40.5-41.5" - light to medium gray, (10YR 7/1 to 10YR 5/1), moist to wet, very fine grained, 40.5-41.5' - Silty Sand (SM), Light Gray to Gray (10YR 7/1 to 10YR 5/1), Moist to Wet, Very Fine Grain Sand		
					41.5-44.0' No Recovery at Surface' - 41.5-44.0' - No Recovery at Surface		
65					**Sandstone** 44.0-44.3" - light gray to medium gray, (10YR 7/1 to 10YR 5/1), moist, 44.0-44.3' - Weathered Sandstone, Light Gray (10YR 7/1), Moist, Fine to Medium Grain Weakly Cemented Sand		
					Bottom of Boring at 44.3 ft bgs on 10/3/11 15:30		
70							
75							
80							
85							

Appendix B
Groundwater Development and Sampling Forms

CH2MHILL	PROJECT NUMBER 423535.02.SI	WELL NUMBER 33-341	SHEET 1 OF 1
	WELL DEVELOPMENT FORM		

PROJECT: Crab Orchard Plume 2 Investigation

PERSONNEL: Jessica Hoffman / Glynn Roberts

EQUIPMENT: YSI 556X, water level indicator, 1.5" Bailer

START : 9/20/2011 13:55

END: 9/20/2011 16:04

START WATER LEVELS: 9.43 ft btoc

WELL DEPTH: 13.5 ft btoc

WELL VOLUME: 0.65 gal

MAXIMUM DRAWDOWN DURING DEVELOPMENT: 13.5 ft

TOTAL QUANTITY OF WATER DISCHARGED: 6.5 gal

Field crew will attempt to remove at least three well volumes during development (Calculate well volume before starting development!)

Development will be continued until pH, temperature, and specific conductance, and turbidity stabilize within 10% over 3 readings or until 10 well volumes have been purged.

Date	Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	pH	Temperature (°C)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Remarks (color, odor, sheen, sediment, etc.)
Stabilization Criteria:				±10%	±10%	±10%	< 50 NTU	
09/20/11	14:00	1.5	13.50	7.23	20.33	0.333	> 1000	Brown, Silty
Well Dry, Allow Time for Recharge								
09/20/11	14:15	2.0	12.42	6.69	19.17	0.456	> 1000	Brown, Silty
Well Dry, Allow Time for Recharge								
09/20/11	14:30	2.4	11.58	6.56	19.39	0.477	> 1000	Brown, Silty
09/20/11	14:45	2.7	12.72	6.55	19.29	0.463	> 1000	Brown, Silty
Well Dry, Allow Time for Recharge								
09/20/11	15:50	4.2	9.70	6.75	18.37	0.490	> 1000	Brown, Silty
09/20/11	15:55	5.0	12.92	6.51	17.97	0.505	> 1000	Brown, Silty
09/20/11	15:58	5.5	12.80	6.61	19.96	0.457	> 1000	Brown, Silty
09/20/11	16:01	6.0	12.91	6.58	20.01	0.459	> 1000	Brown, Silty
09/20/11	16:04	6.5	12.96	6.56	19.92	0.465	> 1000	Brown, Silty
10 Well Volumes Removed, Well Development Complete								

Comments:

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	423535.02.SI	33-342	SHEET 1 OF 1
	WELL DEVELOPMENT FORM		

PROJECT: Crab Orchard Plume 2 Investigation

PERSONNEL: Jessica Hoffman / Glynn Roberts

EQUIPMENT: YSI 556X, water level indicator, 1.5" Bailer

START : 9/20/2011 15:10

END: 9/20/2011 15:40

START WATER LEVELS: 16.3 ft btoc

WELL DEPTH: 24.0 ft btoc

WELL VOLUME: 1.25 gal

MAXIMUM DRAWDOWN DURING DEVELOPMENT: 22.5 ft

TOTAL QUANTITY OF WATER DISCHARGED: 12.75 gal

Field crew will attempt to remove at least three well volumes during development (Calculate well volume before starting development!)
Development will be continued until pH, temperature, and specific conductance, and turbidity stabilize within 10% over 3 readings or until 10 well volumes have been purged.

Date	Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	pH	Temperature (°C)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Remarks (color, odor, sheen, sediment, etc.)
Stabilization Criteria:				±10%	±10%	±10%	< 50 NTU	
09/20/11	15:15	1.25	22.41	7.25	15.81	1.281	> 1000	Grey
09/20/11	15:18	2.75	22.50	7.18	15.06	1.476	> 1000	Lighter Grey
09/20/11	15:21	3.25	--	6.95	14.74	1.544	> 1000	Light Brown
09/20/11	15:24	5.00	--	7.25	14.67	1.632	> 1000	Light Brown, Silty
09/20/11	15:26	6.50	22.38	7.36	14.68	1.634	> 1000	Light Brown, Silty
09/20/11	15:29	8.00	22.50	7.29	14.81	1.643	> 1000	Light Brown, Silty
09/20/11	15:32	9.25	22.50	7.23	14.45	1.675	> 1000	Light Brown, Silty
09/20/11	15:35	10.50	22.50	7.15	14.30	1.680	> 1000	Light Brown, Silty
09/20/11	15:38	12.00	22.50	7.11	14.59	1.688	> 1000	Light Brown, Silty
09/20/11	15:40	12.75	22.50	7.16	14.42	1.681	926	Light Brown, Silty
10 Well Volumes Removed, Development Complete								

Comments:

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33-341

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	17.86 ft btoc
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	13.0 - 18.0 ft btoc
Start Date:	9/22/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	15.5 ft btoc
Start Time:	14:02		WLI, YSI w/flow through cell	Start Water Level:	6.06 ft btoc
End Time:	14:50	Sampling Team:	J. Hoffman / G. Roberts	Well Diameter:	2.0 in
Weather:	Cloudy ~ 65°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
14:00	7.86	0.610	19.34	-179.5	11.02	47.0	6.60	200	0.00	Clear
14:05	6.85	0.670	19.24	-64.0	3.94	51.0	7.60	150	0.125	Clear
14:10	6.71	6.585	19.18	-66.7	3.76	45.0	8.58	150	0.45	Clear
14:15	6.67	0.587	19.22	-61.9	3.52	31.0	9.32	150	0.60	Clear
14:20	6.61	0.548	19.16	-48.5	3.48	18.0	9.69	150	0.75	Clear
14:25	6.58	0.539	19.16	-40.4	3.46	18.0	10.15	150	1.00	Clear
14:30	6.55	0.522	19.20	-39.5	3.41	15.0	10.90	150	1.25	Clear
14:35	6.54	0.516	19.19	-36.0	3.39	10.0	11.42	150	1.50	Clear
14:40	6.53	0.510	19.19	-37.0	3.38	10.0	11.86	150	1.75	Clear
14:45	6.51	0.509	19.18	-37.8	3.30	10.0	11.95	150	2.00	Clear
14:50	6.50	0.508	19.18	-37.0	3.28	10.0	12.00	150	2.25	Clear

SAMPLE INFORMATION

Sample ID:	GW-33-341-092211	Laboratoy	TestAmerica - Chicago
Collection Date:	9/22/2011	Shipment Method:	FedEx
Collection Time:	15:00		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 1.2 mg/L CO_2 = 60 drops x 2.0 = 120.0 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33-342

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	23.8 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	19.0 - 24.0 ft bgs
Start Date:	9/22/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	21.3 ft bgs
Start Time:	15:25		WLI, YSI w/flow through cell	Start Water Level:	16.53 ft btoc
End Time:	16:25	Sampling Team:	G. Roberts	Well Diameter:	2.0 in
Weather:	Cloudy ~ 75°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
15:30	7.13	1.703	16.32	-12.2	11.19	197	16.94	100	0.00	Slightly Turbid
15:35	7.05	1.731	15.89	-33.0	5.25	78.0	16.93	100	0.125	Slightly Turbid
15:40	7.10	1.728	15.78	-31.4	4.58	45.0	16.94	100	0.50	Clear
15:45	7.14	1.719	15.66	-31.8	4.19	35.0	16.96	100	0.75	Clear
15:55	7.17	1.712	15.61	-32.9	3.69	24.0	16.96	100	1.00	Clear
16:05	7.20	1.713	15.63	-36.4	3.18	15.0	16.96	100	1.50	Clear
16:10	7.23	1.711	15.62	-37.2	3.14	12.0	16.96	100	1.75	Clear
16:15	7.25	1.710	15.63	-39.1	3.08	12.0	16.96	100	2.00	Clear
16:20	7.27	1.712	15.62	-39.5	3.05	11.0	16.96	100	2.25	Clear

SAMPLE INFORMATION

Sample ID:	GW-33-342	Laboratoy	TestAmerica - Chicago
Collection Date:	9/22/2011	Shipment Method:	FedEx
Collection Time:	16:25		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0.4 mg/L CO_2 = 24 drops x 2.0 = 48 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-01

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	21.8 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	7.0 - 22.0 ft bgs
Start Date:	9/21/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	21.0 ft bgs
Start Time:	8:10		WLI, YSI w/flow through cell	Start Water Level:	17.05 ft btoc
End Time:	9:56	Sampling Team:	G. Roberts	Well Diameter:	2.0 in
Weather:	Sunny ~ 70°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
8:20	6.74	0.635	16.64	214.9	10.20	> 1000	17.30	100	0.00	Tan, Turbid
8:25	6.73	0.631	16.35	118.3	7.88	> 1000	17.46	200	0.125	Tan, Turbid
8:30	6.71	0.625	16.28	92.8	7.49	> 1000	17.72	100	0.35	Tan, Turbid
8:35	6.69	0.620	16.22	83.7	6.95	> 1000	17.92	100	0.50	Tan, Turbid
8:50	6.65	0.613	16.21	74.1	6.51	999.0	18.33	100	0.75	Tan, Turbid
9:00	6.67	0.611	16.29	66.2	6.31	150.0	18.60	100	1.00	Slightly Turbiid
9:15	6.73	0.612	16.45	53.2	5.98	135.0	19.00	100	1.25	Slightly Turbiid
9:25	6.78	0.612	16.51	44.0	5.55	106.0	19.22	100	1.50	Slightly Turbiid
9:35	6.82	0.614	16.58	38.2	5.22	98.0	19.33	100	1.75	Slightly Turbiid
9:45	6.89	0.617	16.75	25.9	4.54	68.0	19.58	100	2.00	Clear
9:50	6.90	0.617	16.76	23.5	4.43	57.0	19.60	100	2.125	Clear
9:53	6.90	0.618	16.78	16.6	4.34	52.0	19.64	100	2.25	Clear
9:56	6.91	0.618	16.80	17.2	4.32	50.0	19.66	100	2.40	Clear

SAMPLE INFORMATION

Sample ID:	GW-33MWC-01-092111	Laboratoy	TestAmerica - Chicago
Collection Date:	9/21/2011	Shipment Method:	FedEx
Collection Time:	10:00		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0.1 mg/L CO_2 = 27 drops x 2.00 = 54 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-02

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	21.7 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	7.0 - 22.0 ft bgs
Start Date:	9/20/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	18.0 ft bgs
Start Time:	8:38		WLI, YSI w/flow through cell	Start Water Level:	13.21 ft btoc
End Time:	9:43	Sampling Team:	J. Hoffman	Well Diameter:	2.0 in
Weather:	Cloudy, Humid ~ 75°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
8:40	6.46	5.194	15.86	58.6	4.04	564	13.56	100	0.00	Brown
8:45	6.68	5.121	15.93	44.4	7.32	596	13.68	100	0.30	Brown
8:50	6.77	5.242	16.07	48.2	7.86	433	13.79	100	0.50	Brown
8:55	6.89	5.282	16.14	52.0	8.53	297	13.88	100	0.60	Light Brown
9:00	6.96	5.310	16.20	49.4	8.83	217	14.00	100	0.75	Light Brown
9:05	7.00	5.331	16.26	41.5	9.07	147	14.09	100	0.85	Cloudy
9:10	7.04	5.342	16.34	34.8	9.08	120	14.18	100	0.95	Cloudy
9:15	7.04	5.334	16.35	31.0	9.08	98.6	14.26	100	1.10	Cloudy
9:20	7.06	5.323	16.32	28.8	9.10	84.2	14.30	100	1.25	Cloudy
9:25	7.07	5.294	16.29	27.0	9.12	70.2	14.32	100	1.40	Cloudy
9:30	7.07	5.266	16.32	26.2	9.12	58.9	14.34	150	1.55	Cloudy
9:35	7.06	5.261	16.36	26.0	9.12	55.5	14.36	150	1.70	Cloudy
9:40	7.07	5.258	16.40	24.2	9.11	57.4	14.37	150	1.90	Clearing
9:43	7.08	5.255	16.43	24.7	9.12	54.7	14.37	150	2.00	Clearing

SAMPLE INFORMATION

Sample ID:	GW-33MWC-02-092011	Laboratoy	TestAmerica - Chicago
Collection Date:	9/20/2011	Shipment Method:	FedEx
Collection Time:	0920		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 1.2 mg/L CO_2 = 27 drops x 2.0 = 54 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-03

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	23.0 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	8.0 - 23.0 ft bgs
Start Date:	9/21/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	19.5 ft bgs
Start Time:	11:13		WLI, YSI w/flow through cell	Start Water Level:	17.34 ft btoc
End Time:	12:16	Sampling Team:	J. Hoffman	Well Diameter:	2.0 in
Weather:	Sunny ~ 80°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
11:20	6.89	1.257	18.36	204.9	7.90	423	17.40	200	0.10	Cloudy
11:25	6.78	1.225	17.40	208.4	7.38	434	17.44	150	0.35	Cloudy
11:30	6.72	1.203	16.30	192.3	4.70	454	17.45	150	0.55	Cloudy
11:35	6.88	1.207	16.19	196.0	6.03	399	17.45	150	0.75	Cloudy
11:40	6.88	1.222	16.68	193.9	5.25	314	17.43	150	0.95	Cloudy
11:45	6.88	1.233	16.93	187.2	3.39	249	17.40	150	1.10	Cloudy
11:50	6.89	1.237	16.89	171.7	2.17	166	17.40	150	1.30	Cloudy
11:55	6.89	1.241	16.99	174.8	1.88	120	17.40	150	1.50	Cloudy
12:00	6.90	1.243	16.91	165.6	1.57	88.3	17.40	150	1.70	Cloudy
12:05	6.93	1.243	16.88	166.8	1.39	62.4	17.40	150	1.90	Cloudy
12:10	6.94	1.244	16.83	160.0	1.35	54.1	17.40	150	2.10	Clear
12:13	6.94	1.242	16.80	158.9	1.33	49.5	17.40	150	2.20	Clear
12:16	6.95	1.241	16.78	157.6	1.35	47.5	17.40	150	2.35	Clear

SAMPLE INFORMATION

Sample ID:	GW-33MWC-03-092111, 33-FDUP-002	Laboratoy	TestAmerica - Chicago
Collection Date:	9/21/2011	Shipment Method:	FedEx
Collection Time:	12:20, 12:30 (FD)		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0 mg/L CO_2 = 31 drops x 2.0 = 62 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-10

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	26.0 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	11.0 - 26.0 ft bgs
Start Date:	9/19/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	17.5 ft bgs
Start Time:	14:56		WLI, YSI w/flow through cell	Start Water Level:	15.12 ft btoc
End Time:	15:36	Sampling Team:	J. Hoffman	Well Diameter:	2.0 in
Weather:	Cloudy ~ 75°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
15:00	7.02	0.657	19.77	149.8	7.96	81.4	15.34	200	0.00	Cloudy
15:05	7.04	0.668	19.57	166.2	8.49	67.9	15.42	200	0.25	Cloudy
15:10	7.00	0.663	19.51	176.6	8.01	61.4	15.48	200	0.50	Cloudy
15:15	7.01	0.655	19.44	181.4	8.18	44.4	15.58	200	0.75	Clear
15:20	7.02	0.653	19.42	188.8	8.34	32.6	15.63	200	1.00	Clear
15:25	7.04	0.655	19.45	179.7	8.32	32.4	15.68	200	1.25	Clear
15:30	7.05	0.656	19.40	179.3	8.41	29.2	15.76	200	1.50	Clear
15:33	7.06	0.657	19.37	177.8	8.40	28.2	15.77	200	1.65	Clear
15:36	7.07	0.658	19.35	177.1	8.43	26.4	15.78	200	1.80	Clear

SAMPLE INFORMATION

Sample ID:	GW-33MWC-10-091911	Laboratoy	TestAmerica - Chicago
Collection Date:	9/19/2011	Shipment Method:	FedEx
Collection Time:	15:40		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0 mg/L CO_2 = 41 drops x 2.0 = 82 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-11

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	21.0 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	6.0 - 21.0 ft bgs
Start Date:	9/21/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	18.0 ft bgs
Start Time:	7:58		WLI, YSI w/flow through cell	Start Water Level:	15.21 ft btoc
End Time:	8:54	Sampling Team:	J. Hoffman	Well Diameter:	2.0 in
Weather:	Sunny ~ 70°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
8:05	6.71	1.967	16.53	174.6	5.01	449	15.32	250	0.00	Cloudy
8:10	6.83	1.923	16.14	172.7	8.00	387	15.44	250	0.30	Cloudy
8:15	6.88	1.925	16.22	165.4	7.14	285	15.40	200	0.60	Cloudy
8:20	6.90	1.938	16.40	151.6	2.83	191	15.38	200	0.85	Cloudy
8:25	6.91	1.942	16.34	146.0	2.47	128	15.38	200	1.10	Cloudy
8:30	6.91	1.943	16.37	144.5	2.50	113	15.38	200	1.35	Cloudy
8:35	6.93	1.940	16.30	143.2	2.53	89.5	15.38	200	1.55	Cloudy
8:40	6.95	1.941	16.35	146.2	2.63	76.6	15.38	200	1.80	Cloudy
8:45	6.96	1.944	16.39	146.2	2.54	73.2	15.38	200	2.05	Cloudy
8:48	6.98	1.945	16.35	145.4	2.54	72.1	15.38	200	2.20	Cloudy
8:51	6.98	1.946	16.38	145.2	2.50	68.9	15.38	200	2.40	Cloudy
8:54	6.98	1.947	16.39	145.2	2.48	68.3	15.38	200	2.55	Cloudy

SAMPLE INFORMATION

Sample ID:	GW-33MWC-11-192111, 33-FDUP-001	Laboratoy	TestAmerica - Chicago
Collection Date:	9/21/2011	Shipment Method:	FedEx
Collection Time:	8:55, 9:10 (FD)		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0 mg/L CO_2 = 39 drops x 2.0 = 78 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-12

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	22.0 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	7.0 - 22.0 ft bgs
Start Date:	9/21/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	21.0 ft bgs
Start Time:	14:23		WLI, YSI w/flow through cell	Start Water Level:	18.93 ft btoc
End Time:	15:24	Sampling Team:	J. Hoffman	Well Diameter:	2.0 in
Weather:	Sunny ~ 80°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
14:30	6.64	0.432	18.29	134.7	9.30	575	19.33	200	0.00	Cloudy
14:35	5.99	0.409	16.83	155.9	9.85	519	19.50	100	0.25	Cloudy
14:40	5.96	0.409	16.76	162.4	9.64	423	19.60	100	0.40	Cloudy
14:45	6.03	0.410	16.62	158.6	8.40	399	19.67	100	0.55	Cloudy
14:50	6.04	0.411	16.42	167.9	10.17	372	19.75	100	0.75	Cloudy
14:55	6.09	0.412	16.44	163.7	10.09	363	19.85	100	0.85	Cloudy
15:00	6.16	4.170	16.80	159.0	8.12	347	19.92	100	1.00	Cloudy
15:05	6.01	0.412	15.99	158.8	7.99	330	20.00	100	1.15	Cloudy
15:10	5.90	0.410	15.61	161.2	6.51	265	20.07	100	1.30	Cloudy
15:15	5.88	0.407	16.09	170.4	7.87	233	20.17	100	1.40	Cloudy
15:18	5.94	0.405	16.12	168.0	8.02	241	20.20	100	1.50	Cloudy
15:21	5.98	0.403	16.17	169.2	8.30	242	20.26	100	1.60	Cloudy
15:24	6.03	0.406	16.20	166.7	8.24	246	20.35	100	1.70	Cloudy

SAMPLE INFORMATION

Sample ID:	GW-33MWC-12-092111	Laboratoy	TestAmerica - Chicago
Collection Date:	9/21/2011	Shipment Method:	FedEx
Collection Time:	15:30		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0 mg/L CO_2 = 16 drops x 2.0 = 32 ppm

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-13

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	22.45 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	7.0 - 22.0 ft bgs
Start Date:	9/19/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	15.5 ft bgs
Start Time:	10:45		WLI, YSI w/flow through cell	Start Water Level:	11.89 ft btoc
End Time:	11:46	Sampling Team:	J. Hoffman	Well Diameter:	2.0 in
Weather:	Partly Sunny, ~ 70°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
10:50	7.24	0.713	19.22	104.7	11.63	36.7	12.35	300	0.00	Clear
10:55	7.07	1.321	19.49	114.5	6.95	31.5	12.62	100	0.30	Clear
11:00	7.02	1.317	19.36	117.2	6.90	32.1	12.77	100	0.40	Clear
11:05	7.01	1.316	19.35	117.6	6.86	29.7	12.86	100	0.55	Clear
11:10	7.02	1.306	19.23	122.8	7.65	20.2	12.92	100	0.70	Clear
11:15	7.06	1.304	19.27	125.1	8.03	16.5	13.08	100	0.80	Clear
11:20	7.09	1.303	19.38	133.8	8.43	20.0	13.29	100	0.95	Clear
11:25	7.10	1.305	19.56	136.6	8.49	17.3	13.44	100	1.05	Clear
11:30	7.14	1.306	19.66	133.5	8.54	11.8	13.66	100	1.20	Clear
11:35	7.12	1.306	19.70	135.2	8.59	11.5	13.74	100	1.30	Clear
11:40	7.13	1.306	19.69	130.7	8.63	11.0	13.87	100	1.45	Clear
11:43	7.13	1.307	19.71	134.9	8.64	11.8	13.99	100	1.55	Clear
11:46	7.14	1.307	19.72	132.5	8.66	11.8	14.09	100	1.65	Clear

SAMPLE INFORMATION

Sample ID:	GW-33MWC-13-091911	Laboratoy	TestAmerica - Chicago
Collection Date:	9/19/2011	Shipment Method:	FedEx
Collection Time:	11:50		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0 mg/L CO_2 = 50 drops x 2.0 = 100mg/L ppm

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-14

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	27.09 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	12.0 - 27.0 ft bgs
Start Date:	9/19/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	19.6 ft bgs
Start Time:	14:50		WLI, YSI w/flow through cell	Start Water Level:	11.38 ft btoc
End Time:	15:55	Sampling Team:	G. Roberts	Well Diameter:	2.0 in
Weather:	Cloudy ~ 75°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
14:55	6.35	0.479	19.92	83.9	0.02	61.0	11.45	150	0.00	Clear
15:00	6.19	0.509	18.82	73.3	-0.09	62.0	11.78	150	0.125	Clear
15:10	6.36	0.524	18.29	64.9	-0.08	53.0	12.07	150	0.75	Clear
15:20	6.55	0.537	17.78	54.7	-0.10	43.0	12.40	125	1.50	Clear
15:30	6.90	0.560	17.86	16.8	-0.18	31.0	12.26	125	2.00	Clear
15:35	7.11	0.562	17.74	-29.2	1.93	24.0	12.29	125	2.25	Clear
15:40	7.53	0.561	17.63	-57.0	-0.31	19.0	12.30	125	2.50	Clear
15:45	7.64	0.560	17.59	-68.7	4.23	15.0	12.30	125	2.75	Clear
15:50	7.64	0.558	17.56	-71.1	3.67	15.0	12.30	125	3.00	Clear
15:55	7.63	0.558	17.58	-69.1	3.61	15.0	12.30	125	3.25	Clear

SAMPLE INFORMATION

Sample ID:	GW-33MWC-14-091911	Laboratoy	TestAmerica - Chicago
Collection Date:	9/19/2011	Shipment Method:	FedEx
Collection Time:	16:00		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0.2 mg/L CO_2 = 38 drops x 1.25 = 47.5 ppm

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-24

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	31.0 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	26.0 - 31.0 ft bgs
Start Date:	9/19/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	28.5 ft bgs
Start Time:	10:55		WLI, YSI w/flow through cell	Start Water Level:	11.70 ft btoc
End Time:	12:03	Sampling Team:	G. Roberts	Well Diameter:	2.0 in
Weather:	Partly Sunny, ~ 70°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
11:00	7.61	1.238	18.28	-24.8	4.26	694	11.78	200	0.00	Cloudy
11:10	7.56	1.204	17.76	-41.6	3.65	535	11.99	200	0.25	Cloudy
11:20	7.70	1.201	17.77	-74.4	3.67	296	11.98	150	0.75	Slightly Cloudy
11:30	7.99	1.202	17.84	-112.0	3.66	129	12.00	175	1.25	Slightly Cloudy
11:40	7.95	1.193	18.07	-125.4	3.51	49.0	12.06	150	1.75	Clear
11:45	7.97	1.194	18.18	-130.4	3.49	23.0	12.04	150	2.00	Clear
11:50	8.03	1.201	18.26	-136.4	3.44	22.0	12.00	150	2.40	Clear
11:53	8.13	1.200	18.26	-142.1	3.45	21.0	12.01	150	2.65	Clear
11:56	8.18	1.201	18.27	-145.8	3.42	20.0	12.01	150	3.25	Clear
12:00	8.23	1.198	18.25	-148.5	3.40	20.0	12.00	150	3.75	Clear
12:03	8.21	1.197	18.22	-147.9	3.43	17.0	12.01	150	4.00	Clear

SAMPLE INFORMATION

Sample ID:	GW-33MWC-24-091911	Laboratoy	TestAmerica - Chicago
Collection Date:	9/19/2011	Shipment Method:	FedEx
Collection Time:	12:05		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0 mg/L CO_2 = 62 drops x 2.0 = 124 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-33

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	42.7 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	32.0 - 42.0 ft bgs
Start Date:	9/21/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	37.7 ft bgs
Start Time:	14:00		WLI, YSI w/flow through cell	Start Water Level:	18.28 ft btoc
End Time:	15:30	Sampling Team:	G. Roberts	Well Diameter:	2.0 in
Weather:	Sunny ~ 80°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
14:00	7.47	1.124	18.63	-12.9	12.30	88.0	18.99	200	0.00	Slightly Turbid
14:05	7.52	2.070	15.95	-38.1	6.91	83.0	19.49	150	0.125	Slightly Turbid
14:10	7.41	2.057	15.81	-31.0	5.42	87.0	20.05	150	0.45	Slightly Turbid
14:20	7.37	2.059	15.98	-27.5	4.82	82.0	20.26	100	0.60	Slightly Turbid
14:30	7.56	2.103	16.75	-40.0	3.83	80.0	20.57	100	0.75	Slightly Turbid
14:40	7.86	2.101	16.70	-58.6	3.74	89.0	20.74	100	1.00	Slightly Turbid
14:55	7.98	2.101	16.78	-63.0	3.63	64.0	20.89	100	1.50	Clear
15:05	7.73	2.085	16.54	-57.0	3.53	48.0	21.00	100	1.75	Clear
15:10	7.71	2.078	16.35	-57.8	3.50	40.0	21.08	100	2.00	Clear
15:15	7.69	2.078	16.33	-58.1	3.47	33.0	21.10	100	2.35	Clear
15:20	7.68	2.072	16.21	-59.9	3.38	28.0	21.14	100	2.50	Clear
15:25	7.66	2.073	16.18	-60.2	3.26	24.0	21.18	100	2.60	Clear
15:30	7.67	2.072	16.17	-60.4	3.24	24.0	21.20	100	2.75	Clear

SAMPLE INFORMATION

Sample ID:	GW-33MWC-33-092111	Laboratoy	TestAmerica - Chicago
Collection Date:	9/21/2011	Shipment Method:	FedEx
Collection Time:	15:35		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0 mg/L CO_2 = 33 drops x 2.0 = 66 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-35

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	81.4 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	75.0 - 80.0 ft bgs
Start Date:	9/22/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	79.6 ft bgs
Start Time:	8:00		WLI, YSI w/flow through cell	Start Water Level:	20.56 ft btoc
End Time:	10:10	Sampling Team:	G. Roberts	Well Diameter:	2.0 in
Weather:	Cloudy ~ 70°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
8:05	11.55	2.167	14.98	126.4	9.33	95.0	21.66	225	0.00	Clear
8:15	11.47	2.352	14.36	42.5	8.07	66.0	22.64	150	0.125	Clear
8:25	11.60	2.590	14.20	-93.2	6.12	27.0	25.60	125	0.75	Clear
8:30	11.65	2.600	14.28	-100.7	6.01	25.0	26.24	125	1.00	Clear
8:40	11.75	2.617	14.40	-128.7	5.80	21.0	27.54	100	1.50	Clear
8:50	11.78	2.605	14.40	-134.0	5.82	17.0	29.02	100	1.78	Clear
9:00	11.78	2.568	14.35	-141.4	5.34	9.0	30.75	150	2.50	Clear
9:15	11.79	2.528	14.29	-148.5	4.99	5.0	32.07	150	2.65	Clear
9:30	11.79	2.475	14.24	-155.9	4.25	5.0	34.18	150	3.50	Clear
9:35	11.79	2.467	14.35	-159.4	4.00	5.0	34.64	125	3.60	Clear
9:40	11.80	2.462	14.41	-161.6	3.89	5.0	34.67	100	3.75	Clear
9:50	11.83	2.415	14.62	-164.6	3.36	5.0	35.35	100	4.00	Clear
10:00	11.82	2.358	14.58	-170.0	2.98	5.0	35.93	100	4.25	Clear
10:05	11.82	2.349	14.61	-169.9	2.93	6.0	36.05	100	4.50	Clear
10:10	11.82	2.347	14.59	-168.7	2.91	5.0	36.10	100	4.75	Clear

SAMPLE INFORMATION

Sample ID:	GW-33MWC-35-092211 MS/MSD	Laboratoy	TestAmerica - Chicago
Collection Date:	9/22/2011	Shipment Method:	FedEx
Collection Time:	10:15		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0 mg/L CO_2 = 41 drops x 2.0 = 82 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-36

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	33.4 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	28.0 - 33.0 ft bgs
Start Date:	9/20/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	30.9 ft bgs
Start Time:	8:25		WLI, YSI w/flow through cell	Start Water Level:	11.55 ft btoc
End Time:	9:55	Sampling Team:	G. Roberts	Well Diameter:	2.0 in
Weather:	Cloudy, Humid ~ 75°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
8:35	6.77	0.907	15.97	142.1	5.93	448	12.55	125	0.00	Cloudy
8:45	6.79	0.894	15.87	91.3	4.26	263	13.09	100	0.125	Cloudy
8:55	6.99	0.892	15.75	39.4	4.30	62.0	13.75	100	0.50	Clear
9:10	7.15	0.889	15.87	-3.6	4.23	32.0	14.15	100	1.25	Clear
9:25	7.12	0.882	15.66	-1.7	4.28	22.0	14.31	100	1.75	Clear
9:35	7.21	0.885	15.75	-30.0	4.33	17.0	14.39	100	2.25	Clear
9:40	7.20	0.885	15.78	-28.4	4.35	16.0	14.41	100	2.40	Clear
9:45	7.18	0.884	15.77	-35.9	4.33	15.0	14.41	100	2.60	Clear
9:50	7.22	0.886	15.78	-31.8	4.29	15.0	14.41	100	2.75	Clear
9:55	7.19	0.885	15.77	-32.5	4.30	15.0	14.41	100	2.85	Clear

SAMPLE INFORMATION

Sample ID:	GW-33MWC-36-092011	Laboratoy	TestAmerica - Chicago
Collection Date:	9/20/2011	Shipment Method:	FedEx
Collection Time:	10:00		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0 mg/L CO_2 = 47 drops x 2.0 = 94 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-44

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	23.0 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	8.0 - 23.0 ft bgs
Start Date:	9/22/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	15.5 ft bgs
Start Time:	10:09		WLI, YSI w/flow through cell	Start Water Level:	12.32 ft btoc
End Time:	11:09	Sampling Team:	J. Hoffman	Well Diameter:	2.0 in
Weather:	Cloudy ~ 70°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
10:13	6.77	1.737	16.68	38.8	2.27	7.07	12.47	100	0.00	Clear
10:18	6.70	1.781	16.57	45.6	1.07	4.85	12.64	100	0.15	Clear
10:23	6.69	1.793	16.57	47.6	0.86	3.75	12.80	100	0.30	Clear
10:28	6.68	1.799	16.97	52.0	0.82	2.46	12.90	100	0.50	Clear
10:33	6.69	1.820	17.72	49.0	0.69	2.41	13.07	100	0.65	Clear
10:38	6.67	1.776	17.06	45.6	0.64	1.98	13.20	100	0.80	Clear
10:43	6.65	1.743	16.62	51.6	0.70	3.13	13.33	100	1.00	Clear
10:48	6.63	1.725	16.46	56.9	0.77	2.27	13.43	100	1.15	Clear
10:53	6.62	1.697	16.52	57.7	0.82	2.15	13.53	100	1.30	Clear
10:58	6.61	1.693	16.49	58.6	0.86	2.04	13.63	100	1.45	Clear
11:03	6.60	1.688	16.44	63.6	0.92	2.47	13.70	100	1.60	Clear
11:06	6.60	1.685	16.41	63.5	0.99	1.81	13.73	100	1.70	Clear
11:09	6.60	1.682	16.41	63.7	1.01	2.08	13.76	100	1.80	Clear

SAMPLE INFORMATION

Sample ID:	GW-33MWC-44-092211	Laboratoy	TestAmerica - Chicago
Collection Date:	9/22/2011	Shipment Method:	FedEx
Collection Time:	11:10		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 0 mg/L CO_2 = 52 drops x 2.0 = 104 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

WELL ID: 33MWC-45

Project Name:	Crab Orchard Plume 2	Purge Method:	Low Flow	Well Depth:	40.5 ft bgs
Project Number:	423535.02.SI	Tubing Materials:	Polyethylene	Screened Interval:	35.0 - 40.0 ft bgs
Start Date:	9/22/2011	Equipment:	Bladder Pump, Turbidimeter,	Pump/Tubing Intake:	37.5 ft bgs
Start Time:	8:10		WLI, YSI w/flow through cell	Start Water Level:	11.31 ft btoc
End Time:	8:59	Sampling Team:	J. Hoffman	Well Diameter:	2.0 in
Weather:	Cloudy ~ 70°F				

WELL STABILIZATION DATA

Time	pH	COND. (mS/cm)	Temp. (°C)	ORP (mV)	D.O. (mg/L)	Turbidity (NTU)	Water level (ft btoc)	Pumping rate (mL/min)	Volume Removed	Notes
Requirements	+ / - 0.1	+ / - 3%	+ / - 3%	+ / - 10 mV	<0.5 or +/-10%	<5 or +/ - 10%	< 0.3 ft	<500 mL/min	(Gal)	
8:15	6.62	1.346	14.70	226.0	0.99	22.3	11.64	200	0.00	Clear
8:20	6.98	1.426	14.45	92.3	0.54	13.4	11.68	225	0.30	Clear
8:25	7.13	1.486	14.34	-10.6	0.42	9.46	11.72	225	0.60	Clear
8:30	7.20	1.500	14.30	-37.9	0.38	10.2	11.75	225	0.90	Clear
8:35	7.23	1.520	14.27	-44.9	0.36	5.41	11.78	225	1.20	Clear
8:40	7.24	1.531	14.32	-35.4	0.31	9.07	11.80	225	1.50	Clear
8:45	7.26	1.543	14.32	-42.4	0.32	5.10	11.80	225	1.75	Clear
8:50	7.27	1.541	14.25	-35.6	0.32	4.54	11.80	225	2.00	Clear
8:53	7.27	1.541	14.23	-27.0	0.36	4.35	11.80	225	2.20	Clear
8:56	7.27	1.539	14.22	-31.7	0.35	3.32	11.80	225	2.35	Clear
8:59	7.27	1.538	14.22	-30.9	0.34	3.54	11.80	225	2.55	Clear

SAMPLE INFORMATION

Sample ID:	GW-33MWC-45-092211	Laboratoy	TestAmerica - Chicago
Collection Date:	9/22/2011	Shipment Method:	FedEx
Collection Time:	9:00		

Laboratory Analyses: VOCs, Dissolved Gases, TOC, TIC, Selected Metals (Iron and Manganese), Alkalinity, Chloride, Sulfate, Nitrite+Nitrate, Nitrate

Field Analyses: Dissolved Iron (Iron II) = 1.4 mg/L CO_2 = 58 drops x 2.0 = 116 mg/L

Remarks None

[1] Sampling standards adapted from USEPA Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, 2002

Appendix C
Monitoring Well Survey Data

Shawnee Survey & Consulting, Inc.
Surveyors & Engineers

Mitchell R. Garrett, PLS
Billy J. Abernathy, PLS
John M. Wallace, PLS

GROUNDWATER MONITORING WELL SURVEY
GD-OTS - PLUME 2 AT PCB OU SITE 33
CRAB ORCHARD NATIONAL WILDLIFE REFUGE - MARION, ILLINOIS

Point No.	Northing	Easting	Elevation @ Top Casing	Elevation @ Top of Riser Pipe	Ground Elevation	Elevation of Brass Disk	Elevation @ Top of Concrete	Well #
7354	371398.59	787482.49	429.49	428.64	426.1	426.52	n/a	33-MWC-24
7357	371380.52	787485.68	429.49	428.88	426.3	426.88	n/a	33-MWC-13
7360	371603.88	787323.53	429.28	428.83	426.3	426.73	n/a	33-MWC-14
7367	371803.15	787357.21	424.56	424.14	424.4	n/a	424.56	33-341
7373	371168.62	787154.04	431.21	430.79	427.7	n/a	427.86	33-342
7376	372585.01	787367.30	425.71	425.46	423.0	423.40	n/a	33-MWC-10
7379	370879.17	786550.70	425.70	425.04	422.3	423.10	n/a	33-MWC-11
7382	371558.47	786495.72	429.03	428.46	426.3	n/a	426.56	33-MWC-03
7385	371711.94	786253.52	429.73	428.90	426.6	427.05	n/a	33-MWC-12
7388	371754.67	786216.08	429.26	428.55	425.8	426.38	n/a	33-MWC-33
7391	371741.46	786195.15	429.16	428.79	425.9	426.21	n/a	33-MWC-35
7394	370581.62	787786.54	431.39	431.04	428.4	n/a	428.70	33-MWC-01
7397	371682.89	785201.62	414.76	414.62	411.6	n/a	411.71	33-MWC-44
7400	371677.93	785203.02	414.03	413.87	411.5	n/a	411.43	33-MWC-45
7403	371967.04	787971.45	424.05	423.13	420.5	420.90	n/a	33-MWC-36
7406	372015.41	787849.98	424.39	424.08	421.7	n/a	422.05	33-MWC-02

COORDINATES ARE REFERENCED TO ILLINOIS S.P.C. EAST ZONE - NAD 1983
ELEVATIONS ARE REFERENCED TO NAVD 1988

Billy J. Abernathy, PLS 3536 Date:10/27/2011
SHAWNEE SURVEY & CONSULTING, INC.
PO BOX 125/104 S 4TH ST
VIENNA, IL 62995

BILLY J. ABERNATHY
035003536
PROFESSIONAL LAND SURVEYOR
STATE OF ILLINOIS
VIENNA, IL

Appendix D
Waste Profiles and Manifest

American Environmental Services, Inc.
724-933-4100
724-933-4110 FAX

NAME OF WASTE STREAM

Nonhazardous IDW Soil

MATERIAL PROFILE NO.

MGT

☒ New
☐ Amendment

A. GENERATOR INFORMATION

Generator Name Crab Orchard National Wildlife Refuge
Facility Address Route 148 South
Marion, IL 62959
Mailing address: Schlumberger Technology Corp.
225 Schlumberger Dr., Sugarland, TX 77478
City/County
State **Zip Code**
USEPA ID# IL8 143 609 487
STATE ID#

Technical Contact Virgilio Cocianni
Telephone 281-285-4747 **Ext.**
FAX
Billing Name Capitol Environmental Services
Billing Address 200 Biddle Ave.
Suite 205
City Newark **State** DE **Zip Code** 19702
Attention Terri Fort
Telephone 540-777-6547 **Ext.**

B. DOT

Shipping Name RCRA Nonhazardous, DOT
Nonregulated soil
Hazard Class N/A **UN/NA No.** N/A
Packing Group N/A **RQ** N/A

C. RCRA

RCRA Non Hazardous/Exempt ☒ Yes ☐ No
Process Generating soil collected during installation of monitoring wells to determine extent of VOA contamination
State Waste Codes none
EPA Waste Codes (Attach addl. sheet if necessary)
(VOAs from an unknown source)

D. ANNUAL REPORT CODES

SIC Code
Source Code
Form Code
Origin Code
System Type

E. OTHER COMPONENTS

	No	Yes	Total ppm
PCB's	☒	☐	
Cyanides	☒	☐	
Sulfides	☒	☐	
Pesticides	☒	☐	
Phenolics	☒	☐	
Dioxins	☒	☐	
Halogens	☐	☒	trace- see lab report %

F. PHYSICAL CHARACTERISTICS AT 70°F

1. Infectious or Biological Waste? ☐ Yes ☒ No
2. NRC Regulated Radioactive? ☐ Yes ☒ No
3. Reactivity ☒ None ☐ Water Reactive
   ☐ Pyrophoric ☐ Shock Sensitive
   ☐ Cyanides ☐ DOT Explosive
   ☐ Sulfides ☐ Other

☐ Gas (Cylinder) ☒ Solid 100 %
☐ Aerosol ☐ Sludges %
☐ Lab Pack ☐ Free Liquids %
☐ Dust %

Layers
☒ Single Layered ☐ Bi-Layered ☐ Multi-Layered

Viscosity
☐ Low ☒ Medium ☐ High

Odor
☐ None ☒ Mild ☐ Strong
Describe: typical for soil

Color/Appearance
brown solid soil

Weight
Density lbs./gal. (US, liq)
10-11 lbs./cu. foot
Dry Weight ☐ < 1.0% ☐ 5-20%
☐ 1-5% ☒ 20-100%

pH
☐ < 2 ☒ 4.1-10 ☐ >=12.5
☐ 2.1-4 ☐ 10.1-12.4 ☐ NA
Exact

American Environmental Services, Inc.
724-933-4100
724-933-4110 FAX

MATERIAL PROFILE NO.

MGT

Flash Point (liquid only)
- ☐ < 73°F (23°C)
- ☐ 73° - 140°F (23°C - 60°C)
- ☐ 142° - 200°F (61°C - 93°C)
- ☐ > 200°F (93°C)
- ☒ N/A

Boiling Point
- ☐ < 95°F (35°C)
- ☐ > 95°F (35°C)
- ☒ N/A

BTU/Lb. none

Dermal Toxicity LD_{50} (Mg/Kg)
- ☒ < = 40
- ☐ > 40, < = 200
- ☐ > 200, < = 1000
- ☐ > 1000

4. Material poisonous by inhalation? ☐ Yes ☒ No

Oral Toxicity LD_{50} (Mg/Kg)

	☒ < = 5	☐ > 5, < = 50
Solids:	☐ > 50, < = 200	☐ > 200
Liquids:	☐ > 50, < = 500	☐ > 500

G. METALS

☐ NONE ☐ TCLP (MG/L) ☐ TOTAL (PPM)

	Reg. Limit	Below	Above	Range
Arsenic	5 mg/L	☒	☐	
Barium	100 mg/L	☒	☐	
Cadmium	1 mg/L	☒	☐	
Chromium	5 mg/L	☒	☐	
Copper		☒	☐	
Lead	5 mg/L	☒	☐	
Mercury	0.2 mg/L	☒	☐	
Nickel	134 mg/L	☒	☐	
Selenium	1 mg/L	☒	☐	
Silver	5 mg/L	☒	☐	
Zinc		☒	☐	

Others: historic data supports no metals contamination suspected

5. Is this waste stored in vented drums? ☐ Yes ☒ No
6. Is this waste pumpable? ☐ Yes ☒ No
7. Is this waste polymerizable? ☐ Yes ☒ No
8. Is waste stream subject to the National Emission Standards for Benzene Waste Operations (40 CFR 61 Subpart FF)? ☐ Yes ☒ No
9. Is this waste regulated as an ozone depleting substance (40 CFR part 82)? ☐ Yes ☒ No
10. Does this waste contain scrap metal pieces greater than 2 inches in size? ☐ Yes ☒ No
11. Does this waste contain > 100 ppm VOC's? ☐ Yes ☒ No

H. PHYSICAL/CHEMICAL CONSTITUENTS

soil, gravel	90-100 %
PPE	0-10 %
	%
	%
	%
	%
	%
	%
	%

(Attach All MSDS, Sample Analysis and Additional Info.)

I. ANTICIPATED VOLUME

	Qty	Container		Qty	Container
☐		5 gl. pail	☐		Cubic Yard Box*
☐		15 gl. carboy	☐		Super Sack*
☐		30 gl. drum	☐		Rolloff/Dump Trailer*
☒	47	55 gl. drum	☐		Tanker*
☐		85 gl. drum	☐		Other

Per ☒ 1 Time ☐ Week ☐ Month ☐ Year ☐ Other

(*) Is this waste regulated as a Marine Pollutant (49 CFR 171.8)? ☐ Yes ☒ No

Comments:

Generator's Certification:

I hereby certify that the above and attached description is complete and accurate to the best of my knowledge and ability to determine that no deliberate or willful omissions of composition properties exist and that all known or suspected hazards have been disclosed. I certify that the materials tested are representative of all materials described by this profile.

Generator's Authorized Signature: Monica Martin on behalf of Schlumberger Technology Corporation

Digitally signed by Monica Martin on behalf of Schlumberger Technology Corporation
DN: cn=Monica Martin on behalf of Schlumberger Technology Corporation, o, ou, email=Monica.Martin@ch2m.com, c=US
Date: 2011.11.10 16:56:58 -06'00'

Date

WHITE: AES **YELLOW:** Sales Office Copy

American Environmental Services, Inc.
724-933-4100
724-933-4110 FAX

NAME OF WASTE STREAM

Nonhazardous IDW Water

MATERIAL PROFILE NO.

MGT

☒ New
☐ Amendment

A. GENERATOR INFORMATION

Generator Name Crab Orchard National Wildlife Refuge
Facility Address Route 148 South
Marion, IL 62959
Mailing address: Schlumberger Technology Corp.
City/County 225 Schlumberger Dr., Sugarland, TX 77478
State _____ **Zip Code** _____
USEPA ID# IL8 143 609 487
STATE ID# _____

Technical Contact Virgilio Cocianni
Telephone 281-285-4747 **Ext.** _____
FAX _____
Billing Name Capitol Environmental Services
Billing Address 200 Biddle Ave.
Suite 205
City Newark **State** DE **Zip Code** 19702
Attention Terri Fort
Telephone 540-777-6547 **Ext.** _____

B. DOT

Shipping Name RCRA Nonhazardous, DOT
Nonregulated Water
Hazard Class N/A **UN/NA No.** N/A
Packing Group N/A **RQ** N/A

C. RCRA

RCRA Non Hazardous/Exempt ☒ Yes ☐ No
Process Generating water collected during installation of monitoring wells to determine extent of VOA contamination
State Waste Codes none
EPA Waste Codes (Attach addl. sheet if necessary)
(VOAs from an unknown source)

D. ANNUAL REPORT CODES

SIC Code _____
Source Code _____
Form Code _____
Origin Code _____
System Type _____

E. OTHER COMPONENTS

	No	Yes	Total ppm
PCB's	☒	☐	
Cyanides	☒	☐	
Sulfides	☒	☐	
Pesticides	☒	☐	
Phenolics	☒	☐	
Dioxins	☒	☐	
Halogens	☐	☒	trace- see lab report %

F. PHYSICAL CHARACTERISTICS AT 70°F

1. Infectious or Biological Waste? ☐ Yes ☒ No
2. NRC Regulated Radioactive? ☐ Yes ☒ No
3. Reactivity ☒ None ☐ Water Reactive
   ☐ Pyrophoric ☐ Shock Sensitive
   ☐ Cyanides ☐ DOT Explosive
   ☐ Sulfides ☐ Other _____

☐ Gas (Cylinder) ☐ Solid _____ %
☐ Aerosol ☐ Sludges _____ %
☐ Lab Pack ☒ Free Liquids >98 %
☐ Dust _____ %

Layers
☒ Single Layered ☐ Bi-Layered ☐ Multi-Layered

Viscosity
☒ Low ☐ Medium ☐ High

Odor
☐ None ☒ Mild ☐ Strong
Describe: typical for water

Color/Appearance
colorless/water

Weight
Density 8.34 lbs./gal. (US, liq)
_____ lbs./cu. foot
Dry Weight ☐ < 1.0% ☐ 5-20%
☐ 1-5% ☒ 20-100%

pH ☐ >=12.5
☐ < 2 ☒ 4.1-10 ☐ NA
☐ 2.1-4 ☐ 10.1-12.4 Exact _____

American Environmental Services, Inc.
724-933-4100
724-933-4110 FAX

MATERIAL PROFILE NO.

MGT

Flash Point (liquid only)
- ☐ < 73°F (23°C)
- ☐ 73° - 140°F (23°C - 60°C)
- ☐ 142° - 200°F (61°C - 93°C)
- ☒ > 200°F (93°C)
- ☐ N/A

Boiling Point
- ☐ < 95°F (35°C)
- ☒ > 95°F (35°C)
- ☐ N/A

BTU/Lb. none

Dermal Toxicity LD_{50} (Mg/Kg)
- ☒ < = 40
- ☐ > 40, < = 200
- ☐ > 200, < = 1000
- ☐ > 1000

4. Material poisonous by inhalation? ☐ Yes ☒ No

Oral Toxicity LD_{50} (Mg/Kg)

	☒ < = 5	☐ > 5, < = 50
Solids:	☐ > 50, < = 200	☐ > 200
Liquids:	☐ > 50, < = 500	☐ > 500

G. METALS

☐ NONE ☐ TCLP (MG/L) ☐ TOTAL (PPM)

	Reg. Limit	Below	Above	Range
Arsenic	5 mg/L	☒	☐	
Barium	100 mg/L	☒	☐	
Cadmium	1 mg/L	☒	☐	
Chromium	5 mg/L	☒	☐	
Copper		☒	☐	
Lead	5 mg/L	☒	☐	
Mercury	0.2 mg/L	☒	☐	
Nickel	134 mg/L	☒	☐	
Selenium	1 mg/L	☒	☐	
Silver	5 mg/L	☒	☐	
Zinc		☒	☐	

Others: historic data supports no metals contamination suspected

5. Is this waste stored in vented drums? ☐ Yes ☒ No
6. Is this waste pumpable? ☒ Yes ☐ No
7. Is this waste polymerizable? ☐ Yes ☒ No
8. Is waste stream subject to the National Emission Standards for Benzene Waste Operations (40 CFR 61 Subpart FF)? ☐ Yes ☒ No
9. Is this waste regulated as an ozone depleting substance (40 CFR part 82)? ☐ Yes ☒ No
10. Does this waste contain scrap metal pieces greater than 2 inches in size? ☐ Yes ☒ No
11. Does this waste contain > 100 ppm VOC's? ☐ Yes ☒ No

H. PHYSICAL/CHEMICAL CONSTITUENTS

water	>98 %
soil	<2 %
	%
	%
	%
	%
	%
	%
	%

(Attach All MSDS, Sample Analysis and Additional Info.)

I. ANTICIPATED VOLUME

	Qty	Container		Qty	Container
☐		5 gl. pail	☐		Cubic Yard Box*
☐		15 gl. carboy	☐		Super Sack*
☐		30 gl. drum	☐		Rolloff/Dump Trailer*
☒	33	55 gl. drum	☐		Tanker*
☐		85 gl. drum	☐		Other

Per ☒ 1 Time ☐ Week ☐ Month ☐ Year ☐ Other

(*) Is this waste regulated as a Marine Pollutant (49 CFR 171.8)? ☐ Yes ☒ No

Comments:

Generator's Certification:

I hereby certify that the above and attached description is complete and accurate to the best of my knowledge and ability to determine that no deliberate or willful omissions of composition properties exist and that all known or suspected hazards have been disclosed. I certify that the materials tested are representative of all materials described by this profile.

Generator's Authorized Signature: Monica Martin on behalf of Schlumberger Technology Corporation

Digitally signed by Monica Martin on behalf of Schlumberger Technology Corporation
DN: cn=Monica Martin on behalf of Schlumberger Technology Corporation, o, ou, email=Monica.Martin@ch2m.com, c=US
Date: 2011.11.10 16:51:58 -06'00'

Date

WHITE: AES **YELLOW:** Sales Office Copy

#85683

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: IL8 143 609 487
2. Page 1 of 1
3. Emergency Response Phone: 724-933-4100
4. Waste Tracking Number: 112111

5. Generator's Name and Mailing Address
Crab Orchard National Wildlife Refuge
Schlumberger Technology Corp. 225 Schlumberger Dr. Sugarland, TX 77478
Generator's Phone: 281 285-4747 ATTN: Virgilio Cocianni

Generator's Site Address (if different than mailing address)
Crab Orchard National Wildlife Refuge
Route 148 South
Marion, IL 62959

6. Transporter 1 Company Name: American Transportation Solutions, LLC
U.S. EPA ID Number: PAR 000 521 740

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
AES Environmental LLC
1689 Shar-Cal Road
Facility's Phone: 270 395-0504 Calvert City, KY 42029
U.S. EPA ID Number: KYD 985 073 196

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	RCRA Nonhazardous, DOT Nonregulated soil	21	DM	8400	P	None
2.	RCRA Nonhazardous, DOT Nonregulated water	37	DM	11,100	~~G~~ P	None
3.						
4.						

13. Special Handling Instructions and Additional Information
1. NH-S-10 IDW soil MGT-38662
2. NH-L-20 IDW water MGT-38663
CESI Job# ROAN-TFORT-3873-20191

H32

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: Agent for Schlumberger Glynn Roberts /CHZN/AU
Signature:
Month 11 Day 21 Year 11

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Andy Hutson
Signature:
Month 11 Day 21 Year 11
Transporter 2 Printed/Typed Name:
Signature:
Month Day Year

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: Mike Mosell
Signature:
Month 11 Day 21 Year

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

169-BLS-C 6 10497 (Rev. 8/06)

DESIGNATED FACILITY TO GENERATOR

Appendix E
Data Quality Evaluation Report and Laboratory Reports (Laboratory Reports included on CD)

Data Quality Evaluation for Crab Orchard National Wildlife Refuge—Plume 2 Supplemental Site Characterization Investigation

Introduction

The objective of this data quality evaluation (DQE) report is to assess the quality of analytical results for groundwater and soil samples collected at Crab Orchard National Wildlife Refuge, Marion, Illinois. Samples were collected by CH2M HILL September 13, 2011, through October 12, 2011. Guidance for the DQE report came from the *Quality Assurance Project Plan (QAPP) for Crab Orchard National Wildlife Refuge (CONWR); Supplemental Site Characterization Investigation for Plume 2 at PCB Operable Unit (OU) Site 33, Marion, Illinois* (CH2M HILL, June 2011); U.S. Environmental Protection Agency (USEPA) *Contract Laboratory National Functional Guidelines (NFG) for Organic Data Review, June 2008; USEPA NFG for Inorganic Data Review, January 2010;* and individual method requirements. The analytical results were evaluated using the criteria of precision, accuracy, representativeness, comparability, and completeness (PARCC) as described in the QAPP.

This memorandum is intended as a general data quality assessment designed to summarize data issues.

Analytical Data

This DQE report covers 34 groundwater samples, 4 groundwater field duplicates (FDs), 27 soil samples, 3 soil FDs, 7 field blanks (FBs), 1 equipment blank (EB), and 10 trip blanks (TBs). The samples were reported as 13 sample delivery groups (SDGs) listed as 500-39107, 500-39470, 500-39539, 500-39643, 500-39710, 500-40136, 500-40223, 500-40292, 500-40426, 500-40434, 500-40474, 500-40530, and 500-40621. Samples were collected and delivered to TestAmerica, Inc., in Chicago, Illinois. The samples were analyzed by one or more of the methods listed in Table 1.

TABLE 1

Analytical Parameters

Crab Orchard National Wildlife Refuge Investigation

Parameter	Method	Laboratory
Volatile Organic Compounds (VOCs)	SW-846 5030B/8260B	TestAmerica
Dissolved Gases	RSK-175	TestAmerica
Total Organic Carbon (TOC)/Total Inorganic Carbon (TIC)	SW-846 9060	TestAmerica
Iron and Manganese	SW-846 3010A/6010B	TestAmerica
Alkalinity	EPA 310.1	TestAmerica
Chloride and Sulfate	EPA 300.0	TestAmerica
Nitrite + Nitrate	EPA 353.2	TestAmerica
Nitrite	EPA 354.1	TestAmerica
Nitrate	By Calculation	TestAmerica

The SDGs were assessed by reviewing the following: (1) the chain-of-custody documentation, (2) holding-time compliance, (3) initial and continuing calibration criteria, (4) method blanks and field blanks, (5) laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) recoveries, (6) matrix spike (MS)/matrix spike duplicate

(MSD) recoveries; (7) surrogate spike recoveries; (8) internal standard recoveries; (9) FD precision; and (10) the required quality control (QC) samples at the specified frequencies.

Data flags were assigned according to the NFGs. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will only be one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are those listed and are defined below:

- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- R = The sample result was rejected due to serious deficiencies in the ability to analyze the sample and meet the QC criteria. The presence or absence of the analyte could not be verified.
- U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.
- UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Findings

The overall summaries of the data validation are contained in the following sections. Qualified data are presented in Table 2.

Holding Time and Preservation

The pH criterion of 2 or below was exceeded for 4 samples in SDG 500-40474 for the volatile organic compound (VOC) analysis. The data were qualified as estimated detected and nondetected results and flagged “J” and “UJ” in the associated samples.

Calibration

Initial and continuing calibration analyses were performed as required by the methods. All acceptance criteria were met with the following exceptions: The percent difference (%D) for bromoform and bromomethane were greater than method criteria in the continuing calibration verification standard (CCV) associated with SDGs 500-39539, 500-39643, 500-39710, and 500-40474, indicating a possible high bias. Nondetected results were qualified as estimated and flagged “UJ” in the associated samples.

Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination with the following exceptions:

- Methylene chloride was detected at concentrations both greater than and less than the reporting limit (RL) in the method blank associated with the VOC analysis in SDGs 500-39470 and 500-40530. The data were qualified as nondetected at the concentration measured and flagged “U” when the associated sample concentrations were less than 10 times the concentration detected in the blanks. Nondetected results and results detected greater than 10 times the concentration found in the blanks were not qualified.
- Chloride, sulfate, nitrite, and TIC were detected at concentrations less than the RL in the method blanks in all associated SDGs. Nitrite was detected at a concentration greater than the RL in the method blank associated with SDG 500-39643. The data were qualified as not detected at the concentration measured and flagged “U” when the associated sample concentrations were less than five times the concentration detected in the blanks. Nondetected results and results detected greater than five times the concentration found in the blanks were not qualified.

Calibration Blanks

Calibration blanks were analyzed at the required frequency and were free of contamination with the following exceptions: Chloride, sulfate, nitrite, TOC, and TIC were detected at concentrations less than the RL in several associated initial calibration and/or continuing calibration blanks. The data were qualified as nondetected at the concentration measured and flagged "U" when the associated sample concentrations were less than five times the concentration detected in the blanks. Nondetected results and results detected greater than five times the concentration found in the blanks were not qualified.

Field Blanks

Seven FBs, 1 EB, and 10 TBs were collected, analyzed, and were free of contamination with the following exceptions:

- Trichloroethene was detected at concentrations less than the RL in two TBs associated with the VOC analysis. All associated results were detected greater than five times the concentration found in the blank and were therefore not qualified.
- Chloroform was detected at concentrations less than the RL in three FBs associated with the VOC analysis. Chloroform was not detected in any of the associated samples; therefore, no qualifiers were applied.
- Methane was detected at concentrations greater than the RL in two FBs and one EB associated with the dissolved gas analysis. The data were qualified as nondetected at the concentration measured and flagged "U" when the associated sample concentrations were less than five times the concentration detected in the blanks. Results detected greater than five times the concentration found in the blanks were not qualified.
- Chloride, sulfate, nitrite, alkalinity, TOC, and TIC were detected at concentrations less than the RL in several FBs and/or the one EB. The data were qualified as nondetected at the concentration measured and flagged "U" when the associated sample concentrations were less than five times the concentration detected in the blanks. Nondetected results and results detected greater than five times the concentration found in the blanks were not qualified.

Laboratory Control Samples

LCSs were analyzed as required and all accuracy criteria were met with the following exception:

- Methyl isobutyl ketone, 1,2-dichloroethane, and 1,2-dichloropropane were recovered less than control limits in the VOC LCS in SDGs 500-40223, 500-40136, and 500-40474. Nondetected results were qualified as estimated and flagged "UJ" in the associated samples.
- The relative percent difference (RPD) for acetone exceeded control limits in the LCS/LCSD in SDGs 500-40530 and 500-40621. Detected results were qualified as estimated and flagged "J" in the associated samples. Nondetected results were not qualified.

Matrix Spike

MS/MSDs were analyzed as required and all accuracy and precision criteria were met with the following exceptions:

- Trichloroethene and chloroethane were recovered greater than the upper control limits in the MS and MSD of sample 33-GG144-30, indicating a possible high bias. Acetone, trichloroethene, cis-1,2-dichloroethene, and 2-hexanone were recovered greater than the upper control limits in the MS of sample 33-SB151-32. Iron was recovered greater than the upper control limits in the MS and MSD of sample GW-33MWC-11-092111. Methane was recovered greater than upper control limits in the MSD for sample GW-33MWC-35-092211. Detected results were qualified as estimated and flagged "J" in the parent samples. Nondetected results were not qualified.
- Nitrite-nitrate was recovered less than the lower control limits in the MSD of sample GW-GW-33MWC-35-092211, indicating a possible low bias. Trichloroethene was recovered less than the lower control limits in the MS of sample 33-GG144-30. Detected results were qualified as estimated and flagged "J" in the parent samples. Nondetected results were qualified as estimated and flagged "UJ" in the parent samples.

The RPD for ethane and methane exceeded control limits in the MS/MSD for GW-33MWC-35-092211. Detected results were qualified as estimated and flagged "J" in the parent samples.

Surrogates

Surrogates were added as required and all acceptance criteria were met with the following exception: The recovery of one VOC surrogate, dibromofluoromethane, was recovered greater than control limits in sample GW-33-342-092211. Detected results were qualified as estimated and flagged "J" in the associated sample. Nondetected results were not qualified.

Serial Dilutions

Serial dilutions were analyzed according to methods requiring their use and all acceptance criteria were met.

Interference Check Standards

Interference check standards were analyzed as required and all accuracy criteria were met.

Laboratory Duplicates

Laboratory duplicates were performed as all precision criteria were met with the following exception: The RPD between samples GW-33MWC-35-092211and GW-33MWC-11-092111 and their respective laboratory duplicates exceeded control limits for iron. The data were qualified as estimated and flagged "J" in the parent samples.

Field Duplicates

FDs were collected and analyzed as required. The RPD were generally within established QC limits of less than 30 percent. The RPD between the field sample and the field duplicate exceeded control limits for the samples listed below. The associated results were qualified as estimated detected results and flagged "J" in the FDs and associated samples.

- Tetrachloroethene for samples 33-GG141-38/33-FDUP-005
- Trichloroethene for samples 33-SB139-28/33-FDUP-006

Chain of Custody

Required procedures were followed and the document was free of errors.

Overall Assessment

The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data can be used to support the decision making process. The following summary highlights the PARCC findings for the above-defined event:

- Precision of the data was verified through the review of the laboratory data quality indicators that include FD, LCS/LCSD, MS/MSD, serial dilution, column confirmation, and laboratory duplicate RPDs. Precision was generally acceptable with several analytes being qualified as estimated detected results due to FD, LCS/LCSD, MS/MSD, column confirmation, and/or laboratory duplicate RPD issues. Data users should consider the impact to any result that is qualified as estimated as it may contain a bias, which could affect the decision making process.
- Accuracy of the data was verified through the review of the calibration data, LCS/LCSD, MS/MSD, interference check standard and surrogate recoveries, as well as the evaluation of method/field blank data. Accuracy was generally acceptable with several analytes being qualified as estimated nondetected and detected results due to calibration, LCS, MS/MSD, and/or surrogate issues. The method/field/calibration blank samples were generally free of contamination with a few analytes being qualified as nondetected results due to low-level detections in the blanks.
- Representativeness of the data was verified through the sample collection, storage, and preservation procedures and the verification of holding-time compliance. The pH criterion of 2 or below was exceeded for 4 samples associated with the VOC analysis. All data were reported from analyses within the recommended holding time.
- Comparability of the data was verified using standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.

- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

TABLE 2

Data Qualification Data

Crab Orchard National Wildlife Refuge Investigation

Method	NativeID	SDG Number	Analyte	Units	Final Result	Validation Flag	Validation Reason
SW8260B	33-FDUP-001	500-39643	Bromomethane	mg/L	0.001	UJ	CCV>UCL
SW8260B	33-FDUP-002	500-39643	Bromomethane	mg/L	0.001	UJ	CCV>UCL
SW8260B	33-FDUP-005	500-40434	Tetrachloroethene	mg/L	0.11	J	FD>RPD
SW8260B	33-FDUP-006	500-40530	Trichloroethene	mg/Kg	15	J	FD>RPD
SW8260B	33-GG141-38	500-40434	Tetrachloroethene	mg/L	0.063	J	FD>RPD
SW8260B	33-GG144-30	500-40426	Trichloroethene	mg/L	1300	J	MS<LCL; SD>UCL
SW8260B	33-GG150-18	500-40474	1,1,1-Trichloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	1,1,2,2-Tetrachloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	1,1,2-Trichloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	1,1-Dichloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	1,1-Dichloroethene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	1,2-Dichloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	1,2-Dichloropropane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	1,3-Dichloropropene, Total	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	2-Hexanone	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-18	500-40474	Acetone	mg/L	0.011	J	Pres
SW8260B	33-GG150-18	500-40474	Benzene	mg/L	0.0005	UJ	Pres
SW8260B	33-GG150-18	500-40474	Bromodichloromethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	Bromoform	mg/L	0.001	UJ	Pres; CCV>UCL
SW8260B	33-GG150-18	500-40474	Bromomethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	Carbon disulfide	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-18	500-40474	Carbon tetrachloride	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	Chlorobenzene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	Chloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	Chloroform	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	Chloromethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	cis-1,2-Dichloroethene	mg/L	0.0045	J	Pres
SW8260B	33-GG150-18	500-40474	cis-1,3-Dichloropropene	mg/L	0.001	UJ	Pres

TABLE 2

Data Qualification Data

Crab Orchard National Wildlife Refuge Investigation

Method	NativeID	SDG Number	Analyte	Units	Final Result	Validation Flag	Validation Reason
SW8260B	33-GG150-18	500-40474	Dibromochloromethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	Ethylbenzene	mg/L	0.0005	UJ	Pres
SW8260B	33-GG150-18	500-40474	Methyl Ethyl Ketone	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-18	500-40474	methyl isobutyl ketone	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-18	500-40474	Methyl tert-butyl ether	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	Methylene Chloride	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-18	500-40474	Styrene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	Tetrachloroethene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	Toluene	mg/L	0.00045	J	Pres
SW8260B	33-GG150-18	500-40474	trans-1,2-Dichloroethene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	trans-1,3-Dichloropropene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-18	500-40474	Trichloroethene	mg/L	0.067	J	Pres
SW8260B	33-GG150-18	500-40474	Vinyl chloride	mg/L	0.0005	UJ	Pres
SW8260B	33-GG150-18	500-40474	Xylenes, Total	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-23	500-40474	Trichloroethene	mg/L	4.3	J	Pres
SW8260B	33-GG150-23	500-40474	1,1,1-Trichloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	1,1,2,2-Tetrachloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	1,1,2-Trichloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	1,1-Dichloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	1,1-Dichloroethene	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	1,2-Dichloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	1,2-Dichloropropane	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	2-Hexanone	mg/L	0.05	UJ	Pres
SW8260B	33-GG150-23	500-40474	Acetone	mg/L	0.05	UJ	Pres
SW8260B	33-GG150-23	500-40474	Bromodichloromethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Bromoform	mg/L	0.01	UJ	Pres; CCV>UCL
SW8260B	33-GG150-23	500-40474	Bromomethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Carbon disulfide	mg/L	0.05	UJ	Pres

TABLE 2

Data Qualification Data

Crab Orchard National Wildlife Refuge Investigation

Method	NativeID	SDG Number	Analyte	Units	Final Result	Validation Flag	Validation Reason
SW8260B	33-GG150-23	500-40474	Carbon tetrachloride	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Chlorobenzene	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Chloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Chloroform	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Chloromethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	cis-1,2-Dichloroethene	mg/L	0.079	J	Pres
SW8260B	33-GG150-23	500-40474	cis-1,3-Dichloropropene	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Dibromochloromethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Methyl Ethyl Ketone	mg/L	0.05	UJ	Pres
SW8260B	33-GG150-23	500-40474	Methyl isobutyl ketone	mg/L	0.05	UJ	Pres
SW8260B	33-GG150-23	500-40474	Methyl tert-butyl ether	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Methylene Chloride	mg/L	0.05	UJ	Pres
SW8260B	33-GG150-23	500-40474	Styrene	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Tetrachloroethene	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	trans-1,2-Dichloroethene	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	trans-1,3-Dichloropropene	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	1,3-Dichloropropene, Total	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Xylenes, Total	mg/L	0.01	UJ	Pres
SW8260B	33-GG150-23	500-40474	Benzene	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-23	500-40474	Ethylbenzene	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-23	500-40474	Toluene	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-23	500-40474	Vinyl chloride	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-34	500-40474	Trichloroethene	mg/L	0.03	J	Pres
SW8260B	33-GG150-34	500-40474	1,1,1-Trichloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	1,1,2,2-Tetrachloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	1,1,2-Trichloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	1,1-Dichloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	1,1-Dichloroethene	mg/L	0.001	UJ	Pres

TABLE 2

Data Qualification Data

Crab Orchard National Wildlife Refuge Investigation

Method	NativeID	SDG Number	Analyte	Units	Final Result	Validation Flag	Validation Reason
SW8260B	33-GG150-34	500-40474	1,2-Dichloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	1,2-Dichloropropane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	2-Hexanone	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-34	500-40474	Acetone	mg/L	0.0084	J	Pres
SW8260B	33-GG150-34	500-40474	Bromodichloromethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Bromoform	mg/L	0.001	UJ	Pres; CCV>UCL
SW8260B	33-GG150-34	500-40474	Bromomethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Carbon disulfide	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-34	500-40474	Carbon tetrachloride	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Chlorobenzene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Chloroethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Chloroform	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Chloromethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	cis-1,2-Dichloroethene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	cis-1,3-Dichloropropene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Dibromochloromethane	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Methyl Ethyl Ketone	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-34	500-40474	Methyl isobutyl ketone	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-34	500-40474	Methyl tert-butyl ether	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Methylene Chloride	mg/L	0.005	UJ	Pres
SW8260B	33-GG150-34	500-40474	Styrene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Tetrachloroethene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	trans-1,2-Dichloroethene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	trans-1,3-Dichloropropene	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	1,3-Dichloropropene, Total	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Xylenes, Total	mg/L	0.001	UJ	Pres
SW8260B	33-GG150-34	500-40474	Benzene	mg/L	0.0005	UJ	Pres
SW8260B	33-GG150-34	500-40474	Ethylbenzene	mg/L	0.0005	UJ	Pres

TABLE 2

Data Qualification Data

Crab Orchard National Wildlife Refuge Investigation

Method	NativeID	SDG Number	Analyte	Units	Final Result	Validation Flag	Validation Reason
SW8260B	33-GG150-34	500-40474	Toluene	mg/L	0.0005	UJ	Pres
SW8260B	33-GG150-34	500-40474	Vinyl chloride	mg/L	0.0005	UJ	Pres
SW8260B	33-GG151-28	500-40474	Bromoform	mg/L	0.002	UJ	CCV>UCL
SW8260B	33-GG151-38	500-40474	Trichloroethene	mg/L	3	J	Pres
SW8260B	33-GG151-38	500-40474	cis-1,2-Dichloroethene	mg/L	0.42	J	Pres
SW8260B	33-GG151-38	500-40474	1,1,1-Trichloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	1,1,2,2-Tetrachloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	1,1,2-Trichloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	1,1-Dichloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	1,1-Dichloroethene	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	1,2-Dichloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	1,2-Dichloropropane	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	2-Hexanone	mg/L	0.05	UJ	Pres
SW8260B	33-GG151-38	500-40474	Acetone	mg/L	0.05	UJ	Pres
SW8260B	33-GG151-38	500-40474	Bromodichloromethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	Bromoform	mg/L	0.01	UJ	Pres; CCV>UCL
SW8260B	33-GG151-38	500-40474	Bromomethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	Carbon disulfide	mg/L	0.05	UJ	Pres
SW8260B	33-GG151-38	500-40474	Carbon tetrachloride	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	Chlorobenzene	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	Chloroethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	Chloroform	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	Chloromethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	cis-1,3-Dichloropropene	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	Dibromochloromethane	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	Methyl Ethyl Ketone	mg/L	0.05	UJ	Pres
SW8260B	33-GG151-38	500-40474	Methyl isobutyl ketone	mg/L	0.05	UJ	Pres
SW8260B	33-GG151-38	500-40474	Methyl tert-butyl ether	mg/L	0.01	UJ	Pres

TABLE 2

Data Qualification Data

Crab Orchard National Wildlife Refuge Investigation

Method	NativeID	SDG Number	Analyte	Units	Final Result	Validation Flag	Validation Reason
SW8260B	33-GG151-38	500-40474	Methylene Chloride	mg/L	0.05	UJ	Pres
SW8260B	33-GG151-38	500-40474	Styrene	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	Tetrachloroethene	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	trans-1,2-Dichloroethene	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	trans-1,3-Dichloropropene	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	1,3-Dichloropropene, Total	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	Xylenes, Total	mg/L	0.01	UJ	Pres
SW8260B	33-GG151-38	500-40474	Benzene	mg/L	0.005	UJ	Pres
SW8260B	33-GG151-38	500-40474	Ethylbenzene	mg/L	0.005	UJ	Pres
SW8260B	33-GG151-38	500-40474	Toluene	mg/L	0.005	UJ	Pres
SW8260B	33-GG151-38	500-40474	Vinyl chloride	mg/L	0.005	UJ	Pres
SW8260B	33-SB138-11	500-40474	1,2-Dichloropropane	mg/kg	0.0043	UJ	LCS<LCL
SW8260B	33-SB138-11	500-40474	Methyl isobutyl ketone	mg/kg	0.0043	UJ	LCS<LCL
SW8260B	33-SB139-28	500-40530	Trichloroethene	mg/kg	8.3	J	FD>RPD
SW8260B	33-SB142-41	500-40223	Methyl isobutyl ketone	mg/kg	0.0041	UJ	LCS<LCL
SW8260B	33-SB147-13	500-40621	Acetone	mg/kg	0.0057	J	LCSRPD
SW8260B	33-SB150-38	500-40136	1,2-Dichloroethane	mg/kg	0.0048	UJ	LCS<LCL
SW8260B	33-SB150-38	500-40136	Methyl isobutyl ketone	mg/kg	0.0048	UJ	LCS<LCL
SW8260B	33-SB151-27	500-40136	1,2-Dichloroethane	mg/kg	0.0039	UJ	LCS<LCL
SW8260B	33-SB151-27	500-40136	methyl isobutyl ketone	mg/kg	0.0039	UJ	LCS<LCL
SW8260B	33-SB151-32	500-40136	Trichloroethene	mg/kg	2	J	MS>UCL
SW8260B	GW-33-341-092211	500-39710	Bromomethane	mg/L	0.001	UJ	CCV>UCL
E354.1	GW-33-341-092211	500-39710	Nitrogen, Nitrite	mg/L	0.0027	U	FB>RL
SW8260B	GW-33-342-092211	500-39710	Trichloroethene	mg/L	1.6	J	Sur>UCL
SW8260B	GW-33-342-092211	500-39710	cis-1,2-Dichloroethene	mg/L	0.23	J	Sur>UCL
SW8260B	GW-33-342-092211	500-39710	Bromomethane	mg/L	0.005	UJ	CCV>UCL
SW8260B	GW-33-342-092211	500-39710	trans-1,2-Dichloroethene	mg/L	0.0027	J	Sur>UCL
SW8260B	GW-33-342-092211	500-39710	Vinyl chloride	mg/L	0.0035	J	Sur>UCL

TABLE 2

Data Qualification Data

Crab Orchard National Wildlife Refuge Investigation

Method	NativeID	SDG Number	Analyte	Units	Final Result	Validation Flag	Validation Reason
SW8260B	GW-33MWC-01-092111	500-39643	Bromomethane	mg/L	0.001	UJ	CCV>UCL
E354.1	GW-33MWC-02-092011	500-39539	Nitrogen, Nitrite	mg/L	0.007	U	LB<RL; EB<RL; FB<RL; ICB<RL; CCB<RL
RSK175	GW-33MWC-02-092011	500-39539	Methane	µg/L	0.46	U	EB>RL; FB>RL
SW8260B	GW-33MWC-02-092011	500-39539	Bromomethane	mg/L	0.001	UJ	CCV>UCL
SW9060	GW-33MWC-02-092011	500-39539	TOC Dup	mg/L	4	U	FB<RL
SW8260B	GW-33MWC-03-092111	500-39643	Bromomethane	mg/L	0.001	UJ	CCV>UCL
SW6010B	GW-33MWC-11-092111	500-39643	Iron	mg/L	0.71	J	Lab Dup RPD
SW8260B	GW-33MWC-11-092111	500-39643	Bromomethane	mg/L	0.001	UJ	CCV>UCL
SW6010B	GW-33MWC-11-092111	500-39643	Iron	mg/L	0.71	J	MS>UCL; SD>UCL
E354.1	GW-33MWC-11-092111	500-39643	Nitrogen, Nitrite	mg/L	0.0043	U	LB<RL; ICB<RL; CCB<RL
SW8260B	GW-33MWC-12-092111	500-39643	Bromomethane	mg/L	0.001	UJ	CCV>UCL
SW8260B	GW-33MWC-13-091911	500-39470	Methylene Chloride	mg/L	0.058	U	LB>RL
SW8260B	GW-33MWC-33-092111	500-39643	Bromomethane	mg/L	0.002	UJ	CCV>UCL
E354.1	GW-33MWC-33-092111	500-39643	Nitrogen, Nitrite	mg/L	0.0062	U	LB>RL; ICB<RL; CCB<RL
E353.2	GW-33MWC-35-092211	500-39710	Nitrogen, Nitrate Nitrite	mg/L	0.1	UJ	SD<LCL
SW6010B	GW-33MWC-35-092211	500-39710	Iron	mg/L	0.27	J	Lab Dup RPD
RSK175	GW-33MWC-35-092211	500-39710	Methane	µg/L	72	J	SD>UCL; MSRPD
RSK175	GW-33MWC-35-092211	500-39710	Ethane	µg/L	1.3	J	MSRPD
SW8260B	GW-33MWC-35-092211	500-39710	Bromomethane	mg/L	0.001	UJ	CCV>UCL
E354.1	GW-33MWC-35-092211	500-39710	Nitrogen, Nitrite	mg/L	0.0036	U	FB>RL
SW9060	GW-33MWC-36-092011	500-39539	TOC Dup	mg/L	2.6	U	EB<RL; FB<RL
SW8260B	GW-33MWC-36-092011	500-39539	Bromomethane	mg/L	0.001	UJ	CCV>UCL
RSK175	GW-33MWC-36-092011	500-39539	Methane	µg/L	0.65	U	EB>RL; FB>RL
E354.1	GW-33MWC-36-092011	500-39539	Nitrogen, Nitrite	mg/L	0.013	U	LB<RL; EB<RL; FB<RL; ICB<RL; CCB<RL
SW8260B	GW-33MWC-44-092211	500-39710	Bromomethane	mg/L	0.001	UJ	CCV>UCL
RSK175	GW-33MWC-44-092211	500-39710	Methane	µg/L	0.71	U	FB>RL
SW8260B	GW-33MWC-45-092211	500-39710	Bromomethane	mg/L	0.001	UJ	CCV>UCL
E354.1	GW-33MWC-45-092211	500-39710	Nitrogen, Nitrite	mg/L	0.0023	U	FB>RL

TABLE 2

Data Qualification Data

Crab Orchard National Wildlife Refuge Investigation

Method	NativeID	SDG Number	Analyte	Units	Final Result	Validation Flag	Validation Reason
E300.0	GW-33MWC-45-092211	500-39710	Sulfate	mg/L	0.34	U	ICB<RL

Validation Reasons:

EB<RL	The analyte was detected at a concentration less than the reporting limit in the equipment blank.
EB>RL	The analyte was detected at a concentration greater than the reporting limit in the equipment blank.
FB<RL	The analyte was detected at a concentration less than the reporting limit in the field blank.
FB>RL	The analyte was detected at a concentration greater than the reporting limit in the field blank.
FD>RPD	The field duplicate exceeded RPD control limits.
LB<RL	The analyte was detected at a concentration less than the reporting limit in the lab blank.
LB>RL	The analyte was detected at a concentration greater than the reporting limit in the lab blank.
ICB<RL	The analyte was detected at a concentration less than the reporting limit in the initial calibration blank.
CCB<RL	The analyte was detected at a concentration less than the reporting limit in the continuing calibration blank.
CF>RPD	The column confirmation exceeded RPD control limits.
CCV>UCL	The continuing calibration percent difference was greater than control limits.
Lab Dup RPD	The laboratory duplicate exceeded RPD control limits.
LCS<LCL	The LCS was recovered less than control limits.
LCSRPD	The LCS/LCSD exceeded RPD control limits.
MS<LCL	The MS was recovered less than control limits.
MS>UCL	The matrix spike was recovered greater than control limits.
MSRPD	The MS/MSD exceeded RPD control limits.
Pres	The pH criterion of 2 or below was exceeded.
SD<LCL	The MSD was recovered less than control limits.
SD>UCL	The matrix spike duplicate was recovered greater than control limits.
Sur>UCL	The surrogate was recovered greater than control limits.

Laboratory Reports

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-39107-1
Client Project/Site: Crab Orchard Wildlife Refuge

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
09/28/2011 08:44:16 AM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

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Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Definitions 9
QC Association 10
Surrogate Summary 11
QC Sample Results 12
Certification Summary 16
Chain of Custody 17
Receipt Checklists 18

Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge

TestAmerica Job ID: 500-39107-1

Job ID: 500-39107-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-39107-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC/MS VOA
Method(s) 8260B: The following sample was diluted due to the abundance of target analytes: 33-SB136-28 (500-39107-1). Elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge

TestAmerica Job ID: 500-39107-1

Client Sample ID: 33-SB136-28 — Lab Sample ID: 500-39107-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	1.2		0.042	0.0095	mg/Kg	50	☼	8260B	Total/NA
Vinyl chloride	0.070		0.011	0.0053	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	14		0.021	0.013	mg/Kg	100	☼	8260B	Total/NA

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge

TestAmerica Job ID: 500-39107-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge

TestAmerica Job ID: 500-39107-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-39107-1	33-SB136-28	Solid	09/13/11 14:00	09/14/11 10:30

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge

TestAmerica Job ID: 500-39107-1

Client Sample ID: 33-SB136-28
Date Collected: 09/13/11 14:00
Date Received: 09/14/11 10:30

Lab Sample ID: 500-39107-1
Matrix: Solid
Percent Solids: 83.9

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.21	U	0.21	0.081	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Benzene	0.011	U	0.011	0.0034	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Bromodichloromethane	0.085	U	0.085	0.012	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Bromoform	0.085	U	0.085	0.024	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Bromomethane	0.085	U	0.085	0.036	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Methyl Ethyl Ketone	0.21	U	0.21	0.044	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Carbon disulfide	0.21	U	0.21	0.019	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Carbon tetrachloride	0.042	U	0.042	0.012	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Chlorobenzene	0.042	U	0.042	0.010	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Chloroethane	0.085	U	0.085	0.021	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Chloroform	0.042	U	0.042	0.011	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Chloromethane	0.085	U	0.085	0.021	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
cis-1,2-Dichloroethene	**1.2**		0.042	0.0095	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
cis-1,3-Dichloropropene	0.042	U	0.042	0.012	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Dibromochloromethane	0.085	U	0.085	0.016	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
1,1-Dichloroethane	0.042	U	0.042	0.010	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
1,2-Dichloroethane	0.042	U	0.042	0.012	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
1,1-Dichloroethene	0.042	U	0.042	0.012	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
1,2-Dichloropropane	0.042	U	0.042	0.015	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Ethylbenzene	0.011	U	0.011	0.0059	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
2-Hexanone	0.21	U	0.21	0.024	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Methylene Chloride	0.21	U	0.21	0.027	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
methyl isobutyl ketone	0.21	U	0.21	0.033	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Methyl tert-butyl ether	0.085	U	0.085	0.020	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Styrene	0.042	U	0.042	0.011	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
1,1,2,2-Tetrachloroethane	0.042	U	0.042	0.015	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Tetrachloroethene	0.042	U	0.042	0.0092	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Toluene	0.011	U	0.011	0.0064	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
trans-1,2-Dichloroethene	0.042	U	0.042	0.011	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
trans-1,3-Dichloropropene	0.042	U	0.042	0.015	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
1,1,1-Trichloroethane	0.042	U	0.042	0.011	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
1,1,2-Trichloroethane	0.042	U	0.042	0.013	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Vinyl chloride	**0.070**		0.011	0.0053	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
Xylenes, Total	0.021	U	0.021	0.0055	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50
1,3-Dichloropropene, Total	0.042	U	0.042	0.012	mg/Kg	☼	09/13/11 14:00	09/23/11 10:54	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*83*		*77 - 112*	*09/13/11 14:00*	*09/23/11 10:54*	*50*
Dibromofluoromethane	*84*		*78 - 119*	*09/13/11 14:00*	*09/23/11 10:54*	*50*
1,2-Dichloroethane-d4 (Surr)	*85*		*77 - 124*	*09/13/11 14:00*	*09/23/11 10:54*	*50*
Toluene-d8 (Surr)	*89*		*80 - 121*	*09/13/11 14:00*	*09/23/11 10:54*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**14**		0.021	0.013	mg/Kg	☼	09/13/11 14:00	09/22/11 16:55	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*81*		*77 - 112*	*09/13/11 14:00*	*09/22/11 16:55*	*100*
Dibromofluoromethane	*93*		*78 - 119*	*09/13/11 14:00*	*09/22/11 16:55*	*100*
1,2-Dichloroethane-d4 (Surr)	*93*		*77 - 124*	*09/13/11 14:00*	*09/22/11 16:55*	*100*
Toluene-d8 (Surr)	*89*		*80 - 121*	*09/13/11 14:00*	*09/22/11 16:55*	*100*

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge

TestAmerica Job ID: 500-39107-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge

TestAmerica Job ID: 500-39107-1

GC/MS VOA

Prep Batch: 125451

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39107-1 - DL	33-SB136-28	Total/NA	Solid	5035	
500-39107-1	33-SB136-28	Total/NA	Solid	5035	

Analysis Batch: 126275

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39107-1 - DL	33-SB136-28	Total/NA	Solid	8260B	125451
LCS 500-126275/5	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-126275/4	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 126338

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39107-1	33-SB136-28	Total/NA	Solid	8260B	125451
LCS 500-126338/4	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-126338/3	Method Blank	Total/NA	Solid	8260B	

General Chemistry

Analysis Batch: 125317

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39107-1	33-SB136-28	Total/NA	Solid	Moisture	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge

TestAmerica Job ID: 500-39107-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-39107-1 - DL	33-SB136-28	81	93	93	89
500-39107-1	33-SB136-28	83	84	85	89
LCS 500-126275/5	Lab Control Sample	92	95	91	92
LCS 500-126338/4	Lab Control Sample	90	98	93	92
MB 500-126275/4	Method Blank	84	89	89	88
MB 500-126338/3	Method Blank	87	98	95	92

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

QC Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge

TestAmerica Job ID: 500-39107-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-126275/4
Matrix: Solid
Analysis Batch: 126275

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			09/22/11 13:03	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			09/22/11 13:03	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			09/22/11 13:03	1
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			09/22/11 13:03	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			09/22/11 13:03	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			09/22/11 13:03	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			09/22/11 13:03	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			09/22/11 13:03	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			09/22/11 13:03	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			09/22/11 13:03	1
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			09/22/11 13:03	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			09/22/11 13:03	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			09/22/11 13:03	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			09/22/11 13:03	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			09/22/11 13:03	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			09/22/11 13:03	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			09/22/11 13:03	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			09/22/11 13:03	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			09/22/11 13:03	1
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			09/22/11 13:03	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			09/22/11 13:03	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/Kg			09/22/11 13:03	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			09/22/11 13:03	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			09/22/11 13:03	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			09/22/11 13:03	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			09/22/11 13:03	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			09/22/11 13:03	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			09/22/11 13:03	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			09/22/11 13:03	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			09/22/11 13:03	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			09/22/11 13:03	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			09/22/11 13:03	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			09/22/11 13:03	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			09/22/11 13:03	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			09/22/11 13:03	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			09/22/11 13:03	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*84*		*77 - 112*		*09/22/11 13:03*	*1*
Dibromofluoromethane	*89*		*78 - 119*		*09/22/11 13:03*	*1*
1,2-Dichloroethane-d4 (Surr)	*89*		*77 - 124*		*09/22/11 13:03*	*1*
Toluene-d8 (Surr)	*88*		*80 - 121*		*09/22/11 13:03*	*1*

Lab Sample ID: LCS 500-126275/5
Matrix: Solid
Analysis Batch: 126275

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0484		mg/Kg		97	46 - 152

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-126275/5
Matrix: Solid
Analysis Batch: 126275

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Benzene	0.0500	0.0420		mg/Kg		84	74 - 112
Bromodichloromethane	0.0500	0.0410		mg/Kg		82	73 - 122
Bromoform	0.0500	0.0372		mg/Kg		74	62 - 119
Bromomethane	0.0500	0.0541		mg/Kg		108	38 - 157
Methyl Ethyl Ketone	0.0500	0.0410		mg/Kg		82	48 - 152
Carbon disulfide	0.0500	0.0337		mg/Kg		67	38 - 112
Carbon tetrachloride	0.0500	0.0410		mg/Kg		82	63 - 127
Chlorobenzene	0.0500	0.0408		mg/Kg		82	80 - 110
Chloroethane	0.0500	0.0605		mg/Kg		121	53 - 156
Chloroform	0.0500	0.0420		mg/Kg		84	74 - 115
Chloromethane	0.0500	0.0447		mg/Kg		89	44 - 148
cis-1,2-Dichloroethene	0.0500	0.0432		mg/Kg		86	68 - 110
cis-1,3-Dichloropropene	0.0538	0.0415		mg/Kg		77	65 - 116
Dibromochloromethane	0.0500	0.0401		mg/Kg		80	66 - 123
1,1-Dichloroethane	0.0500	0.0417		mg/Kg		83	69 - 118
1,2-Dichloroethane	0.0500	0.0394		mg/Kg		79	66 - 120
1,1-Dichloroethene	0.0500	0.0397		mg/Kg		79	60 - 123
1,2-Dichloropropane	0.0500	0.0428		mg/Kg		86	72 - 124
Ethylbenzene	0.0500	0.0411		mg/Kg		82	79 - 112
2-Hexanone	0.0500	0.0394		mg/Kg		79	58 - 137
Methylene Chloride	0.0500	0.0363		mg/Kg		73	67 - 126
methyl isobutyl ketone	0.0500	0.0370		mg/Kg		74	58 - 135
Methyl tert-butyl ether	0.0500	0.0488		mg/Kg		98	57 - 122
Styrene	0.0500	0.0419		mg/Kg		84	77 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0420		mg/Kg		84	73 - 119
Tetrachloroethene	0.0500	0.0413		mg/Kg		83	76 - 112
Toluene	0.0500	0.0408		mg/Kg		82	78 - 116
trans-1,2-Dichloroethene	0.0500	0.0431		mg/Kg		86	70 - 119
trans-1,3-Dichloropropene	0.0486	0.0370		mg/Kg		76	64 - 114
1,1,1-Trichloroethane	0.0500	0.0443		mg/Kg		89	70 - 125
1,1,2-Trichloroethane	0.0500	0.0417		mg/Kg		83	63 - 136
Trichloroethene	0.0500	0.0415		mg/Kg		83	75 - 113
Vinyl chloride	0.0500	0.0505		mg/Kg		101	58 - 136
Xylenes, Total	0.150	0.127		mg/Kg		85	74 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*92*		*77 - 112*
Dibromofluoromethane	*95*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*91*		*77 - 124*
Toluene-d8 (Surr)	*92*		*80 - 121*

Lab Sample ID: MB 500-126338/3
Matrix: Solid
Analysis Batch: 126338

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			09/23/11 00:34	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			09/23/11 00:34	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			09/23/11 00:34	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-126338/3
Matrix: Solid
Analysis Batch: 126338

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			09/23/11 00:34	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			09/23/11 00:34	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			09/23/11 00:34	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			09/23/11 00:34	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			09/23/11 00:34	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			09/23/11 00:34	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			09/23/11 00:34	1
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			09/23/11 00:34	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			09/23/11 00:34	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			09/23/11 00:34	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			09/23/11 00:34	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			09/23/11 00:34	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			09/23/11 00:34	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			09/23/11 00:34	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			09/23/11 00:34	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			09/23/11 00:34	1
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			09/23/11 00:34	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			09/23/11 00:34	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/Kg			09/23/11 00:34	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			09/23/11 00:34	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			09/23/11 00:34	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			09/23/11 00:34	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			09/23/11 00:34	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			09/23/11 00:34	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			09/23/11 00:34	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			09/23/11 00:34	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			09/23/11 00:34	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			09/23/11 00:34	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			09/23/11 00:34	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			09/23/11 00:34	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			09/23/11 00:34	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			09/23/11 00:34	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			09/23/11 00:34	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*87*		*77 - 112*		*09/23/11 00:34*	*1*
Dibromofluoromethane	*98*		*78 - 119*		*09/23/11 00:34*	*1*
1,2-Dichloroethane-d4 (Surr)	*95*		*77 - 124*		*09/23/11 00:34*	*1*
Toluene-d8 (Surr)	*92*		*80 - 121*		*09/23/11 00:34*	*1*

Lab Sample ID: LCS 500-126338/4
Matrix: Solid
Analysis Batch: 126338

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0452		mg/Kg		90	46 - 152
Benzene	0.0500	0.0484		mg/Kg		97	74 - 112
Bromodichloromethane	0.0500	0.0464		mg/Kg		93	73 - 122
Bromoform	0.0500	0.0423		mg/Kg		85	62 - 119

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-126338/4
Matrix: Solid
Analysis Batch: 126338

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Bromomethane	0.0500	0.0538		mg/Kg		108	38 - 157
Methyl Ethyl Ketone	0.0500	0.0424		mg/Kg		85	48 - 152
Carbon disulfide	0.0500	0.0420		mg/Kg		84	38 - 112
Carbon tetrachloride	0.0500	0.0467		mg/Kg		93	63 - 127
Chlorobenzene	0.0500	0.0462		mg/Kg		92	80 - 110
Chloroethane	0.0500	0.0592		mg/Kg		118	53 - 156
Chloroform	0.0500	0.0497		mg/Kg		99	74 - 115
Chloromethane	0.0500	0.0438		mg/Kg		88	44 - 148
cis-1,2-Dichloroethene	0.0500	0.0507		mg/Kg		101	68 - 110
cis-1,3-Dichloropropene	0.0538	0.0458		mg/Kg		85	65 - 116
Dibromochloromethane	0.0500	0.0464		mg/Kg		93	66 - 123
1,1-Dichloroethane	0.0500	0.0492		mg/Kg		98	69 - 118
1,2-Dichloroethane	0.0500	0.0455		mg/Kg		91	66 - 120
1,1-Dichloroethene	0.0500	0.0476		mg/Kg		95	60 - 123
1,2-Dichloropropane	0.0500	0.0482		mg/Kg		96	72 - 124
Ethylbenzene	0.0500	0.0466		mg/Kg		93	79 - 112
2-Hexanone	0.0500	0.0418		mg/Kg		84	58 - 137
Methylene Chloride	0.0500	0.0476		mg/Kg		95	67 - 126
methyl isobutyl ketone	0.0500	0.0424		mg/Kg		85	58 - 135
Methyl tert-butyl ether	0.0500	0.0389		mg/Kg		78	57 - 122
Styrene	0.0500	0.0479		mg/Kg		96	77 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0468		mg/Kg		94	73 - 119
Tetrachloroethene	0.0500	0.0458		mg/Kg		92	76 - 112
Toluene	0.0500	0.0464		mg/Kg		93	78 - 116
trans-1,2-Dichloroethene	0.0500	0.0499		mg/Kg		100	70 - 119
trans-1,3-Dichloropropene	0.0486	0.0411		mg/Kg		85	64 - 114
1,1,1-Trichloroethane	0.0500	0.0508		mg/Kg		102	70 - 125
1,1,2-Trichloroethane	0.0500	0.0465		mg/Kg		93	63 - 136
Trichloroethene	0.0500	0.0467		mg/Kg		93	75 - 113
Vinyl chloride	0.0500	0.0491		mg/Kg		98	58 - 136
Xylenes, Total	0.150	0.143		mg/Kg		96	74 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*90*		*77 - 112*
Dibromofluoromethane	*98*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*93*		*77 - 124*
Toluene-d8 (Surr)	*92*		*80 - 121*

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge

TestAmerica Job ID: 500-39107-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Lab Job #: 500-39107

Chain of Custody Number:

Page 1 of 1

Temperature °C of Cooler: 3.1

Report To (optional)
Contact: Monica Martin
Company: CH2M Hill
Address: 1034 S. Brentwood
Address: St Louis MO 63117
Phone: 314-429-0900
Fax:
E-Mail:

Bill To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Client: CH2M Hill
Client Project #: 423535.02.SI
Project Name: Crab Orchard
Project Location/State: Marion IL
Lab Project #:
Sampler: G. Roberts
Lab PM:

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOC 8260B (Preservative 7)	VOC 8260B (1)	RSK-175 MODIFIED (7/8)	SW-846 9040 (2)	SW-846 3000/6010B (3)	EPA 310.1 (7/8)	EPA 325.2 SW-846 9038 (7/8)	EPA 353.2 (7/8)	EPA 353.2 (2)	Comments
1		33-SB136-28	9/13/11	1400	5	S	X									
2		GW-33MWC-14-091311	9-13-11	10:50	13	W		X	X	X	X	X	X	X	X	
3		GW-33MWC-10-091311	9-13-11	15:05	13	W		X	X	X	X	X	X	X	X	
4		TB-001-091311	9-13-11	08:00	2	W		X								

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days ___ 10 Days ___ 15 Days X Other
Requested Due Date _____

Sample Disposal
[ ] Return to Client [X] Disposal by Lab [ ] Archive for ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	CH2M Hill	9/13/11	1700	[signature]	TA	9/14/11	1030

Lab Courier:
Shipped: FX
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
D – Other

Client Comments: None

Lab Comments:

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-39107-1

Login Number: 39107
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	3.1
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-39470-1
Client Project/Site: Crab Orchard Wildlife Refuge (423535)

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/05/2011 04:32:46 PM
Donna Ingersoll
Project Manager II
donna.ingersoll@testamericainc.com

Designee for

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Detection Summary 3
Method Summary 5
Sample Summary 6
Client Sample Results 7
Definitions 16
QC Association 17
Surrogate Summary 20
QC Sample Results 21
Certification Summary 29
Chain of Custody 31
Receipt Checklists 33

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Client Sample ID: GW-33MWC-13-091911 — Lab Sample ID: 500-39470-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	1.9		0.010	0.0022	mg/L	10		8260B	Total/NA
1,1-Dichloroethene	0.0042	J	0.010	0.0029	mg/L	10		8260B	Total/NA
Methylene Chloride	0.058	B	0.050	0.0063	mg/L	10		8260B	Total/NA
Tetrachloroethene	0.0069	J	0.010	0.0022	mg/L	10		8260B	Total/NA
trans-1,2-Dichloroethene	0.0044	J	0.010	0.0027	mg/L	10		8260B	Total/NA
Vinyl chloride	0.0096		0.0050	0.0013	mg/L	10		8260B	Total/NA
Trichloroethene - DL	9.6		0.025	0.0090	mg/L	50		8260B	Total/NA
Methane	1.2		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.24		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.026		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	35		2.0	0.83	mg/L	10		300.0	Total/NA
Sulfate	260		10	4.5	mg/L	50		300.0	Total/NA
Alkalinity	290		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrate Nitrite	0.095	J	0.10	0.043	mg/L	1		353.2	Total/NA
Nitrogen, Nitrite	0.0036	J	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	7.0		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	57	B	5.0	1.8	mg/L	5		9060	Total/NA
Nitrogen, Nitrate	0.091	J	0.10	0.043	mg/L	1		Nitrate by calc	Total/NA

Client Sample ID: GW-33MWC-24-091911 — Lab Sample ID: 500-39470-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.76		0.010	0.0022	mg/L	10		8260B	Total/NA
Tetrachloroethene	0.039		0.010	0.0022	mg/L	10		8260B	Total/NA
Vinyl chloride	0.039		0.0050	0.0013	mg/L	10		8260B	Total/NA
Trichloroethene - DL	2.0		0.025	0.0090	mg/L	50		8260B	Total/NA
Ethylene	0.85	J	1.0	0.50	ug/L	1		RSK-175	Total/NA
Methane	140		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.20		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.027		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	37		2.0	0.83	mg/L	10		300.0	Total/NA
Sulfate	170		4.0	1.8	mg/L	20		300.0	Total/NA
Alkalinity	390		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrate Nitrite	0.72		0.10	0.043	mg/L	1		353.2	Total/NA
Nitrogen, Nitrite	0.0032	J	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	5.2		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	78	B	5.0	1.8	mg/L	5		9060	Total/NA
Nitrogen, Nitrate	0.72		0.10	0.043	mg/L	1		Nitrate by calc	Total/NA

Client Sample ID: GW-33MWC-10-091911 — Lab Sample ID: 500-39470-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methane	0.35	J	0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.49		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.017		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	6.6		2.0	0.83	mg/L	10		300.0	Total/NA
Sulfate	55		2.0	0.90	mg/L	10		300.0	Total/NA
Alkalinity	220		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrate Nitrite	3.8		0.20	0.086	mg/L	2		353.2	Total/NA
Nitrogen, Nitrite	0.0034	J	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	4.7		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	52	B	5.0	1.8	mg/L	5		9060	Total/NA
Nitrogen, Nitrate	3.8		0.10	0.043	mg/L	1		Nitrate by calc	Total/NA

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Client Sample ID: GW-33MWC-14-091911 — Lab Sample ID: 500-39470-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chlorobenzene	0.0013		0.0010	0.00024	mg/L	1		8260B	Total/NA
cis-1,2-Dichloroethene	0.026		0.0010	0.00022	mg/L	1		8260B	Total/NA
Tetrachloroethene	0.14		0.0010	0.00022	mg/L	1		8260B	Total/NA
Trichloroethene	0.061		0.00050	0.00018	mg/L	1		8260B	Total/NA
Methane	5.7		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.38		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.057		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	14		2.0	0.83	mg/L	10		300.0	Total/NA
Sulfate	72		2.0	0.90	mg/L	10		300.0	Total/NA
Alkalinity	180		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrite	0.0021	J	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	3.3		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	38	B	5.0	1.8	mg/L	5		9060	Total/NA

Client Sample ID: TB-091911 — Lab Sample ID: 500-39470-5

No Detections

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
RSK-175	Dissolved Gases (GC)	RSK	TAL SAV
6010B	Metals (ICP)	SW846	TAL CHI
300.0	Anions, Ion Chromatography	MCAWW	TAL CHI
310.1	Alkalinity	MCAWW	TAL CHI
353.2	Nitrogen, Nitrate-Nitrite	MCAWW	TAL CHI
354.1	Nitrogen, Nitrite	MCAWW	TAL CHI
9060	Organic Carbon, Total (TOC)	SW846	TAL CHI
Nitrate by calc	Nitrogen, Nitrate-Nitrite	SM	TAL CHI

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique , RSKSOP-175, Rev. 0, 8/11/94, USEPA Research Lab

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-39470-1	GW-33MWC-13-091911	Water	09/19/11 11:15	09/20/11 10:30
500-39470-2	GW-33MWC-24-091911	Water	09/19/11 12:05	09/20/11 10:30
500-39470-3	GW-33MWC-10-091911	Water	09/19/11 15:40	09/20/11 10:30
500-39470-4	GW-33MWC-14-091911	Water	09/19/11 16:00	09/20/11 10:30
500-39470-5	TB-091911	Water	09/19/11 17:00	09/20/11 10:30

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Client Sample ID: GW-33MWC-13-091911
Date Collected: 09/19/11 11:15
Date Received: 09/20/11 10:30

Lab Sample ID: 500-39470-1
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.050	U	0.050	0.019	mg/L			09/28/11 17:42	10
Benzene	0.0050	U	0.0050	0.0012	mg/L			09/28/11 17:42	10
Bromodichloromethane	0.010	U	0.010	0.0023	mg/L			09/28/11 17:42	10
Bromoform	0.010	U	0.010	0.0045	mg/L			09/28/11 17:42	10
Bromomethane	0.010	U	0.010	0.0049	mg/L			09/28/11 17:42	10
Methyl Ethyl Ketone	0.050	U	0.050	0.010	mg/L			09/28/11 17:42	10
Carbon disulfide	0.050	U	0.050	0.0044	mg/L			09/28/11 17:42	10
Carbon tetrachloride	0.010	U	0.010	0.0028	mg/L			09/28/11 17:42	10
Chlorobenzene	0.010	U	0.010	0.0024	mg/L			09/28/11 17:42	10
Chloroethane	0.010	U	0.010	0.0033	mg/L			09/28/11 17:42	10
Chloroform	0.010	U	0.010	0.0025	mg/L			09/28/11 17:42	10
Chloromethane	0.010	U	0.010	0.0024	mg/L			09/28/11 17:42	10
cis-1,2-Dichloroethene	**1.9**		0.010	0.0022	mg/L			09/28/11 17:42	10
cis-1,3-Dichloropropene	0.010	U	0.010	0.0028	mg/L			09/28/11 17:42	10
Dibromochloromethane	0.010	U	0.010	0.0025	mg/L			09/28/11 17:42	10
1,1-Dichloroethane	0.010	U	0.010	0.0024	mg/L			09/28/11 17:42	10
1,1-Dichloroethene	**0.0042**	**J**	0.010	0.0029	mg/L			09/28/11 17:42	10
1,2-Dichloropropane	0.010	U	0.010	0.0036	mg/L			09/28/11 17:42	10
Ethylbenzene	0.0050	U	0.0050	0.0014	mg/L			09/28/11 17:42	10
2-Hexanone	0.050	U	0.050	0.0056	mg/L			09/28/11 17:42	10
Methylene Chloride	**0.058**	**B**	0.050	0.0063	mg/L			09/28/11 17:42	10
methyl isobutyl ketone	0.050	U	0.050	0.0079	mg/L			09/28/11 17:42	10
Methyl tert-butyl ether	0.010	U	0.010	0.0028	mg/L			09/28/11 17:42	10
Styrene	0.010	U	0.010	0.0026	mg/L			09/28/11 17:42	10
1,1,2,2-Tetrachloroethane	0.010	U	0.010	0.0035	mg/L			09/28/11 17:42	10
Tetrachloroethene	**0.0069**	**J**	0.010	0.0022	mg/L			09/28/11 17:42	10
Toluene	0.0050	U	0.0050	0.0015	mg/L			09/28/11 17:42	10
trans-1,2-Dichloroethene	**0.0044**	**J**	0.010	0.0027	mg/L			09/28/11 17:42	10
trans-1,3-Dichloropropene	0.010	U	0.010	0.0035	mg/L			09/28/11 17:42	10
1,1,1-Trichloroethane	0.010	U	0.010	0.0026	mg/L			09/28/11 17:42	10
1,1,2-Trichloroethane	0.010	U	0.010	0.0030	mg/L			09/28/11 17:42	10
Vinyl chloride	**0.0096**		0.0050	0.0013	mg/L			09/28/11 17:42	10
Xylenes, Total	0.010	U	0.010	0.0030	mg/L			09/28/11 17:42	10
1,2-Dichloroethane	0.010	U	0.010	0.0028	mg/L			09/28/11 17:42	10
1,3-Dichloropropene, Total	0.010	U	0.010	0.0050	mg/L			09/28/11 17:42	10

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*		*09/28/11 17:42*	*10*
Dibromofluoromethane	*105*		*78 - 119*		*09/28/11 17:42*	*10*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*		*09/28/11 17:42*	*10*
Toluene-d8 (Surr)	*101*		*80 - 121*		*09/28/11 17:42*	*10*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**9.6**		0.025	0.0090	mg/L			09/27/11 16:00	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*88*		*77 - 112*		*09/27/11 16:00*	*50*
Dibromofluoromethane	*98*		*78 - 119*		*09/27/11 16:00*	*50*
1,2-Dichloroethane-d4 (Surr)	*95*		*77 - 124*		*09/27/11 16:00*	*50*
Toluene-d8 (Surr)	*97*		*80 - 121*		*09/27/11 16:00*	*50*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/27/11 17:29	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/27/11 17:29	1
Methane	**1.2**		0.58	0.29	ug/L			09/27/11 17:29	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**0.24**		0.20	0.040	mg/L		09/20/11 16:45	09/25/11 02:16	1
Manganese	**0.026**		0.010	0.00094	mg/L		09/20/11 16:45	09/25/11 02:16	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**35**		2.0	0.83	mg/L			09/21/11 03:27	10
Sulfate	**260**		10	4.5	mg/L			09/22/11 00:52	50
Alkalinity	**290**		5.0	1.3	mg/L			09/29/11 08:42	1
Nitrogen, Nitrate Nitrite	**0.095**	**J**	0.10	0.043	mg/L			10/05/11 09:51	1
Nitrogen, Nitrite	**0.0036**	**J**	0.020	0.0020	mg/L			09/21/11 10:22	1
TOC Dup	**7.0**		1.0	0.36	mg/L			09/28/11 13:01	1
TIC Dup	**57**	**B**	5.0	1.8	mg/L			09/29/11 08:55	5
Nitrogen, Nitrate	**0.091**	**J**	0.10	0.043	mg/L			10/05/11 15:43	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Client Sample ID: GW-33MWC-24-091911
Date Collected: 09/19/11 12:05
Date Received: 09/20/11 10:30

Lab Sample ID: 500-39470-2
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.050	U	0.050	0.019	mg/L			09/27/11 16:49	10
Benzene	0.0050	U	0.0050	0.0012	mg/L			09/27/11 16:49	10
Bromodichloromethane	0.010	U	0.010	0.0023	mg/L			09/27/11 16:49	10
Bromoform	0.010	U	0.010	0.0045	mg/L			09/27/11 16:49	10
Bromomethane	0.010	U	0.010	0.0049	mg/L			09/27/11 16:49	10
Methyl Ethyl Ketone	0.050	U	0.050	0.010	mg/L			09/27/11 16:49	10
Carbon disulfide	0.050	U	0.050	0.0044	mg/L			09/27/11 16:49	10
Carbon tetrachloride	0.010	U	0.010	0.0028	mg/L			09/27/11 16:49	10
Chlorobenzene	0.010	U	0.010	0.0024	mg/L			09/27/11 16:49	10
Chloroethane	0.010	U	0.010	0.0033	mg/L			09/27/11 16:49	10
Chloroform	0.010	U	0.010	0.0025	mg/L			09/27/11 16:49	10
Chloromethane	0.010	U	0.010	0.0024	mg/L			09/27/11 16:49	10
cis-1,2-Dichloroethene	**0.76**		0.010	0.0022	mg/L			09/27/11 16:49	10
cis-1,3-Dichloropropene	0.010	U	0.010	0.0028	mg/L			09/27/11 16:49	10
Dibromochloromethane	0.010	U	0.010	0.0025	mg/L			09/27/11 16:49	10
1,1-Dichloroethane	0.010	U	0.010	0.0024	mg/L			09/27/11 16:49	10
1,1-Dichloroethene	0.010	U	0.010	0.0029	mg/L			09/27/11 16:49	10
1,2-Dichloropropane	0.010	U	0.010	0.0036	mg/L			09/27/11 16:49	10
Ethylbenzene	0.0050	U	0.0050	0.0014	mg/L			09/27/11 16:49	10
2-Hexanone	0.050	U	0.050	0.0056	mg/L			09/27/11 16:49	10
Methylene Chloride	0.050	U	0.050	0.0063	mg/L			09/27/11 16:49	10
methyl isobutyl ketone	0.050	U	0.050	0.0079	mg/L			09/27/11 16:49	10
Methyl tert-butyl ether	0.010	U	0.010	0.0028	mg/L			09/27/11 16:49	10
Styrene	0.010	U	0.010	0.0026	mg/L			09/27/11 16:49	10
1,1,2,2-Tetrachloroethane	0.010	U	0.010	0.0035	mg/L			09/27/11 16:49	10
Tetrachloroethene	**0.039**		0.010	0.0022	mg/L			09/27/11 16:49	10
Toluene	0.0050	U	0.0050	0.0015	mg/L			09/27/11 16:49	10
trans-1,2-Dichloroethene	0.010	U	0.010	0.0027	mg/L			09/27/11 16:49	10
trans-1,3-Dichloropropene	0.010	U	0.010	0.0035	mg/L			09/27/11 16:49	10
1,1,1-Trichloroethane	0.010	U	0.010	0.0026	mg/L			09/27/11 16:49	10
1,1,2-Trichloroethane	0.010	U	0.010	0.0030	mg/L			09/27/11 16:49	10
Vinyl chloride	**0.039**		0.0050	0.0013	mg/L			09/27/11 16:49	10
Xylenes, Total	0.010	U	0.010	0.0030	mg/L			09/27/11 16:49	10
1,2-Dichloroethane	0.010	U	0.010	0.0028	mg/L			09/27/11 16:49	10
1,3-Dichloropropene, Total	0.010	U	0.010	0.0050	mg/L			09/27/11 16:49	10

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*90*		*77 - 112*		*09/27/11 16:49*	*10*
Dibromofluoromethane	*101*		*78 - 119*		*09/27/11 16:49*	*10*
1,2-Dichloroethane-d4 (Surr)	*98*		*77 - 124*		*09/27/11 16:49*	*10*
Toluene-d8 (Surr)	*99*		*80 - 121*		*09/27/11 16:49*	*10*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**2.0**		0.025	0.0090	mg/L			09/27/11 17:14	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*		*09/27/11 17:14*	*50*
Dibromofluoromethane	*100*		*78 - 119*		*09/27/11 17:14*	*50*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*		*09/27/11 17:14*	*50*
Toluene-d8 (Surr)	*99*		*80 - 121*		*09/27/11 17:14*	*50*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/27/11 17:42	1
Ethylene	**0.85**	**J**	1.0	0.50	ug/L			09/27/11 17:42	1
Methane	**140**		0.58	0.29	ug/L			09/27/11 17:42	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**0.20**		0.20	0.040	mg/L		09/20/11 16:45	09/25/11 02:22	1
Manganese	**0.027**		0.010	0.00094	mg/L		09/20/11 16:45	09/25/11 02:22	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**37**		2.0	0.83	mg/L			09/21/11 03:41	10
Sulfate	**170**		4.0	1.8	mg/L			09/22/11 01:06	20
Alkalinity	**390**		5.0	1.3	mg/L			09/29/11 08:51	1
Nitrogen, Nitrate Nitrite	**0.72**		0.10	0.043	mg/L			10/05/11 09:53	1
Nitrogen, Nitrite	**0.0032**	**J**	0.020	0.0020	mg/L			09/21/11 10:24	1
TOC Dup	**5.2**		1.0	0.36	mg/L			09/28/11 13:17	1
TIC Dup	**78**	**B**	5.0	1.8	mg/L			09/29/11 09:30	5
Nitrogen, Nitrate	**0.72**		0.10	0.043	mg/L			10/05/11 15:43	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Client Sample ID: GW-33MWC-10-091911

Date Collected: 09/19/11 15:40
Date Received: 09/20/11 10:30

Lab Sample ID: 500-39470-3

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/27/11 17:39	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/27/11 17:39	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/27/11 17:39	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/27/11 17:39	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/27/11 17:39	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/27/11 17:39	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/27/11 17:39	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/27/11 17:39	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/27/11 17:39	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/27/11 17:39	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/27/11 17:39	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 17:39	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 17:39	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/27/11 17:39	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/27/11 17:39	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 17:39	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/27/11 17:39	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/27/11 17:39	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/27/11 17:39	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/27/11 17:39	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/27/11 17:39	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/27/11 17:39	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/27/11 17:39	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/27/11 17:39	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/27/11 17:39	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 17:39	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/27/11 17:39	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/27/11 17:39	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/27/11 17:39	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/27/11 17:39	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/27/11 17:39	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/27/11 17:39	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/27/11 17:39	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/27/11 17:39	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/27/11 17:39	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/27/11 17:39	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*77 - 112*		*09/27/11 17:39*	*1*
Dibromofluoromethane	*103*		*78 - 119*		*09/27/11 17:39*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*		*09/27/11 17:39*	*1*
Toluene-d8 (Surr)	*99*		*80 - 121*		*09/27/11 17:39*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/27/11 17:55	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/27/11 17:55	1
Methane	**0.35**	**J**	0.58	0.29	ug/L			09/27/11 17:55	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Client Sample ID: GW-33MWC-10-091911

Date Collected: 09/19/11 15:40
Date Received: 09/20/11 10:30

Lab Sample ID: 500-39470-3

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.49		0.20	0.040	mg/L		09/20/11 16:45	09/25/11 02:29	1
Manganese	0.017		0.010	0.00094	mg/L		09/20/11 16:45	09/25/11 02:29	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6.6		2.0	0.83	mg/L			09/21/11 03:56	10
Sulfate	55		2.0	0.90	mg/L			09/21/11 03:56	10
Alkalinity	220		5.0	1.3	mg/L			09/29/11 08:58	1
Nitrogen, Nitrate Nitrite	3.8		0.20	0.086	mg/L			10/05/11 11:09	2
Nitrogen, Nitrite	0.0034	J	0.020	0.0020	mg/L			09/21/11 10:25	1
TOC Dup	4.7		1.0	0.36	mg/L			09/28/11 13:33	1
TIC Dup	52	B	5.0	1.8	mg/L			09/29/11 09:46	5
Nitrogen, Nitrate	3.8		0.10	0.043	mg/L			10/05/11 15:43	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Client Sample ID: GW-33MWC-14-091911

Date Collected: 09/19/11 16:00
Date Received: 09/20/11 10:30

Lab Sample ID: 500-39470-4

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/27/11 18:04	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/27/11 18:04	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/27/11 18:04	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/27/11 18:04	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/27/11 18:04	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/27/11 18:04	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/27/11 18:04	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/27/11 18:04	1
Chlorobenzene	**0.0013**		0.0010	0.00024	mg/L			09/27/11 18:04	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/27/11 18:04	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/27/11 18:04	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 18:04	1
cis-1,2-Dichloroethene	**0.026**		0.0010	0.00022	mg/L			09/27/11 18:04	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/27/11 18:04	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/27/11 18:04	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 18:04	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/27/11 18:04	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/27/11 18:04	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/27/11 18:04	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/27/11 18:04	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/27/11 18:04	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/27/11 18:04	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/27/11 18:04	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/27/11 18:04	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/27/11 18:04	1
Tetrachloroethene	**0.14**		0.0010	0.00022	mg/L			09/27/11 18:04	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/27/11 18:04	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/27/11 18:04	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/27/11 18:04	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/27/11 18:04	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/27/11 18:04	1
Trichloroethene	**0.061**		0.00050	0.00018	mg/L			09/27/11 18:04	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/27/11 18:04	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/27/11 18:04	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/27/11 18:04	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/27/11 18:04	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*91*		*77 - 112*		*09/27/11 18:04*	*1*
Dibromofluoromethane	*97*		*78 - 119*		*09/27/11 18:04*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*		*09/27/11 18:04*	*1*
Toluene-d8 (Surr)	*98*		*80 - 121*		*09/27/11 18:04*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/27/11 18:07	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/27/11 18:07	1
Methane	**5.7**		0.58	0.29	ug/L			09/27/11 18:07	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Client Sample ID: GW-33MWC-14-091911

Date Collected: 09/19/11 16:00
Date Received: 09/20/11 10:30

Lab Sample ID: 500-39470-4

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.38		0.20	0.040	mg/L		09/20/11 16:45	09/25/11 02:35	1
Manganese	0.057		0.010	0.00094	mg/L		09/20/11 16:45	09/25/11 02:35	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	14		2.0	0.83	mg/L			09/21/11 04:10	10
Sulfate	72		2.0	0.90	mg/L			09/21/11 04:10	10
Alkalinity	180		5.0	1.3	mg/L			09/29/11 09:05	1
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 09:58	1
Nitrogen, Nitrite	0.0021	J	0.020	0.0020	mg/L			09/21/11 10:26	1
TOC Dup	3.3		1.0	0.36	mg/L			09/28/11 13:50	1
TIC Dup	38	B	5.0	1.8	mg/L			09/29/11 10:03	5
Nitrogen, Nitrate	0.10	U	0.10	0.043	mg/L			10/05/11 15:43	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Client Sample ID: TB-091911

Date Collected: 09/19/11 17:00
Date Received: 09/20/11 10:30

Lab Sample ID: 500-39470-5

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/27/11 18:54	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/27/11 18:54	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/27/11 18:54	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/27/11 18:54	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/27/11 18:54	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/27/11 18:54	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/27/11 18:54	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/27/11 18:54	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/27/11 18:54	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/27/11 18:54	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/27/11 18:54	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 18:54	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 18:54	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/27/11 18:54	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/27/11 18:54	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 18:54	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/27/11 18:54	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/27/11 18:54	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/27/11 18:54	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/27/11 18:54	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/27/11 18:54	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/27/11 18:54	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/27/11 18:54	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/27/11 18:54	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/27/11 18:54	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 18:54	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/27/11 18:54	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/27/11 18:54	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/27/11 18:54	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/27/11 18:54	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/27/11 18:54	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/27/11 18:54	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/27/11 18:54	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/27/11 18:54	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/27/11 18:54	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/27/11 18:54	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*89*		*77 - 112*		*09/27/11 18:54*	*1*
Dibromofluoromethane	*100*		*78 - 119*		*09/27/11 18:54*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*77 - 124*		*09/27/11 18:54*	*1*
Toluene-d8 (Surr)	*100*		*80 - 121*		*09/27/11 18:54*	*1*

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.

GC VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

GC/MS VOA

Analysis Batch: 126768

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1 - DL	GW-33MWC-13-091911	Total/NA	Water	8260B	
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	8260B	
500-39470-2 - DL	GW-33MWC-24-091911	Total/NA	Water	8260B	
500-39470-3	GW-33MWC-10-091911	Total/NA	Water	8260B	
500-39470-4	GW-33MWC-14-091911	Total/NA	Water	8260B	
500-39470-5	TB-091911	Total/NA	Water	8260B	
LCS 500-126768/4	Lab Control Sample	Total/NA	Water	8260B	
MB 500-126768/3	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 126931

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	8260B	
LCS 500-126931/5	Lab Control Sample	Total/NA	Water	8260B	
MB 500-126931/7	Method Blank	Total/NA	Water	8260B	

GC VOA

Analysis Batch: 215990

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	RSK-175	
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	RSK-175	
500-39470-3	GW-33MWC-10-091911	Total/NA	Water	RSK-175	
500-39470-4	GW-33MWC-14-091911	Total/NA	Water	RSK-175	
LCS 680-215990/18	Lab Control Sample	Total/NA	Water	RSK-175	
LCSD 680-215990/19	Lab Control Sample Dup	Total/NA	Water	RSK-175	
MB 680-215990/20	Method Blank	Total/NA	Water	RSK-175	

Metals

Prep Batch: 126029

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	3010A	
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	3010A	
500-39470-3	GW-33MWC-10-091911	Total/NA	Water	3010A	
500-39470-4	GW-33MWC-14-091911	Total/NA	Water	3010A	
LCS 500-126029/2-A	Lab Control Sample	Total/NA	Water	3010A	
MB 500-126029/1-A	Method Blank	Total/NA	Water	3010A	

Analysis Batch: 126628

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	6010B	126029
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	6010B	126029
500-39470-3	GW-33MWC-10-091911	Total/NA	Water	6010B	126029
500-39470-4	GW-33MWC-14-091911	Total/NA	Water	6010B	126029
LCS 500-126029/2-A	Lab Control Sample	Total/NA	Water	6010B	126029
MB 500-126029/1-A	Method Blank	Total/NA	Water	6010B	126029

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

General Chemistry

Analysis Batch: 126096

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	300.0	
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	300.0	
500-39470-3	GW-33MWC-10-091911	Total/NA	Water	300.0	
500-39470-4	GW-33MWC-14-091911	Total/NA	Water	300.0	
LCS 500-126096/4	Lab Control Sample	Total/NA	Water	300.0	
MB 500-126096/3	Method Blank	Total/NA	Water	300.0	

Analysis Batch: 126327

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	300.0	
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	300.0	
LCS 500-126327/4	Lab Control Sample	Total/NA	Water	300.0	
MB 500-126327/3	Method Blank	Total/NA	Water	300.0	

Analysis Batch: 126462

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	354.1	
500-39470-1 MS	GW-33MWC-13-091911	Total/NA	Water	354.1	
500-39470-1 MSD	GW-33MWC-13-091911	Total/NA	Water	354.1	
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	354.1	
500-39470-3	GW-33MWC-10-091911	Total/NA	Water	354.1	
500-39470-4	GW-33MWC-14-091911	Total/NA	Water	354.1	
LCS 500-126462/4	Lab Control Sample	Total/NA	Water	354.1	
MB 500-126462/3	Method Blank	Total/NA	Water	354.1	

Analysis Batch: 127058

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	9060	
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	9060	
500-39470-3	GW-33MWC-10-091911	Total/NA	Water	9060	
500-39470-4	GW-33MWC-14-091911	Total/NA	Water	9060	
LCS 500-127058/4	Lab Control Sample	Total/NA	Water	9060	
MB 500-127058/3	Method Blank	Total/NA	Water	9060	

Analysis Batch: 127120

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	310.1	
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	310.1	
500-39470-3	GW-33MWC-10-091911	Total/NA	Water	310.1	
500-39470-4	GW-33MWC-14-091911	Total/NA	Water	310.1	
LCS 500-127120/3	Lab Control Sample	Total/NA	Water	310.1	
MB 500-127120/2	Method Blank	Total/NA	Water	310.1	

Analysis Batch: 127220

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	9060	
500-39470-1 MS	GW-33MWC-13-091911	Total/NA	Water	9060	
500-39470-1 MSD	GW-33MWC-13-091911	Total/NA	Water	9060	
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	9060	
500-39470-3	GW-33MWC-10-091911	Total/NA	Water	9060	
500-39470-4	GW-33MWC-14-091911	Total/NA	Water	9060	
LCS 500-127220/4	Lab Control Sample	Total/NA	Water	9060	

General Chemistry (Continued)

Analysis Batch: 127220 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 500-127220/3	Method Blank	Total/NA	Water	9060	

Analysis Batch: 127685

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	353.2	
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	353.2	
500-39470-3	GW-33MWC-10-091911	Total/NA	Water	353.2	
500-39470-4	GW-33MWC-14-091911	Total/NA	Water	353.2	
LCS 500-127685/13	Lab Control Sample	Total/NA	Water	353.2	
MB 500-127685/12	Method Blank	Total/NA	Water	353.2	

Analysis Batch: 127726

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39470-1	GW-33MWC-13-091911	Total/NA	Water	Nitrate by calc	
500-39470-2	GW-33MWC-24-091911	Total/NA	Water	Nitrate by calc	
500-39470-3	GW-33MWC-10-091911	Total/NA	Water	Nitrate by calc	
500-39470-4	GW-33MWC-14-091911	Total/NA	Water	Nitrate by calc	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-39470-1 - DL	GW-33MWC-13-091911	88	98	95	97
500-39470-1	GW-33MWC-13-091911	96	105	105	101
500-39470-2	GW-33MWC-24-091911	90	101	98	99
500-39470-2 - DL	GW-33MWC-24-091911	93	100	99	99
500-39470-3	GW-33MWC-10-091911	92	103	99	99
500-39470-4	GW-33MWC-14-091911	91	97	99	98
500-39470-5	TB-091911	89	100	97	100
LCS 500-126768/4	Lab Control Sample	94	95	91	100
LCS 500-126931/5	Lab Control Sample	99	100	94	99
MB 500-126768/3	Method Blank	93	94	94	100
MB 500-126931/7	Method Blank	94	98	97	97

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

QC Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-126768/3
Matrix: Water
Analysis Batch: 126768

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/27/11 08:35	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/27/11 08:35	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/27/11 08:35	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/27/11 08:35	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/27/11 08:35	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/27/11 08:35	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/27/11 08:35	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/27/11 08:35	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/27/11 08:35	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/27/11 08:35	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/27/11 08:35	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 08:35	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 08:35	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/27/11 08:35	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/27/11 08:35	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 08:35	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/27/11 08:35	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/27/11 08:35	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/27/11 08:35	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/27/11 08:35	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/27/11 08:35	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/27/11 08:35	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/27/11 08:35	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/27/11 08:35	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/27/11 08:35	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 08:35	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/27/11 08:35	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/27/11 08:35	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/27/11 08:35	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/27/11 08:35	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/27/11 08:35	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/27/11 08:35	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/27/11 08:35	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/27/11 08:35	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/27/11 08:35	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/27/11 08:35	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*		*09/27/11 08:35*	*1*
Dibromofluoromethane	*94*		*78 - 119*		*09/27/11 08:35*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*77 - 124*		*09/27/11 08:35*	*1*
Toluene-d8 (Surr)	*100*		*80 - 121*		*09/27/11 08:35*	*1*

Lab Sample ID: LCS 500-126768/4
Matrix: Water
Analysis Batch: 126768

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0492		mg/L		98	43 - 153

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-126768/4
Matrix: Water
Analysis Batch: 126768

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Benzene	0.0500	0.0505		mg/L		101	74 - 113
Bromodichloromethane	0.0500	0.0483		mg/L		97	73 - 120
Bromoform	0.0500	0.0418		mg/L		84	64 - 126
Bromomethane	0.0500	0.0464		mg/L		93	46 - 155
Methyl Ethyl Ketone	0.0500	0.0403		mg/L		81	42 - 152
Carbon disulfide	0.0500	0.0362		mg/L		72	36 - 110
Carbon tetrachloride	0.0500	0.0491		mg/L		98	58 - 132
Chlorobenzene	0.0500	0.0489		mg/L		98	81 - 111
Chloroethane	0.0500	0.0418		mg/L		84	54 - 149
Chloroform	0.0500	0.0475		mg/L		95	71 - 116
Chloromethane	0.0500	0.0334		mg/L		67	36 - 148
cis-1,2-Dichloroethene	0.0500	0.0488		mg/L		98	66 - 111
cis-1,3-Dichloropropene	0.0538	0.0478		mg/L		89	65 - 114
Dibromochloromethane	0.0500	0.0471		mg/L		94	73 - 118
1,1-Dichloroethane	0.0500	0.0469		mg/L		94	64 - 117
1,1-Dichloroethene	0.0500	0.0438		mg/L		88	60 - 126
1,2-Dichloropropane	0.0500	0.0504		mg/L		101	68 - 123
Ethylbenzene	0.0500	0.0507		mg/L		101	79 - 114
2-Hexanone	0.0500	0.0419		mg/L		84	55 - 138
Methylene Chloride	0.0500	0.0458		mg/L		92	65 - 125
methyl isobutyl ketone	0.0500	0.0423		mg/L		85	56 - 138
Methyl tert-butyl ether	0.0500	0.0376		mg/L		75	57 - 119
Styrene	0.0500	0.0499		mg/L		100	76 - 118
1,1,2,2-Tetrachloroethane	0.0500	0.0489		mg/L		98	66 - 121
Tetrachloroethene	0.0500	0.0505		mg/L		101	76 - 114
Toluene	0.0500	0.0495		mg/L		99	76 - 121
trans-1,2-Dichloroethene	0.0500	0.0485		mg/L		97	67 - 120
trans-1,3-Dichloropropene	0.0486	0.0420		mg/L		86	60 - 119
1,1,1-Trichloroethane	0.0500	0.0503		mg/L		101	66 - 128
1,1,2-Trichloroethane	0.0500	0.0463		mg/L		93	62 - 137
Trichloroethene	0.0500	0.0495		mg/L		99	75 - 116
Vinyl chloride	0.0500	0.0390		mg/L		78	47 - 138
Xylenes, Total	0.150	0.155		mg/L		103	74 - 117
1,2-Dichloroethane	0.0500	0.0452		mg/L		90	69 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*94*		*77 - 112*
Dibromofluoromethane	*95*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*91*		*77 - 124*
Toluene-d8 (Surr)	*100*		*80 - 121*

Lab Sample ID: MB 500-126931/7
Matrix: Water
Analysis Batch: 126931

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 13:46	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 13:46	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 13:46	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-126931/7
Matrix: Water
Analysis Batch: 126931

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 13:46	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 13:46	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 13:46	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 13:46	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 13:46	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 13:46	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 13:46	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 13:46	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 13:46	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 13:46	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 13:46	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 13:46	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 13:46	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 13:46	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 13:46	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 13:46	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 13:46	1
Methylene Chloride	0.00649		0.0050	0.00063	mg/L			09/28/11 13:46	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 13:46	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 13:46	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 13:46	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 13:46	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 13:46	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 13:46	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 13:46	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 13:46	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 13:46	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 13:46	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 13:46	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 13:46	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 13:46	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 13:46	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 13:46	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*77 - 112*		*09/28/11 13:46*	*1*
Dibromofluoromethane	*98*		*78 - 119*		*09/28/11 13:46*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*77 - 124*		*09/28/11 13:46*	*1*
Toluene-d8 (Surr)	*97*		*80 - 121*		*09/28/11 13:46*	*1*

Lab Sample ID: LCS 500-126931/5
Matrix: Water
Analysis Batch: 126931

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0448		mg/L		90	43 - 153
Benzene	0.0500	0.0494		mg/L		99	74 - 113
Bromodichloromethane	0.0500	0.0470		mg/L		94	73 - 120
Bromoform	0.0500	0.0520		mg/L		104	64 - 126

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-126931/5
Matrix: Water
Analysis Batch: 126931

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Bromomethane	0.0500	0.0449		mg/L		90	46 - 155
Methyl Ethyl Ketone	0.0500	0.0456		mg/L		91	42 - 152
Carbon disulfide	0.0500	0.0420		mg/L		84	36 - 110
Carbon tetrachloride	0.0500	0.0544		mg/L		109	58 - 132
Chlorobenzene	0.0500	0.0498		mg/L		100	81 - 111
Chloroethane	0.0500	0.0377		mg/L		75	54 - 149
Chloroform	0.0500	0.0472		mg/L		94	71 - 116
Chloromethane	0.0500	0.0401		mg/L		80	36 - 148
cis-1,2-Dichloroethene	0.0500	0.0507		mg/L		101	66 - 111
cis-1,3-Dichloropropene	0.0538	0.0505		mg/L		94	65 - 114
Dibromochloromethane	0.0500	0.0495		mg/L		99	73 - 118
1,1-Dichloroethane	0.0500	0.0488		mg/L		98	64 - 117
1,1-Dichloroethene	0.0500	0.0466		mg/L		93	60 - 126
1,2-Dichloropropane	0.0500	0.0493		mg/L		99	68 - 123
Ethylbenzene	0.0500	0.0510		mg/L		102	79 - 114
2-Hexanone	0.0500	0.0476		mg/L		95	55 - 138
Methylene Chloride	0.0500	0.0549		mg/L		110	65 - 125
methyl isobutyl ketone	0.0500	0.0471		mg/L		94	56 - 138
Methyl tert-butyl ether	0.0500	0.0404		mg/L		81	57 - 119
Styrene	0.0500	0.0508		mg/L		102	76 - 118
1,1,2,2-Tetrachloroethane	0.0500	0.0498		mg/L		100	66 - 121
Tetrachloroethene	0.0500	0.0509		mg/L		102	76 - 114
Toluene	0.0500	0.0489		mg/L		98	76 - 121
trans-1,2-Dichloroethene	0.0500	0.0499		mg/L		100	67 - 120
trans-1,3-Dichloropropene	0.0486	0.0440		mg/L		90	60 - 119
1,1,1-Trichloroethane	0.0500	0.0474		mg/L		95	66 - 128
1,1,2-Trichloroethane	0.0500	0.0481		mg/L		96	62 - 137
Trichloroethene	0.0500	0.0477		mg/L		95	75 - 116
Vinyl chloride	0.0500	0.0472		mg/L		94	47 - 138
Xylenes, Total	0.150	0.148		mg/L		99	74 - 117
1,2-Dichloroethane	0.0500	0.0470		mg/L		94	69 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*
Dibromofluoromethane	*100*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*94*		*77 - 124*
Toluene-d8 (Surr)	*99*		*80 - 121*

Method: RSK-175 - Dissolved Gases (GC)

Lab Sample ID: MB 680-215990/20
Matrix: Water
Analysis Batch: 215990

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/27/11 14:14	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/27/11 14:14	1
Methane	0.58	U	0.58	0.29	ug/L			09/27/11 14:14	1

Method: RSK-175 - Dissolved Gases (GC) (Continued)

Lab Sample ID: LCS 680-215990/18 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 215990

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Ethane	282	297		ug/L		105	75 - 125
Ethylene	271	289		ug/L		107	75 - 125
Methane	153	153		ug/L		100	75 - 125

Lab Sample ID: LCSD 680-215990/19 — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 215990

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Ethane	282	328		ug/L		116	75 - 125	10	30
Ethylene	271	319		ug/L		118	75 - 125	10	30
Methane	153	183		ug/L		119	75 - 125	17	30

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 500-126029/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126628 — **Prep Batch: 126029**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.20	U	0.20	0.040	mg/L		09/20/11 16:45	09/25/11 02:03	1
Manganese	0.010	U	0.010	0.00094	mg/L		09/20/11 16:45	09/25/11 02:03	1

Lab Sample ID: LCS 500-126029/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126628 — **Prep Batch: 126029**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Iron	1.00	1.06		mg/L		106	80 - 120
Manganese	0.500	0.524		mg/L		105	80 - 120

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 500-126096/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126096

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.20	U	0.20	0.083	mg/L			09/20/11 20:46	1
Sulfate	0.20	U	0.20	0.090	mg/L			09/20/11 20:46	1

Lab Sample ID: LCS 500-126096/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126096

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloride	3.00	2.85		mg/L		95	90 - 110
Sulfate	5.00	4.92		mg/L		98	90 - 110

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: MB 500-126327/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126327

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.20	U	0.20	0.083	mg/L			09/21/11 17:43	1
Sulfate	0.20	U	0.20	0.090	mg/L			09/21/11 17:43	1

Lab Sample ID: LCS 500-126327/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126327

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloride	3.00	2.83		mg/L		94	90 - 110
Sulfate	5.00	5.01		mg/L		100	90 - 110

Method: 310.1 - Alkalinity

Lab Sample ID: MB 500-127120/2 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127120

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	1.3	mg/L			09/29/11 08:20	1

Lab Sample ID: LCS 500-127120/3 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127120

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Alkalinity	100	97.4		mg/L		97	80 - 120

Method: 353.2 - Nitrogen, Nitrate-Nitrite

Lab Sample ID: MB 500-127685/12 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127685

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 09:47	1

Lab Sample ID: LCS 500-127685/13 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127685

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Nitrogen, Nitrate Nitrite	1.00	0.980		mg/L		98	80 - 120

Method: 354.1 - Nitrogen, Nitrite

Lab Sample ID: MB 500-126462/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126462

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Nitrite	0.020	U	0.020	0.0020	mg/L			09/21/11 10:21	1

Lab Sample ID: LCS 500-126462/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126462

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Nitrogen, Nitrite	0.100	0.107		mg/L		107	80 - 120

Lab Sample ID: 500-39470-1 MS — **Client Sample ID: GW-33MWC-13-091911**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126462

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Nitrogen, Nitrite	0.0036	J	0.100	0.108		mg/L		104	75 - 125

Lab Sample ID: 500-39470-1 MSD — **Client Sample ID: GW-33MWC-13-091911**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126462

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Nitrogen, Nitrite	0.0036	J	0.100	0.108		mg/L		105	75 - 125	1	20

Method: 9060 - Organic Carbon, Total (TOC)

Lab Sample ID: MB 500-127058/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127058

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TOC Dup	1.0	U	1.0	0.36	mg/L			09/28/11 09:23	1

Lab Sample ID: LCS 500-127058/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127058

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
TOC Result 1	10.0	9.78		mg/L		98	80 - 120
TOC Result 2	10.0	9.80		mg/L		98	80 - 120
TOC Dup	10.0	9.79		mg/L		98	80 - 120

Lab Sample ID: MB 500-127220/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127220

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TIC Dup	0.750	J	1.0	0.36	mg/L			09/29/11 08:21	1

Method: 9060 - Organic Carbon, Total (TOC) (Continued)

Lab Sample ID: LCS 500-127220/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127220

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
TIC Res 1	10.0	9.65		mg/L		96	80 - 120
TIC Res 2	10.0	9.42		mg/L		94	80 - 120
TIC Dup	10.0	9.53		mg/L		95	80 - 120

Lab Sample ID: 500-39470-1 MS — **Client Sample ID: GW-33MWC-13-091911**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127220

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
TIC Res 1	60		25.0	82.5		mg/L		91	75 - 125
TIC Res 2	55		25.0	82.5		mg/L		109	75 - 125
TIC Dup	57	B	25.0	82.5		mg/L		100	75 - 125

Lab Sample ID: 500-39470-1 MSD — **Client Sample ID: GW-33MWC-13-091911**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127220

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
TIC Res 1	60		25.0	82.3		mg/L		91	75 - 125	0	20
TIC Res 2	55		25.0	82.3		mg/L		108	75 - 125	0	20
TIC Dup	57	B	25.0	82.3		mg/L		100	75 - 125	0	20

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q
TestAmerica Savannah	A2LA	DoD ELAP		0399-01
TestAmerica Savannah	A2LA	ISO/IEC 17025		399.01
TestAmerica Savannah	Alabama	State Program	4	41450
TestAmerica Savannah	Arkansas	Arkansas DOH	6	N/A
TestAmerica Savannah	Arkansas	State Program	6	88-0692
TestAmerica Savannah	California	NELAC	9	3217CA
TestAmerica Savannah	Colorado	State Program	8	N/A
TestAmerica Savannah	Connecticut	State Program	1	PH-0161
TestAmerica Savannah	Delaware	State Program	3	N/A
TestAmerica Savannah	Florida	NELAC	4	E87052
TestAmerica Savannah	Georgia	Georgia EPD	4	N/A
TestAmerica Savannah	Georgia	State Program	4	803
TestAmerica Savannah	Guam	State Program	9	09-005r
TestAmerica Savannah	Hawaii	State Program	9	N/A
TestAmerica Savannah	Illinois	NELAC	5	200022
TestAmerica Savannah	Indiana	State Program	5	N/A
TestAmerica Savannah	Iowa	State Program	7	353
TestAmerica Savannah	Kentucky	Kentucky UST	4	18
TestAmerica Savannah	Kentucky	State Program	4	90084
TestAmerica Savannah	Louisiana	NELAC	6	LA100015
TestAmerica Savannah	Louisiana	NELAC	6	30690
TestAmerica Savannah	Maine	State Program	1	GA00006
TestAmerica Savannah	Maryland	State Program	3	250
TestAmerica Savannah	Massachusetts	State Program	1	M-GA006
TestAmerica Savannah	Michigan	State Program	5	9925
TestAmerica Savannah	Mississippi	State Program	4	N/A
TestAmerica Savannah	Montana	State Program	8	CERT0081
TestAmerica Savannah	Nebraska	State Program	7	TestAmerica-Savannah
TestAmerica Savannah	New Jersey	NELAC	2	GA769

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge (423535)

TestAmerica Job ID: 500-39470-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Savannah	New Mexico	State Program	6	N/A
TestAmerica Savannah	New York	NELAC	2	10842
TestAmerica Savannah	North Carolina	North Carolina DENR	4	269
TestAmerica Savannah	North Carolina	North Carolina PHL	4	13701
TestAmerica Savannah	Oklahoma	State Program	6	9984
TestAmerica Savannah	Pennsylvania	NELAC	3	68-00474
TestAmerica Savannah	Puerto Rico	State Program	2	GA00006
TestAmerica Savannah	Rhode Island	State Program	1	LAO00244
TestAmerica Savannah	South Carolina	State Program	4	98001
TestAmerica Savannah	Tennessee	State Program	4	TN02961
TestAmerica Savannah	Texas	NELAC	6	T104704185-08-TX
TestAmerica Savannah	USDA	USDA		SAV 3-04
TestAmerica Savannah	Vermont	State Program	1	87052
TestAmerica Savannah	Virginia	NELAC Secondary AB	3	460161
TestAmerica Savannah	Virginia	State Program	3	302
TestAmerica Savannah	Washington	State Program	10	C1794
TestAmerica Savannah	West Virginia	West Virginia DEP	3	94
TestAmerica Savannah	West Virginia	West Virginia DHHR (DW)	3	9950C
TestAmerica Savannah	Wisconsin	State Program	5	999819810
TestAmerica Savannah	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package . Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Lab Job #: 500- 39470

Chain of Custody Number:

Page 1 of 1

Temperature °C of Cooler: 2.8

(optional)

Report To
Contact: Monica Martin
Company: CH2M Hill
Address: 1034 S. Brentwood
Address: St. Louis MO 63117
Phone: 314-605-4616
Fax:
E-Mail:

(optional)

Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Client: CH2M Hill
Client Project #: 423535
Project Name: Crab Orchard
Project Location/State: Marion IL
Lab Project #:
Sampler: G. Roberts
Lab PM:

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOC 8260B (Preservative 1)	RSK-175 modified (Preservative 7)	SW-846 9060 (Preservative 2)	Select Metals 6010B (Preservative 3)	Alkalinity EPA 310.1 (Preservative 7)	Chloride and Sulfate EPA 325.2 (Preservative 7)	Nitrate EPA 353.2 (Preservative 7)	Nitrite + Nitrate EPA 353.2 (Preservative 2)		Comments
1		GW-33MWC-13-091911	9/19/11	1115	13	W	X	X	X	X	X	X	X	X		
2		GW-33MWC-24-091911	9/19/11	1205	13	W	X	X	X	X	X	X	X	X		
3		GW-33MWC-10-091911	9/19/11	1540	13	W	X	X	X	X	X	X	X	X		
4		GW-33MWC-14-091911	9/19/11	1600	13	W	X	X	X	X	X	X	X	X		
5		TB-091911	9/19/11	1700	2	W	X									

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other
Requested Due Date _____

Sample Disposal
[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
G. Roberts	CH2M Hill	9/19/11	1720	[signature]	TestAmerica	09/20/11	1030

Lab Courier
Shipped
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Phone (708) 534-5200 Fax (708) 534-5211

Chain of Custody Record

TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Knapp, Jim	Carrier Tracking No(s):	COC No: 500-7529.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: jim.knapp@testamericainc.com		Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.				Job #: 500-39470-1
Address: 5102 LaRoche Avenue,	Due Date Requested: 9/29/2011			
City: Savannah	TAT Requested (days):			
State, Zip: GA, 31404				
Phone: 912-354-7858(Tel) 912-352-0165(Fax)	PO #:			
Email:	WO #:			
Project Name: Crab Orchard Wildlife Refuge #2	Project #: 50005970			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCl, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	RSK_175/ Methane, Ethane, & Ethene	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
GW-33MWC-13-091911 (500-39470-1)	9/19/11	11:15 Central		Water			X	3	
GW-33MWC-24-091911 (500-39470-2)	9/19/11	12:05 Central		Water			X	3	
GW-33MWC-10-091911 (500-39470-3)	9/19/11	15:40 Central		Water			X	3	
GW-33MWC-14-091911 (500-39470-4)	9/19/11	16:00 Central		Water			X	3	

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[illegible]	9/20/11 1032	TestAmerica	[illegible]	9/21/11 0930	TA
Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Relinquished by	Date/Time	Company	Received by	Date/Time	Company

Custody Seals Intact: ☐ Yes ☐ No

Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 3.4

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-39470-1

Login Number: 39470

List Source: TestAmerica Chicago

List Number: 1

Creator: Kelsey, Shawn M

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	True	

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-39470-1

Login Number: 39470
List Number: 1
Creator: Kicklighter, Marilyn

List Source: TestAmerica Savannah
List Creation: 09/21/11 11:08 AM

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-39539-1
Client Project/Site: Crab Orchard Wildlife Refuge(423535)

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/05/2011 05:22:12 PM
Donna Ingersoll
Project Manager II
donna.ingersoll@testamericainc.com

Designee for

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Definitions 16
QC Association 17
Surrogate Summary 20
QC Sample Results 21
Certification Summary 28
Chain of Custody 30
Receipt Checklists 32

Job ID: 500-39539-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-39539-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC/MS VOA
No analytical or quality issues were noted.

GC VOA
Method(s) RSK-175: The field blank associated with these samples contained a detection above the method detection limit (MDL) for the following analyte: methane.

Method(s) RSK-175: The matrix spike / matrix spike duplicate (MS/MSD) precision for batch 216124 was outside control limits for Methane.

Method(s) RSK-175: The equipment blank associated with these samples contained a detection above the reporting limit (RL) for the following analyte: Methane.

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

General Chemistry
Method(s) 300.0, 9056: The method blank for IC batch 127686 contained chloride above the reporting limit (RL). The associated samples contained detects for this analyte at concentrations greater than 10X the value found in the method blank; therefore, re-analysis of samples was not performed.

No other analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Client Sample ID: EB-001-092011 — Lab Sample ID: 500-39539-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methane	0.59		0.58	0.29	ug/L	1		RSK-175	Total/NA
Sulfate	0.21		0.20	0.090	mg/L	1		300.0	Total/NA
Nitrogen, Nitrite	0.0047	J B	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	0.62	J	1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	0.56	J B	1.0	0.36	mg/L	1		9060	Total/NA

Client Sample ID: FB-001-092011 — Lab Sample ID: 500-39539-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methane	0.35	J	0.58	0.29	ug/L	1		RSK-175	Total/NA
Sulfate	0.11	J	0.20	0.090	mg/L	1		300.0	Total/NA
Alkalinity	2.6	J	5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrite	0.0049	J B	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	1.7		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	0.48	J B	1.0	0.36	mg/L	1		9060	Total/NA

Client Sample ID: GW-33MWC-02-092011 — Lab Sample ID: 500-39539-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.12		0.0010	0.00022	mg/L	1		8260B	Total/NA
Trichloroethene - DL	0.43		0.0025	0.00090	mg/L	5		8260B	Total/NA
Methane	0.46	J	0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	3.7		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.92		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	1100	B	100	42	mg/L	500		300.0	Total/NA
Sulfate	720		20	9.0	mg/L	100		300.0	Total/NA
Alkalinity	410		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrite	0.0070	J B	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	4.0		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	47	B	5.0	1.8	mg/L	5		9060	Total/NA

Client Sample ID: GW-33MWC-36-092011 — Lab Sample ID: 500-39539-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.010		0.0010	0.00022	mg/L	1		8260B	Total/NA
Trichloroethene	0.0086		0.00050	0.00018	mg/L	1		8260B	Total/NA
Methane	0.65		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.082	J	0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.12		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	19		2.0	0.83	mg/L	10		300.0	Total/NA
Sulfate	93		2.0	0.90	mg/L	10		300.0	Total/NA
Alkalinity	330		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrate Nitrite	0.25		0.10	0.043	mg/L	1		353.2	Total/NA
Nitrogen, Nitrite	0.013	J B	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	2.6		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	43	B	5.0	1.8	mg/L	5		9060	Total/NA
Nitrogen, Nitrate	0.24		0.10	0.043	mg/L	1		Nitrate by calc	Total/NA

Client Sample ID: TB-001-092011 — Lab Sample ID: 500-39539-5

No Detections

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
RSK-175	Dissolved Gases (GC)	RSK	TAL SAV
6010B	Metals (ICP)	SW846	TAL CHI
300.0	Anions, Ion Chromatography	MCAWW	TAL CHI
310.1	Alkalinity	MCAWW	TAL CHI
353.2	Nitrogen, Nitrate-Nitrite	MCAWW	TAL CHI
354.1	Nitrogen, Nitrite	MCAWW	TAL CHI
9060	Organic Carbon, Total (TOC)	SW846	TAL CHI
Nitrate by calc	Nitrogen, Nitrate-Nitrite	SM	TAL CHI

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique , RSKSOP-175, Rev. 0, 8/11/94, USEPA Research Lab

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-39539-1	EB-001-092011	Water	09/20/11 08:00	09/21/11 10:10
500-39539-2	FB-001-092011	Water	09/20/11 08:10	09/21/11 10:10
500-39539-3	GW-33MWC-02-092011	Water	09/20/11 09:45	09/21/11 10:10
500-39539-4	GW-33MWC-36-092011	Water	09/20/11 10:00	09/21/11 10:10
500-39539-5	TB-001-092011	Water	09/20/11 17:00	09/21/11 10:10

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Client Sample ID: EB-001-092011

Date Collected: 09/20/11 08:00
Date Received: 09/21/11 10:10

Lab Sample ID: 500-39539-1

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 00:16	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 00:16	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 00:16	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 00:16	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 00:16	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 00:16	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 00:16	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 00:16	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 00:16	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 00:16	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 00:16	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 00:16	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 00:16	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 00:16	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 00:16	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 00:16	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 00:16	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 00:16	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 00:16	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 00:16	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 00:16	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 00:16	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 00:16	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 00:16	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 00:16	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 00:16	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 00:16	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 00:16	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 00:16	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 00:16	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 00:16	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 00:16	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 00:16	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 00:16	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 00:16	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 00:16	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*91*		*77 - 112*		*09/28/11 00:16*	*1*
Dibromofluoromethane	*97*		*78 - 119*		*09/28/11 00:16*	*1*
1,2-Dichloroethane-d4 (Surr)	*92*		*77 - 124*		*09/28/11 00:16*	*1*
Toluene-d8 (Surr)	*96*		*80 - 121*		*09/28/11 00:16*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/27/11 18:20	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/27/11 18:20	1
Methane	**0.59**		0.58	0.29	ug/L			09/27/11 18:20	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Client Sample ID: EB-001-092011

Date Collected: 09/20/11 08:00
Date Received: 09/21/11 10:10

Lab Sample ID: 500-39539-1

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.20	U	0.20	0.040	mg/L		09/21/11 16:00	09/22/11 21:47	1
Manganese	0.010	U	0.010	0.00094	mg/L		09/21/11 16:00	09/22/11 21:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.20	U	0.20	0.083	mg/L			09/22/11 01:21	1
Sulfate	**0.21**		0.20	0.090	mg/L			09/22/11 01:21	1
Alkalinity	5.0	U	5.0	1.3	mg/L			09/29/11 09:11	1
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 10:00	1
Nitrogen, Nitrite	**0.0047**	**J B**	0.020	0.0020	mg/L			09/21/11 19:07	1
TOC Dup	**0.62**	**J**	1.0	0.36	mg/L			10/04/11 17:38	1
TIC Dup	**0.56**	**J B**	1.0	0.36	mg/L			10/05/11 09:08	1
Nitrogen, Nitrate	0.10	U	0.10	0.043	mg/L			10/05/11 15:43	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Client Sample ID: FB-001-092011

Date Collected: 09/20/11 08:10
Date Received: 09/21/11 10:10

Lab Sample ID: 500-39539-2

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 00:40	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 00:40	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 00:40	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 00:40	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 00:40	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 00:40	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 00:40	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 00:40	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 00:40	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 00:40	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 00:40	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 00:40	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 00:40	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 00:40	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 00:40	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 00:40	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 00:40	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 00:40	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 00:40	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 00:40	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 00:40	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 00:40	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 00:40	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 00:40	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 00:40	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 00:40	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 00:40	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 00:40	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 00:40	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 00:40	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 00:40	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 00:40	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 00:40	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 00:40	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 00:40	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 00:40	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*95*		*77 - 112*		*09/28/11 00:40*	*1*
Dibromofluoromethane	*100*		*78 - 119*		*09/28/11 00:40*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*77 - 124*		*09/28/11 00:40*	*1*
Toluene-d8 (Surr)	*96*		*80 - 121*		*09/28/11 00:40*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/27/11 18:33	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/27/11 18:33	1
Methane	**0.35**	**J**	0.58	0.29	ug/L			09/27/11 18:33	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Client Sample ID: FB-001-092011

Date Collected: 09/20/11 08:10
Date Received: 09/21/11 10:10

Lab Sample ID: 500-39539-2

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.20	U	0.20	0.040	mg/L		09/21/11 16:00	09/22/11 22:18	1
Manganese	0.010	U	0.010	0.00094	mg/L		09/21/11 16:00	09/22/11 22:18	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.20	U	0.20	0.083	mg/L			09/22/11 01:35	1
Sulfate	**0.11**	**J**	0.20	0.090	mg/L			09/22/11 01:35	1
Alkalinity	**2.6**	**J**	5.0	1.3	mg/L			09/29/11 09:22	1
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 10:02	1
Nitrogen, Nitrite	**0.0049**	**J B**	0.020	0.0020	mg/L			09/21/11 19:09	1
TOC Dup	**1.7**		1.0	0.36	mg/L			10/04/11 17:54	1
TIC Dup	**0.48**	**J B**	1.0	0.36	mg/L			10/05/11 09:25	1
Nitrogen, Nitrate	0.10	U	0.10	0.043	mg/L			10/05/11 15:43	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Client Sample ID: GW-33MWC-02-092011

Date Collected: 09/20/11 09:45
Date Received: 09/21/11 10:10

Lab Sample ID: 500-39539-3

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/27/11 20:59	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/27/11 20:59	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/27/11 20:59	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/27/11 20:59	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/27/11 20:59	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/27/11 20:59	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/27/11 20:59	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:59	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:59	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/27/11 20:59	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/27/11 20:59	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:59	1
cis-1,2-Dichloroethene	**0.12**		0.0010	0.00022	mg/L			09/27/11 20:59	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:59	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/27/11 20:59	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:59	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/27/11 20:59	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/27/11 20:59	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/27/11 20:59	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/27/11 20:59	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/27/11 20:59	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/27/11 20:59	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:59	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/27/11 20:59	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/27/11 20:59	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 20:59	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/27/11 20:59	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/27/11 20:59	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/27/11 20:59	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/27/11 20:59	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/27/11 20:59	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/27/11 20:59	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/27/11 20:59	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:59	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/27/11 20:59	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*86*		*77 - 112*		*09/27/11 20:59*	*1*
Dibromofluoromethane	*86*		*78 - 119*		*09/27/11 20:59*	*1*
1,2-Dichloroethane-d4 (Surr)	*84*		*77 - 124*		*09/27/11 20:59*	*1*
Toluene-d8 (Surr)	*91*		*80 - 121*		*09/27/11 20:59*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**0.43**		0.0025	0.00090	mg/L			09/27/11 23:52	5

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*77 - 112*		*09/27/11 23:52*	*5*
Dibromofluoromethane	*97*		*78 - 119*		*09/27/11 23:52*	*5*
1,2-Dichloroethane-d4 (Surr)	*96*		*77 - 124*		*09/27/11 23:52*	*5*
Toluene-d8 (Surr)	*98*		*80 - 121*		*09/27/11 23:52*	*5*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/28/11 11:15	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/28/11 11:15	1
Methane	**0.46**	**J**	0.58	0.29	ug/L			09/28/11 11:15	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**3.7**		0.20	0.040	mg/L		09/21/11 16:00	09/22/11 22:39	1
Manganese	**0.92**		0.010	0.00094	mg/L		09/21/11 16:00	09/22/11 22:39	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**1100**	**B**	100	42	mg/L			09/29/11 15:40	500
Sulfate	**720**		20	9.0	mg/L			09/29/11 15:26	100
Alkalinity	**410**		5.0	1.3	mg/L			09/29/11 09:53	1
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 10:04	1
Nitrogen, Nitrite	**0.0070**	**J B**	0.020	0.0020	mg/L			09/21/11 19:10	1
TOC Dup	**4.0**		1.0	0.36	mg/L			10/04/11 18:11	1
TIC Dup	**47**	**B**	5.0	1.8	mg/L			10/05/11 09:42	5
Nitrogen, Nitrate	0.10	U	0.10	0.043	mg/L			10/05/11 15:43	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Client Sample ID: GW-33MWC-36-092011

Date Collected: 09/20/11 10:00
Date Received: 09/21/11 10:10

Lab Sample ID: 500-39539-4

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 01:05	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 01:05	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 01:05	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 01:05	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 01:05	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 01:05	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 01:05	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:05	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 01:05	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 01:05	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 01:05	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 01:05	1
cis-1,2-Dichloroethene	**0.010**		0.0010	0.00022	mg/L			09/28/11 01:05	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:05	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 01:05	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 01:05	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 01:05	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 01:05	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 01:05	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 01:05	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 01:05	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 01:05	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:05	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 01:05	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 01:05	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 01:05	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 01:05	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 01:05	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 01:05	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 01:05	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 01:05	1
Trichloroethene	**0.0086**		0.00050	0.00018	mg/L			09/28/11 01:05	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 01:05	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 01:05	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:05	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 01:05	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*77 - 112*		*09/28/11 01:05*	*1*
Dibromofluoromethane	*102*		*78 - 119*		*09/28/11 01:05*	*1*
1,2-Dichloroethane-d4 (Surr)	*102*		*77 - 124*		*09/28/11 01:05*	*1*
Toluene-d8 (Surr)	*102*		*80 - 121*		*09/28/11 01:05*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/27/11 18:59	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/27/11 18:59	1
Methane	**0.65**		0.58	0.29	ug/L			09/27/11 18:59	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Client Sample ID: GW-33MWC-36-092011

Lab Sample ID: 500-39539-4

Date Collected: 09/20/11 10:00
Date Received: 09/21/11 10:10

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.082	J	0.20	0.040	mg/L		09/21/11 16:00	09/22/11 22:46	1
Manganese	0.12		0.010	0.00094	mg/L		09/21/11 16:00	09/22/11 22:46	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	19		2.0	0.83	mg/L			09/22/11 02:32	10
Sulfate	93		2.0	0.90	mg/L			09/22/11 02:32	10
Alkalinity	330		5.0	1.3	mg/L			09/29/11 10:00	1
Nitrogen, Nitrate Nitrite	0.25		0.10	0.043	mg/L			10/05/11 10:06	1
Nitrogen, Nitrite	0.013	J B	0.020	0.0020	mg/L			09/21/11 19:11	1
TOC Dup	2.6		1.0	0.36	mg/L			10/04/11 18:27	1
TIC Dup	43	B	5.0	1.8	mg/L			10/05/11 09:58	5
Nitrogen, Nitrate	0.24		0.10	0.043	mg/L			10/05/11 15:43	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Client Sample ID: TB-001-092011

Date Collected: 09/20/11 17:00
Date Received: 09/21/11 10:10

Lab Sample ID: 500-39539-5

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 01:29	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 01:29	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 01:29	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 01:29	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 01:29	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 01:29	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 01:29	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:29	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 01:29	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 01:29	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 01:29	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 01:29	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 01:29	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:29	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 01:29	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 01:29	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 01:29	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 01:29	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 01:29	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 01:29	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 01:29	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 01:29	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:29	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 01:29	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 01:29	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 01:29	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 01:29	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 01:29	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 01:29	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 01:29	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 01:29	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 01:29	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 01:29	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 01:29	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:29	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 01:29	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*77 - 112*		*09/28/11 01:29*	*1*
Dibromofluoromethane	*102*		*78 - 119*		*09/28/11 01:29*	*1*
1,2-Dichloroethane-d4 (Surr)	*101*		*77 - 124*		*09/28/11 01:29*	*1*
Toluene-d8 (Surr)	*99*		*80 - 121*		*09/28/11 01:29*	*1*

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

GC VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

GC/MS VOA

Analysis Batch: 126868

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-1	EB-001-092011	Total/NA	Water	8260B	
500-39539-2	FB-001-092011	Total/NA	Water	8260B	
500-39539-3 - DL	GW-33MWC-02-092011	Total/NA	Water	8260B	
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	8260B	
500-39539-4	GW-33MWC-36-092011	Total/NA	Water	8260B	
500-39539-5	TB-001-092011	Total/NA	Water	8260B	
LCS 500-126868/4	Lab Control Sample	Total/NA	Water	8260B	
MB 500-126868/3	Method Blank	Total/NA	Water	8260B	

GC VOA

Analysis Batch: 215990

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-1	EB-001-092011	Total/NA	Water	RSK-175	
500-39539-2	FB-001-092011	Total/NA	Water	RSK-175	
500-39539-4	GW-33MWC-36-092011	Total/NA	Water	RSK-175	
LCS 680-215990/18	Lab Control Sample	Total/NA	Water	RSK-175	
LCSD 680-215990/19	Lab Control Sample Dup	Total/NA	Water	RSK-175	
MB 680-215990/20	Method Blank	Total/NA	Water	RSK-175	

Analysis Batch: 216124

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	RSK-175	
LCS 680-216124/25	Lab Control Sample	Total/NA	Water	RSK-175	
MB 680-216124/24	Method Blank	Total/NA	Water	RSK-175	

Metals

Prep Batch: 126193

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-1	EB-001-092011	Total/NA	Water	3010A	
500-39539-1 DU	EB-001-092011	Total/NA	Water	3010A	
500-39539-1 MS	EB-001-092011	Total/NA	Water	3010A	
500-39539-1 MSD	EB-001-092011	Total/NA	Water	3010A	
500-39539-2	FB-001-092011	Total/NA	Water	3010A	
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	3010A	
500-39539-4	GW-33MWC-36-092011	Total/NA	Water	3010A	
LCS 500-126193/2-A	Lab Control Sample	Total/NA	Water	3010A	
MB 500-126193/1-A	Method Blank	Total/NA	Water	3010A	

Analysis Batch: 126387

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-1	EB-001-092011	Total/NA	Water	6010B	126193
500-39539-1 DU	EB-001-092011	Total/NA	Water	6010B	126193
500-39539-1 MS	EB-001-092011	Total/NA	Water	6010B	126193
500-39539-1 MSD	EB-001-092011	Total/NA	Water	6010B	126193
500-39539-2	FB-001-092011	Total/NA	Water	6010B	126193
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	6010B	126193
500-39539-4	GW-33MWC-36-092011	Total/NA	Water	6010B	126193
LCS 500-126193/2-A	Lab Control Sample	Total/NA	Water	6010B	126193
MB 500-126193/1-A	Method Blank	Total/NA	Water	6010B	126193

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

General Chemistry

Analysis Batch: 126327

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-1	EB-001-092011	Total/NA	Water	300.0	
500-39539-2	FB-001-092011	Total/NA	Water	300.0	
500-39539-4	GW-33MWC-36-092011	Total/NA	Water	300.0	
500-39539-4 MS	GW-33MWC-36-092011	Total/NA	Water	300.0	
500-39539-4 MSD	GW-33MWC-36-092011	Total/NA	Water	300.0	
LCS 500-126327/4	Lab Control Sample	Total/NA	Water	300.0	
MB 500-126327/3	Method Blank	Total/NA	Water	300.0	

Analysis Batch: 126606

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-1	EB-001-092011	Total/NA	Water	354.1	
500-39539-1 MS	EB-001-092011	Total/NA	Water	354.1	
500-39539-1 MSD	EB-001-092011	Total/NA	Water	354.1	
500-39539-2	FB-001-092011	Total/NA	Water	354.1	
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	354.1	
500-39539-4	GW-33MWC-36-092011	Total/NA	Water	354.1	
LCS 500-126606/4	Lab Control Sample	Total/NA	Water	354.1	
MB 500-126606/3	Method Blank	Total/NA	Water	354.1	

Analysis Batch: 126770

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 500-126770/4	Lab Control Sample	Total/NA	Water	300.0	
MB 500-126770/3	Method Blank	Total/NA	Water	300.0	

Analysis Batch: 127120

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-1	EB-001-092011	Total/NA	Water	310.1	
500-39539-1 DU	EB-001-092011	Total/NA	Water	310.1	
500-39539-2	FB-001-092011	Total/NA	Water	310.1	
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	310.1	
500-39539-4	GW-33MWC-36-092011	Total/NA	Water	310.1	
LCS 500-127120/3	Lab Control Sample	Total/NA	Water	310.1	
MB 500-127120/2	Method Blank	Total/NA	Water	310.1	

Analysis Batch: 127635

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-1	EB-001-092011	Total/NA	Water	9060	
500-39539-2	FB-001-092011	Total/NA	Water	9060	
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	9060	
500-39539-4	GW-33MWC-36-092011	Total/NA	Water	9060	
LCS 500-127635/4	Lab Control Sample	Total/NA	Water	9060	
MB 500-127635/3	Method Blank	Total/NA	Water	9060	

Analysis Batch: 127685

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-1	EB-001-092011	Total/NA	Water	353.2	
500-39539-2	FB-001-092011	Total/NA	Water	353.2	
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	353.2	
500-39539-4	GW-33MWC-36-092011	Total/NA	Water	353.2	
LCS 500-127685/13	Lab Control Sample	Total/NA	Water	353.2	
MB 500-127685/12	Method Blank	Total/NA	Water	353.2	

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

General Chemistry (Continued)

Analysis Batch: 127686

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	300.0	
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	300.0	
LCS 500-127686/4	Lab Control Sample	Total/NA	Water	300.0	
MB 500-127686/3	Method Blank	Total/NA	Water	300.0	

Analysis Batch: 127726

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-1	EB-001-092011	Total/NA	Water	Nitrate by calc	
500-39539-2	FB-001-092011	Total/NA	Water	Nitrate by calc	
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	Nitrate by calc	
500-39539-4	GW-33MWC-36-092011	Total/NA	Water	Nitrate by calc	

Analysis Batch: 127735

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39539-1	EB-001-092011	Total/NA	Water	9060	
500-39539-2	FB-001-092011	Total/NA	Water	9060	
500-39539-3	GW-33MWC-02-092011	Total/NA	Water	9060	
500-39539-4	GW-33MWC-36-092011	Total/NA	Water	9060	
LCS 500-127735/4	Lab Control Sample	Total/NA	Water	9060	
MB 500-127735/3	Method Blank	Total/NA	Water	9060	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-39539-1	EB-001-092011	91	97	92	96
500-39539-2	FB-001-092011	95	100	97	96
500-39539-3 - DL	GW-33MWC-02-092011	92	97	96	98
500-39539-3	GW-33MWC-02-092011	86	86	84	91
500-39539-4	GW-33MWC-36-092011	94	102	102	102
500-39539-5	TB-001-092011	94	102	101	99
LCS 500-126868/4	Lab Control Sample	100	97	95	100
MB 500-126868/3	Method Blank	92	94	94	101

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-126868/3
Matrix: Water
Analysis Batch: 126868

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/27/11 20:09	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/27/11 20:09	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/27/11 20:09	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/27/11 20:09	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/27/11 20:09	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/27/11 20:09	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/27/11 20:09	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:09	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/27/11 20:09	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/27/11 20:09	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:09	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 20:09	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/27/11 20:09	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:09	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/27/11 20:09	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/27/11 20:09	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/27/11 20:09	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/27/11 20:09	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/27/11 20:09	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/27/11 20:09	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/27/11 20:09	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/27/11 20:09	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 20:09	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/27/11 20:09	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/27/11 20:09	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/27/11 20:09	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/27/11 20:09	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/27/11 20:09	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/27/11 20:09	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/27/11 20:09	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/27/11 20:09	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/27/11 20:09	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*77 - 112*		*09/27/11 20:09*	*1*
Dibromofluoromethane	*94*		*78 - 119*		*09/27/11 20:09*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*77 - 124*		*09/27/11 20:09*	*1*
Toluene-d8 (Surr)	*101*		*80 - 121*		*09/27/11 20:09*	*1*

Lab Sample ID: LCS 500-126868/4
Matrix: Water
Analysis Batch: 126868

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0484		mg/L		97	43 - 153

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-126868/4
Matrix: Water
Analysis Batch: 126868

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Benzene	0.0500	0.0503		mg/L		101	74 - 113
Bromodichloromethane	0.0500	0.0480		mg/L		96	73 - 120
Bromoform	0.0500	0.0432		mg/L		86	64 - 126
Bromomethane	0.0500	0.0514		mg/L		103	46 - 155
Methyl Ethyl Ketone	0.0500	0.0418		mg/L		84	42 - 152
Carbon disulfide	0.0500	0.0365		mg/L		73	36 - 110
Carbon tetrachloride	0.0500	0.0514		mg/L		103	58 - 132
Chlorobenzene	0.0500	0.0495		mg/L		99	81 - 111
Chloroethane	0.0500	0.0525		mg/L		105	54 - 149
Chloroform	0.0500	0.0488		mg/L		98	71 - 116
Chloromethane	0.0500	0.0353		mg/L		71	36 - 148
cis-1,2-Dichloroethene	0.0500	0.0496		mg/L		99	66 - 111
cis-1,3-Dichloropropene	0.0538	0.0472		mg/L		88	65 - 114
Dibromochloromethane	0.0500	0.0473		mg/L		95	73 - 118
1,1-Dichloroethane	0.0500	0.0474		mg/L		95	64 - 117
1,1-Dichloroethene	0.0500	0.0451		mg/L		90	60 - 126
1,2-Dichloropropane	0.0500	0.0502		mg/L		100	68 - 123
Ethylbenzene	0.0500	0.0520		mg/L		104	79 - 114
2-Hexanone	0.0500	0.0433		mg/L		87	55 - 138
Methylene Chloride	0.0500	0.0467		mg/L		93	65 - 125
methyl isobutyl ketone	0.0500	0.0428		mg/L		86	56 - 138
Methyl tert-butyl ether	0.0500	0.0375		mg/L		75	57 - 119
Styrene	0.0500	0.0521		mg/L		104	76 - 118
1,1,2,2-Tetrachloroethane	0.0500	0.0480		mg/L		96	66 - 121
Tetrachloroethene	0.0500	0.0512		mg/L		102	76 - 114
Toluene	0.0500	0.0495		mg/L		99	76 - 121
trans-1,2-Dichloroethene	0.0500	0.0502		mg/L		100	67 - 120
trans-1,3-Dichloropropene	0.0486	0.0411		mg/L		85	60 - 119
1,1,1-Trichloroethane	0.0500	0.0530		mg/L		106	66 - 128
1,1,2-Trichloroethane	0.0500	0.0469		mg/L		94	62 - 137
Trichloroethene	0.0500	0.0497		mg/L		99	75 - 116
Vinyl chloride	0.0500	0.0415		mg/L		83	47 - 138
Xylenes, Total	0.150	0.159		mg/L		106	74 - 117
1,2-Dichloroethane	0.0500	0.0455		mg/L		91	69 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*
Dibromofluoromethane	*97*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*95*		*77 - 124*
Toluene-d8 (Surr)	*100*		*80 - 121*

Method: RSK-175 - Dissolved Gases (GC)

Lab Sample ID: MB 680-215990/20
Matrix: Water
Analysis Batch: 215990

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/27/11 14:14	1

Method: RSK-175 - Dissolved Gases (GC) (Continued)

Lab Sample ID: MB 680-215990/20 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 215990

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylene	1.0	U	1.0	0.50	ug/L			09/27/11 14:14	1
Methane	0.58	U	0.58	0.29	ug/L			09/27/11 14:14	1

Lab Sample ID: LCS 680-215990/18 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 215990

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Ethane	282	297		ug/L		105	75 - 125
Ethylene	271	289		ug/L		107	75 - 125
Methane	153	153		ug/L		100	75 - 125

Lab Sample ID: LCSD 680-215990/19 — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 215990

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Ethane	282	328		ug/L		116	75 - 125	10	30
Ethylene	271	319		ug/L		118	75 - 125	10	30
Methane	153	183		ug/L		119	75 - 125	17	30

Lab Sample ID: MB 680-216124/24 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216124

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/28/11 11:03	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/28/11 11:03	1
Methane	0.58	U	0.58	0.29	ug/L			09/28/11 11:03	1

Lab Sample ID: LCS 680-216124/25 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216124

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Ethane	282	314		ug/L		111	75 - 125
Ethylene	271	284		ug/L		105	75 - 125
Methane	153	177		ug/L		116	75 - 125

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 500-126193/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126387 — **Prep Batch: 126193**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.20	U	0.20	0.040	mg/L		09/21/11 16:00	09/22/11 21:35	1
Manganese	0.010	U	0.010	0.00094	mg/L		09/21/11 16:00	09/22/11 21:35	1

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: LCS 500-126193/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126387 — **Prep Batch: 126193**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Iron	1.00	0.998		mg/L		100	80 - 120
Manganese	0.500	0.519		mg/L		104	80 - 120

Lab Sample ID: 500-39539-1 MS — **Client Sample ID: EB-001-092011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126387 — **Prep Batch: 126193**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Iron	0.20	U	1.00	0.994		mg/L		99	75 - 125
Manganese	0.010	U	0.500	0.513		mg/L		103	75 - 125

Lab Sample ID: 500-39539-1 MSD — **Client Sample ID: EB-001-092011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126387 — **Prep Batch: 126193**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Iron	0.20	U	1.00	0.973		mg/L		97	75 - 125	2	20
Manganese	0.010	U	0.500	0.512		mg/L		102	75 - 125	0	20

Lab Sample ID: 500-39539-1 DU — **Client Sample ID: EB-001-092011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126387 — **Prep Batch: 126193**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Iron	0.20	U	0.20	U	mg/L		NC	20
Manganese	0.010	U	0.010	U	mg/L		NC	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 500-126327/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126327

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.20	U	0.20	0.083	mg/L			09/21/11 17:43	1
Sulfate	0.20	U	0.20	0.090	mg/L			09/21/11 17:43	1

Lab Sample ID: LCS 500-126327/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126327

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloride	3.00	2.83		mg/L		94	90 - 110
Sulfate	5.00	5.01		mg/L		100	90 - 110

Lab Sample ID: 500-39539-4 MS — **Client Sample ID: GW-33MWC-36-092011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126327

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloride	19		30.0	50.8		mg/L		105	75 - 125

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 500-39539-4 MS — **Client Sample ID: GW-33MWC-36-092011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126327

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Sulfate	93		50.0	145		mg/L		104	75 - 125

Lab Sample ID: 500-39539-4 MSD — **Client Sample ID: GW-33MWC-36-092011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126327

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Chloride	19		30.0	51.7		mg/L		108	75 - 125	2	20
Sulfate	93		50.0	145		mg/L		105	75 - 125	0	20

Lab Sample ID: MB 500-126770/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126770

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.20	U	0.20	0.083	mg/L			09/26/11 17:52	1
Sulfate	0.20	U	0.20	0.090	mg/L			09/26/11 17:52	1

Lab Sample ID: LCS 500-126770/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126770

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloride	3.00	3.07		mg/L		102	90 - 110
Sulfate	5.00	4.80		mg/L		96	90 - 110

Lab Sample ID: MB 500-127686/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127686

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.252		0.20	0.083	mg/L			09/29/11 09:45	1
Sulfate	0.0918	J	0.20	0.090	mg/L			09/29/11 09:45	1

Lab Sample ID: LCS 500-127686/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127686

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloride	3.00	2.91		mg/L		97	90 - 110
Sulfate	5.00	4.87		mg/L		97	90 - 110

Method: 310.1 - Alkalinity

Lab Sample ID: MB 500-127120/2 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127120

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	1.3	mg/L			09/29/11 08:20	1

Method: 310.1 - Alkalinity (Continued)

Lab Sample ID: LCS 500-127120/3 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127120

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Alkalinity	100	97.4		mg/L		97	80 - 120

Lab Sample ID: 500-39539-1 DU — **Client Sample ID: EB-001-092011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127120

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity	5.0	U	5.0	U	mg/L		NC	20

Method: 353.2 - Nitrogen, Nitrate-Nitrite

Lab Sample ID: MB 500-127685/12 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127685

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 09:47	1

Lab Sample ID: LCS 500-127685/13 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127685

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Nitrogen, Nitrate Nitrite	1.00	0.980		mg/L		98	80 - 120

Method: 354.1 - Nitrogen, Nitrite

Lab Sample ID: MB 500-126606/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126606

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Nitrite	0.00390	J	0.020	0.0020	mg/L			09/21/11 19:06	1

Lab Sample ID: LCS 500-126606/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126606

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Nitrogen, Nitrite	0.100	0.107		mg/L		107	80 - 120

Lab Sample ID: 500-39539-1 MS — **Client Sample ID: EB-001-092011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126606

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Nitrogen, Nitrite	0.0047	J B	0.100	0.118		mg/L		113	75 - 125

Method: 354.1 - Nitrogen, Nitrite (Continued)

Lab Sample ID: 500-39539-1 MSD — **Client Sample ID: EB-001-092011**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126606

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Nitrogen, Nitrite	0.0047	J B	0.100	0.117		mg/L		112	75 - 125	1	20

Method: 9060 - Organic Carbon, Total (TOC)

Lab Sample ID: MB 500-127635/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127635

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TOC Dup	1.0	U	1.0	0.36	mg/L			10/04/11 17:06	1

Lab Sample ID: LCS 500-127635/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127635

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
TOC Result 1	10.0	9.68		mg/L		97	80 - 120
TOC Result 2	10.0	9.79		mg/L		98	80 - 120
TOC Dup	10.0	9.73		mg/L		97	80 - 120

Lab Sample ID: MB 500-127735/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127735

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TIC Dup	0.650	J	1.0	0.36	mg/L			10/05/11 08:35	1

Lab Sample ID: LCS 500-127735/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127735

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
TIC Dup	10.0	9.16		mg/L		92	80 - 120

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q
TestAmerica Savannah	A2LA	DoD ELAP		0399-01
TestAmerica Savannah	A2LA	ISO/IEC 17025		399.01
TestAmerica Savannah	Alabama	State Program	4	41450
TestAmerica Savannah	Arkansas	Arkansas DOH	6	N/A
TestAmerica Savannah	Arkansas	State Program	6	88-0692
TestAmerica Savannah	California	NELAC	9	3217CA
TestAmerica Savannah	Colorado	State Program	8	N/A
TestAmerica Savannah	Connecticut	State Program	1	PH-0161
TestAmerica Savannah	Delaware	State Program	3	N/A
TestAmerica Savannah	Florida	NELAC	4	E87052
TestAmerica Savannah	Georgia	Georgia EPD	4	N/A
TestAmerica Savannah	Georgia	State Program	4	803
TestAmerica Savannah	Guam	State Program	9	09-005r
TestAmerica Savannah	Hawaii	State Program	9	N/A
TestAmerica Savannah	Illinois	NELAC	5	200022
TestAmerica Savannah	Indiana	State Program	5	N/A
TestAmerica Savannah	Iowa	State Program	7	353
TestAmerica Savannah	Kentucky	Kentucky UST	4	18
TestAmerica Savannah	Kentucky	State Program	4	90084
TestAmerica Savannah	Louisiana	NELAC	6	LA100015
TestAmerica Savannah	Louisiana	NELAC	6	30690
TestAmerica Savannah	Maine	State Program	1	GA00006
TestAmerica Savannah	Maryland	State Program	3	250
TestAmerica Savannah	Massachusetts	State Program	1	M-GA006
TestAmerica Savannah	Michigan	State Program	5	9925
TestAmerica Savannah	Mississippi	State Program	4	N/A
TestAmerica Savannah	Montana	State Program	8	CERT0081
TestAmerica Savannah	Nebraska	State Program	7	TestAmerica-Savannah
TestAmerica Savannah	New Jersey	NELAC	2	GA769

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge(423535)

TestAmerica Job ID: 500-39539-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Savannah	New Mexico	State Program	6	N/A
TestAmerica Savannah	New York	NELAC	2	10842
TestAmerica Savannah	North Carolina	North Carolina DENR	4	269
TestAmerica Savannah	North Carolina	North Carolina PHL	4	13701
TestAmerica Savannah	Oklahoma	State Program	6	9984
TestAmerica Savannah	Pennsylvania	NELAC	3	68-00474
TestAmerica Savannah	Puerto Rico	State Program	2	GA00006
TestAmerica Savannah	Rhode Island	State Program	1	LAO00244
TestAmerica Savannah	South Carolina	State Program	4	98001
TestAmerica Savannah	Tennessee	State Program	4	TN02961
TestAmerica Savannah	Texas	NELAC	6	T104704185-08-TX
TestAmerica Savannah	USDA	USDA		SAV 3-04
TestAmerica Savannah	Vermont	State Program	1	87052
TestAmerica Savannah	Virginia	NELAC Secondary AB	3	460161
TestAmerica Savannah	Virginia	State Program	3	302
TestAmerica Savannah	Washington	State Program	10	C1794
TestAmerica Savannah	West Virginia	West Virginia DEP	3	94
TestAmerica Savannah	West Virginia	West Virginia DHHR (DW)	3	9950C
TestAmerica Savannah	Wisconsin	State Program	5	999819810
TestAmerica Savannah	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package . Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Lab Job #: 500-39539

Chain of Custody Number:

Page 1 of 1

Temperature °C of Cooler: 3.4

(optional)

Report To
Contact: Monica Martin
Company: CH2M HILL
Address: 1034 S. Brentwood
Address: St. Louis MO 63117
Phone: 314-605-4616
Fax:
E-Mail:

(optional)

Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Client: CH2M Hill
Client Project #: 423535
Project Name: Crab Orchard Plume 2
Project Location/State: Marion IL
Lab Project #:
Sampler: G. Roberts
Lab PM:

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOC 8260B (Preservative: 1)	RSK-175 Modified (Preservative: 7)	SW-846 9060 (Preservative: 2)	Select Metals 6010B (Preservative: 3)	Alkalinity EPA 310.1 (Preservative: 7)	Chloride and Sulfate EPA 325.2 (Preservative: 7)	Nitrate EPA 353.2 (Preservative: 7)	Nitrite + Nitrate EPA 353.2 (Preservative: 2)		Comments
1		EB-001-092011	9/20/11	0800	13	W	X	X	X	X	X	X	X	X		
2		FB-001-092011	9/20/11	0810	13	W	X	X	X	X	X	X	X	X		
3		GW-33MWC-02-092011	9/20/11	0945	13	W	X	X	X	X	X	X	X	X		
4		GW-33MWC-36-092011	9/20/11	1000	13	W	X	X	X	X	X	X	X	X		
5		TB-001-092011	9/20/11	1700	2	W	X									

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other
Requested Due Date _____

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	CH2M Hill	9/20/11	1730	[signature]	TA	9/21/11	1010
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier
Shipped: FX
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1209)

FedEx Express *US Airbill*

FedEx tracking number 8750 2424 8556

Recipient's Copy

1 From

Date

Sender's Name Phone

Company

Address

Dept./Floor/Suite/Room

City State ZIP

500-39537

2 Your Internal Billing Reference

3 To

Recipient's Name Phone

Company

Address

We cannot deliver to P.O. boxes or P.O. ZIP codes. Dept./Floor/Suite/Room

Address

Use this line for the HOLD location address or for additional ship address.

City State ZIP

HOLD Weekday FedEx location address. NOT available for FedEx First Overnight

HOLD Saturday FedEx location address. REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to a FedEx location

4a Express Package Service * To most locations. *Packages up to 150 lbs.*

- [x] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations.*
- [ ] FedEx 2Day — Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

4b Express Freight Service * To most locations. *Packages over 150 lbs.*

- [ ] FedEx 1Day Freight — Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected. FedEx 1Day Freight Box Rate
- [ ] FedEx 2Day Freight — Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 3Day Freight — Third business day.** Saturday Delivery NOT available.

5 Packaging * Declared value limit $500.

- [ ] FedEx Envelope*
- [ ] FedEx Pak* — Includes FedEx Small Pak and FedEx Large Pak.
- [ ] FedEx Box
- [ ] FedEx Tube
- [x] Other

6 Special Handling and Delivery Signature Options

- [ ] SATURDAY Delivery — NOT available for FedEx Standard Overnight, FedEx Express Saver, or FedEx 2Day Freight.
- [ ] No Signature Required — Package may be left without obtaining signature for delivery.
- [ ] Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. Fee applies.

Does this shipment contain dangerous goods?

One box must be checked.

- [x] No
- [ ] Yes — As per attached Shipper's Declaration
- [ ] Yes — Shipper's Declaration not required
- [ ] Dry Ice — Dry ice, 9, UN 1845 ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or left in a FedEx Express Drop Box.

- [ ] Cargo Aircraft Only

7 Payment *Bill to:*

- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

Enter FedEx Acct. No. or Credit Card No. below.

Obtain FedEx Acct. No.

Total Packages 1 | Total Weight 15.0 | Total Declared Value* | Credit Card Auth.

10/05/2011

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-39539-1

Login Number: 39539

List Source: TestAmerica Chicago

List Number: 1

Creator: Lunt, Jeff T

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	3.4
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-39539-1

Login Number: 39539
List Number: 1
Creator: Barnett, Eddie T

List Source: TestAmerica Savannah
List Creation: 09/22/11 10:14 AM

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	False	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-39643-1
Client Project/Site: Crab Orchard Wildlife Refuge #2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/06/2011 05:13:19 PM
Donna Ingersoll
Project Manager II
donna.ingersoll@testamericainc.com

Designee for

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

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Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Detection Summary 3
Method Summary 6
Sample Summary 7
Client Sample Results 8
Definitions 23
QC Association 24
Surrogate Summary 27
QC Sample Results 28
Certification Summary 34
Chain of Custody 36
Receipt Checklists 38

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: GW-33MWC-11-092111 — Lab Sample ID: 500-39643-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methane	0.49	J	0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.71		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.011		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	51	B	4.0	1.7	mg/L	20		300.0	Total/NA
Sulfate	460		10	4.5	mg/L	50		300.0	Total/NA
Alkalinity	330		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrate Nitrite	5.2		0.50	0.22	mg/L	5		353.2	Total/NA
Nitrogen, Nitrite	0.0043	J B	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	2.4		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	40	B	5.0	1.8	mg/L	5		9060	Total/NA
Nitrogen, Nitrate	5.2		0.10	0.043	mg/L	1		Nitrate by calc	Total/NA

Client Sample ID: 33-FDUP-001 — Lab Sample ID: 500-39643-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methane	0.48	J	0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.73		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.012		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	53	B	4.0	1.7	mg/L	20		300.0	Total/NA
Sulfate	430		20	9.0	mg/L	100		300.0	Total/NA
Alkalinity	330		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrate Nitrite	4.4		0.50	0.22	mg/L	5		353.2	Total/NA
TOC Dup	2.4		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	45	B	5.0	1.8	mg/L	5		9060	Total/NA
Nitrogen, Nitrate	4.4		0.10	0.043	mg/L	1		Nitrate by calc	Total/NA

Client Sample ID: GW-33MWC-01-092111 — Lab Sample ID: 500-39643-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methane	1.2		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	1.3		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.023		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	4.9	B	2.0	0.83	mg/L	10		300.0	Total/NA
Sulfate	43		2.0	0.90	mg/L	10		300.0	Total/NA
Alkalinity	280		5.0	1.3	mg/L	1		310.1	Total/NA
TOC Dup	2.6		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	41	B	5.0	1.8	mg/L	5		9060	Total/NA

Client Sample ID: GW-33MWC-03-092111 — Lab Sample ID: 500-39643-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloromethane	0.00094	J	0.0010	0.00024	mg/L	1		8260B	Total/NA
cis-1,2-Dichloroethene	0.034		0.0010	0.00022	mg/L	1		8260B	Total/NA
Tetrachloroethene	0.0072		0.0010	0.00022	mg/L	1		8260B	Total/NA
Trichloroethene - DL	0.35		0.0025	0.00090	mg/L	5		8260B	Total/NA
Methane	0.79		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.46		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.0084	J	0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	22	B	4.0	1.7	mg/L	20		300.0	Total/NA
Sulfate	190		4.0	1.8	mg/L	20		300.0	Total/NA
Alkalinity	310		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrate Nitrite	0.50		0.10	0.043	mg/L	1		353.2	Total/NA
TOC Dup	3.0		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	44	B	5.0	1.8	mg/L	5		9060	Total/NA

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: GW-33MWC-03-092111 (Continued) — Lab Sample ID: 500-39643-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Nitrogen, Nitrate	0.50		0.10	0.043	mg/L	1		Nitrate by calc	Total/NA

Client Sample ID: 33-FDUP-002 — Lab Sample ID: 500-39643-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.034		0.0010	0.00022	mg/L	1		8260B	Total/NA
Tetrachloroethene	0.0076		0.0010	0.00022	mg/L	1		8260B	Total/NA
trans-1,2-Dichloroethene	0.00069	J	0.0010	0.00027	mg/L	1		8260B	Total/NA
Trichloroethene - DL	0.37		0.0025	0.00090	mg/L	5		8260B	Total/NA
Methane	0.82		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.51		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.0090	J	0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	24	B	4.0	1.7	mg/L	20		300.0	Total/NA
Sulfate	190		4.0	1.8	mg/L	20		300.0	Total/NA
Alkalinity	320		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrate Nitrite	0.50		0.10	0.043	mg/L	1		353.2	Total/NA
TOC Dup	3.0		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	38	B	5.0	1.8	mg/L	5		9060	Total/NA
Nitrogen, Nitrate	0.50		0.10	0.043	mg/L	1		Nitrate by calc	Total/NA

Client Sample ID: GW-33MWC-12-092111 — Lab Sample ID: 500-39643-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methane	0.48	J	0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.82		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.029		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	1.1		0.20	0.083	mg/L	1		300.0	Total/NA
Sulfate	21		4.0	1.8	mg/L	20		300.0	Total/NA
Alkalinity	110		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrate Nitrite	0.53		0.10	0.043	mg/L	1		353.2	Total/NA
TOC Dup	4.0		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	18	B	5.0	1.8	mg/L	5		9060	Total/NA
Nitrogen, Nitrate	0.53		0.10	0.043	mg/L	1		Nitrate by calc	Total/NA

Client Sample ID: GW-33MWC-33-092111 — Lab Sample ID: 500-39643-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethene	0.0023		0.0020	0.00058	mg/L	2		8260B	Total/NA
Tetrachloroethene	0.014		0.0020	0.00044	mg/L	2		8260B	Total/NA
Vinyl chloride	0.012		0.0010	0.00026	mg/L	2		8260B	Total/NA
cis-1,2-Dichloroethene - DL	0.48		0.020	0.0044	mg/L	20		8260B	Total/NA
trans-1,2-Dichloroethene - DL	0.92		0.020	0.0054	mg/L	20		8260B	Total/NA
Trichloroethene - DL	1.9		0.010	0.0036	mg/L	20		8260B	Total/NA
Methane	8.3		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	2.2		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.89		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	130	B	4.0	1.7	mg/L	20		300.0	Total/NA
Sulfate	570		20	9.0	mg/L	100		300.0	Total/NA
Alkalinity	410		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrite	0.0062	J B	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	4.1		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	59	B	5.0	1.8	mg/L	5		9060	Total/NA

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: TB-003-092111 **Lab Sample ID: 500-39643-8**

No Detections

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
RSK-175	Dissolved Gases (GC)	RSK	TAL SAV
6010B	Metals (ICP)	SW846	TAL CHI
300.0	Anions, Ion Chromatography	MCAWW	TAL CHI
310.1	Alkalinity	MCAWW	TAL CHI
353.2	Nitrogen, Nitrate-Nitrite	MCAWW	TAL CHI
354.1	Nitrogen, Nitrite	MCAWW	TAL CHI
9060	Organic Carbon, Total (TOC)	SW846	TAL CHI
Nitrate by calc	Nitrogen, Nitrate-Nitrite	SM	TAL CHI

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique, RSKSOP-175, Rev. 0, 8/11/94, USEPA Research Lab

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-39643-1	GW-33MWC-11-092111	Water	09/21/11 08:55	09/22/11 10:30
500-39643-2	33-FDUP-001	Water	09/21/11 09:10	09/22/11 10:30
500-39643-3	GW-33MWC-01-092111	Water	09/21/11 10:00	09/22/11 10:30
500-39643-4	GW-33MWC-03-092111	Water	09/21/11 12:20	09/22/11 10:30
500-39643-5	33-FDUP-002	Water	09/21/11 12:30	09/22/11 10:30
500-39643-6	GW-33MWC-12-092111	Water	09/21/11 15:30	09/22/11 10:30
500-39643-7	GW-33MWC-33-092111	Water	09/21/11 15:35	09/22/11 10:30
500-39643-8	TB-003-092111	Water	09/21/11 17:00	09/22/11 10:30

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: GW-33MWC-11-092111
Date Collected: 09/21/11 08:55
Date Received: 09/22/11 10:30

Lab Sample ID: 500-39643-1
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 01:54	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 01:54	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 01:54	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 01:54	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 01:54	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 01:54	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 01:54	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:54	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 01:54	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 01:54	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 01:54	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 01:54	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 01:54	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:54	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 01:54	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 01:54	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 01:54	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 01:54	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 01:54	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 01:54	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 01:54	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 01:54	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:54	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 01:54	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 01:54	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 01:54	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 01:54	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 01:54	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 01:54	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 01:54	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 01:54	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 01:54	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 01:54	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 01:54	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 01:54	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 01:54	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*		*09/28/11 01:54*	*1*
Dibromofluoromethane	*100*		*78 - 119*		*09/28/11 01:54*	*1*
1,2-Dichloroethane-d4 (Surr)	*98*		*77 - 124*		*09/28/11 01:54*	*1*
Toluene-d8 (Surr)	*99*		*80 - 121*		*09/28/11 01:54*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/29/11 12:42	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/29/11 12:42	1
Methane	**0.49**	**J**	0.58	0.29	ug/L			09/29/11 12:42	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: GW-33MWC-11-092111

Date Collected: 09/21/11 08:55
Date Received: 09/22/11 10:30

Lab Sample ID: 500-39643-1

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.71		0.20	0.040	mg/L		09/22/11 18:45	09/23/11 18:33	1
Manganese	0.011		0.010	0.00094	mg/L		09/22/11 18:45	09/23/11 18:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	51	B	4.0	1.7	mg/L			09/29/11 18:20	20
Sulfate	460		10	4.5	mg/L			10/06/11 14:11	50
Alkalinity	330		5.0	1.3	mg/L			09/29/11 10:08	1
Nitrogen, Nitrate Nitrite	5.2		0.50	0.22	mg/L			10/05/11 12:15	5
Nitrogen, Nitrite	0.0043	J B	0.020	0.0020	mg/L			09/22/11 21:18	1
TOC Dup	2.4		1.0	0.36	mg/L			10/04/11 18:44	1
TIC Dup	40	B	5.0	1.8	mg/L			10/05/11 10:15	5
Nitrogen, Nitrate	5.2		0.10	0.043	mg/L			10/05/11 18:25	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: 33-FDUP-001

Date Collected: 09/21/11 09:10
Date Received: 09/22/11 10:30

Lab Sample ID: 500-39643-2

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 02:18	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 02:18	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 02:18	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 02:18	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 02:18	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 02:18	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 02:18	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 02:18	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 02:18	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 02:18	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 02:18	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 02:18	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 02:18	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 02:18	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 02:18	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 02:18	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 02:18	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 02:18	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 02:18	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 02:18	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 02:18	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 02:18	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 02:18	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 02:18	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 02:18	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 02:18	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 02:18	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 02:18	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 02:18	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 02:18	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 02:18	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 02:18	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 02:18	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 02:18	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 02:18	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 02:18	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*77 - 112*		*09/28/11 02:18*	*1*
Dibromofluoromethane	*99*		*78 - 119*		*09/28/11 02:18*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*77 - 124*		*09/28/11 02:18*	*1*
Toluene-d8 (Surr)	*102*		*80 - 121*		*09/28/11 02:18*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/29/11 12:54	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/29/11 12:54	1
Methane	**0.48**	**J**	0.58	0.29	ug/L			09/29/11 12:54	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: 33-FDUP-001

Date Collected: 09/21/11 09:10
Date Received: 09/22/11 10:30

Lab Sample ID: 500-39643-2

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.73		0.20	0.040	mg/L		09/22/11 18:45	09/23/11 18:59	1
Manganese	0.012		0.010	0.00094	mg/L		09/22/11 18:45	09/23/11 18:59	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	53	B	4.0	1.7	mg/L			09/29/11 19:28	20
Sulfate	430		20	9.0	mg/L			10/06/11 14:25	100
Alkalinity	330		5.0	1.3	mg/L			09/29/11 10:16	1
Nitrogen, Nitrate Nitrite	4.4		0.50	0.22	mg/L			10/05/11 12:16	5
Nitrogen, Nitrite	0.020	U	0.020	0.0020	mg/L			09/22/11 21:21	1
TOC Dup	2.4		1.0	0.36	mg/L			10/04/11 19:00	1
TIC Dup	45	B	5.0	1.8	mg/L			10/05/11 10:32	5
Nitrogen, Nitrate	4.4		0.10	0.043	mg/L			10/05/11 18:25	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: GW-33MWC-01-092111

Date Collected: 09/21/11 10:00
Date Received: 09/22/11 10:30

Lab Sample ID: 500-39643-3

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 02:42	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 02:42	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 02:42	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 02:42	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 02:42	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 02:42	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 02:42	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 02:42	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 02:42	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 02:42	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 02:42	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 02:42	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 02:42	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 02:42	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 02:42	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 02:42	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 02:42	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 02:42	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 02:42	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 02:42	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 02:42	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 02:42	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 02:42	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 02:42	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 02:42	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 02:42	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 02:42	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 02:42	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 02:42	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 02:42	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 02:42	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 02:42	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 02:42	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 02:42	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 02:42	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 02:42	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*		*09/28/11 02:42*	*1*
Dibromofluoromethane	*95*		*78 - 119*		*09/28/11 02:42*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*77 - 124*		*09/28/11 02:42*	*1*
Toluene-d8 (Surr)	*100*		*80 - 121*		*09/28/11 02:42*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/29/11 13:07	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/29/11 13:07	1
Methane	**1.2**		0.58	0.29	ug/L			09/29/11 13:07	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: GW-33MWC-01-092111

Lab Sample ID: 500-39643-3

Date Collected: 09/21/11 10:00
Matrix: Water
Date Received: 09/22/11 10:30

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	1.3		0.20	0.040	mg/L		09/22/11 18:45	09/23/11 19:03	1
Manganese	0.023		0.010	0.00094	mg/L		09/22/11 18:45	09/23/11 19:03	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4.9	B	2.0	0.83	mg/L			09/29/11 19:56	10
Sulfate	43		2.0	0.90	mg/L			09/29/11 19:56	10
Alkalinity	280		5.0	1.3	mg/L			09/29/11 10:24	1
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 11:26	1
Nitrogen, Nitrite	0.020	U	0.020	0.0020	mg/L			09/22/11 21:22	1
TOC Dup	2.6		1.0	0.36	mg/L			10/04/11 19:16	1
TIC Dup	41	B	5.0	1.8	mg/L			10/05/11 10:49	5
Nitrogen, Nitrate	0.10	U	0.10	0.043	mg/L			10/05/11 18:25	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: GW-33MWC-03-092111

Date Collected: 09/21/11 12:20
Date Received: 09/22/11 10:30

Lab Sample ID: 500-39643-4

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/27/11 21:24	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/27/11 21:24	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/27/11 21:24	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/27/11 21:24	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/27/11 21:24	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/27/11 21:24	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/27/11 21:24	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/27/11 21:24	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/27/11 21:24	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/27/11 21:24	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/27/11 21:24	1
Chloromethane	**0.00094**	**J**	0.0010	0.00024	mg/L			09/27/11 21:24	1
cis-1,2-Dichloroethene	**0.034**		0.0010	0.00022	mg/L			09/27/11 21:24	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/27/11 21:24	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/27/11 21:24	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 21:24	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/27/11 21:24	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/27/11 21:24	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/27/11 21:24	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/27/11 21:24	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/27/11 21:24	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/27/11 21:24	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/27/11 21:24	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/27/11 21:24	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/27/11 21:24	1
Tetrachloroethene	**0.0072**		0.0010	0.00022	mg/L			09/27/11 21:24	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/27/11 21:24	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/27/11 21:24	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/27/11 21:24	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/27/11 21:24	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/27/11 21:24	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/27/11 21:24	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/27/11 21:24	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/27/11 21:24	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/27/11 21:24	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*89*		*77 - 112*		*09/27/11 21:24*	*1*
Dibromofluoromethane	*90*		*78 - 119*		*09/27/11 21:24*	*1*
1,2-Dichloroethane-d4 (Surr)	*89*		*77 - 124*		*09/27/11 21:24*	*1*
Toluene-d8 (Surr)	*95*		*80 - 121*		*09/27/11 21:24*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**0.35**		0.0025	0.00090	mg/L			09/27/11 21:49	5

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*91*		*77 - 112*		*09/27/11 21:49*	*5*
Dibromofluoromethane	*92*		*78 - 119*		*09/27/11 21:49*	*5*
1,2-Dichloroethane-d4 (Surr)	*93*		*77 - 124*		*09/27/11 21:49*	*5*
Toluene-d8 (Surr)	*98*		*80 - 121*		*09/27/11 21:49*	*5*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/29/11 13:20	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/29/11 13:20	1
Methane	**0.79**		0.58	0.29	ug/L			09/29/11 13:20	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**0.46**		0.20	0.040	mg/L		09/22/11 18:45	09/23/11 19:07	1
Manganese	**0.0084**	**J**	0.010	0.00094	mg/L		09/22/11 18:45	09/23/11 19:07	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**22**	**B**	4.0	1.7	mg/L			09/29/11 20:25	20
Sulfate	**190**		4.0	1.8	mg/L			09/29/11 20:25	20
Alkalinity	**310**		5.0	1.3	mg/L			09/29/11 10:32	1
Nitrogen, Nitrate Nitrite	**0.50**		0.10	0.043	mg/L			10/05/11 11:28	1
Nitrogen, Nitrite	0.020	U	0.020	0.0020	mg/L			09/22/11 21:22	1
TOC Dup	**3.0**		1.0	0.36	mg/L			10/04/11 19:52	1
TIC Dup	**44**	**B**	5.0	1.8	mg/L			10/05/11 11:06	5
Nitrogen, Nitrate	**0.50**		0.10	0.043	mg/L			10/05/11 18:25	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: 33-FDUP-002

Date Collected: 09/21/11 12:30
Date Received: 09/22/11 10:30

Lab Sample ID: 500-39643-5

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/27/11 22:13	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/27/11 22:13	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/27/11 22:13	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/27/11 22:13	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/27/11 22:13	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/27/11 22:13	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/27/11 22:13	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/27/11 22:13	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/27/11 22:13	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/27/11 22:13	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/27/11 22:13	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 22:13	1
cis-1,2-Dichloroethene	**0.034**		0.0010	0.00022	mg/L			09/27/11 22:13	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/27/11 22:13	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/27/11 22:13	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 22:13	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/27/11 22:13	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/27/11 22:13	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/27/11 22:13	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/27/11 22:13	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/27/11 22:13	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/27/11 22:13	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/27/11 22:13	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/27/11 22:13	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/27/11 22:13	1
Tetrachloroethene	**0.0076**		0.0010	0.00022	mg/L			09/27/11 22:13	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/27/11 22:13	1
trans-1,2-Dichloroethene	**0.00069**	**J**	0.0010	0.00027	mg/L			09/27/11 22:13	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/27/11 22:13	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/27/11 22:13	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/27/11 22:13	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/27/11 22:13	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/27/11 22:13	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/27/11 22:13	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/27/11 22:13	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*77 - 112*		*09/27/11 22:13*	*1*
Dibromofluoromethane	*98*		*78 - 119*		*09/27/11 22:13*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*		*09/27/11 22:13*	*1*
Toluene-d8 (Surr)	*97*		*80 - 121*		*09/27/11 22:13*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**0.37**		0.0025	0.00090	mg/L			09/27/11 22:38	5

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*91*		*77 - 112*		*09/27/11 22:38*	*5*
Dibromofluoromethane	*97*		*78 - 119*		*09/27/11 22:38*	*5*
1,2-Dichloroethane-d4 (Surr)	*92*		*77 - 124*		*09/27/11 22:38*	*5*
Toluene-d8 (Surr)	*99*		*80 - 121*		*09/27/11 22:38*	*5*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/29/11 13:33	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/29/11 13:33	1
Methane	**0.82**		0.58	0.29	ug/L			09/29/11 13:33	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**0.51**		0.20	0.040	mg/L		09/22/11 18:45	09/23/11 19:11	1
Manganese	**0.0090**	**J**	0.010	0.00094	mg/L		09/22/11 18:45	09/23/11 19:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**24**	**B**	4.0	1.7	mg/L			09/30/11 07:41	20
Sulfate	**190**		4.0	1.8	mg/L			09/30/11 07:41	20
Alkalinity	**320**		5.0	1.3	mg/L			09/29/11 10:39	1
Nitrogen, Nitrate Nitrite	**0.50**		0.10	0.043	mg/L			10/05/11 11:30	1
Nitrogen, Nitrite	0.020	U	0.020	0.0020	mg/L			09/22/11 21:25	1
TOC Dup	**3.0**		1.0	0.36	mg/L			10/04/11 20:09	1
TIC Dup	**38**	**B**	5.0	1.8	mg/L			10/05/11 11:41	5
Nitrogen, Nitrate	**0.50**		0.10	0.043	mg/L			10/05/11 18:25	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: GW-33MWC-12-092111

Date Collected: 09/21/11 15:30
Date Received: 09/22/11 10:30

Lab Sample ID: 500-39643-6

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 03:06	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 03:06	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 03:06	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 03:06	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 03:06	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 03:06	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 03:06	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:06	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 03:06	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 03:06	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 03:06	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 03:06	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 03:06	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:06	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 03:06	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 03:06	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 03:06	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 03:06	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 03:06	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 03:06	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 03:06	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 03:06	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:06	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 03:06	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 03:06	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 03:06	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 03:06	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 03:06	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 03:06	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 03:06	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 03:06	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 03:06	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 03:06	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 03:06	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:06	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 03:06	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*		*09/28/11 03:06*	*1*
Dibromofluoromethane	*98*		*78 - 119*		*09/28/11 03:06*	*1*
1,2-Dichloroethane-d4 (Surr)	*96*		*77 - 124*		*09/28/11 03:06*	*1*
Toluene-d8 (Surr)	*100*		*80 - 121*		*09/28/11 03:06*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/29/11 13:46	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/29/11 13:46	1
Methane	**0.48**	**J**	0.58	0.29	ug/L			09/29/11 13:46	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: GW-33MWC-12-092111

Date Collected: 09/21/11 15:30
Date Received: 09/22/11 10:30

Lab Sample ID: 500-39643-6

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.82		0.20	0.040	mg/L		09/22/11 18:45	09/23/11 19:15	1
Manganese	0.029		0.010	0.00094	mg/L		09/22/11 18:45	09/23/11 19:15	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1.1		0.20	0.083	mg/L			10/06/11 14:40	1
Sulfate	21		4.0	1.8	mg/L			09/30/11 08:09	20
Alkalinity	110		5.0	1.3	mg/L			09/29/11 10:46	1
Nitrogen, Nitrate Nitrite	0.53		0.10	0.043	mg/L			10/05/11 11:32	1
Nitrogen, Nitrite	0.020	U	0.020	0.0020	mg/L			09/22/11 21:26	1
TOC Dup	4.0		1.0	0.36	mg/L			10/04/11 20:25	1
TIC Dup	18	B	5.0	1.8	mg/L			10/05/11 11:58	5
Nitrogen, Nitrate	0.53		0.10	0.043	mg/L			10/05/11 18:25	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: GW-33MWC-33-092111

Date Collected: 09/21/11 15:35
Date Received: 09/22/11 10:30

Lab Sample ID: 500-39643-7

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.010	U	0.010	0.0038	mg/L			09/27/11 23:03	2
Benzene	0.0010	U	0.0010	0.00024	mg/L			09/27/11 23:03	2
Bromodichloromethane	0.0020	U	0.0020	0.00046	mg/L			09/27/11 23:03	2
Bromoform	0.0020	U	0.0020	0.00090	mg/L			09/27/11 23:03	2
Bromomethane	0.0020	U	0.0020	0.00098	mg/L			09/27/11 23:03	2
Methyl Ethyl Ketone	0.010	U	0.010	0.0020	mg/L			09/27/11 23:03	2
Carbon disulfide	0.010	U	0.010	0.00088	mg/L			09/27/11 23:03	2
Carbon tetrachloride	0.0020	U	0.0020	0.00056	mg/L			09/27/11 23:03	2
Chlorobenzene	0.0020	U	0.0020	0.00048	mg/L			09/27/11 23:03	2
Chloroethane	0.0020	U	0.0020	0.00066	mg/L			09/27/11 23:03	2
Chloroform	0.0020	U	0.0020	0.00050	mg/L			09/27/11 23:03	2
Chloromethane	0.0020	U	0.0020	0.00048	mg/L			09/27/11 23:03	2
cis-1,3-Dichloropropene	0.0020	U	0.0020	0.00056	mg/L			09/27/11 23:03	2
Dibromochloromethane	0.0020	U	0.0020	0.00050	mg/L			09/27/11 23:03	2
1,1-Dichloroethane	0.0020	U	0.0020	0.00048	mg/L			09/27/11 23:03	2
1,1-Dichloroethene	**0.0023**		0.0020	0.00058	mg/L			09/27/11 23:03	2
1,2-Dichloropropane	0.0020	U	0.0020	0.00072	mg/L			09/27/11 23:03	2
Ethylbenzene	0.0010	U	0.0010	0.00028	mg/L			09/27/11 23:03	2
2-Hexanone	0.010	U	0.010	0.0011	mg/L			09/27/11 23:03	2
Methylene Chloride	0.010	U	0.010	0.0013	mg/L			09/27/11 23:03	2
methyl isobutyl ketone	0.010	U	0.010	0.0016	mg/L			09/27/11 23:03	2
Methyl tert-butyl ether	0.0020	U	0.0020	0.00056	mg/L			09/27/11 23:03	2
Styrene	0.0020	U	0.0020	0.00052	mg/L			09/27/11 23:03	2
1,1,2,2-Tetrachloroethane	0.0020	U	0.0020	0.00070	mg/L			09/27/11 23:03	2
Tetrachloroethene	**0.014**		0.0020	0.00044	mg/L			09/27/11 23:03	2
Toluene	0.0010	U	0.0010	0.00030	mg/L			09/27/11 23:03	2
trans-1,3-Dichloropropene	0.0020	U	0.0020	0.00070	mg/L			09/27/11 23:03	2
1,1,1-Trichloroethane	0.0020	U	0.0020	0.00052	mg/L			09/27/11 23:03	2
1,1,2-Trichloroethane	0.0020	U	0.0020	0.00060	mg/L			09/27/11 23:03	2
Vinyl chloride	**0.012**		0.0010	0.00026	mg/L			09/27/11 23:03	2
Xylenes, Total	0.0020	U	0.0020	0.00060	mg/L			09/27/11 23:03	2
1,2-Dichloroethane	0.0020	U	0.0020	0.00056	mg/L			09/27/11 23:03	2
1,3-Dichloropropene, Total	0.0020	U	0.0020	0.0010	mg/L			09/27/11 23:03	2

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*		*09/27/11 23:03*	*2*
Dibromofluoromethane	*97*		*78 - 119*		*09/27/11 23:03*	*2*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*		*09/27/11 23:03*	*2*
Toluene-d8 (Surr)	*99*		*80 - 121*		*09/27/11 23:03*	*2*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	**0.48**		0.020	0.0044	mg/L			09/27/11 23:28	20
trans-1,2-Dichloroethene	**0.92**		0.020	0.0054	mg/L			09/27/11 23:28	20
Trichloroethene	**1.9**		0.010	0.0036	mg/L			09/27/11 23:28	20

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*		*09/27/11 23:28*	*20*
Dibromofluoromethane	*98*		*78 - 119*		*09/27/11 23:28*	*20*
1,2-Dichloroethane-d4 (Surr)	*95*		*77 - 124*		*09/27/11 23:28*	*20*
Toluene-d8 (Surr)	*99*		*80 - 121*		*09/27/11 23:28*	*20*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/29/11 13:59	1
Ethylene	1.0	U	1.0	0.50	ug/L			09/29/11 13:59	1
Methane	**8.3**		0.58	0.29	ug/L			09/29/11 13:59	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**2.2**		0.20	0.040	mg/L		09/22/11 18:45	09/23/11 19:18	1
Manganese	**0.89**		0.010	0.00094	mg/L		09/22/11 18:45	09/23/11 19:18	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**130**	**B**	4.0	1.7	mg/L			09/30/11 08:24	20
Sulfate	**570**		20	9.0	mg/L			10/06/11 14:54	100
Alkalinity	**410**		5.0	1.3	mg/L			09/29/11 10:55	1
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 11:33	1
Nitrogen, Nitrite	**0.0062**	**J B**	0.020	0.0020	mg/L			09/22/11 21:27	1
TOC Dup	**4.1**		1.0	0.36	mg/L			10/04/11 20:41	1
TIC Dup	**59**	**B**	5.0	1.8	mg/L			10/05/11 12:14	5
Nitrogen, Nitrate	0.10	U	0.10	0.043	mg/L			10/05/11 18:25	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Client Sample ID: TB-003-092111

Date Collected: 09/21/11 17:00
Date Received: 09/22/11 10:30

Lab Sample ID: 500-39643-8

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 03:30	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 03:30	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 03:30	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 03:30	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 03:30	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 03:30	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 03:30	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:30	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 03:30	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 03:30	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 03:30	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 03:30	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 03:30	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:30	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 03:30	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 03:30	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 03:30	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 03:30	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 03:30	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 03:30	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 03:30	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 03:30	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:30	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 03:30	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 03:30	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 03:30	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 03:30	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 03:30	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 03:30	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 03:30	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 03:30	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 03:30	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 03:30	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 03:30	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:30	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 03:30	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*77 - 112*		*09/28/11 03:30*	*1*
Dibromofluoromethane	*101*		*78 - 119*		*09/28/11 03:30*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*77 - 124*		*09/28/11 03:30*	*1*
Toluene-d8 (Surr)	*101*		*80 - 121*		*09/28/11 03:30*	*1*

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
F	Duplicate RPD exceeds the control limit
F	MS or MSD exceeds the control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

GC/MS VOA

Analysis Batch: 126868

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	8260B	
500-39643-2	33-FDUP-001	Total/NA	Water	8260B	
500-39643-3	GW-33MWC-01-092111	Total/NA	Water	8260B	
500-39643-4	GW-33MWC-03-092111	Total/NA	Water	8260B	
500-39643-4 - DL	GW-33MWC-03-092111	Total/NA	Water	8260B	
500-39643-5	33-FDUP-002	Total/NA	Water	8260B	
500-39643-5 - DL	33-FDUP-002	Total/NA	Water	8260B	
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	8260B	
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	8260B	
500-39643-7 - DL	GW-33MWC-33-092111	Total/NA	Water	8260B	
500-39643-8	TB-003-092111	Total/NA	Water	8260B	
LCS 500-126868/4	Lab Control Sample	Total/NA	Water	8260B	
MB 500-126868/3	Method Blank	Total/NA	Water	8260B	

GC VOA

Analysis Batch: 216262

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	RSK-175	
500-39643-2	33-FDUP-001	Total/NA	Water	RSK-175	
500-39643-3	GW-33MWC-01-092111	Total/NA	Water	RSK-175	
500-39643-4	GW-33MWC-03-092111	Total/NA	Water	RSK-175	
500-39643-5	33-FDUP-002	Total/NA	Water	RSK-175	
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	RSK-175	
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	RSK-175	
LCS 680-216262/22	Lab Control Sample	Total/NA	Water	RSK-175	
MB 680-216262/23	Method Blank	Total/NA	Water	RSK-175	

Metals

Prep Batch: 126366

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	3010A	
500-39643-1 DU	GW-33MWC-11-092111	Total/NA	Water	3010A	
500-39643-1 MS	GW-33MWC-11-092111	Total/NA	Water	3010A	
500-39643-1 MSD	GW-33MWC-11-092111	Total/NA	Water	3010A	
500-39643-2	33-FDUP-001	Total/NA	Water	3010A	
500-39643-3	GW-33MWC-01-092111	Total/NA	Water	3010A	
500-39643-4	GW-33MWC-03-092111	Total/NA	Water	3010A	
500-39643-5	33-FDUP-002	Total/NA	Water	3010A	
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	3010A	
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	3010A	
LCS 500-126366/2-A	Lab Control Sample	Total/NA	Water	3010A	
MB 500-126366/1-A	Method Blank	Total/NA	Water	3010A	

Analysis Batch: 126526

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	6010B	126366
500-39643-1 DU	GW-33MWC-11-092111	Total/NA	Water	6010B	126366
500-39643-1 MS	GW-33MWC-11-092111	Total/NA	Water	6010B	126366
500-39643-1 MSD	GW-33MWC-11-092111	Total/NA	Water	6010B	126366
500-39643-2	33-FDUP-001	Total/NA	Water	6010B	126366

Metals (Continued)

Analysis Batch: 126526 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-3	GW-33MWC-01-092111	Total/NA	Water	6010B	126366
500-39643-4	GW-33MWC-03-092111	Total/NA	Water	6010B	126366
500-39643-5	33-FDUP-002	Total/NA	Water	6010B	126366
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	6010B	126366
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	6010B	126366
LCS 500-126366/2-A	Lab Control Sample	Total/NA	Water	6010B	126366
MB 500-126366/1-A	Method Blank	Total/NA	Water	6010B	126366

General Chemistry

Analysis Batch: 126500

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	354.1	
500-39643-1 MS	GW-33MWC-11-092111	Total/NA	Water	354.1	
500-39643-1 MSD	GW-33MWC-11-092111	Total/NA	Water	354.1	
500-39643-2	33-FDUP-001	Total/NA	Water	354.1	
500-39643-3	GW-33MWC-01-092111	Total/NA	Water	354.1	
500-39643-4	GW-33MWC-03-092111	Total/NA	Water	354.1	
500-39643-5	33-FDUP-002	Total/NA	Water	354.1	
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	354.1	
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	354.1	
LCS 500-126500/4	Lab Control Sample	Total/NA	Water	354.1	
MB 500-126500/3	Method Blank	Total/NA	Water	354.1	

Analysis Batch: 127120

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	310.1	
500-39643-2	33-FDUP-001	Total/NA	Water	310.1	
500-39643-3	GW-33MWC-01-092111	Total/NA	Water	310.1	
500-39643-4	GW-33MWC-03-092111	Total/NA	Water	310.1	
500-39643-5	33-FDUP-002	Total/NA	Water	310.1	
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	310.1	
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	310.1	
LCS 500-127120/3	Lab Control Sample	Total/NA	Water	310.1	
MB 500-127120/2	Method Blank	Total/NA	Water	310.1	

Analysis Batch: 127635

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	9060	
500-39643-2	33-FDUP-001	Total/NA	Water	9060	
500-39643-3	GW-33MWC-01-092111	Total/NA	Water	9060	
500-39643-4	GW-33MWC-03-092111	Total/NA	Water	9060	
500-39643-5	33-FDUP-002	Total/NA	Water	9060	
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	9060	
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	9060	
LCS 500-127635/4	Lab Control Sample	Total/NA	Water	9060	
MB 500-127635/3	Method Blank	Total/NA	Water	9060	

Analysis Batch: 127685

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	353.2	
500-39643-2	33-FDUP-001	Total/NA	Water	353.2	

General Chemistry (Continued)

Analysis Batch: 127685 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-3	GW-33MWC-01-092111	Total/NA	Water	353.2	
500-39643-4	GW-33MWC-03-092111	Total/NA	Water	353.2	
500-39643-5	33-FDUP-002	Total/NA	Water	353.2	
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	353.2	
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	353.2	
LCS 500-127685/13	Lab Control Sample	Total/NA	Water	353.2	
MB 500-127685/12	Method Blank	Total/NA	Water	353.2	

Analysis Batch: 127687

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	300.0	
500-39643-2	33-FDUP-001	Total/NA	Water	300.0	
500-39643-3	GW-33MWC-01-092111	Total/NA	Water	300.0	
500-39643-4	GW-33MWC-03-092111	Total/NA	Water	300.0	
500-39643-5	33-FDUP-002	Total/NA	Water	300.0	
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	300.0	
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	300.0	
LCS 500-127687/4	Lab Control Sample	Total/NA	Water	300.0	
MB 500-127687/3	Method Blank	Total/NA	Water	300.0	

Analysis Batch: 127726

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	Nitrate by calc	
500-39643-2	33-FDUP-001	Total/NA	Water	Nitrate by calc	
500-39643-3	GW-33MWC-01-092111	Total/NA	Water	Nitrate by calc	
500-39643-4	GW-33MWC-03-092111	Total/NA	Water	Nitrate by calc	
500-39643-5	33-FDUP-002	Total/NA	Water	Nitrate by calc	
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	Nitrate by calc	
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	Nitrate by calc	

Analysis Batch: 127735

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	9060	
500-39643-2	33-FDUP-001	Total/NA	Water	9060	
500-39643-3	GW-33MWC-01-092111	Total/NA	Water	9060	
500-39643-4	GW-33MWC-03-092111	Total/NA	Water	9060	
500-39643-5	33-FDUP-002	Total/NA	Water	9060	
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	9060	
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	9060	
LCS 500-127735/4	Lab Control Sample	Total/NA	Water	9060	
MB 500-127735/3	Method Blank	Total/NA	Water	9060	

Analysis Batch: 127918

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39643-1	GW-33MWC-11-092111	Total/NA	Water	300.0	
500-39643-2	33-FDUP-001	Total/NA	Water	300.0	
500-39643-6	GW-33MWC-12-092111	Total/NA	Water	300.0	
500-39643-7	GW-33MWC-33-092111	Total/NA	Water	300.0	
LCS 500-127918/58	Lab Control Sample	Total/NA	Water	300.0	
MB 500-127918/57	Method Blank	Total/NA	Water	300.0	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-39643-1	GW-33MWC-11-092111	93	100	98	99
500-39643-2	33-FDUP-001	92	99	97	102
500-39643-3	GW-33MWC-01-092111	93	95	97	100
500-39643-4	GW-33MWC-03-092111	89	90	89	95
500-39643-4 - DL	GW-33MWC-03-092111	91	92	93	98
500-39643-5	33-FDUP-002	94	98	99	97
500-39643-5 - DL	33-FDUP-002	91	97	92	99
500-39643-6	GW-33MWC-12-092111	93	98	96	100
500-39643-7	GW-33MWC-33-092111	93	97	100	99
500-39643-7 - DL	GW-33MWC-33-092111	93	98	95	99
500-39643-8	TB-003-092111	94	101	97	101
LCS 500-126868/4	Lab Control Sample	100	97	95	100
MB 500-126868/3	Method Blank	92	94	94	101

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-126868/3
Matrix: Water
Analysis Batch: 126868

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/27/11 20:09	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/27/11 20:09	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/27/11 20:09	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/27/11 20:09	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/27/11 20:09	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/27/11 20:09	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/27/11 20:09	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:09	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/27/11 20:09	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/27/11 20:09	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:09	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 20:09	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/27/11 20:09	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:09	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/27/11 20:09	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/27/11 20:09	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/27/11 20:09	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/27/11 20:09	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/27/11 20:09	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/27/11 20:09	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/27/11 20:09	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/27/11 20:09	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 20:09	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/27/11 20:09	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/27/11 20:09	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/27/11 20:09	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/27/11 20:09	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/27/11 20:09	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/27/11 20:09	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/27/11 20:09	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/27/11 20:09	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/27/11 20:09	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*77 - 112*		*09/27/11 20:09*	*1*
Dibromofluoromethane	*94*		*78 - 119*		*09/27/11 20:09*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*77 - 124*		*09/27/11 20:09*	*1*
Toluene-d8 (Surr)	*101*		*80 - 121*		*09/27/11 20:09*	*1*

Lab Sample ID: LCS 500-126868/4
Matrix: Water
Analysis Batch: 126868

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0484		mg/L		97	43 - 153

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-126868/4
Matrix: Water
Analysis Batch: 126868

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Benzene	0.0500	0.0503		mg/L		101	74 - 113
Bromodichloromethane	0.0500	0.0480		mg/L		96	73 - 120
Bromoform	0.0500	0.0432		mg/L		86	64 - 126
Bromomethane	0.0500	0.0514		mg/L		103	46 - 155
Methyl Ethyl Ketone	0.0500	0.0418		mg/L		84	42 - 152
Carbon disulfide	0.0500	0.0365		mg/L		73	36 - 110
Carbon tetrachloride	0.0500	0.0514		mg/L		103	58 - 132
Chlorobenzene	0.0500	0.0495		mg/L		99	81 - 111
Chloroethane	0.0500	0.0525		mg/L		105	54 - 149
Chloroform	0.0500	0.0488		mg/L		98	71 - 116
Chloromethane	0.0500	0.0353		mg/L		71	36 - 148
cis-1,2-Dichloroethene	0.0500	0.0496		mg/L		99	66 - 111
cis-1,3-Dichloropropene	0.0538	0.0472		mg/L		88	65 - 114
Dibromochloromethane	0.0500	0.0473		mg/L		95	73 - 118
1,1-Dichloroethane	0.0500	0.0474		mg/L		95	64 - 117
1,1-Dichloroethene	0.0500	0.0451		mg/L		90	60 - 126
1,2-Dichloropropane	0.0500	0.0502		mg/L		100	68 - 123
Ethylbenzene	0.0500	0.0520		mg/L		104	79 - 114
2-Hexanone	0.0500	0.0433		mg/L		87	55 - 138
Methylene Chloride	0.0500	0.0467		mg/L		93	65 - 125
methyl isobutyl ketone	0.0500	0.0428		mg/L		86	56 - 138
Methyl tert-butyl ether	0.0500	0.0375		mg/L		75	57 - 119
Styrene	0.0500	0.0521		mg/L		104	76 - 118
1,1,2,2-Tetrachloroethane	0.0500	0.0480		mg/L		96	66 - 121
Tetrachloroethene	0.0500	0.0512		mg/L		102	76 - 114
Toluene	0.0500	0.0495		mg/L		99	76 - 121
trans-1,2-Dichloroethene	0.0500	0.0502		mg/L		100	67 - 120
trans-1,3-Dichloropropene	0.0486	0.0411		mg/L		85	60 - 119
1,1,1-Trichloroethane	0.0500	0.0530		mg/L		106	66 - 128
1,1,2-Trichloroethane	0.0500	0.0469		mg/L		94	62 - 137
Trichloroethene	0.0500	0.0497		mg/L		99	75 - 116
Vinyl chloride	0.0500	0.0415		mg/L		83	47 - 138
Xylenes, Total	0.150	0.159		mg/L		106	74 - 117
1,2-Dichloroethane	0.0500	0.0455		mg/L		91	69 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*
Dibromofluoromethane	*97*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*95*		*77 - 124*
Toluene-d8 (Surr)	*100*		*80 - 121*

Method: RSK-175 - Dissolved Gases (GC)

Lab Sample ID: MB 680-216262/23
Matrix: Water
Analysis Batch: 216262

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			09/29/11 08:58	1

Method: RSK-175 - Dissolved Gases (GC) (Continued)

Lab Sample ID: MB 680-216262/23 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216262

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylene	1.0	U	1.0	0.50	ug/L			09/29/11 08:58	1
Methane	0.58	U	0.58	0.29	ug/L			09/29/11 08:58	1

Lab Sample ID: LCS 680-216262/22 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216262

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Ethane	282	312		ug/L		111	75 - 125
Ethylene	271	284		ug/L		105	75 - 125
Methane	153	181		ug/L		118	75 - 125

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 500-126366/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126526 — **Prep Batch: 126366**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.20	U	0.20	0.040	mg/L		09/22/11 18:45	09/23/11 18:25	1
Manganese	0.010	U	0.010	0.00094	mg/L		09/22/11 18:45	09/23/11 18:25	1

Lab Sample ID: LCS 500-126366/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126526 — **Prep Batch: 126366**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Iron	1.00	1.04		mg/L		104	80 - 120
Manganese	0.500	0.499		mg/L		100	80 - 120

Lab Sample ID: 500-39643-1 MS — **Client Sample ID: GW-33MWC-11-092111**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126526 — **Prep Batch: 126366**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Iron	0.71		1.00	2.09	F	mg/L		138	75 - 125
Manganese	0.011		0.500	0.509		mg/L		100	75 - 125

Lab Sample ID: 500-39643-1 MSD — **Client Sample ID: GW-33MWC-11-092111**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126526 — **Prep Batch: 126366**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Iron	0.71		1.00	2.54	F	mg/L		183	75 - 125	19	20
Manganese	0.011		0.500	0.509		mg/L		100	75 - 125	0	20

QC Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: 500-39643-1 DU — **Client Sample ID: GW-33MWC-11-092111**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126526 — **Prep Batch: 126366**

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Iron	0.71			0.922	F	mg/L				26	20
Manganese	0.011			0.0121		mg/L				13	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 500-127687/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127687

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.146	J	0.20	0.083	mg/L			09/29/11 17:51	1
Sulfate	0.20	U	0.20	0.090	mg/L			09/29/11 17:51	1

Lab Sample ID: LCS 500-127687/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127687

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloride	3.00	2.97		mg/L		99	90 - 110
Sulfate	5.00	5.00		mg/L		100	90 - 110

Lab Sample ID: MB 500-127918/57 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127918

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.20	U	0.20	0.083	mg/L			10/06/11 11:48	1
Sulfate	0.20	U	0.20	0.090	mg/L			10/06/11 11:48	1

Lab Sample ID: LCS 500-127918/58 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127918

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloride	3.00	2.91		mg/L		97	90 - 110
Sulfate	5.00	4.86		mg/L		97	90 - 110

Method: 310.1 - Alkalinity

Lab Sample ID: MB 500-127120/2 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127120

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	1.3	mg/L			09/29/11 08:20	1

Method: 310.1 - Alkalinity (Continued)

Lab Sample ID: LCS 500-127120/3 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127120

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Alkalinity	100	97.4		mg/L		97	80 - 120

Method: 353.2 - Nitrogen, Nitrate-Nitrite

Lab Sample ID: MB 500-127685/12 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127685

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 09:47	1

Lab Sample ID: LCS 500-127685/13 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127685

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Nitrogen, Nitrate Nitrite	1.00	0.980		mg/L		98	80 - 120

Method: 354.1 - Nitrogen, Nitrite

Lab Sample ID: MB 500-126500/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126500

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Nitrite	0.00260	J	0.020	0.0020	mg/L			09/22/11 21:16	1

Lab Sample ID: LCS 500-126500/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126500

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Nitrogen, Nitrite	0.100	0.107		mg/L		107	80 - 120

Lab Sample ID: 500-39643-1 MS — **Client Sample ID: GW-33MWC-11-092111**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126500

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Nitrogen, Nitrite	0.0043	J B	0.100	0.111		mg/L		106	75 - 125

Lab Sample ID: 500-39643-1 MSD — **Client Sample ID: GW-33MWC-11-092111**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126500

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Nitrogen, Nitrite	0.0043	J B	0.100	0.113		mg/L		109	75 - 125	2	20

QC Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Method: 9060 - Organic Carbon, Total (TOC)

Lab Sample ID: MB 500-127635/3
Matrix: Water
Analysis Batch: 127635

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TOC Dup	1.0	U	1.0	0.36	mg/L			10/04/11 17:06	1

Lab Sample ID: LCS 500-127635/4
Matrix: Water
Analysis Batch: 127635

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
TOC Result 1	10.0	9.68		mg/L		97	80 - 120
TOC Result 2	10.0	9.79		mg/L		98	80 - 120
TOC Dup	10.0	9.73		mg/L		97	80 - 120

Lab Sample ID: MB 500-127735/3
Matrix: Water
Analysis Batch: 127735

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TIC Dup	0.650	J	1.0	0.36	mg/L			10/05/11 08:35	1

Lab Sample ID: LCS 500-127735/4
Matrix: Water
Analysis Batch: 127735

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
TIC Dup	10.0	9.16		mg/L		92	80 - 120

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q
TestAmerica Savannah	A2LA	DoD ELAP		0399-01
TestAmerica Savannah	A2LA	ISO/IEC 17025		399.01
TestAmerica Savannah	Alabama	State Program	4	41450
TestAmerica Savannah	Arkansas	Arkansas DOH	6	N/A
TestAmerica Savannah	Arkansas	State Program	6	88-0692
TestAmerica Savannah	California	NELAC	9	3217CA
TestAmerica Savannah	Colorado	State Program	8	N/A
TestAmerica Savannah	Connecticut	State Program	1	PH-0161
TestAmerica Savannah	Delaware	State Program	3	N/A
TestAmerica Savannah	Florida	NELAC	4	E87052
TestAmerica Savannah	Georgia	Georgia EPD	4	N/A
TestAmerica Savannah	Georgia	State Program	4	803
TestAmerica Savannah	Guam	State Program	9	09-005r
TestAmerica Savannah	Hawaii	State Program	9	N/A
TestAmerica Savannah	Illinois	NELAC	5	200022
TestAmerica Savannah	Indiana	State Program	5	N/A
TestAmerica Savannah	Iowa	State Program	7	353
TestAmerica Savannah	Kentucky	Kentucky UST	4	18
TestAmerica Savannah	Kentucky	State Program	4	90084
TestAmerica Savannah	Louisiana	NELAC	6	LA100015
TestAmerica Savannah	Louisiana	NELAC	6	30690
TestAmerica Savannah	Maine	State Program	1	GA00006
TestAmerica Savannah	Maryland	State Program	3	250
TestAmerica Savannah	Massachusetts	State Program	1	M-GA006
TestAmerica Savannah	Michigan	State Program	5	9925
TestAmerica Savannah	Mississippi	State Program	4	N/A
TestAmerica Savannah	Montana	State Program	8	CERT0081
TestAmerica Savannah	Nebraska	State Program	7	TestAmerica-Savannah
TestAmerica Savannah	New Jersey	NELAC	2	GA769

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39643-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Savannah	New Mexico	State Program	6	N/A
TestAmerica Savannah	New York	NELAC	2	10842
TestAmerica Savannah	North Carolina	North Carolina DENR	4	269
TestAmerica Savannah	North Carolina	North Carolina PHL	4	13701
TestAmerica Savannah	Oklahoma	State Program	6	9984
TestAmerica Savannah	Pennsylvania	NELAC	3	68-00474
TestAmerica Savannah	Puerto Rico	State Program	2	GA00006
TestAmerica Savannah	Rhode Island	State Program	1	LAO00244
TestAmerica Savannah	South Carolina	State Program	4	98001
TestAmerica Savannah	Tennessee	State Program	4	TN02961
TestAmerica Savannah	Texas	NELAC	6	T104704185-08-TX
TestAmerica Savannah	USDA	USDA		SAV 3-04
TestAmerica Savannah	Vermont	State Program	1	87052
TestAmerica Savannah	Virginia	NELAC Secondary AB	3	460161
TestAmerica Savannah	Virginia	State Program	3	302
TestAmerica Savannah	Washington	State Program	10	C1794
TestAmerica Savannah	West Virginia	West Virginia DEP	3	94
TestAmerica Savannah	West Virginia	West Virginia DHHR (DW)	3	9950C
TestAmerica Savannah	Wisconsin	State Program	5	999819810
TestAmerica Savannah	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Lab Job #: 500-39643

Chain of Custody Number:

Page 1 of 1

Temperature °C of Cooler: (3.0) (2.7)

(optional)

Report To
Contact: Monica Martin
Company: CH2M Hill
Address: 1034 S. Brentwood
Address: St Louis MO 63117
Phone: 314-665-4616
Fax:
E-Mail:

(optional)

Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Client: CH2M Hill
Client Project #: 423535
Project Name: Crab Orchard Phase 2
Project Location/State: Marion IL
Lab Project #:
Sampler: G. Roberts
Lab PM:

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOC 8260B (Preservative 1)	RSK-175 Modified (7)	SW-846 9060 (2)	Select Metals 6010B (3)	Alkalinity EPA 310.1 (7)	Chloride and Sulfate EPA 325.2 (7)	Nitrate EPA 353.2 (7)	Nitrite + Nitrate EPA 353.2 (2)		Comments
1		GW-33MWC-11-092111	9/21/11	0855	13	W	X	X	X	X	X	X	X	X		
2		33-FDUP-001	9/21/11	0910	13	W	X	X	X	X	X	X	X	X		
3		GW-33MWC-01-092111	9/21/11	1000	13	W	X	X	X	X	X	X	X	X		
4		GW-33MWC-03-092111	9/21/11	1220	13	W	X	X	X	X	X	X	X	X		
5		33-FDUP-002	9/21/11	1230	13	W	X	X	X	X	X	X	X	X		
6		GW-33MWC-12-092111	9/21/11	1530	13	W	X	X	X	X	X	X	X	X		
7		GW-33MWC-33-092111	9/21/11	1535	13	W	X	X	X	X	X	X	X	X		
8		TB-003-092111	9/21/11	1700	2	W	X									

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days ___ Other
Requested Due Date

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for ___ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	CH2M Hill	9/21/11	1730	[signature]	TA	9/22/11	1030
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier
Shipped: FX
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Phone (708) 534-5200 Fax (708) 534 5211

Chain of Custody Record

TestAmerica

Client Information (Sub Contract Lab)
Client Contact: Shipping/Receiving
Company: TestAmerica Laboratories, Inc.
Address: 5102 LaRoche Avenue,
City: Savannah
State, Zip: GA, 31404
Phone: 912-354-7858(Tel) 912-352-0165(Fax)
Email:
Project Name: Crab Orchard Wildlife Refuge #2
Site:

Sample:
Phone:
Due Date Requested: 10/3/2011
TAT Requested (days):
PO #:
WO #:
Project #: 50005970
SSOW#:

Lab PM: Knapp, Jim
E-Mail: jim.knapp@testamericainc.com
Carrier Tracking No(s):
COC No: 500-7651 1
Page: Page 1 of 1
Job #: 500-39643 1

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (w=water, s=solid, o=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	RSK_175/ Methane, Ethane, & Ethene	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
GW-33MWC-11-092111 (500-39643 1)	9/21/11	08:55 Central		Water			X	3	
33-FDUP-001 (500-39643-2)	9/21/11	09:10 Central		Water			X	3	
GW-33MWC 01-092111 (500-39643 3)	9/21/11	10:00 Central		Water			X	3	
GW-33MWC-03 092111 (500-39643 4)	9/21/11	12:20 Central		Water			X	3	
33-FDUP-002 (500-39643 5)	9/21/11	12:30 Central		Water			X	3	
GW-33MWC-12-092111 (500-39643-6)	9/21/11	15:30 Central		Water			X	3	
GW-33MWC-33-092111 (500-39643-7)	9/21/11	15:35 Central		Water			X	3	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: Date: Time: Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	09/22/11 1600	TestAmerica	[signature]	9/23/11 09:31	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ☐ Yes ☐ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks: 3 C/O

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-39643-1

Login Number: 39643
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	3.0,2.7
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-39643-1

Login Number: 39643
List Number: 1
Creator: Kicklighter, Marilyn

List Source: TestAmerica Savannah
List Creation: 09/23/11 11:21 AM

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-39710-1
Client Project/Site: Crab Orchard Wildlife Refuge #2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/13/2011 03:32:32 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

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Have a Question? Ask The Expert

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Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 6
Sample Summary 7
Client Sample Results 8
Definitions 21
QC Association 22
Surrogate Summary 26
QC Sample Results 27
Certification Summary 40
Chain of Custody 42
Receipt Checklists 44

Job ID: 500-39710-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-39710-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC/MS VOA
Method(s) 8260B: The following sample(s) was diluted due to the abundance of target analytes: GW-33-342-092211 (500-39710-6). Elevated reporting limits (RLs) are provided.

Method(s) 8260B: Surrogate recovery for the following sample was outside control limits: GW-33-342-092211 (500-39710-6). The sample was re-analyzed at a dilution with all surrogates within limits. Both sets of surrogate data have been reported.

No other analytical or quality issues were noted.

GC VOA
Method(s) RSK-175: The field blank associated with these samples contained a detection above the reporting limit (RL) for the following analyte: Methane. Sample was re-analyzed with concurring results.

Method(s) RSK-175: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 216598 were outside control limits. The associated laboratory control samples (LCS/LCSD) recovery met acceptance criteria.

Method(s) RSK-175: The matrix spike / matrix spike duplicate (MS/MSD) precision for batch 216598 was outside control limits. The associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) precision met acceptance criteria.

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

General Chemistry
Method(s) 353.2: The nitrate matrix spike duplicate (MSD) recovery for sample GW-33MWC-35-092211 (500-39710-4) in batch 127736 was outside control limits. The matrix spike (MS) and the associated laboratory control sample (LCS) recoveries met acceptance criteria.

No other analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: FB-001-092211 — Lab Sample ID: 500-39710-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methane	0.73		0.58	0.29	ug/L	1		RSK-175	Total/NA
Chloride	0.17	J B	0.20	0.083	mg/L	1		300.0	Total/NA
Nitrogen, Nitrite	0.0027	J	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	0.44	J	1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	0.83	J B	1.0	0.36	mg/L	1		9060	Total/NA

Client Sample ID: GW-33MWC-45-092211 — Lab Sample ID: 500-39710-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methane	770		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	5.0		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.084		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	240		10	4.2	mg/L	50		300.0	Total/NA
Sulfate	0.34		0.20	0.090	mg/L	1		300.0	Total/NA
Alkalinity	450		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrite	0.0023	J	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	5.5		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	48	B	5.0	1.8	mg/L	5		9060	Total/NA

Client Sample ID: GW-33MWC-44-092211 — Lab Sample ID: 500-39710-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methane	0.71		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.14	J	0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.48		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	130	B	4.0	1.7	mg/L	20		300.0	Total/NA
Sulfate	280		8.0	3.6	mg/L	40		300.0	Total/NA
Alkalinity	360		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrate Nitrite	0.26		0.10	0.043	mg/L	1		353.2	Total/NA
Nitrogen, Nitrite	0.027		0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	11		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	59	B	5.0	1.8	mg/L	5		9060	Total/NA
Nitrogen, Nitrate	0.23		0.10	0.043	mg/L	1		Nitrate by calc	Total/NA

Client Sample ID: GW-33MWC-35-092211 — Lab Sample ID: 500-39710-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	0.0061		0.0050	0.0019	mg/L	1		8260B	Total/NA
Ethane	1.3		1.1	0.55	ug/L	1		RSK-175	Total/NA
Methane	72		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.27		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.0065	J	0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	280		10	4.2	mg/L	50		300.0	Total/NA
Sulfate	7.2		0.40	0.18	mg/L	2		300.0	Total/NA
Alkalinity	280		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrite	0.0036	J	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	13		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	5.6	B	5.0	1.8	mg/L	5		9060	Total/NA

Client Sample ID: GW-33-341-092211 — Lab Sample ID: 500-39710-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.18		0.0010	0.00022	mg/L	1		8260B	Total/NA
1,1-Dichloroethane	0.0017		0.0010	0.00024	mg/L	1		8260B	Total/NA

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: GW-33-341-092211 (Continued) — Lab Sample ID: 500-39710-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethene	0.018		0.0010	0.00029	mg/L	1		8260B	Total/NA
trans-1,2-Dichloroethene	0.0023		0.0010	0.00027	mg/L	1		8260B	Total/NA
Vinyl chloride	0.025		0.00050	0.00013	mg/L	1		8260B	Total/NA
Trichloroethene - DL	0.64		0.0050	0.0018	mg/L	10		8260B	Total/NA
Methane	89		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	12		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.82		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	40	B	2.0	0.83	mg/L	10		300.0	Total/NA
Sulfate	62		2.0	0.90	mg/L	10		300.0	Total/NA
Alkalinity	68		5.0	1.3	mg/L	1		310.1	Total/NA
Nitrogen, Nitrite	0.0027	J	0.020	0.0020	mg/L	1		354.1	Total/NA
TOC Dup	5.2		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	15	B	5.0	1.8	mg/L	5		9060	Total/NA

Client Sample ID: GW-33-342-092211 — Lab Sample ID: 500-39710-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.23		0.0050	0.0011	mg/L	5		8260B	Total/NA
trans-1,2-Dichloroethene	0.0027	J	0.0050	0.0014	mg/L	5		8260B	Total/NA
Vinyl chloride	0.0035		0.0025	0.00065	mg/L	5		8260B	Total/NA
Trichloroethene - DL	1.6		0.025	0.0090	mg/L	50		8260B	Total/NA
Methane	8.5		0.58	0.29	ug/L	1		RSK-175	Total/NA
Iron	0.33		0.20	0.040	mg/L	1		6010B	Total/NA
Manganese	0.040		0.010	0.00094	mg/L	1		6010B	Total/NA
Chloride	86	B	4.0	1.7	mg/L	20		300.0	Total/NA
Sulfate	320		8.0	3.6	mg/L	40		300.0	Total/NA
Alkalinity	420		5.0	1.3	mg/L	1		310.1	Total/NA
TOC Dup	4.2		1.0	0.36	mg/L	1		9060	Total/NA
TIC Dup	46	B	5.0	1.8	mg/L	5		9060	Total/NA

Client Sample ID: TB-005-092211 — Lab Sample ID: 500-39710-7

No Detections

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
RSK-175	Dissolved Gases (GC)	RSK	TAL SAV
6010B	Metals (ICP)	SW846	TAL CHI
300.0	Anions, Ion Chromatography	MCAWW	TAL CHI
310.1	Alkalinity	MCAWW	TAL CHI
353.2	Nitrogen, Nitrate-Nitrite	MCAWW	TAL CHI
354.1	Nitrogen, Nitrite	MCAWW	TAL CHI
9060	Organic Carbon, Total (TOC)	SW846	TAL CHI
Nitrate by calc	Nitrogen, Nitrate-Nitrite	SM	TAL CHI

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique, RSKSOP-175, Rev. 0, 8/11/94, USEPA Research Lab

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-39710-1	FB-001-092211	Water	09/22/11 08:00	09/23/11 10:10
500-39710-2	GW-33MWC-45-092211	Water	09/22/11 09:00	09/23/11 10:10
500-39710-3	GW-33MWC-44-092211	Water	09/22/11 11:10	09/23/11 10:10
500-39710-4	GW-33MWC-35-092211	Water	09/22/11 10:15	09/23/11 10:10
500-39710-5	GW-33-341-092211	Water	09/22/11 15:00	09/23/11 10:10
500-39710-6	GW-33-342-092211	Water	09/22/11 16:25	09/23/11 10:10
500-39710-7	TB-005-092211	Water	09/22/11 17:00	09/23/11 10:10

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: FB-001-092211

Date Collected: 09/22/11 08:00
Date Received: 09/23/11 10:10

Lab Sample ID: 500-39710-1

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 04:20	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 04:20	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 04:20	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 04:20	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 04:20	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 04:20	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 04:20	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 04:20	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 04:20	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 04:20	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 04:20	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 04:20	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 04:20	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 04:20	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 04:20	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 04:20	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 04:20	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 04:20	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 04:20	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 04:20	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 04:20	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 04:20	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 04:20	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 04:20	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 04:20	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 04:20	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 04:20	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 04:20	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 04:20	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 04:20	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 04:20	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 04:20	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 04:20	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 04:20	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 04:20	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 04:20	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*89*		*77 - 112*		*09/28/11 04:20*	*1*
Dibromofluoromethane	*101*		*78 - 119*		*09/28/11 04:20*	*1*
1,2-Dichloroethane-d4 (Surr)	*98*		*77 - 124*		*09/28/11 04:20*	*1*
Toluene-d8 (Surr)	*99*		*80 - 121*		*09/28/11 04:20*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			10/04/11 10:24	1
Ethylene	1.0	U	1.0	0.50	ug/L			10/04/11 10:24	1
Methane	**0.73**		0.58	0.29	ug/L			10/04/11 10:24	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: FB-001-092211

Date Collected: 09/22/11 08:00
Date Received: 09/23/11 10:10

Lab Sample ID: 500-39710-1

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.20	U	0.20	0.040	mg/L		09/23/11 16:30	09/26/11 22:45	1
Manganese	0.010	U	0.010	0.00094	mg/L		09/23/11 16:30	09/26/11 22:45	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**0.17**	**J B**	0.20	0.083	mg/L			09/30/11 08:52	1
Sulfate	0.20	U	0.20	0.090	mg/L			09/30/11 08:52	1
Alkalinity	5.0	U	5.0	1.3	mg/L			09/30/11 10:03	1
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 11:37	1
Nitrogen, Nitrite	**0.0027**	**J**	0.020	0.0020	mg/L			09/23/11 18:42	1
TOC Dup	**0.44**	**J**	1.0	0.36	mg/L			10/04/11 20:57	1
TIC Dup	**0.83**	**J B**	1.0	0.36	mg/L			10/05/11 12:31	1
Nitrogen, Nitrate	0.10	U	0.10	0.043	mg/L			10/10/11 16:45	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: GW-33MWC-45-092211

Date Collected: 09/22/11 09:00
Date Received: 09/23/11 10:10

Lab Sample ID: 500-39710-2

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 04:44	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 04:44	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 04:44	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 04:44	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 04:44	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 04:44	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 04:44	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 04:44	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 04:44	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 04:44	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 04:44	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 04:44	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 04:44	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 04:44	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 04:44	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 04:44	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 04:44	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 04:44	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 04:44	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 04:44	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 04:44	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 04:44	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 04:44	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 04:44	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 04:44	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 04:44	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 04:44	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 04:44	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 04:44	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 04:44	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 04:44	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 04:44	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 04:44	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 04:44	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 04:44	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 04:44	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*91*		*77 - 112*		*09/28/11 04:44*	*1*
Dibromofluoromethane	*98*		*78 - 119*		*09/28/11 04:44*	*1*
1,2-Dichloroethane-d4 (Surr)	*101*		*77 - 124*		*09/28/11 04:44*	*1*
Toluene-d8 (Surr)	*104*		*80 - 121*		*09/28/11 04:44*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			10/04/11 10:36	1
Ethylene	1.0	U	1.0	0.50	ug/L			10/04/11 10:36	1
Methane	**770**		0.58	0.29	ug/L			10/04/11 10:36	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: GW-33MWC-45-092211

Date Collected: 09/22/11 09:00
Date Received: 09/23/11 10:10

Lab Sample ID: 500-39710-2

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	5.0		0.20	0.040	mg/L		09/23/11 16:30	09/26/11 22:48	1
Manganese	0.084		0.010	0.00094	mg/L		09/23/11 16:30	09/26/11 22:48	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	240		10	4.2	mg/L			10/12/11 01:05	50
Sulfate	0.34		0.20	0.090	mg/L			10/12/11 00:51	1
Alkalinity	450		5.0	1.3	mg/L			09/30/11 10:13	1
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 15:14	1
Nitrogen, Nitrite	0.0023	J	0.020	0.0020	mg/L			09/23/11 18:43	1
TOC Dup	5.5		1.0	0.36	mg/L			10/04/11 21:13	1
TIC Dup	48	B	5.0	1.8	mg/L			10/05/11 12:48	5
Nitrogen, Nitrate	0.10	U	0.10	0.043	mg/L			10/10/11 16:45	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: GW-33MWC-44-092211

Lab Sample ID: 500-39710-3

Date Collected: 09/22/11 11:10
Date Received: 09/23/11 10:10

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 05:09	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 05:09	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 05:09	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 05:09	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 05:09	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 05:09	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 05:09	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 05:09	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 05:09	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 05:09	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 05:09	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 05:09	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 05:09	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 05:09	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 05:09	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 05:09	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 05:09	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 05:09	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 05:09	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 05:09	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 05:09	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 05:09	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 05:09	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 05:09	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 05:09	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 05:09	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 05:09	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 05:09	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 05:09	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 05:09	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 05:09	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 05:09	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 05:09	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 05:09	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 05:09	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 05:09	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*90*		*77 - 112*		*09/28/11 05:09*	*1*
Dibromofluoromethane	*98*		*78 - 119*		*09/28/11 05:09*	*1*
1,2-Dichloroethane-d4 (Surr)	*98*		*77 - 124*		*09/28/11 05:09*	*1*
Toluene-d8 (Surr)	*100*		*80 - 121*		*09/28/11 05:09*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			10/04/11 10:49	1
Ethylene	1.0	U	1.0	0.50	ug/L			10/04/11 10:49	1
Methane	**0.71**		0.58	0.29	ug/L			10/04/11 10:49	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: GW-33MWC-44-092211

Lab Sample ID: 500-39710-3

Date Collected: 09/22/11 11:10
Date Received: 09/23/11 10:10

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.14	J	0.20	0.040	mg/L		09/23/11 16:30	09/26/11 22:52	1
Manganese	0.48		0.010	0.00094	mg/L		09/23/11 16:30	09/26/11 22:52	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	130	B	4.0	1.7	mg/L			09/30/11 09:50	20
Sulfate	280		8.0	3.6	mg/L			09/30/11 10:33	40
Alkalinity	360		5.0	1.3	mg/L			09/30/11 10:20	1
Nitrogen, Nitrate Nitrite	0.26		0.10	0.043	mg/L			10/05/11 15:16	1
Nitrogen, Nitrite	0.027		0.020	0.0020	mg/L			09/23/11 18:44	1
TOC Dup	11		1.0	0.36	mg/L			10/04/11 21:30	1
TIC Dup	59	B	5.0	1.8	mg/L			10/05/11 13:05	5
Nitrogen, Nitrate	0.23		0.10	0.043	mg/L			10/10/11 16:45	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: GW-33MWC-35-092211

Date Collected: 09/22/11 10:15
Date Received: 09/23/11 10:10

Lab Sample ID: 500-39710-4

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**0.0061**		0.0050	0.0019	mg/L			09/28/11 05:32	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 05:32	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 05:32	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 05:32	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 05:32	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 05:32	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 05:32	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 05:32	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 05:32	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 05:32	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 05:32	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 05:32	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 05:32	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 05:32	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 05:32	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 05:32	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 05:32	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 05:32	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 05:32	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 05:32	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 05:32	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 05:32	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 05:32	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 05:32	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 05:32	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 05:32	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 05:32	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 05:32	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 05:32	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 05:32	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 05:32	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 05:32	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 05:32	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 05:32	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 05:32	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 05:32	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*77 - 112*		*09/28/11 05:32*	*1*
Dibromofluoromethane	*103*		*78 - 119*		*09/28/11 05:32*	*1*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*		*09/28/11 05:32*	*1*
Toluene-d8 (Surr)	*103*		*80 - 121*		*09/28/11 05:32*	*1*

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	**1.3**		1.1	0.55	ug/L			10/04/11 11:02	1
Ethylene	1.0	U	1.0	0.50	ug/L			10/04/11 11:02	1
Methane	**72**		0.58	0.29	ug/L			10/04/11 11:02	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: GW-33MWC-35-092211

Lab Sample ID: 500-39710-4

Date Collected: 09/22/11 10:15
Matrix: Water
Date Received: 09/23/11 10:10

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.27		0.20	0.040	mg/L		09/23/11 16:30	09/26/11 22:56	1
Manganese	0.0065	J	0.010	0.00094	mg/L		09/23/11 16:30	09/26/11 22:56	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	280		10	4.2	mg/L			10/12/11 01:48	50
Sulfate	7.2		0.40	0.18	mg/L			09/30/11 10:47	2
Alkalinity	280		5.0	1.3	mg/L			09/30/11 10:30	1
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 15:18	1
Nitrogen, Nitrite	0.0036	J	0.020	0.0020	mg/L			09/23/11 18:44	1
TOC Dup	13		1.0	0.36	mg/L			10/04/11 21:46	1
TIC Dup	5.6	B	5.0	1.8	mg/L			10/05/11 13:21	5
Nitrogen, Nitrate	0.10	U	0.10	0.043	mg/L			10/10/11 16:45	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: GW-33-341-092211

Date Collected: 09/22/11 15:00
Date Received: 09/23/11 10:10

Lab Sample ID: 500-39710-5

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 06:45	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 06:45	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 06:45	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 06:45	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 06:45	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 06:45	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 06:45	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 06:45	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 06:45	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 06:45	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 06:45	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 06:45	1
cis-1,2-Dichloroethene	**0.18**		0.0010	0.00022	mg/L			09/28/11 06:45	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 06:45	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 06:45	1
1,1-Dichloroethane	**0.0017**		0.0010	0.00024	mg/L			09/28/11 06:45	1
1,1-Dichloroethene	**0.018**		0.0010	0.00029	mg/L			09/28/11 06:45	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 06:45	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 06:45	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 06:45	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 06:45	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 06:45	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 06:45	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 06:45	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 06:45	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 06:45	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 06:45	1
trans-1,2-Dichloroethene	**0.0023**		0.0010	0.00027	mg/L			09/28/11 06:45	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 06:45	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 06:45	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 06:45	1
Vinyl chloride	**0.025**		0.00050	0.00013	mg/L			09/28/11 06:45	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 06:45	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 06:45	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 06:45	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*91*		*77 - 112*		*09/28/11 06:45*	*1*
Dibromofluoromethane	*104*		*78 - 119*		*09/28/11 06:45*	*1*
1,2-Dichloroethane-d4 (Surr)	*98*		*77 - 124*		*09/28/11 06:45*	*1*
Toluene-d8 (Surr)	*103*		*80 - 121*		*09/28/11 06:45*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**0.64**		0.0050	0.0018	mg/L			09/28/11 07:10	10

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*89*		*77 - 112*		*09/28/11 07:10*	*10*
Dibromofluoromethane	*99*		*78 - 119*		*09/28/11 07:10*	*10*
1,2-Dichloroethane-d4 (Surr)	*94*		*77 - 124*		*09/28/11 07:10*	*10*
Toluene-d8 (Surr)	*99*		*80 - 121*		*09/28/11 07:10*	*10*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			10/04/11 11:15	1
Ethylene	1.0	U	1.0	0.50	ug/L			10/04/11 11:15	1
Methane	**89**		0.58	0.29	ug/L			10/04/11 11:15	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**12**		0.20	0.040	mg/L		09/23/11 16:30	09/26/11 23:23	1
Manganese	**0.82**		0.010	0.00094	mg/L		09/23/11 16:30	09/26/11 23:23	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**40**	**B**	2.0	0.83	mg/L			09/30/11 15:05	10
Sulfate	**62**		2.0	0.90	mg/L			09/30/11 15:05	10
Alkalinity	**68**		5.0	1.3	mg/L			09/30/11 10:47	1
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 15:24	1
Nitrogen, Nitrite	**0.0027**	**J**	0.020	0.0020	mg/L			09/23/11 18:47	1
TOC Dup	**5.2**		1.0	0.36	mg/L			10/04/11 22:22	1
TIC Dup	**15**	**B**	5.0	1.8	mg/L			10/05/11 13:56	5
Nitrogen, Nitrate	0.10	U	0.10	0.043	mg/L			10/10/11 16:45	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: GW-33-342-092211

Date Collected: 09/22/11 16:25
Date Received: 09/23/11 10:10

Lab Sample ID: 500-39710-6

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.025	U	0.025	0.0095	mg/L			10/06/11 08:29	5
Benzene	0.0025	U	0.0025	0.00060	mg/L			10/06/11 08:29	5
Bromodichloromethane	0.0050	U	0.0050	0.0012	mg/L			10/06/11 08:29	5
Bromoform	0.0050	U	0.0050	0.0023	mg/L			10/06/11 08:29	5
Bromomethane	0.0050	U	0.0050	0.0025	mg/L			10/06/11 08:29	5
Methyl Ethyl Ketone	0.025	U	0.025	0.0050	mg/L			10/06/11 08:29	5
Carbon disulfide	0.025	U	0.025	0.0022	mg/L			10/06/11 08:29	5
Carbon tetrachloride	0.0050	U	0.0050	0.0014	mg/L			10/06/11 08:29	5
Chlorobenzene	0.0050	U	0.0050	0.0012	mg/L			10/06/11 08:29	5
Chloroethane	0.0050	U	0.0050	0.0017	mg/L			10/06/11 08:29	5
Chloroform	0.0050	U	0.0050	0.0013	mg/L			10/06/11 08:29	5
Chloromethane	0.0050	U	0.0050	0.0012	mg/L			10/06/11 08:29	5
cis-1,2-Dichloroethene	**0.23**		0.0050	0.0011	mg/L			10/06/11 08:29	5
cis-1,3-Dichloropropene	0.0050	U	0.0050	0.0014	mg/L			10/06/11 08:29	5
Dibromochloromethane	0.0050	U	0.0050	0.0013	mg/L			10/06/11 08:29	5
1,1-Dichloroethane	0.0050	U	0.0050	0.0012	mg/L			10/06/11 08:29	5
1,1-Dichloroethene	0.0050	U	0.0050	0.0015	mg/L			10/06/11 08:29	5
1,2-Dichloropropane	0.0050	U	0.0050	0.0018	mg/L			10/06/11 08:29	5
Ethylbenzene	0.0025	U	0.0025	0.00070	mg/L			10/06/11 08:29	5
2-Hexanone	0.025	U	0.025	0.0028	mg/L			10/06/11 08:29	5
Methylene Chloride	0.025	U	0.025	0.0032	mg/L			10/06/11 08:29	5
methyl isobutyl ketone	0.025	U	0.025	0.0040	mg/L			10/06/11 08:29	5
Methyl tert-butyl ether	0.0050	U	0.0050	0.0014	mg/L			10/06/11 08:29	5
Styrene	0.0050	U	0.0050	0.0013	mg/L			10/06/11 08:29	5
1,1,2,2-Tetrachloroethane	0.0050	U	0.0050	0.0018	mg/L			10/06/11 08:29	5
Tetrachloroethene	0.0050	U	0.0050	0.0011	mg/L			10/06/11 08:29	5
Toluene	0.0025	U	0.0025	0.00075	mg/L			10/06/11 08:29	5
trans-1,2-Dichloroethene	**0.0027**	**J**	0.0050	0.0014	mg/L			10/06/11 08:29	5
trans-1,3-Dichloropropene	0.0050	U	0.0050	0.0018	mg/L			10/06/11 08:29	5
1,1,1-Trichloroethane	0.0050	U	0.0050	0.0013	mg/L			10/06/11 08:29	5
1,1,2-Trichloroethane	0.0050	U	0.0050	0.0015	mg/L			10/06/11 08:29	5
Vinyl chloride	**0.0035**		0.0025	0.00065	mg/L			10/06/11 08:29	5
Xylenes, Total	0.0050	U	0.0050	0.0015	mg/L			10/06/11 08:29	5
1,2-Dichloroethane	0.0050	U	0.0050	0.0014	mg/L			10/06/11 08:29	5
1,3-Dichloropropene, Total	0.0050	U	0.0050	0.0025	mg/L			10/06/11 08:29	5

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*104*		*77 - 112*		*10/06/11 08:29*	*5*
Dibromofluoromethane	*120*	*X*	*78 - 119*		*10/06/11 08:29*	*5*
1,2-Dichloroethane-d4 (Surr)	*120*		*77 - 124*		*10/06/11 08:29*	*5*
Toluene-d8 (Surr)	*110*		*80 - 121*		*10/06/11 08:29*	*5*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**1.6**		0.025	0.0090	mg/L			10/06/11 08:52	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*105*		*77 - 112*		*10/06/11 08:52*	*50*
Dibromofluoromethane	*116*		*78 - 119*		*10/06/11 08:52*	*50*
1,2-Dichloroethane-d4 (Surr)	*121*		*77 - 124*		*10/06/11 08:52*	*50*
Toluene-d8 (Surr)	*110*		*80 - 121*		*10/06/11 08:52*	*50*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			10/04/11 11:28	1
Ethylene	1.0	U	1.0	0.50	ug/L			10/04/11 11:28	1
Methane	**8.5**		0.58	0.29	ug/L			10/04/11 11:28	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	**0.33**		0.20	0.040	mg/L		09/23/11 16:30	09/26/11 23:27	1
Manganese	**0.040**		0.010	0.00094	mg/L		09/23/11 16:30	09/26/11 23:27	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**86**	**B**	4.0	1.7	mg/L			09/30/11 15:33	20
Sulfate	**320**		8.0	3.6	mg/L			09/30/11 16:16	40
Alkalinity	**420**		5.0	1.3	mg/L			09/30/11 10:56	1
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 15:26	1
Nitrogen, Nitrite	0.020	U	0.020	0.0020	mg/L			09/23/11 18:47	1
TOC Dup	**4.2**		1.0	0.36	mg/L			10/04/11 22:58	1
TIC Dup	**46**	**B**	5.0	1.8	mg/L			10/05/11 14:13	5
Nitrogen, Nitrate	0.10	U	0.10	0.043	mg/L			10/10/11 16:45	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Client Sample ID: TB-005-092211

Date Collected: 09/22/11 17:00
Date Received: 09/23/11 10:10

Lab Sample ID: 500-39710-7

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/28/11 03:55	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/28/11 03:55	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/28/11 03:55	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/28/11 03:55	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/28/11 03:55	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/28/11 03:55	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/28/11 03:55	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:55	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/28/11 03:55	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/28/11 03:55	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/28/11 03:55	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 03:55	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 03:55	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:55	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/28/11 03:55	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/28/11 03:55	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/28/11 03:55	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/28/11 03:55	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/28/11 03:55	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/28/11 03:55	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/28/11 03:55	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/28/11 03:55	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:55	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/28/11 03:55	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/28/11 03:55	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/28/11 03:55	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/28/11 03:55	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/28/11 03:55	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/28/11 03:55	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/28/11 03:55	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/28/11 03:55	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/28/11 03:55	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/28/11 03:55	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/28/11 03:55	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/28/11 03:55	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/28/11 03:55	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*90*		*77 - 112*		*09/28/11 03:55*	*1*
Dibromofluoromethane	*100*		*78 - 119*		*09/28/11 03:55*	*1*
1,2-Dichloroethane-d4 (Surr)	*96*		*77 - 124*		*09/28/11 03:55*	*1*
Toluene-d8 (Surr)	*96*		*80 - 121*		*09/28/11 03:55*	*1*

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
X	Surrogate is outside control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
F	RPD of the MS and MSD exceeds the control limits
F	MS or MSD exceeds the control limits

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.
B	Compound was found in the blank and sample.
F	MS or MSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

GC/MS VOA

Analysis Batch: 126868

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-1	FB-001-092211	Total/NA	Water	8260B	
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	8260B	
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	8260B	
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	8260B	
500-39710-4 MS	GW-33MWC-35-092211	Total/NA	Water	8260B	
500-39710-4 MSD	GW-33MWC-35-092211	Total/NA	Water	8260B	
500-39710-5	GW-33-341-092211	Total/NA	Water	8260B	
500-39710-5 - DL	GW-33-341-092211	Total/NA	Water	8260B	
500-39710-7	TB-005-092211	Total/NA	Water	8260B	
LCS 500-126868/4	Lab Control Sample	Total/NA	Water	8260B	
MB 500-126868/3	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 127693

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-6	GW-33-342-092211	Total/NA	Water	8260B	
500-39710-6 - DL	GW-33-342-092211	Total/NA	Water	8260B	
LCS 500-127693/6	Lab Control Sample	Total/NA	Water	8260B	
MB 500-127693/5	Method Blank	Total/NA	Water	8260B	

GC VOA

Analysis Batch: 216598

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-1	FB-001-092211	Total/NA	Water	RSK-175	
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	RSK-175	
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	RSK-175	
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	RSK-175	
500-39710-4 MSD	GW-33MWC-35-092211	Total/NA	Water	RSK-175	
500-39710-5	GW-33-341-092211	Total/NA	Water	RSK-175	
500-39710-6	GW-33-342-092211	Total/NA	Water	RSK-175	
LCS 680-216598/23	Lab Control Sample	Total/NA	Water	RSK-175	
LCSD 680-216598/24	Lab Control Sample Dup	Total/NA	Water	RSK-175	
MB 680-216598/22	Method Blank	Total/NA	Water	RSK-175	

Analysis Batch: 216599

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	RSK-175	
LCS 680-216599/3	Lab Control Sample	Total/NA	Water	RSK-175	
LCSD 680-216599/5	Lab Control Sample Dup	Total/NA	Water	RSK-175	
MB 680-216599/4	Method Blank	Total/NA	Water	RSK-175	

Analysis Batch: 216731

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-4 MS	GW-33MWC-35-092211	Total/NA	Water	RSK-175	
LCS 680-216731/27	Lab Control Sample	Total/NA	Water	RSK-175	
LCSD 680-216731/28	Lab Control Sample Dup	Total/NA	Water	RSK-175	
MB 680-216731/29	Method Blank	Total/NA	Water	RSK-175	

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Metals

Prep Batch: 126517

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-1	FB-001-092211	Total/NA	Water	3010A	
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	3010A	
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	3010A	
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	3010A	
500-39710-4 DU	GW-33MWC-35-092211	Total/NA	Water	3010A	
500-39710-4 MS	GW-33MWC-35-092211	Total/NA	Water	3010A	
500-39710-4 MSD	GW-33MWC-35-092211	Total/NA	Water	3010A	
500-39710-5	GW-33-341-092211	Total/NA	Water	3010A	
500-39710-6	GW-33-342-092211	Total/NA	Water	3010A	
LCS 500-126517/2-A	Lab Control Sample	Total/NA	Water	3010A	
MB 500-126517/1-A	Method Blank	Total/NA	Water	3010A	

Analysis Batch: 126760

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-1	FB-001-092211	Total/NA	Water	6010B	126517
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	6010B	126517
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	6010B	126517
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	6010B	126517
500-39710-4 DU	GW-33MWC-35-092211	Total/NA	Water	6010B	126517
500-39710-4 MS	GW-33MWC-35-092211	Total/NA	Water	6010B	126517
500-39710-4 MSD	GW-33MWC-35-092211	Total/NA	Water	6010B	126517
500-39710-5	GW-33-341-092211	Total/NA	Water	6010B	126517
500-39710-6	GW-33-342-092211	Total/NA	Water	6010B	126517
LCS 500-126517/2-A	Lab Control Sample	Total/NA	Water	6010B	126517
MB 500-126517/1-A	Method Blank	Total/NA	Water	6010B	126517

General Chemistry

Analysis Batch: 126605

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-1	FB-001-092211	Total/NA	Water	354.1	
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	354.1	
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	354.1	
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	354.1	
500-39710-4 MS	GW-33MWC-35-092211	Total/NA	Water	354.1	
500-39710-4 MSD	GW-33MWC-35-092211	Total/NA	Water	354.1	
500-39710-5	GW-33-341-092211	Total/NA	Water	354.1	
500-39710-6	GW-33-342-092211	Total/NA	Water	354.1	
LCS 500-126605/4	Lab Control Sample	Total/NA	Water	354.1	
MB 500-126605/3	Method Blank	Total/NA	Water	354.1	

Analysis Batch: 127293

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-1	FB-001-092211	Total/NA	Water	310.1	
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	310.1	
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	310.1	
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	310.1	
500-39710-4 DU	GW-33MWC-35-092211	Total/NA	Water	310.1	
500-39710-5	GW-33-341-092211	Total/NA	Water	310.1	
500-39710-6	GW-33-342-092211	Total/NA	Water	310.1	
LCS 500-127293/3	Lab Control Sample	Total/NA	Water	310.1	
MB 500-127293/2	Method Blank	Total/NA	Water	310.1	

General Chemistry (Continued)

Analysis Batch: 127635

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-1	FB-001-092211	Total/NA	Water	9060	
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	9060	
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	9060	
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	9060	
500-39710-4 MS	GW-33MWC-35-092211	Total/NA	Water	9060	
500-39710-4 MSD	GW-33MWC-35-092211	Total/NA	Water	9060	
500-39710-5	GW-33-341-092211	Total/NA	Water	9060	
500-39710-6	GW-33-342-092211	Total/NA	Water	9060	
LCS 500-127635/4	Lab Control Sample	Total/NA	Water	9060	
MB 500-127635/3	Method Blank	Total/NA	Water	9060	

Analysis Batch: 127685

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-1	FB-001-092211	Total/NA	Water	353.2	
500-39710-1 MS	FB-001-092211	Total/NA	Water	353.2	
500-39710-1 MSD	FB-001-092211	Total/NA	Water	353.2	
LCS 500-127685/13	Lab Control Sample	Total/NA	Water	353.2	
MB 500-127685/12	Method Blank	Total/NA	Water	353.2	

Analysis Batch: 127687

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-1	FB-001-092211	Total/NA	Water	300.0	
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	300.0	
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	300.0	
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	300.0	
500-39710-4 MS	GW-33MWC-35-092211	Total/NA	Water	300.0	
500-39710-4 MSD	GW-33MWC-35-092211	Total/NA	Water	300.0	
500-39710-5	GW-33-341-092211	Total/NA	Water	300.0	
500-39710-6	GW-33-342-092211	Total/NA	Water	300.0	
500-39710-6	GW-33-342-092211	Total/NA	Water	300.0	
LCS 500-127687/4	Lab Control Sample	Total/NA	Water	300.0	
MB 500-127687/3	Method Blank	Total/NA	Water	300.0	

Analysis Batch: 127735

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-1	FB-001-092211	Total/NA	Water	9060	
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	9060	
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	9060	
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	9060	
500-39710-4 MS	GW-33MWC-35-092211	Total/NA	Water	9060	
500-39710-4 MSD	GW-33MWC-35-092211	Total/NA	Water	9060	
500-39710-5	GW-33-341-092211	Total/NA	Water	9060	
500-39710-6	GW-33-342-092211	Total/NA	Water	9060	
LCS 500-127735/4	Lab Control Sample	Total/NA	Water	9060	
MB 500-127735/3	Method Blank	Total/NA	Water	9060	

Analysis Batch: 127736

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	353.2	
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	353.2	
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	353.2	
500-39710-4 MS	GW-33MWC-35-092211	Total/NA	Water	353.2	

General Chemistry (Continued)

Analysis Batch: 127736 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-4 MSD	GW-33MWC-35-092211	Total/NA	Water	353.2	
500-39710-5	GW-33-341-092211	Total/NA	Water	353.2	
500-39710-6	GW-33-342-092211	Total/NA	Water	353.2	
LCS 500-127736/37	Lab Control Sample	Total/NA	Water	353.2	
MB 500-127736/36	Method Blank	Total/NA	Water	353.2	

Analysis Batch: 128316

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-1	FB-001-092211	Total/NA	Water	Nitrate by calc	
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	Nitrate by calc	
500-39710-3	GW-33MWC-44-092211	Total/NA	Water	Nitrate by calc	
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	Nitrate by calc	
500-39710-5	GW-33-341-092211	Total/NA	Water	Nitrate by calc	
500-39710-6	GW-33-342-092211	Total/NA	Water	Nitrate by calc	

Analysis Batch: 128514

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	300.0	
500-39710-2	GW-33MWC-45-092211	Total/NA	Water	300.0	
500-39710-4	GW-33MWC-35-092211	Total/NA	Water	300.0	
500-39710-4 MS	GW-33MWC-35-092211	Total/NA	Water	300.0	
500-39710-4 MSD	GW-33MWC-35-092211	Total/NA	Water	300.0	
LCS 500-128514/8	Lab Control Sample	Total/NA	Water	300.0	
MB 500-128514/7	Method Blank	Total/NA	Water	300.0	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-39710-1	FB-001-092211	89	101	98	99
500-39710-2	GW-33MWC-45-092211	91	98	101	104
500-39710-3	GW-33MWC-44-092211	90	98	98	100
500-39710-4	GW-33MWC-35-092211	92	103	100	103
500-39710-4 MS	GW-33MWC-35-092211	98	104	101	102
500-39710-4 MSD	GW-33MWC-35-092211	98	103	99	102
500-39710-5	GW-33-341-092211	91	104	98	103
500-39710-5 - DL	GW-33-341-092211	89	99	94	99
500-39710-6	GW-33-342-092211	104	120 X	120	110
500-39710-6 - DL	GW-33-342-092211	105	116	121	110
500-39710-7	TB-005-092211	90	100	96	96
LCS 500-126868/4	Lab Control Sample	100	97	95	100
LCS 500-127693/6	Lab Control Sample	104	110	112	110
MB 500-126868/3	Method Blank	92	94	94	101
MB 500-127693/5	Method Blank	102	108	113	115

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-126868/3
Matrix: Water
Analysis Batch: 126868

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			09/27/11 20:09	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			09/27/11 20:09	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			09/27/11 20:09	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			09/27/11 20:09	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			09/27/11 20:09	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			09/27/11 20:09	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			09/27/11 20:09	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:09	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			09/27/11 20:09	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			09/27/11 20:09	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:09	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 20:09	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			09/27/11 20:09	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			09/27/11 20:09	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			09/27/11 20:09	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			09/27/11 20:09	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			09/27/11 20:09	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			09/27/11 20:09	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			09/27/11 20:09	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			09/27/11 20:09	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			09/27/11 20:09	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			09/27/11 20:09	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			09/27/11 20:09	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			09/27/11 20:09	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			09/27/11 20:09	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			09/27/11 20:09	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			09/27/11 20:09	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			09/27/11 20:09	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			09/27/11 20:09	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			09/27/11 20:09	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			09/27/11 20:09	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			09/27/11 20:09	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			09/27/11 20:09	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*77 - 112*		*09/27/11 20:09*	*1*
Dibromofluoromethane	*94*		*78 - 119*		*09/27/11 20:09*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*77 - 124*		*09/27/11 20:09*	*1*
Toluene-d8 (Surr)	*101*		*80 - 121*		*09/27/11 20:09*	*1*

Lab Sample ID: LCS 500-126868/4
Matrix: Water
Analysis Batch: 126868

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0484		mg/L		97	43 - 153

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-126868/4
Matrix: Water
Analysis Batch: 126868

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Benzene	0.0500	0.0503		mg/L		101	74 - 113
Bromodichloromethane	0.0500	0.0480		mg/L		96	73 - 120
Bromoform	0.0500	0.0432		mg/L		86	64 - 126
Bromomethane	0.0500	0.0514		mg/L		103	46 - 155
Methyl Ethyl Ketone	0.0500	0.0418		mg/L		84	42 - 152
Carbon disulfide	0.0500	0.0365		mg/L		73	36 - 110
Carbon tetrachloride	0.0500	0.0514		mg/L		103	58 - 132
Chlorobenzene	0.0500	0.0495		mg/L		99	81 - 111
Chloroethane	0.0500	0.0525		mg/L		105	54 - 149
Chloroform	0.0500	0.0488		mg/L		98	71 - 116
Chloromethane	0.0500	0.0353		mg/L		71	36 - 148
cis-1,2-Dichloroethene	0.0500	0.0496		mg/L		99	66 - 111
cis-1,3-Dichloropropene	0.0538	0.0472		mg/L		88	65 - 114
Dibromochloromethane	0.0500	0.0473		mg/L		95	73 - 118
1,1-Dichloroethane	0.0500	0.0474		mg/L		95	64 - 117
1,1-Dichloroethene	0.0500	0.0451		mg/L		90	60 - 126
1,2-Dichloropropane	0.0500	0.0502		mg/L		100	68 - 123
Ethylbenzene	0.0500	0.0520		mg/L		104	79 - 114
2-Hexanone	0.0500	0.0433		mg/L		87	55 - 138
Methylene Chloride	0.0500	0.0467		mg/L		93	65 - 125
methyl isobutyl ketone	0.0500	0.0428		mg/L		86	56 - 138
Methyl tert-butyl ether	0.0500	0.0375		mg/L		75	57 - 119
Styrene	0.0500	0.0521		mg/L		104	76 - 118
1,1,2,2-Tetrachloroethane	0.0500	0.0480		mg/L		96	66 - 121
Tetrachloroethene	0.0500	0.0512		mg/L		102	76 - 114
Toluene	0.0500	0.0495		mg/L		99	76 - 121
trans-1,2-Dichloroethene	0.0500	0.0502		mg/L		100	67 - 120
trans-1,3-Dichloropropene	0.0486	0.0411		mg/L		85	60 - 119
1,1,1-Trichloroethane	0.0500	0.0530		mg/L		106	66 - 128
1,1,2-Trichloroethane	0.0500	0.0469		mg/L		94	62 - 137
Trichloroethene	0.0500	0.0497		mg/L		99	75 - 116
Vinyl chloride	0.0500	0.0415		mg/L		83	47 - 138
Xylenes, Total	0.150	0.159		mg/L		106	74 - 117
1,2-Dichloroethane	0.0500	0.0455		mg/L		91	69 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*
Dibromofluoromethane	*97*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*95*		*77 - 124*
Toluene-d8 (Surr)	*100*		*80 - 121*

Lab Sample ID: 500-39710-4 MS
Matrix: Water
Analysis Batch: 126868

Client Sample ID: GW-33MWC-35-092211
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0061		0.0500	0.0560		mg/L		100	43 - 153
Benzene	0.00050	U	0.0500	0.0519		mg/L		104	74 - 113
Bromodichloromethane	0.0010	U	0.0500	0.0518		mg/L		104	73 - 120

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 500-39710-4 MS
Matrix: Water
Analysis Batch: 126868

Client Sample ID: GW-33MWC-35-092211
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Bromoform	0.0010	U	0.0500	0.0461		mg/L		92	64 - 126
Bromomethane	0.0010	U	0.0500	0.0624		mg/L		125	46 - 155
Methyl Ethyl Ketone	0.0050	U	0.0500	0.0463		mg/L		93	42 - 152
Carbon disulfide	0.0050	U	0.0500	0.0377		mg/L		75	36 - 110
Carbon tetrachloride	0.0010	U	0.0500	0.0519		mg/L		104	58 - 132
Chlorobenzene	0.0010	U	0.0500	0.0505		mg/L		101	81 - 111
Chloroethane	0.0010	U	0.0500	0.0530		mg/L		106	54 - 149
Chloroform	0.0010	U	0.0500	0.0531		mg/L		106	71 - 116
Chloromethane	0.0010	U	0.0500	0.0331		mg/L		66	36 - 148
cis-1,2-Dichloroethene	0.0010	U	0.0500	0.0540		mg/L		108	66 - 111
cis-1,3-Dichloropropene	0.0010	U	0.0538	0.0489		mg/L		91	65 - 114
Dibromochloromethane	0.0010	U	0.0500	0.0508		mg/L		102	73 - 118
1,1-Dichloroethane	0.0010	U	0.0500	0.0510		mg/L		102	64 - 117
1,1-Dichloroethene	0.0010	U	0.0500	0.0472		mg/L		94	60 - 126
1,2-Dichloropropane	0.0010	U	0.0500	0.0530		mg/L		106	68 - 123
Ethylbenzene	0.00050	U	0.0500	0.0517		mg/L		103	79 - 114
2-Hexanone	0.0050	U	0.0500	0.0437		mg/L		87	55 - 138
Methylene Chloride	0.0050	U	0.0500	0.0534		mg/L		107	65 - 125
methyl isobutyl ketone	0.0050	U	0.0500	0.0461		mg/L		92	56 - 138
Methyl tert-butyl ether	0.0010	U	0.0500	0.0406		mg/L		81	57 - 119
Styrene	0.0010	U	0.0500	0.0525		mg/L		105	76 - 118
1,1,2,2-Tetrachloroethane	0.0010	U	0.0500	0.0525		mg/L		105	66 - 121
Tetrachloroethene	0.0010	U	0.0500	0.0503		mg/L		101	76 - 114
Toluene	0.00050	U	0.0500	0.0509		mg/L		102	76 - 121
trans-1,2-Dichloroethene	0.0010	U	0.0500	0.0524		mg/L		105	67 - 120
trans-1,3-Dichloropropene	0.0010	U	0.0486	0.0445		mg/L		92	60 - 119
1,1,1-Trichloroethane	0.0010	U	0.0500	0.0558		mg/L		112	66 - 128
1,1,2-Trichloroethane	0.0010	U	0.0500	0.0519		mg/L		104	62 - 137
Trichloroethene	0.00050	U	0.0500	0.0512		mg/L		102	75 - 116
Vinyl chloride	0.00050	U	0.0500	0.0394		mg/L		79	47 - 138
Xylenes, Total	0.0010	U	0.150	0.158		mg/L		106	74 - 117
1,2-Dichloroethane	0.0010	U	0.0500	0.0496		mg/L		99	69 - 115

Surrogate	*MS % Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*
Dibromofluoromethane	*104*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*101*		*77 - 124*
Toluene-d8 (Surr)	*102*		*80 - 121*

Lab Sample ID: 500-39710-4 MSD
Matrix: Water
Analysis Batch: 126868

Client Sample ID: GW-33MWC-35-092211
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	0.0061		0.0500	0.0522		mg/L		92	43 - 153	7	20
Benzene	0.00050	U	0.0500	0.0515		mg/L		103	74 - 113	1	20
Bromodichloromethane	0.0010	U	0.0500	0.0518		mg/L		104	73 - 120	0	20
Bromoform	0.0010	U	0.0500	0.0463		mg/L		93	64 - 126	0	20
Bromomethane	0.0010	U	0.0500	0.0643		mg/L		129	46 - 155	3	20

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 500-39710-4 MSD — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126868

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Methyl Ethyl Ketone	0.0050	U	0.0500	0.0426		mg/L		85	42 - 152	8	20
Carbon disulfide	0.0050	U	0.0500	0.0372		mg/L		74	36 - 110	1	20
Carbon tetrachloride	0.0010	U	0.0500	0.0514		mg/L		103	58 - 132	1	20
Chlorobenzene	0.0010	U	0.0500	0.0503		mg/L		101	81 - 111	0	20
Chloroethane	0.0010	U	0.0500	0.0553		mg/L		111	54 - 149	4	20
Chloroform	0.0010	U	0.0500	0.0515		mg/L		103	71 - 116	3	20
Chloromethane	0.0010	U	0.0500	0.0348		mg/L		70	36 - 148	5	20
cis-1,2-Dichloroethene	0.0010	U	0.0500	0.0519		mg/L		104	66 - 111	4	20
cis-1,3-Dichloropropene	0.0010	U	0.0538	0.0498		mg/L		93	65 - 114	2	20
Dibromochloromethane	0.0010	U	0.0500	0.0505		mg/L		101	73 - 118	1	20
1,1-Dichloroethane	0.0010	U	0.0500	0.0501		mg/L		100	64 - 117	2	20
1,1-Dichloroethene	0.0010	U	0.0500	0.0453		mg/L		91	60 - 126	4	20
1,2-Dichloropropane	0.0010	U	0.0500	0.0526		mg/L		105	68 - 123	1	20
Ethylbenzene	0.00050	U	0.0500	0.0517		mg/L		103	79 - 114	0	20
2-Hexanone	0.0050	U	0.0500	0.0430		mg/L		86	55 - 138	2	20
Methylene Chloride	0.0050	U	0.0500	0.0517		mg/L		103	65 - 125	3	20
methyl isobutyl ketone	0.0050	U	0.0500	0.0461		mg/L		92	56 - 138	0	20
Methyl tert-butyl ether	0.0010	U	0.0500	0.0404		mg/L		81	57 - 119	0	20
Styrene	0.0010	U	0.0500	0.0508		mg/L		102	76 - 118	3	20
1,1,2,2-Tetrachloroethane	0.0010	U	0.0500	0.0535		mg/L		107	66 - 121	2	20
Tetrachloroethene	0.0010	U	0.0500	0.0503		mg/L		101	76 - 114	0	20
Toluene	0.00050	U	0.0500	0.0519		mg/L		104	76 - 121	2	20
trans-1,2-Dichloroethene	0.0010	U	0.0500	0.0513		mg/L		103	67 - 120	2	20
trans-1,3-Dichloropropene	0.0010	U	0.0486	0.0440		mg/L		90	60 - 119	1	20
1,1,1-Trichloroethane	0.0010	U	0.0500	0.0540		mg/L		108	66 - 128	3	20
1,1,2-Trichloroethane	0.0010	U	0.0500	0.0522		mg/L		104	62 - 137	1	20
Trichloroethene	0.00050	U	0.0500	0.0497		mg/L		99	75 - 116	3	20
Vinyl chloride	0.00050	U	0.0500	0.0407		mg/L		81	47 - 138	3	20
Xylenes, Total	0.0010	U	0.150	0.157		mg/L		105	74 - 117	1	20
1,2-Dichloroethane	0.0010	U	0.0500	0.0480		mg/L		96	69 - 115	3	20

Surrogate	*MSD % Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*
Dibromofluoromethane	*103*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*
Toluene-d8 (Surr)	*102*		*80 - 121*

Lab Sample ID: MB 500-127693/5 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127693

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/06/11 00:02	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/06/11 00:02	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/06/11 00:02	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/06/11 00:02	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/06/11 00:02	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/06/11 00:02	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/06/11 00:02	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-127693/5
Matrix: Water
Analysis Batch: 127693

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/06/11 00:02	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/06/11 00:02	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/06/11 00:02	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/06/11 00:02	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/06/11 00:02	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/06/11 00:02	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/06/11 00:02	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/06/11 00:02	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/06/11 00:02	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/06/11 00:02	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/06/11 00:02	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/06/11 00:02	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/06/11 00:02	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/06/11 00:02	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/06/11 00:02	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/06/11 00:02	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/06/11 00:02	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/06/11 00:02	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/06/11 00:02	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/06/11 00:02	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/06/11 00:02	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/06/11 00:02	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/06/11 00:02	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/06/11 00:02	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/06/11 00:02	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/06/11 00:02	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/06/11 00:02	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/06/11 00:02	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/06/11 00:02	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*102*		*77 - 112*		*10/06/11 00:02*	*1*
Dibromofluoromethane	*108*		*78 - 119*		*10/06/11 00:02*	*1*
1,2-Dichloroethane-d4 (Surr)	*113*		*77 - 124*		*10/06/11 00:02*	*1*
Toluene-d8 (Surr)	*115*		*80 - 121*		*10/06/11 00:02*	*1*

Lab Sample ID: LCS 500-127693/6
Matrix: Water
Analysis Batch: 127693

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0525		mg/L		105	43 - 153
Benzene	0.0500	0.0513		mg/L		103	74 - 113
Bromodichloromethane	0.0500	0.0507		mg/L		101	73 - 120
Bromoform	0.0500	0.0475		mg/L		95	64 - 126
Bromomethane	0.0500	0.0570		mg/L		114	46 - 155
Methyl Ethyl Ketone	0.0500	0.0530		mg/L		106	42 - 152
Carbon disulfide	0.0500	0.0350		mg/L		70	36 - 110
Carbon tetrachloride	0.0500	0.0510		mg/L		102	58 - 132

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-127693/6
Matrix: Water
Analysis Batch: 127693

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chlorobenzene	0.0500	0.0532		mg/L		106	81 - 111
Chloroethane	0.0500	0.0482		mg/L		96	54 - 149
Chloroform	0.0500	0.0524		mg/L		105	71 - 116
Chloromethane	0.0500	0.0486		mg/L		97	36 - 148
cis-1,2-Dichloroethene	0.0500	0.0508		mg/L		102	66 - 111
cis-1,3-Dichloropropene	0.0538	0.0495		mg/L		92	65 - 114
Dibromochloromethane	0.0500	0.0508		mg/L		102	73 - 118
1,1-Dichloroethane	0.0500	0.0492		mg/L		98	64 - 117
1,1-Dichloroethene	0.0500	0.0453		mg/L		91	60 - 126
1,2-Dichloropropane	0.0500	0.0535		mg/L		107	68 - 123
Ethylbenzene	0.0500	0.0527		mg/L		105	79 - 114
2-Hexanone	0.0500	0.0538		mg/L		108	55 - 138
Methylene Chloride	0.0500	0.0533		mg/L		107	65 - 125
methyl isobutyl ketone	0.0500	0.0554		mg/L		111	56 - 138
Methyl tert-butyl ether	0.0500	0.0460		mg/L		92	57 - 119
Styrene	0.0500	0.0516		mg/L		103	76 - 118
1,1,2,2-Tetrachloroethane	0.0500	0.0541		mg/L		108	66 - 121
Tetrachloroethene	0.0500	0.0544		mg/L		109	76 - 114
Toluene	0.0500	0.0516		mg/L		103	76 - 121
trans-1,2-Dichloroethene	0.0500	0.0509		mg/L		102	67 - 120
trans-1,3-Dichloropropene	0.0486	0.0439		mg/L		90	60 - 119
1,1,1-Trichloroethane	0.0500	0.0507		mg/L		101	66 - 128
1,1,2-Trichloroethane	0.0500	0.0544		mg/L		109	62 - 137
Trichloroethene	0.0500	0.0538		mg/L		108	75 - 116
Vinyl chloride	0.0500	0.0506		mg/L		101	47 - 138
Xylenes, Total	0.150	0.159		mg/L		106	74 - 117
1,2-Dichloroethane	0.0500	0.0551		mg/L		110	69 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*104*		*77 - 112*
Dibromofluoromethane	*110*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*112*		*77 - 124*
Toluene-d8 (Surr)	*110*		*80 - 121*

Method: RSK-175 - Dissolved Gases (GC)

Lab Sample ID: MB 680-216598/22
Matrix: Water
Analysis Batch: 216598

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			10/03/11 15:33	1
Ethylene	1.0	U	1.0	0.50	ug/L			10/03/11 15:33	1
Methane	0.58	U	0.58	0.29	ug/L			10/03/11 15:33	1

Method: RSK-175 - Dissolved Gases (GC) (Continued)

Lab Sample ID: LCS 680-216598/23 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216598

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Ethane	282	305		ug/L		108	75 - 125
Ethylene	271	285		ug/L		105	75 - 125
Methane	153	173		ug/L		113	75 - 125

Lab Sample ID: LCSD 680-216598/24 — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216598

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Ethane	282	311		ug/L		110	75 - 125	2	30
Ethylene	271	284		ug/L		105	75 - 125	0	30
Methane	153	172		ug/L		112	75 - 125	1	30

Lab Sample ID: 500-39710-4 MSD — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216598

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Ethane	1.3		282	335	F	ug/L		118	75 - 125	35	30
Ethylene	1.0	U	271	312		ug/L		115	75 - 125	30	30
Methane	72		153	290	F	ug/L		142	75 - 125	37	30

Lab Sample ID: MB 680-216599/4 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216599

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane	0.58	U	0.58	0.29	ug/L			10/03/11 15:33	1

Lab Sample ID: LCS 680-216599/3 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216599

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Methane	1910	1800		ug/L		94	75 - 125

Lab Sample ID: LCSD 680-216599/5 — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216599

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Methane	1910	2040		ug/L		107	75 - 125	13	30

Lab Sample ID: MB 680-216731/29 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216731

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethane	1.1	U	1.1	0.55	ug/L			10/04/11 13:49	1
Ethylene	1.0	U	1.0	0.50	ug/L			10/04/11 13:49	1
Methane	0.58	U	0.58	0.29	ug/L			10/04/11 13:49	1

Method: RSK-175 - Dissolved Gases (GC) (Continued)

Lab Sample ID: LCS 680-216731/27 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216731

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Ethane	282	311		ug/L		110	75 - 125
Ethylene	271	284		ug/L		105	75 - 125
Methane	153	172		ug/L		112	75 - 125

Lab Sample ID: LCSD 680-216731/28 — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216731

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Ethane	282	312		ug/L		110	75 - 125	0	30
Ethylene	271	287		ug/L		106	75 - 125	1	30
Methane	153	176		ug/L		115	75 - 125	3	30

Lab Sample ID: 500-39710-4 MS — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 216731

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Ethane	1.3		282	235		ug/L		83	75 - 125
Ethylene	1.0	U	271	231		ug/L		85	75 - 125
Methane	72		153	199		ug/L		83	75 - 125

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 500-126517/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126760 — **Prep Batch: 126517**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.20	U	0.20	0.040	mg/L		09/23/11 16:30	09/26/11 22:37	1
Manganese	0.010	U	0.010	0.00094	mg/L		09/23/11 16:30	09/26/11 22:37	1

Lab Sample ID: LCS 500-126517/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126760 — **Prep Batch: 126517**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Iron	1.00	1.03		mg/L		103	80 - 120
Manganese	0.500	0.480		mg/L		96	80 - 120

Lab Sample ID: 500-39710-4 MS — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126760 — **Prep Batch: 126517**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Iron	0.27		1.00	1.38		mg/L		110	75 - 125
Manganese	0.0065	J	0.500	0.489		mg/L		97	75 - 125

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: 500-39710-4 MSD — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126760 — **Prep Batch: 126517**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Iron	0.27		1.00	1.42		mg/L		115	75 - 125	3	20
Manganese	0.0065	J	0.500	0.490		mg/L		97	75 - 125	0	20

Lab Sample ID: 500-39710-4 DU — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126760 — **Prep Batch: 126517**

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Iron	0.27			0.360		mg/L				28	20
Manganese	0.0065	J		0.00693	J	mg/L				7	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 500-127687/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127687

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.146	J	0.20	0.083	mg/L			09/29/11 17:51	1
Sulfate	0.20	U	0.20	0.090	mg/L			09/29/11 17:51	1

Lab Sample ID: LCS 500-127687/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127687

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits		
Chloride			3.00	2.97		mg/L		99	90 - 110		
Sulfate			5.00	5.00		mg/L		100	90 - 110		

Lab Sample ID: 500-39710-4 MS — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127687

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits		
Sulfate	7.2		10.0	17.9		mg/L		107	75 - 125		

Lab Sample ID: 500-39710-4 MSD — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127687

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Sulfate	7.2		10.0	17.8		mg/L		105	75 - 125	1	20

Lab Sample ID: MB 500-128514/7 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 128514

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.20	U	0.20	0.083	mg/L			10/11/11 20:04	1
Sulfate	0.20	U	0.20	0.090	mg/L			10/11/11 20:04	1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 500-128514/8 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 128514

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloride	3.00	2.88		mg/L		96	90 - 110
Sulfate	5.00	4.83		mg/L		97	90 - 110

Lab Sample ID: 500-39710-4 MS — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 128514

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloride	280		150	435		mg/L		106	75 - 125

Lab Sample ID: 500-39710-4 MSD — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 128514

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Chloride	280		150	437		mg/L		107	75 - 125	0	20

Method: 310.1 - Alkalinity

Lab Sample ID: MB 500-127293/2 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127293

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	1.3	mg/L			09/30/11 09:43	1

Lab Sample ID: LCS 500-127293/3 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127293

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Alkalinity	100	93.3		mg/L		93	80 - 120

Lab Sample ID: 500-39710-4 DU — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127293

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity	280		280		mg/L		0.02	20

Method: 353.2 - Nitrogen, Nitrate-Nitrite

Lab Sample ID: MB 500-127685/12 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127685

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 09:47	1

Method: 353.2 - Nitrogen, Nitrate-Nitrite (Continued)

Lab Sample ID: LCS 500-127685/13 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127685

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits		
Nitrogen, Nitrate Nitrite			1.00	0.980		mg/L		98	80 - 120		

Lab Sample ID: 500-39710-1 MS — **Client Sample ID: FB-001-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127685

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits		
Nitrogen, Nitrate Nitrite	0.10	U	1.00	0.957		mg/L		96	75 - 125		

Lab Sample ID: 500-39710-1 MSD — **Client Sample ID: FB-001-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127685

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Nitrogen, Nitrate Nitrite	0.10	U	1.00	0.966		mg/L		97	75 - 125	1	20

Lab Sample ID: MB 500-127736/36 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127736

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Nitrate Nitrite	0.10	U	0.10	0.043	mg/L			10/05/11 15:09	1

Lab Sample ID: LCS 500-127736/37 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127736

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits		
Nitrogen, Nitrate Nitrite			1.00	0.974		mg/L		97	80 - 120		

Lab Sample ID: 500-39710-4 MS — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127736

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits		
Nitrogen, Nitrate Nitrite	0.10	U	1.00	0.751		mg/L		75	75 - 125		

Lab Sample ID: 500-39710-4 MSD — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127736

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Nitrogen, Nitrate Nitrite	0.10	U	1.00	0.682	F	mg/L		68	75 - 125	10	20

Method: 354.1 - Nitrogen, Nitrite

Lab Sample ID: MB 500-126605/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126605

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Nitrite	0.020	U	0.020	0.0020	mg/L			09/23/11 18:41	1

Lab Sample ID: LCS 500-126605/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126605

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Nitrogen, Nitrite	0.100	0.101		mg/L		101	80 - 120

Lab Sample ID: 500-39710-4 MS — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126605

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Nitrogen, Nitrite	0.0036	J	0.100	0.102		mg/L		98	75 - 125

Lab Sample ID: 500-39710-4 MSD — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 126605

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Nitrogen, Nitrite	0.0036	J	0.100	0.105		mg/L		101	75 - 125	3	20

Method: 9060 - Organic Carbon, Total (TOC)

Lab Sample ID: MB 500-127635/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127635

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TOC Dup	1.0	U	1.0	0.36	mg/L			10/04/11 17:06	1

Lab Sample ID: LCS 500-127635/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127635

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
TOC Dup	10.0	9.73		mg/L		97	80 - 120

Lab Sample ID: 500-39710-4 MS — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127635

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
TOC Dup	13		10.0	20.2		mg/L		76	75 - 125

Method: 9060 - Organic Carbon, Total (TOC) (Continued)

Lab Sample ID: 500-39710-4 MSD — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127635

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
TOC Dup	13		10.0	20.4		mg/L		77	75 - 125	1	20

Lab Sample ID: MB 500-127735/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127735

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TIC Dup	0.650	J	1.0	0.36	mg/L			10/05/11 08:35	1

Lab Sample ID: LCS 500-127735/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127735

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
TIC Dup	10.0	9.16		mg/L		92	80 - 120

Lab Sample ID: 500-39710-4 MS — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127735

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
TIC Dup	5.6	B	50.0	43.1		mg/L		75	75 - 125

Lab Sample ID: 500-39710-4 MSD — **Client Sample ID: GW-33MWC-35-092211**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 127735

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
TIC Dup	5.6	B	50.0	44.1		mg/L		77	75 - 125	2	20

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q
TestAmerica Savannah	A2LA	DoD ELAP		0399-01
TestAmerica Savannah	A2LA	ISO/IEC 17025		399.01
TestAmerica Savannah	Alabama	State Program	4	41450
TestAmerica Savannah	Arkansas	Arkansas DOH	6	N/A
TestAmerica Savannah	Arkansas	State Program	6	88-0692
TestAmerica Savannah	California	NELAC	9	3217CA
TestAmerica Savannah	Colorado	State Program	8	N/A
TestAmerica Savannah	Connecticut	State Program	1	PH-0161
TestAmerica Savannah	Delaware	State Program	3	N/A
TestAmerica Savannah	Florida	NELAC	4	E87052
TestAmerica Savannah	Georgia	Georgia EPD	4	N/A
TestAmerica Savannah	Georgia	State Program	4	803
TestAmerica Savannah	Guam	State Program	9	09-005r
TestAmerica Savannah	Hawaii	State Program	9	N/A
TestAmerica Savannah	Illinois	NELAC	5	200022
TestAmerica Savannah	Indiana	State Program	5	N/A
TestAmerica Savannah	Iowa	State Program	7	353
TestAmerica Savannah	Kentucky	Kentucky UST	4	18
TestAmerica Savannah	Kentucky	State Program	4	90084
TestAmerica Savannah	Louisiana	NELAC	6	30690
TestAmerica Savannah	Louisiana	NELAC	6	LA100015
TestAmerica Savannah	Maine	State Program	1	GA00006
TestAmerica Savannah	Maryland	State Program	3	250
TestAmerica Savannah	Massachusetts	State Program	1	M-GA006
TestAmerica Savannah	Michigan	State Program	5	9925
TestAmerica Savannah	Mississippi	State Program	4	N/A
TestAmerica Savannah	Montana	State Program	8	CERT0081
TestAmerica Savannah	Nebraska	State Program	7	TestAmerica-Savannah

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-39710-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Savannah	New Jersey	NELAC	2	GA769
TestAmerica Savannah	New Mexico	State Program	6	N/A
TestAmerica Savannah	New York	NELAC	2	10842
TestAmerica Savannah	North Carolina	North Carolina DENR	4	269
TestAmerica Savannah	North Carolina	North Carolina PHL	4	13701
TestAmerica Savannah	Oklahoma	State Program	6	9984
TestAmerica Savannah	Pennsylvania	NELAC	3	68-00474
TestAmerica Savannah	Puerto Rico	State Program	2	GA00006
TestAmerica Savannah	Rhode Island	State Program	1	LAO00244
TestAmerica Savannah	South Carolina	State Program	4	98001
TestAmerica Savannah	Tennessee	State Program	4	TN02961
TestAmerica Savannah	Texas	NELAC	6	T104704185-08-TX
TestAmerica Savannah	USDA	USDA		SAV 3-04
TestAmerica Savannah	Vermont	State Program	1	87052
TestAmerica Savannah	Virginia	NELAC Secondary AB	3	460161
TestAmerica Savannah	Virginia	State Program	3	302
TestAmerica Savannah	Washington	State Program	10	C1794
TestAmerica Savannah	West Virginia	West Virginia DEP	3	94
TestAmerica Savannah	West Virginia	West Virginia DHHR (DW)	3	9950C
TestAmerica Savannah	Wisconsin	State Program	5	999819810
TestAmerica Savannah	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Lab Job #: 500-39710

Chain of Custody Number:

Page 1 of 1

Temperature °C of Cooler: (2.7) (2.3)

Report To (optional)
Contact: MONICA MARTIN
Company: CH2M HILL
Address: 1034 S. BRENTWOOD BLVD
Address: ST. LOUIS, MO 63117
Phone: 314-605-4616
Fax:
E-Mail:

Bill To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Client: CH2M HILL
Client Project #:
Project Name: CRAB ORCHARD PLUME 2
Project Location/State: MARION, IL
Lab Project #:
Sampler: G. ROBERTS
Lab PM:

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOC 8260B	RSK-175 MODIFIED	SW-8466 9060	ALKALINITY EPA 310.1	SELECT METALS 6010B	CHLORIDE AND SULFATE EPA 325.2	NITRATE EPA 325.2	NITRITE + NITRATE EPA 353.2		Comments
Preservative							1	7	2	3	7	7	7	2		
1		FB-001-092211	9-22-11	0800	13	W	X	X	X	X	X	X	X	X		
2		GW-33MWC-45-092211	9-22-11	0900	13	W	X	X	X	X	X	X	X	X		
3		GW-33MWC-44-092211	9-22-11	11:10	13	W	X	X	X	X	X	X	X	X		
4	X	GW-33MWC-35-092211	9-22-11	10:15	39	W	X	X	X	X	X	X	X	X		
5		GW-33-341-092211	9-22-11	15:00	13	W	X	X	X	X	X	X	X	X		
6		GW-33-342-092211	9-22-11	16:25	13	W	X	X	X	X	X	X	X	X		
7		TB-005-092211	9-22-11	17:00	2	W	X									
							NC									

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other
Requested Due Date _____

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	CH2M Hill	9/22/11	1750	[signature]	TA	9/23/11	1010
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier:
Shipped: FX
Hand Delivered:

Matrix Key
WW - Wastewater
W - Water
S - Soil
SL - Sludge
MS - Miscellaneous
OL - Oil
A - Air
SE - Sediment
SO - Soil
L - Leachate
WI - Wipe
DW - Drinking Water
O - Other

Client Comments

Lab Comments:

TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Phone (708) 534-5200 Fax (708) 534-5211

Chain of Custody Record

TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Knapp, Jim	Carrier Tracking No(s):	COC No: 500-7718.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: jim.knapp@testamericainc.com		Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.				Job #: 500-39710-1
Address: 5102 LaRoche Avenue, ,	Due Date Requested: 10/4/2011			
City: Savannah	TAT Requested (days):			
State, Zip: GA, 31404				
Phone: 912-354-7858(Tel) 912-352-0165(Fax)	PO #:			
Email:	WO #:			
Project Name: Crab Orchard Wildlife Refuge #2	Project #: 50005970			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	RSK_175/ Methane, Ethane, & Ethene	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
FB-001-092211 (500-39710-1)	9/22/11	08:00 Central		Water			X	3	
GW-33MWC-45-092211 (500-39710-2)	9/22/11	09:00 Central		Water			X	3	
GW-33MWC-44-092211 (500-39710-3)	9/22/11	11:10 Central		Water			X	3	
GW-33MWC-35-092211 (500-39710-4)	9/22/11	10:15 Central		Water			X	3	
GW-33MWC-35-092211 (500-39710-4MS)	9/22/11	10:15 Central	MS	Water			X	3	
GW-33MWC-35-092211 (500-39710-4MSD)	9/22/11	10:15 Central	MSD	Water			X	3	
GW-33-341-092211 (500-39710-5)	9/22/11	15:00 Central		Water			X	3	
GW-33-342-092211 (500-39710-6)	9/22/11	16:25 Central		Water			X	3	

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: [signature]	Date/Time: 09/23/11 1600	Company: TestAmerica	Received by: [signature]	Date/Time: 09-24-11 0855	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 6 °C

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-39710-1

Login Number: 39710
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	2.7,2.3
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-39710-1

Login Number: 39710
List Number: 1
Creator: Howard, Brandon L

List Source: TestAmerica Savannah
List Creation: 09/24/11 10:30 AM

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-40136-1
Client Project/Site: Crab Orchard Wildlife Refuge Plume 2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/18/2011 04:50:06 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Definitions 14
QC Association 15
Surrogate Summary 16
QC Sample Results 17
Certification Summary 25
Chain of Custody 26
Receipt Checklists 27

Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Job ID: 500-40136-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-40136-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC/MS VOA
No analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Client Sample ID: 33-SB151-27 — Lab Sample ID: 500-40136-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.011		0.0039	0.00057	mg/Kg	1	☼	8260B	Total/NA
Trichloroethene	0.097		0.0039	0.00063	mg/Kg	1	☼	8260B	Total/NA
Tetrachloroethene	0.0020	J	0.0039	0.00074	mg/Kg	1	☼	8260B	Total/NA
Chlorobenzene	0.0016	J	0.0039	0.00062	mg/Kg	1	☼	8260B	Total/NA

Client Sample ID: 33-SB151-32 — Lab Sample ID: 500-40136-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Trichloroethene	2.0		0.011	0.0067	mg/Kg	50	☼	8260B	Total/NA

Client Sample ID: 33-SB150-27 — Lab Sample ID: 500-40136-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.038		0.037	0.0083	mg/Kg	50	☼	8260B	Total/NA
Tetrachloroethene	0.012	J	0.037	0.0080	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	10		0.018	0.011	mg/Kg	100	☼	8260B	Total/NA

Client Sample ID: 33-SB150-38 — Lab Sample ID: 500-40136-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	0.0058		0.0048	0.0024	mg/Kg	1	☼	8260B	Total/NA

Client Sample ID: 33-SB151-38 — Lab Sample ID: 500-40136-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.28		0.044	0.0098	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	13		0.022	0.013	mg/Kg	100	☼	8260B	Total/NA

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-40136-1	33-SB151-27	Solid	10/03/11 14:10	10/04/11 10:30
500-40136-2	33-SB151-32	Solid	10/03/11 14:15	10/04/11 10:30
500-40136-3	33-SB150-27	Solid	10/03/11 14:38	10/04/11 10:30
500-40136-4	33-SB150-38	Solid	10/03/11 15:41	10/04/11 10:30
500-40136-5	33-SB151-38	Solid	10/03/11 15:40	10/04/11 10:30

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Client Sample ID: 33-SB151-27
Date Collected: 10/03/11 14:10
Date Received: 10/04/11 10:30

Lab Sample ID: 500-40136-1
Matrix: Solid
Percent Solids: 86.5

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	0.0039	U	0.0039	0.00064	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Vinyl chloride	0.0039	U	0.0039	0.00055	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Bromomethane	0.0039	U	0.0039	0.00084	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Chloroethane	0.0039	U	0.0039	0.00082	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
1,1-Dichloroethene	0.0039	U	0.0039	0.00062	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Acetone	0.0039	U	0.0039	0.0019	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Carbon disulfide	0.0039	U	0.0039	0.00056	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Methylene Chloride	0.0039	U	0.0039	0.0011	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
trans-1,2-Dichloroethene	0.0039	U	0.0039	0.00056	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Methyl tert-butyl ether	0.0039	U	0.0039	0.00059	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
1,1-Dichloroethane	0.0039	U	0.0039	0.00062	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
cis-1,2-Dichloroethene	**0.011**		0.0039	0.00057	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Methyl Ethyl Ketone	0.0039	U	0.0039	0.00084	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Chloroform	0.0039	U	0.0039	0.00072	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
1,1,1-Trichloroethane	0.0039	U	0.0039	0.00075	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Carbon tetrachloride	0.0039	U	0.0039	0.00085	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Benzene	0.0039	U	0.0039	0.00042	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
1,2-Dichloroethane	0.0039	U *	0.0039	0.00040	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Trichloroethene	**0.097**		0.0039	0.00063	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
1,2-Dichloropropane	0.0039	U	0.0039	0.00088	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Bromodichloromethane	0.0039	U	0.0039	0.00059	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
cis-1,3-Dichloropropene	0.0039	U	0.0039	0.00045	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
methyl isobutyl ketone	0.0039	U *	0.0039	0.00066	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Toluene	0.0039	U	0.0039	0.00076	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
trans-1,3-Dichloropropene	0.0039	U	0.0039	0.00088	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
1,1,2-Trichloroethane	0.0039	U	0.0039	0.00052	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Tetrachloroethene	**0.0020**	**J**	0.0039	0.00074	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
2-Hexanone	0.0039	U	0.0039	0.00056	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Dibromochloromethane	0.0039	U	0.0039	0.00054	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Chlorobenzene	**0.0016**	**J**	0.0039	0.00062	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Ethylbenzene	0.0039	U	0.0039	0.00059	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Xylenes, Total	0.0078	U	0.0078	0.00055	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Styrene	0.0039	U	0.0039	0.00049	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
Bromoform	0.0039	U	0.0039	0.00063	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
1,1,2,2-Tetrachloroethane	0.0039	U	0.0039	0.00053	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1
1,3-Dichloropropene, Total	0.0039	U	0.0039	0.00045	mg/Kg	☼	10/03/11 14:10	10/11/11 21:52	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*88*		*69 - 120*	*10/03/11 14:10*	*10/11/11 21:52*	*1*
Toluene-d8 (Surr)	*101*		*69 - 122*	*10/03/11 14:10*	*10/11/11 21:52*	*1*
4-Bromofluorobenzene (Surr)	*102*		*67 - 120*	*10/03/11 14:10*	*10/11/11 21:52*	*1*
Dibromofluoromethane	*113*		*69 - 120*	*10/03/11 14:10*	*10/11/11 21:52*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Client Sample ID: 33-SB151-32
Date Collected: 10/03/11 14:15
Date Received: 10/04/11 10:30

Lab Sample ID: 500-40136-2
Matrix: Solid
Percent Solids: 86.6

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.22	U	0.22	0.085	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Benzene	0.011	U	0.011	0.0035	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Bromodichloromethane	0.089	U	0.089	0.012	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Bromoform	0.089	U	0.089	0.025	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Bromomethane	0.089	U	0.089	0.038	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Methyl Ethyl Ketone	0.22	U	0.22	0.046	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Carbon disulfide	0.22	U	0.22	0.019	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Carbon tetrachloride	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Chlorobenzene	0.044	U	0.044	0.011	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Chloroethane	0.089	U	0.089	0.022	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Chloroform	0.044	U	0.044	0.011	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Chloromethane	0.089	U	0.089	0.022	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
cis-1,2-Dichloroethene	0.044	U	0.044	0.0099	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
cis-1,3-Dichloropropene	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Dibromochloromethane	0.089	U	0.089	0.017	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
1,1-Dichloroethane	0.044	U	0.044	0.011	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
1,2-Dichloroethane	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
1,1-Dichloroethene	0.044	U	0.044	0.013	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
1,2-Dichloropropane	0.044	U	0.044	0.016	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Ethylbenzene	0.011	U	0.011	0.0062	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
2-Hexanone	0.22	U	0.22	0.025	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Methylene Chloride	0.22	U	0.22	0.028	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
methyl isobutyl ketone	0.22	U	0.22	0.035	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Methyl tert-butyl ether	0.089	U	0.089	0.021	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Styrene	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
1,1,2,2-Tetrachloroethane	0.044	U	0.044	0.016	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Tetrachloroethene	0.044	U	0.044	0.0096	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Toluene	0.011	U	0.011	0.0067	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
trans-1,2-Dichloroethene	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
trans-1,3-Dichloropropene	0.044	U	0.044	0.016	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
1,1,1-Trichloroethane	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
1,1,2-Trichloroethane	0.044	U	0.044	0.013	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Trichloroethene	**2.0**		0.011	0.0067	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Vinyl chloride	0.011	U	0.011	0.0056	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
Xylenes, Total	0.022	U	0.022	0.0057	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50
1,3-Dichloropropene, Total	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 14:15	10/14/11 22:11	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*	*10/03/11 14:15*	*10/14/11 22:11*	*50*
Dibromofluoromethane	*102*		*78 - 119*	*10/03/11 14:15*	*10/14/11 22:11*	*50*
1,2-Dichloroethane-d4 (Surr)	*108*		*77 - 124*	*10/03/11 14:15*	*10/14/11 22:11*	*50*
Toluene-d8 (Surr)	*103*		*80 - 121*	*10/03/11 14:15*	*10/14/11 22:11*	*50*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Client Sample ID: 33-SB150-27
Date Collected: 10/03/11 14:38
Date Received: 10/04/11 10:30

Lab Sample ID: 500-40136-3
Matrix: Solid
Percent Solids: 88.3

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.18	U	0.18	0.071	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Benzene	0.0092	U	0.0092	0.0030	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Bromodichloromethane	0.074	U	0.074	0.010	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Bromoform	0.074	U	0.074	0.021	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Bromomethane	0.074	U	0.074	0.032	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Methyl Ethyl Ketone	0.18	U	0.18	0.038	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Carbon disulfide	0.18	U	0.18	0.016	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Carbon tetrachloride	0.037	U	0.037	0.010	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Chlorobenzene	0.037	U	0.037	0.0088	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Chloroethane	0.074	U	0.074	0.018	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Chloroform	0.037	U	0.037	0.0092	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Chloromethane	0.074	U	0.074	0.018	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
cis-1,2-Dichloroethene	**0.038**		0.037	0.0083	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
cis-1,3-Dichloropropene	0.037	U	0.037	0.010	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Dibromochloromethane	0.074	U	0.074	0.014	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
1,1-Dichloroethane	0.037	U	0.037	0.0090	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
1,2-Dichloroethane	0.037	U	0.037	0.010	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
1,1-Dichloroethene	0.037	U	0.037	0.011	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
1,2-Dichloropropane	0.037	U	0.037	0.013	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Ethylbenzene	0.0092	U	0.0092	0.0052	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
2-Hexanone	0.18	U	0.18	0.021	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Methylene Chloride	0.18	U	0.18	0.023	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
methyl isobutyl ketone	0.18	U	0.18	0.029	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Methyl tert-butyl ether	0.074	U	0.074	0.018	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Styrene	0.037	U	0.037	0.0096	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
1,1,2,2-Tetrachloroethane	0.037	U	0.037	0.013	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Tetrachloroethene	**0.012**	**J**	0.037	0.0080	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Toluene	0.0092	U	0.0092	0.0056	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
trans-1,2-Dichloroethene	0.037	U	0.037	0.010	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
trans-1,3-Dichloropropene	0.037	U	0.037	0.013	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
1,1,1-Trichloroethane	0.037	U	0.037	0.0097	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
1,1,2-Trichloroethane	0.037	U	0.037	0.011	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Vinyl chloride	0.0092	U	0.0092	0.0047	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
Xylenes, Total	0.018	U	0.018	0.0048	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50
1,3-Dichloropropene, Total	0.037	U	0.037	0.010	mg/Kg	☼	10/03/11 14:38	10/14/11 22:35	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*	*10/03/11 14:38*	*10/14/11 22:35*	*50*
Dibromofluoromethane	*101*		*78 - 119*	*10/03/11 14:38*	*10/14/11 22:35*	*50*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*	*10/03/11 14:38*	*10/14/11 22:35*	*50*
Toluene-d8 (Surr)	*100*		*80 - 121*	*10/03/11 14:38*	*10/14/11 22:35*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**10**		0.018	0.011	mg/Kg	☼	10/03/11 14:38	10/15/11 06:05	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*	*10/03/11 14:38*	*10/15/11 06:05*	*100*
Dibromofluoromethane	*109*		*78 - 119*	*10/03/11 14:38*	*10/15/11 06:05*	*100*
1,2-Dichloroethane-d4 (Surr)	*118*		*77 - 124*	*10/03/11 14:38*	*10/15/11 06:05*	*100*
Toluene-d8 (Surr)	*112*		*80 - 121*	*10/03/11 14:38*	*10/15/11 06:05*	*100*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Client Sample ID: 33-SB150-38
Date Collected: 10/03/11 15:41
Date Received: 10/04/11 10:30

Lab Sample ID: 500-40136-4
Matrix: Solid
Percent Solids: 83.4

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	0.0048	U	0.0048	0.00079	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Vinyl chloride	0.0048	U	0.0048	0.00068	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Bromomethane	0.0048	U	0.0048	0.0010	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Chloroethane	0.0048	U	0.0048	0.0010	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
1,1-Dichloroethene	0.0048	U	0.0048	0.00076	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Acetone	**0.0058**		0.0048	0.0024	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Carbon disulfide	0.0048	U	0.0048	0.00069	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Methylene Chloride	0.0048	U	0.0048	0.0014	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
trans-1,2-Dichloroethene	0.0048	U	0.0048	0.00069	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Methyl tert-butyl ether	0.0048	U	0.0048	0.00072	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
1,1-Dichloroethane	0.0048	U	0.0048	0.00076	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
cis-1,2-Dichloroethene	0.0048	U	0.0048	0.00070	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Methyl Ethyl Ketone	0.0048	U	0.0048	0.0010	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Chloroform	0.0048	U	0.0048	0.00089	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
1,1,1-Trichloroethane	0.0048	U	0.0048	0.00093	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Carbon tetrachloride	0.0048	U	0.0048	0.0011	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Benzene	0.0048	U	0.0048	0.00052	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
1,2-Dichloroethane	0.0048	U *	0.0048	0.00049	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Trichloroethene	0.0048	U	0.0048	0.00078	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
1,2-Dichloropropane	0.0048	U	0.0048	0.0011	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Bromodichloromethane	0.0048	U	0.0048	0.00073	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
cis-1,3-Dichloropropene	0.0048	U	0.0048	0.00055	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
methyl isobutyl ketone	0.0048	U *	0.0048	0.00082	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Toluene	0.0048	U	0.0048	0.00094	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
trans-1,3-Dichloropropene	0.0048	U	0.0048	0.0011	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
1,1,2-Trichloroethane	0.0048	U	0.0048	0.00065	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Tetrachloroethene	0.0048	U	0.0048	0.00092	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
2-Hexanone	0.0048	U	0.0048	0.00069	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Dibromochloromethane	0.0048	U	0.0048	0.00067	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Chlorobenzene	0.0048	U	0.0048	0.00076	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Ethylbenzene	0.0048	U	0.0048	0.00072	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Xylenes, Total	0.0097	U	0.0097	0.00068	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Styrene	0.0048	U	0.0048	0.00061	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
Bromoform	0.0048	U	0.0048	0.00078	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
1,1,2,2-Tetrachloroethane	0.0048	U	0.0048	0.00066	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1
1,3-Dichloropropene, Total	0.0048	U	0.0048	0.00055	mg/Kg	☼	10/03/11 15:41	10/11/11 22:16	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*88*		*69 - 120*	*10/03/11 15:41*	*10/11/11 22:16*	*1*
Toluene-d8 (Surr)	*101*		*69 - 122*	*10/03/11 15:41*	*10/11/11 22:16*	*1*
4-Bromofluorobenzene (Surr)	*100*		*67 - 120*	*10/03/11 15:41*	*10/11/11 22:16*	*1*
Dibromofluoromethane	*111*		*69 - 120*	*10/03/11 15:41*	*10/11/11 22:16*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Client Sample ID: 33-SB151-38
Date Collected: 10/03/11 15:40
Date Received: 10/04/11 10:30

Lab Sample ID: 500-40136-5
Matrix: Solid
Percent Solids: 87.2

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.22	U	0.22	0.084	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Benzene	0.011	U	0.011	0.0035	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Bromodichloromethane	0.088	U	0.088	0.012	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Bromoform	0.088	U	0.088	0.025	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Bromomethane	0.088	U	0.088	0.038	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Methyl Ethyl Ketone	0.22	U	0.22	0.046	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Carbon disulfide	0.22	U	0.22	0.019	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Carbon tetrachloride	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Chlorobenzene	0.044	U	0.044	0.010	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Chloroethane	0.088	U	0.088	0.022	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Chloroform	0.044	U	0.044	0.011	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Chloromethane	0.088	U	0.088	0.022	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
cis-1,2-Dichloroethene	**0.28**		0.044	0.0098	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
cis-1,3-Dichloropropene	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Dibromochloromethane	0.088	U	0.088	0.017	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
1,1-Dichloroethane	0.044	U	0.044	0.011	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
1,2-Dichloroethane	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
1,1-Dichloroethene	0.044	U	0.044	0.013	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
1,2-Dichloropropane	0.044	U	0.044	0.016	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Ethylbenzene	0.011	U	0.011	0.0062	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
2-Hexanone	0.22	U	0.22	0.025	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Methylene Chloride	0.22	U	0.22	0.028	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
methyl isobutyl ketone	0.22	U	0.22	0.035	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Methyl tert-butyl ether	0.088	U	0.088	0.021	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Styrene	0.044	U	0.044	0.011	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
1,1,2,2-Tetrachloroethane	0.044	U	0.044	0.015	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Tetrachloroethene	0.044	U	0.044	0.0095	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Toluene	0.011	U	0.011	0.0066	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
trans-1,2-Dichloroethene	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
trans-1,3-Dichloropropene	0.044	U	0.044	0.015	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
1,1,1-Trichloroethane	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
1,1,2-Trichloroethane	0.044	U	0.044	0.013	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Vinyl chloride	0.011	U	0.011	0.0055	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
Xylenes, Total	0.022	U	0.022	0.0057	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50
1,3-Dichloropropene, Total	0.044	U	0.044	0.012	mg/Kg	☼	10/03/11 15:40	10/14/11 22:59	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*103*		*77 - 112*	*10/03/11 15:40*	*10/14/11 22:59*	*50*
Dibromofluoromethane	*104*		*78 - 119*	*10/03/11 15:40*	*10/14/11 22:59*	*50*
1,2-Dichloroethane-d4 (Surr)	*111*		*77 - 124*	*10/03/11 15:40*	*10/14/11 22:59*	*50*
Toluene-d8 (Surr)	*104*		*80 - 121*	*10/03/11 15:40*	*10/14/11 22:59*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**13**		0.022	0.013	mg/Kg	☼	10/03/11 15:40	10/15/11 06:29	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*	*10/03/11 15:40*	*10/15/11 06:29*	*100*
Dibromofluoromethane	*109*		*78 - 119*	*10/03/11 15:40*	*10/15/11 06:29*	*100*
1,2-Dichloroethane-d4 (Surr)	*117*		*77 - 124*	*10/03/11 15:40*	*10/15/11 06:29*	*100*
Toluene-d8 (Surr)	*109*		*80 - 121*	*10/03/11 15:40*	*10/15/11 06:29*	*100*

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
*	LCS or LCSD exceeds the control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
F	MS or MSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

GC/MS VOA

Prep Batch: 127679

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40136-2	33-SB151-32	Total/NA	Solid	5035	
500-40136-2 MS	33-SB151-32	Total/NA	Solid	5035	
500-40136-2 MSD	33-SB151-32	Total/NA	Solid	5035	
500-40136-3	33-SB150-27	Total/NA	Solid	5035	
500-40136-3 - DL	33-SB150-27	Total/NA	Solid	5035	
500-40136-5	33-SB151-38	Total/NA	Solid	5035	
500-40136-5 - DL	33-SB151-38	Total/NA	Solid	5035	

Prep Batch: 127746

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40136-1	33-SB151-27	Total/NA	Solid	5035	
500-40136-4	33-SB150-38	Total/NA	Solid	5035	

Analysis Batch: 128406

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40136-1	33-SB151-27	Total/NA	Solid	8260B	127746
500-40136-4	33-SB150-38	Total/NA	Solid	8260B	127746
LCS 500-128406/5	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-128406/4	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 128891

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40136-2	33-SB151-32	Total/NA	Solid	8260B	127679
500-40136-2 MS	33-SB151-32	Total/NA	Solid	8260B	127679
500-40136-2 MSD	33-SB151-32	Total/NA	Solid	8260B	127679
500-40136-3	33-SB150-27	Total/NA	Solid	8260B	127679
500-40136-5	33-SB151-38	Total/NA	Solid	8260B	127679
LCS 500-128891/4	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-128891/7	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 128968

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40136-3 - DL	33-SB150-27	Total/NA	Solid	8260B	127679
500-40136-5 - DL	33-SB151-38	Total/NA	Solid	8260B	127679
LCS 500-128968/4	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-128968/3	Method Blank	Total/NA	Solid	8260B	

General Chemistry

Analysis Batch: 127579

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40136-1	33-SB151-27	Total/NA	Solid	Moisture	
500-40136-2	33-SB151-32	Total/NA	Solid	Moisture	
500-40136-2 DU	33-SB151-32	Total/NA	Solid	Moisture	
500-40136-2 MS	33-SB151-32	Total/NA	Solid	Moisture	
500-40136-2 MSD	33-SB151-32	Total/NA	Solid	Moisture	
500-40136-3	33-SB150-27	Total/NA	Solid	Moisture	
500-40136-4	33-SB150-38	Total/NA	Solid	Moisture	
500-40136-5	33-SB151-38	Total/NA	Solid	Moisture	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		12DCE	TOL	BFB	DBFM
Lab Sample ID	Client Sample ID	(69-120)	(69-122)	(67-120)	(69-120)
500-40136-1	33-SB151-27	88	101	102	113
500-40136-4	33-SB150-38	88	101	100	111
LCS 500-128406/5	Lab Control Sample	78	101	102	106
LCS 500-128891/4	Lab Control Sample	97	93	90	90
LCS 500-128968/4	Lab Control Sample	112	112	107	109
MB 500-128406/4	Method Blank	81	101	102	110
MB 500-128891/7	Method Blank	107	103	103	100
MB 500-128968/3	Method Blank	100	103	89	97

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40136-2	33-SB151-32	100	102	108	103
500-40136-2 MS	33-SB151-32	103	106	112	105
500-40136-2 MSD	33-SB151-32	99	101	104	100
500-40136-3	33-SB150-27	98	101	106	100
500-40136-3 - DL	33-SB150-27	100	109	118	112
500-40136-5	33-SB151-38	103	104	111	104
500-40136-5 - DL	33-SB151-38	97	109	117	109

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: 500-40136-2 MS — **Client Sample ID: 33-SB151-32**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 128891 — **Prep Batch: 127679**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.22	U	2.07	3.89	F	mg/Kg	☼	187	46 - 152
Benzene	0.011	U	2.07	2.09		mg/Kg	☼	101	74 - 112
Bromodichloromethane	0.089	U	2.07	2.27		mg/Kg	☼	110	73 - 122
Bromoform	0.089	U	2.07	2.28		mg/Kg	☼	110	62 - 119
Bromomethane	0.089	U	2.07	2.04		mg/Kg	☼	98	38 - 157
Methyl Ethyl Ketone	0.22	U	2.07	3.06		mg/Kg	☼	147	48 - 152
Carbon disulfide	0.22	U	2.07	1.53		mg/Kg	☼	74	38 - 112
Carbon tetrachloride	0.044	U	2.07	2.32		mg/Kg	☼	112	63 - 127
Chlorobenzene	0.044	U	2.07	2.11		mg/Kg	☼	102	80 - 110
Chloroethane	0.089	U	2.07	2.20		mg/Kg	☼	106	53 - 156
Chloroform	0.044	U	2.07	2.23		mg/Kg	☼	108	74 - 115
Chloromethane	0.089	U	2.07	2.13		mg/Kg	☼	103	44 - 148
cis-1,2-Dichloroethene	0.044	U	2.07	2.30	F	mg/Kg	☼	111	68 - 110
cis-1,3-Dichloropropene	0.044	U	2.23	2.30		mg/Kg	☼	103	65 - 116
Dibromochloromethane	0.089	U	2.07	2.29		mg/Kg	☼	110	66 - 123
1,1-Dichloroethane	0.044	U	2.07	2.03		mg/Kg	☼	98	69 - 118
1,2-Dichloroethane	0.044	U	2.07	2.25		mg/Kg	☼	109	66 - 120
1,1-Dichloroethene	0.044	U	2.07	1.84		mg/Kg	☼	89	60 - 123
1,2-Dichloropropane	0.044	U	2.07	2.21		mg/Kg	☼	106	72 - 124
Ethylbenzene	0.011	U	2.07	2.08		mg/Kg	☼	100	79 - 112
2-Hexanone	0.22	U	2.07	2.88	F	mg/Kg	☼	139	58 - 137
Methylene Chloride	0.22	U	2.07	2.15		mg/Kg	☼	104	67 - 126
methyl isobutyl ketone	0.22	U	2.07	2.73		mg/Kg	☼	132	58 - 135
Methyl tert-butyl ether	0.089	U	2.07	2.34		mg/Kg	☼	113	57 - 122
Styrene	0.044	U	2.07	2.17		mg/Kg	☼	105	77 - 115
1,1,2,2-Tetrachloroethane	0.044	U	2.07	2.19		mg/Kg	☼	106	73 - 119
Tetrachloroethene	0.044	U	2.07	2.02		mg/Kg	☼	97	76 - 112
Toluene	0.011	U	2.07	2.19		mg/Kg	☼	105	78 - 116
trans-1,2-Dichloroethene	0.044	U	2.07	2.21		mg/Kg	☼	107	70 - 119
trans-1,3-Dichloropropene	0.044	U	2.02	2.15		mg/Kg	☼	107	64 - 114
1,1,1-Trichloroethane	0.044	U	2.07	2.19		mg/Kg	☼	105	70 - 125
1,1,2-Trichloroethane	0.044	U	2.07	2.33		mg/Kg	☼	112	63 - 136
Trichloroethene	2.0		2.07	4.81	F	mg/Kg	☼	136	75 - 113
Vinyl chloride	0.011	U	2.07	2.20		mg/Kg	☼	106	58 - 136
Xylenes, Total	0.022	U	6.22	6.25		mg/Kg	☼	101	74 - 114

Surrogate	*MS % Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*103*		*77 - 112*
Dibromofluoromethane	*106*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*112*		*77 - 124*
Toluene-d8 (Surr)	*105*		*80 - 121*

Lab Sample ID: 500-40136-2 MSD — **Client Sample ID: 33-SB151-32**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 128891 — **Prep Batch: 127679**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	0.22	U	2.09	3.01		mg/Kg	☼	144	46 - 152	25	30
Benzene	0.011	U	2.09	2.04		mg/Kg	☼	97	74 - 112	2	30

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 500-40136-2 MSD — **Client Sample ID: 33-SB151-32**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 128891 — **Prep Batch: 127679**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Bromodichloromethane	0.089	U	2.09	2.21		mg/Kg	☼	105	73 - 122	3	30
Bromoform	0.089	U	2.09	2.25		mg/Kg	☼	107	62 - 119	2	30
Bromomethane	0.089	U	2.09	2.03		mg/Kg	☼	97	38 - 157	0	30
Methyl Ethyl Ketone	0.22	U	2.09	2.76		mg/Kg	☼	132	48 - 152	10	30
Carbon disulfide	0.22	U	2.09	1.47		mg/Kg	☼	70	38 - 112	4	30
Carbon tetrachloride	0.044	U	2.09	2.27		mg/Kg	☼	108	63 - 127	2	30
Chlorobenzene	0.044	U	2.09	2.07		mg/Kg	☼	99	80 - 110	2	30
Chloroethane	0.089	U	2.09	2.00		mg/Kg	☼	95	53 - 156	10	30
Chloroform	0.044	U	2.09	2.16		mg/Kg	☼	103	74 - 115	3	30
Chloromethane	0.089	U	2.09	2.02		mg/Kg	☼	97	44 - 148	5	30
cis-1,2-Dichloroethene	0.044	U	2.09	2.19		mg/Kg	☼	105	68 - 110	5	30
cis-1,3-Dichloropropene	0.044	U	2.25	2.25		mg/Kg	☼	100	65 - 116	2	30
Dibromochloromethane	0.089	U	2.09	2.25		mg/Kg	☼	108	66 - 123	2	30
1,1-Dichloroethane	0.044	U	2.09	1.99		mg/Kg	☼	95	69 - 118	2	30
1,2-Dichloroethane	0.044	U	2.09	2.18		mg/Kg	☼	104	66 - 120	3	30
1,1-Dichloroethene	0.044	U	2.09	1.86		mg/Kg	☼	89	60 - 123	1	30
1,2-Dichloropropane	0.044	U	2.09	2.14		mg/Kg	☼	102	72 - 124	3	30
Ethylbenzene	0.011	U	2.09	2.06		mg/Kg	☼	98	79 - 112	1	30
2-Hexanone	0.22	U	2.09	2.67		mg/Kg	☼	127	58 - 137	8	30
Methylene Chloride	0.22	U	2.09	2.02		mg/Kg	☼	96	67 - 126	6	30
methyl isobutyl ketone	0.22	U	2.09	2.51		mg/Kg	☼	120	58 - 135	9	30
Methyl tert-butyl ether	0.089	U	2.09	2.28		mg/Kg	☼	109	57 - 122	3	30
Styrene	0.044	U	2.09	2.17		mg/Kg	☼	104	77 - 115	0	30
1,1,2,2-Tetrachloroethane	0.044	U	2.09	2.11		mg/Kg	☼	101	73 - 119	4	30
Tetrachloroethene	0.044	U	2.09	2.00		mg/Kg	☼	95	76 - 112	1	30
Toluene	0.011	U	2.09	2.12		mg/Kg	☼	101	78 - 116	3	30
trans-1,2-Dichloroethene	0.044	U	2.09	2.20		mg/Kg	☼	105	70 - 119	1	30
trans-1,3-Dichloropropene	0.044	U	2.04	2.11		mg/Kg	☼	104	64 - 114	2	30
1,1,1-Trichloroethane	0.044	U	2.09	2.14		mg/Kg	☼	102	70 - 125	2	30
1,1,2-Trichloroethane	0.044	U	2.09	2.17		mg/Kg	☼	104	63 - 136	7	30
Trichloroethene	2.0		2.09	4.34		mg/Kg	☼	112	75 - 113	10	30
Vinyl chloride	0.011	U	2.09	2.12		mg/Kg	☼	101	58 - 136	4	30
Xylenes, Total	0.022	U	6.28	6.23		mg/Kg	☼	99	74 - 114	0	30

Surrogate	*MSD % Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*
Dibromofluoromethane	*101*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*
Toluene-d8 (Surr)	*100*		*80 - 121*

Lab Sample ID: MB 500-128406/4 — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 128406

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0025	mg/Kg			10/11/11 14:12	1
Bromomethane	0.0050	U	0.0050	0.0011	mg/Kg			10/11/11 14:12	1
Carbon disulfide	0.0050	U	0.0050	0.00071	mg/Kg			10/11/11 14:12	1
Chloroethane	0.0050	U	0.0050	0.0011	mg/Kg			10/11/11 14:12	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-128406/4
Matrix: Solid
Analysis Batch: 128406

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	0.0050	U	0.0050	0.00082	mg/Kg			10/11/11 14:12	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0011	mg/Kg			10/11/11 14:12	1
Chloroform	0.0050	U	0.0050	0.00092	mg/Kg			10/11/11 14:12	1
cis-1,2-Dichloroethene	0.0050	U	0.0050	0.00073	mg/Kg			10/11/11 14:12	1
Carbon tetrachloride	0.0050	U	0.0050	0.0011	mg/Kg			10/11/11 14:12	1
Benzene	0.0050	U	0.0050	0.00054	mg/Kg			10/11/11 14:12	1
1,1-Dichloroethane	0.0050	U	0.0050	0.00079	mg/Kg			10/11/11 14:12	1
1,2-Dichloroethane	0.0050	U	0.0050	0.00051	mg/Kg			10/11/11 14:12	1
1,1-Dichloroethene	0.0050	U	0.0050	0.00079	mg/Kg			10/11/11 14:12	1
Bromodichloromethane	0.0050	U	0.0050	0.00076	mg/Kg			10/11/11 14:12	1
1,2-Dichloropropane	0.0050	U	0.0050	0.0011	mg/Kg			10/11/11 14:12	1
cis-1,3-Dichloropropene	0.0050	U	0.0050	0.00057	mg/Kg			10/11/11 14:12	1
Methylene Chloride	0.0050	U	0.0050	0.0014	mg/Kg			10/11/11 14:12	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00085	mg/Kg			10/11/11 14:12	1
Methyl tert-butyl ether	0.0050	U	0.0050	0.00075	mg/Kg			10/11/11 14:12	1
2-Hexanone	0.0050	U	0.0050	0.00071	mg/Kg			10/11/11 14:12	1
Dibromochloromethane	0.0050	U	0.0050	0.00069	mg/Kg			10/11/11 14:12	1
Chlorobenzene	0.0050	U	0.0050	0.00079	mg/Kg			10/11/11 14:12	1
Ethylbenzene	0.0050	U	0.0050	0.00075	mg/Kg			10/11/11 14:12	1
Tetrachloroethene	0.0050	U	0.0050	0.00095	mg/Kg			10/11/11 14:12	1
Toluene	0.0050	U	0.0050	0.00097	mg/Kg			10/11/11 14:12	1
Styrene	0.0050	U	0.0050	0.00063	mg/Kg			10/11/11 14:12	1
trans-1,2-Dichloroethene	0.0050	U	0.0050	0.00071	mg/Kg			10/11/11 14:12	1
Bromoform	0.0050	U	0.0050	0.00081	mg/Kg			10/11/11 14:12	1
trans-1,3-Dichloropropene	0.0050	U	0.0050	0.0011	mg/Kg			10/11/11 14:12	1
1,1,1-Trichloroethane	0.0050	U	0.0050	0.00096	mg/Kg			10/11/11 14:12	1
1,1,2,2-Tetrachloroethane	0.0050	U	0.0050	0.00068	mg/Kg			10/11/11 14:12	1
1,1,2-Trichloroethane	0.0050	U	0.0050	0.00067	mg/Kg			10/11/11 14:12	1
Trichloroethene	0.0050	U	0.0050	0.00081	mg/Kg			10/11/11 14:12	1
Vinyl chloride	0.0050	U	0.0050	0.00070	mg/Kg			10/11/11 14:12	1
Xylenes, Total	0.010	U	0.010	0.00070	mg/Kg			10/11/11 14:12	1
1,3-Dichloropropene, Total	0.0050	U	0.0050	0.00057	mg/Kg			10/11/11 14:12	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*81*		*69 - 120*		*10/11/11 14:12*	*1*
Toluene-d8 (Surr)	*101*		*69 - 122*		*10/11/11 14:12*	*1*
4-Bromofluorobenzene (Surr)	*102*		*67 - 120*		*10/11/11 14:12*	*1*
Dibromofluoromethane	*110*		*69 - 120*		*10/11/11 14:12*	*1*

Lab Sample ID: LCS 500-128406/5
Matrix: Solid
Analysis Batch: 128406

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0274		mg/Kg		55	43 - 149
Bromomethane	0.0500	0.0623		mg/Kg		125	36 - 146
Carbon disulfide	0.0500	0.0295		mg/Kg		59	27 - 107
Chloroethane	0.0500	0.0662		mg/Kg		132	34 - 144
Chloromethane	0.0500	0.0377		mg/Kg		75	48 - 136

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-128406/5
Matrix: Solid
Analysis Batch: 128406

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Methyl Ethyl Ketone	0.0500	0.0322		mg/Kg		64	58 - 140
Chloroform	0.0500	0.0475		mg/Kg		95	70 - 112
cis-1,2-Dichloroethene	0.0500	0.0493		mg/Kg		99	62 - 111
Carbon tetrachloride	0.0500	0.0393		mg/Kg		79	64 - 116
Benzene	0.0500	0.0437		mg/Kg		87	74 - 112
1,1-Dichloroethane	0.0500	0.0383		mg/Kg		77	70 - 113
1,2-Dichloroethane	0.0500	0.0360	*	mg/Kg		72	74 - 114
1,1-Dichloroethene	0.0500	0.0392		mg/Kg		78	60 - 128
Bromodichloromethane	0.0500	0.0436		mg/Kg		87	76 - 108
1,2-Dichloropropane	0.0500	0.0386		mg/Kg		77	77 - 116
cis-1,3-Dichloropropene	0.0538	0.0429		mg/Kg		80	68 - 103
Methylene Chloride	0.0500	0.0467		mg/Kg		93	49 - 125
methyl isobutyl ketone	0.0500	0.0295	*	mg/Kg		59	65 - 127
Methyl tert-butyl ether	0.0500	0.0418		mg/Kg		84	55 - 116
2-Hexanone	0.0500	0.0311		mg/Kg		62	58 - 138
Dibromochloromethane	0.0500	0.0477		mg/Kg		95	76 - 110
Chlorobenzene	0.0500	0.0514		mg/Kg		103	80 - 110
Ethylbenzene	0.0500	0.0501		mg/Kg		100	78 - 112
Tetrachloroethene	0.0500	0.0448		mg/Kg		90	76 - 114
Toluene	0.0500	0.0470		mg/Kg		94	77 - 113
Styrene	0.0500	0.0491		mg/Kg		98	78 - 109
trans-1,2-Dichloroethene	0.0500	0.0460		mg/Kg		92	62 - 119
Bromoform	0.0500	0.0441		mg/Kg		88	66 - 115
trans-1,3-Dichloropropene	0.0486	0.0378		mg/Kg		78	63 - 107
1,1,1-Trichloroethane	0.0500	0.0480		mg/Kg		96	67 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0511		mg/Kg		102	73 - 114
1,1,2-Trichloroethane	0.0500	0.0496		mg/Kg		99	69 - 118
Trichloroethene	0.0500	0.0461		mg/Kg		92	76 - 111
Vinyl chloride	0.0500	0.0469		mg/Kg		94	44 - 130
Xylenes, Total	0.150	0.149		mg/Kg		99	77 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*78*		*69 - 120*
Toluene-d8 (Surr)	*101*		*69 - 122*
4-Bromofluorobenzene (Surr)	*102*		*67 - 120*
Dibromofluoromethane	*106*		*69 - 120*

Lab Sample ID: MB 500-128891/7
Matrix: Solid
Analysis Batch: 128891

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0025	mg/Kg			10/14/11 14:44	1
Bromomethane	0.0050	U	0.0050	0.0011	mg/Kg			10/14/11 14:44	1
Carbon disulfide	0.0050	U	0.0050	0.00071	mg/Kg			10/14/11 14:44	1
Chloroethane	0.0050	U	0.0050	0.0011	mg/Kg			10/14/11 14:44	1
Chloromethane	0.0050	U	0.0050	0.00082	mg/Kg			10/14/11 14:44	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0011	mg/Kg			10/14/11 14:44	1
Chloroform	0.0050	U	0.0050	0.00092	mg/Kg			10/14/11 14:44	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-128891/7
Matrix: Solid
Analysis Batch: 128891

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	0.0050	U	0.0050	0.00073	mg/Kg			10/14/11 14:44	1
Carbon tetrachloride	0.0050	U	0.0050	0.0011	mg/Kg			10/14/11 14:44	1
Benzene	0.0050	U	0.0050	0.00054	mg/Kg			10/14/11 14:44	1
1,1-Dichloroethane	0.0050	U	0.0050	0.00079	mg/Kg			10/14/11 14:44	1
1,2-Dichloroethane	0.0050	U	0.0050	0.00051	mg/Kg			10/14/11 14:44	1
1,1-Dichloroethene	0.0050	U	0.0050	0.00079	mg/Kg			10/14/11 14:44	1
Bromodichloromethane	0.0050	U	0.0050	0.00076	mg/Kg			10/14/11 14:44	1
1,2-Dichloropropane	0.0050	U	0.0050	0.0011	mg/Kg			10/14/11 14:44	1
cis-1,3-Dichloropropene	0.0050	U	0.0050	0.00057	mg/Kg			10/14/11 14:44	1
Methylene Chloride	0.0050	U	0.0050	0.0014	mg/Kg			10/14/11 14:44	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00085	mg/Kg			10/14/11 14:44	1
Methyl tert-butyl ether	0.0050	U	0.0050	0.00075	mg/Kg			10/14/11 14:44	1
2-Hexanone	0.0050	U	0.0050	0.00071	mg/Kg			10/14/11 14:44	1
Dibromochloromethane	0.0050	U	0.0050	0.00069	mg/Kg			10/14/11 14:44	1
Chlorobenzene	0.0050	U	0.0050	0.00079	mg/Kg			10/14/11 14:44	1
Ethylbenzene	0.0050	U	0.0050	0.00075	mg/Kg			10/14/11 14:44	1
Tetrachloroethene	0.0050	U	0.0050	0.00095	mg/Kg			10/14/11 14:44	1
Toluene	0.0050	U	0.0050	0.00097	mg/Kg			10/14/11 14:44	1
Styrene	0.0050	U	0.0050	0.00063	mg/Kg			10/14/11 14:44	1
trans-1,2-Dichloroethene	0.0050	U	0.0050	0.00071	mg/Kg			10/14/11 14:44	1
Bromoform	0.0050	U	0.0050	0.00081	mg/Kg			10/14/11 14:44	1
trans-1,3-Dichloropropene	0.0050	U	0.0050	0.0011	mg/Kg			10/14/11 14:44	1
1,1,1-Trichloroethane	0.0050	U	0.0050	0.00096	mg/Kg			10/14/11 14:44	1
1,1,2,2-Tetrachloroethane	0.0050	U	0.0050	0.00068	mg/Kg			10/14/11 14:44	1
1,1,2-Trichloroethane	0.0050	U	0.0050	0.00067	mg/Kg			10/14/11 14:44	1
Trichloroethene	0.0050	U	0.0050	0.00081	mg/Kg			10/14/11 14:44	1
Vinyl chloride	0.0050	U	0.0050	0.00070	mg/Kg			10/14/11 14:44	1
Xylenes, Total	0.010	U	0.010	0.00070	mg/Kg			10/14/11 14:44	1
1,3-Dichloropropene, Total	0.0050	U	0.0050	0.00057	mg/Kg			10/14/11 14:44	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*107*		*69 - 120*		*10/14/11 14:44*	*1*
Toluene-d8 (Surr)	*103*		*69 - 122*		*10/14/11 14:44*	*1*
4-Bromofluorobenzene (Surr)	*103*		*67 - 120*		*10/14/11 14:44*	*1*
Dibromofluoromethane	*100*		*69 - 120*		*10/14/11 14:44*	*1*

Lab Sample ID: LCS 500-128891/4
Matrix: Solid
Analysis Batch: 128891

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0729		mg/Kg		146	43 - 149
Bromomethane	0.0500	0.0484		mg/Kg		97	36 - 146
Carbon disulfide	0.0500	0.0338		mg/Kg		68	27 - 107
Chloroethane	0.0500	0.0469		mg/Kg		94	34 - 144
Chloromethane	0.0500	0.0484		mg/Kg		97	48 - 136
Methyl Ethyl Ketone	0.0500	0.0614		mg/Kg		123	58 - 140
Chloroform	0.0500	0.0460		mg/Kg		92	70 - 112
cis-1,2-Dichloroethene	0.0500	0.0453		mg/Kg		91	62 - 111

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-128891/4
Matrix: Solid
Analysis Batch: 128891

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Carbon tetrachloride	0.0500	0.0513		mg/Kg		103	64 - 116
Benzene	0.0500	0.0446		mg/Kg		89	74 - 112
1,1-Dichloroethane	0.0500	0.0424		mg/Kg		85	70 - 113
1,2-Dichloroethane	0.0500	0.0472		mg/Kg		94	74 - 114
1,1-Dichloroethene	0.0500	0.0405		mg/Kg		81	60 - 128
Bromodichloromethane	0.0500	0.0478		mg/Kg		96	76 - 108
1,2-Dichloropropane	0.0500	0.0470		mg/Kg		94	77 - 116
cis-1,3-Dichloropropene	0.0538	0.0500		mg/Kg		93	68 - 103
Methylene Chloride	0.0500	0.0472		mg/Kg		94	49 - 125
methyl isobutyl ketone	0.0500	0.0550		mg/Kg		110	65 - 127
Methyl tert-butyl ether	0.0500	0.0482		mg/Kg		96	55 - 116
2-Hexanone	0.0500	0.0596		mg/Kg		119	58 - 138
Dibromochloromethane	0.0500	0.0488		mg/Kg		98	76 - 110
Chlorobenzene	0.0500	0.0452		mg/Kg		90	80 - 110
Ethylbenzene	0.0500	0.0454		mg/Kg		91	78 - 112
Tetrachloroethene	0.0500	0.0428		mg/Kg		86	76 - 114
Toluene	0.0500	0.0464		mg/Kg		93	77 - 113
Styrene	0.0500	0.0468		mg/Kg		94	78 - 109
trans-1,2-Dichloroethene	0.0500	0.0478		mg/Kg		96	62 - 119
Bromoform	0.0500	0.0494		mg/Kg		99	66 - 115
trans-1,3-Dichloropropene	0.0486	0.0471		mg/Kg		97	63 - 107
1,1,1-Trichloroethane	0.0500	0.0456		mg/Kg		91	67 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0473		mg/Kg		95	73 - 114
1,1,2-Trichloroethane	0.0500	0.0471		mg/Kg		94	69 - 118
Trichloroethene	0.0500	0.0424		mg/Kg		85	76 - 111
Vinyl chloride	0.0500	0.0486		mg/Kg		97	44 - 130
Xylenes, Total	0.150	0.136		mg/Kg		91	77 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*97*		*69 - 120*
Toluene-d8 (Surr)	*93*		*69 - 122*
4-Bromofluorobenzene (Surr)	*90*		*67 - 120*
Dibromofluoromethane	*90*		*69 - 120*

Lab Sample ID: MB 500-128968/3
Matrix: Solid
Analysis Batch: 128968

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0025	mg/Kg			10/15/11 00:38	1
Bromomethane	0.0050	U	0.0050	0.0011	mg/Kg			10/15/11 00:38	1
Carbon disulfide	0.0050	U	0.0050	0.00071	mg/Kg			10/15/11 00:38	1
Chloroethane	0.0050	U	0.0050	0.0011	mg/Kg			10/15/11 00:38	1
Chloromethane	0.0050	U	0.0050	0.00082	mg/Kg			10/15/11 00:38	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0011	mg/Kg			10/15/11 00:38	1
Chloroform	0.0050	U	0.0050	0.00092	mg/Kg			10/15/11 00:38	1
cis-1,2-Dichloroethene	0.0050	U	0.0050	0.00073	mg/Kg			10/15/11 00:38	1
Carbon tetrachloride	0.0050	U	0.0050	0.0011	mg/Kg			10/15/11 00:38	1
Benzene	0.0050	U	0.0050	0.00054	mg/Kg			10/15/11 00:38	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-128968/3
Matrix: Solid
Analysis Batch: 128968

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	0.0050	U	0.0050	0.00079	mg/Kg			10/15/11 00:38	1
1,2-Dichloroethane	0.0050	U	0.0050	0.00051	mg/Kg			10/15/11 00:38	1
1,1-Dichloroethene	0.0050	U	0.0050	0.00079	mg/Kg			10/15/11 00:38	1
Bromodichloromethane	0.0050	U	0.0050	0.00076	mg/Kg			10/15/11 00:38	1
1,2-Dichloropropane	0.0050	U	0.0050	0.0011	mg/Kg			10/15/11 00:38	1
cis-1,3-Dichloropropene	0.0050	U	0.0050	0.00057	mg/Kg			10/15/11 00:38	1
Methylene Chloride	0.0050	U	0.0050	0.0014	mg/Kg			10/15/11 00:38	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00085	mg/Kg			10/15/11 00:38	1
Methyl tert-butyl ether	0.0050	U	0.0050	0.00075	mg/Kg			10/15/11 00:38	1
2-Hexanone	0.0050	U	0.0050	0.00071	mg/Kg			10/15/11 00:38	1
Dibromochloromethane	0.0050	U	0.0050	0.00069	mg/Kg			10/15/11 00:38	1
Chlorobenzene	0.0050	U	0.0050	0.00079	mg/Kg			10/15/11 00:38	1
Ethylbenzene	0.0050	U	0.0050	0.00075	mg/Kg			10/15/11 00:38	1
Tetrachloroethene	0.0050	U	0.0050	0.00095	mg/Kg			10/15/11 00:38	1
Toluene	0.0050	U	0.0050	0.00097	mg/Kg			10/15/11 00:38	1
Styrene	0.0050	U	0.0050	0.00063	mg/Kg			10/15/11 00:38	1
trans-1,2-Dichloroethene	0.0050	U	0.0050	0.00071	mg/Kg			10/15/11 00:38	1
Bromoform	0.0050	U	0.0050	0.00081	mg/Kg			10/15/11 00:38	1
trans-1,3-Dichloropropene	0.0050	U	0.0050	0.0011	mg/Kg			10/15/11 00:38	1
1,1,1-Trichloroethane	0.0050	U	0.0050	0.00096	mg/Kg			10/15/11 00:38	1
1,1,2,2-Tetrachloroethane	0.0050	U	0.0050	0.00068	mg/Kg			10/15/11 00:38	1
1,1,2-Trichloroethane	0.0050	U	0.0050	0.00067	mg/Kg			10/15/11 00:38	1
Trichloroethene	0.0050	U	0.0050	0.00081	mg/Kg			10/15/11 00:38	1
Vinyl chloride	0.0050	U	0.0050	0.00070	mg/Kg			10/15/11 00:38	1
Xylenes, Total	0.010	U	0.010	0.00070	mg/Kg			10/15/11 00:38	1
1,3-Dichloropropene, Total	0.0050	U	0.0050	0.00057	mg/Kg			10/15/11 00:38	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*100*		*69 - 120*		*10/15/11 00:38*	*1*
Toluene-d8 (Surr)	*103*		*69 - 122*		*10/15/11 00:38*	*1*
4-Bromofluorobenzene (Surr)	*89*		*67 - 120*		*10/15/11 00:38*	*1*
Dibromofluoromethane	*97*		*69 - 120*		*10/15/11 00:38*	*1*

Lab Sample ID: LCS 500-128968/4
Matrix: Solid
Analysis Batch: 128968

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0622		mg/Kg		124	43 - 149
Bromomethane	0.0500	0.0492		mg/Kg		98	36 - 146
Carbon disulfide	0.0500	0.0367		mg/Kg		73	27 - 107
Chloroethane	0.0500	0.0552		mg/Kg		110	34 - 144
Chloromethane	0.0500	0.0456		mg/Kg		91	48 - 136
Methyl Ethyl Ketone	0.0500	0.0550		mg/Kg		110	58 - 140
Chloroform	0.0500	0.0522		mg/Kg		104	70 - 112
cis-1,2-Dichloroethene	0.0500	0.0494		mg/Kg		99	62 - 111
Carbon tetrachloride	0.0500	0.0527		mg/Kg		105	64 - 116
Benzene	0.0500	0.0510		mg/Kg		102	74 - 112
1,1-Dichloroethane	0.0500	0.0501		mg/Kg		100	70 - 113

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-128968/4
Matrix: Solid
Analysis Batch: 128968

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
1,2-Dichloroethane	0.0500	0.0533		mg/Kg		107	74 - 114
1,1-Dichloroethene	0.0500	0.0456		mg/Kg		91	60 - 128
Bromodichloromethane	0.0500	0.0526		mg/Kg		105	76 - 108
1,2-Dichloropropane	0.0500	0.0529		mg/Kg		106	77 - 116
cis-1,3-Dichloropropene	0.0538	0.0513		mg/Kg		95	68 - 103
Methylene Chloride	0.0500	0.0481		mg/Kg		96	49 - 125
methyl isobutyl ketone	0.0500	0.0501		mg/Kg		100	65 - 127
Methyl tert-butyl ether	0.0500	0.0486		mg/Kg		97	55 - 116
2-Hexanone	0.0500	0.0520		mg/Kg		104	58 - 138
Dibromochloromethane	0.0500	0.0519		mg/Kg		104	76 - 110
Chlorobenzene	0.0500	0.0521		mg/Kg		104	80 - 110
Ethylbenzene	0.0500	0.0546		mg/Kg		109	78 - 112
Tetrachloroethene	0.0500	0.0526		mg/Kg		105	76 - 114
Toluene	0.0500	0.0537		mg/Kg		107	77 - 113
Styrene	0.0500	0.0525		mg/Kg		105	78 - 109
trans-1,2-Dichloroethene	0.0500	0.0510		mg/Kg		102	62 - 119
Bromoform	0.0500	0.0509		mg/Kg		102	66 - 115
trans-1,3-Dichloropropene	0.0486	0.0467		mg/Kg		96	63 - 107
1,1,1-Trichloroethane	0.0500	0.0535		mg/Kg		107	67 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0527		mg/Kg		105	73 - 114
1,1,2-Trichloroethane	0.0500	0.0529		mg/Kg		106	69 - 118
Trichloroethene	0.0500	0.0525		mg/Kg		105	76 - 111
Vinyl chloride	0.0500	0.0506		mg/Kg		101	44 - 130
Xylenes, Total	0.150	0.163		mg/Kg		109	77 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*112*		*69 - 120*
Toluene-d8 (Surr)	*112*		*69 - 122*
4-Bromofluorobenzene (Surr)	*107*		*67 - 120*
Dibromofluoromethane	*109*		*69 - 120*

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40136-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40136
Chain of Custody Number:
Page ____ of ____
Temperature °C of Cooler: 3.7

Client: CH2M HILL
Client Project #:
Project Name: CONWR Plume 2
Project Location/State: Marion, IL
Lab Project #:
Sampler: Jason Bookout, Carrie Martin, Monica Martin, Wilkstad
Lab PM: Jim Knapp

Preservative: 7 | Methanol | Sodium Bisulfate | Water
Parameter: Percent Moisture | VOCs | VOCs | VOCs

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Percent Moisture	VOCs	VOCs	VOCs	Comments
1		33-SB151-27	10/3/11	1410	5	SO	1	1	2	1	
2	✓	33-SB151-32	10/3/11	1415	15	SO	3	3	6	3	
3		33-SB150-27	10/3/11	1438	5	SO	1	1	1	2	
4		33-SB150-38	10/3/11	1541	5	SO	1	1	2	1	
5		33-SB151-38	10/3/11	1540	5	SO	1	1	1	2	

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days Prelim ___ 10 Days Final ~~15 Days~~ 14 _____ Other
Requested Due Date _____

Sample Disposal
[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/3/11	18:30	[signature]	TA	10/4/11	1030
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier
Shipped: FX
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-40136-1

Login Number: 40136
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	3.7
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

TestAmerica

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-40223-1
Client Project/Site: Crab Orchard Wildlife Refuge #2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/19/2011 03:30:34 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Definitions 17
QC Association 18
Surrogate Summary 20
QC Sample Results 22
Certification Summary 32
Chain of Custody 33
Receipt Checklists 35

Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Job ID: 500-40223-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-40223-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC/MS VOA
Method(s) 8260B: The laboratory control sample (LCS) for batch 500-128674 exceeded control limits for the following analyte: 4-Methyl-2-Pentanone.

The following sample(s) was diluted due to the abundance of non-target analytes: 500-40223-1 & 7. Elevated reporting limits (RLs) are provided.

The following sample(s) was diluted due to the abundance of target analytes: 500-40223-2, 3, 5, & 6. Elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Client Sample ID: 33-SB141-18 — Lab Sample ID: 500-40223-1

No Detections

Client Sample ID: 33-SB142-41 — Lab Sample ID: 500-40223-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	0.0037	J	0.0041	0.0020	mg/Kg	1	☼	8260B	Total/NA
cis-1,2-Dichloroethene	0.022		0.0041	0.00061	mg/Kg	1	☼	8260B	Total/NA
Trichloroethene	0.42		0.011	0.0069	mg/Kg	50	☼	8260B	Total/NA

Client Sample ID: 33-SB142-35 — Lab Sample ID: 500-40223-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	1.3		0.10	0.023	mg/Kg	100	☼	8260B	Total/NA
Trichloroethene - DL	170		0.26	0.16	mg/Kg	1000	☼	8260B	Total/NA

Client Sample ID: 33-SB135-27 — Lab Sample ID: 500-40223-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	3.4		0.044	0.0098	mg/Kg	50	☼	8260B	Total/NA
Tetrachloroethene	0.12		0.044	0.0095	mg/Kg	50	☼	8260B	Total/NA
1,1,2-Trichloroethane	0.023	J	0.044	0.013	mg/Kg	50	☼	8260B	Total/NA
Vinyl chloride	0.13		0.011	0.0055	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	30		0.11	0.066	mg/Kg	500	☼	8260B	Total/NA

Client Sample ID: 33-SB140-26 — Lab Sample ID: 500-40223-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	2.5		0.045	0.010	mg/Kg	50	☼	8260B	Total/NA
Ethylbenzene	0.018		0.011	0.0063	mg/Kg	50	☼	8260B	Total/NA
Tetrachloroethene	0.18		0.045	0.0097	mg/Kg	50	☼	8260B	Total/NA
1,1,2-Trichloroethane	0.027	J	0.045	0.013	mg/Kg	50	☼	8260B	Total/NA
Vinyl chloride	0.078		0.011	0.0056	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	18		0.056	0.034	mg/Kg	250	☼	8260B	Total/NA

Client Sample ID: 33-SB140-18 — Lab Sample ID: 500-40223-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	3.6		0.047	0.011	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene	1.4		0.012	0.0071	mg/Kg	50	☼	8260B	Total/NA
Vinyl chloride	0.016		0.012	0.0059	mg/Kg	50	☼	8260B	Total/NA

Client Sample ID: TB-001-10042011 — Lab Sample ID: 500-40223-8

No Detections

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-40223-1	33-SB141-18	Solid	10/04/11 10:50	10/05/11 10:30
500-40223-2	33-SB142-41	Solid	10/04/11 10:50	10/05/11 10:30
500-40223-3	33-SB142-35	Solid	10/04/11 10:41	10/05/11 10:30
500-40223-5	33-SB135-27	Solid	10/04/11 17:08	10/05/11 10:30
500-40223-6	33-SB140-26	Solid	10/04/11 16:53	10/05/11 10:30
500-40223-7	33-SB140-18	Solid	10/04/11 16:47	10/05/11 10:30
500-40223-8	TB-001-10042011	Water	10/04/11 07:40	10/05/11 10:30

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Client Sample ID: 33-SB141-18
Date Collected: 10/04/11 10:50
Date Received: 10/05/11 10:30

Lab Sample ID: 500-40223-1
Matrix: Solid
Percent Solids: 84.2

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.23	U	0.23	0.088	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Benzene	0.011	U	0.011	0.0037	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Bromodichloromethane	0.092	U	0.092	0.013	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Bromoform	0.092	U	0.092	0.026	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Bromomethane	0.092	U	0.092	0.039	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Methyl Ethyl Ketone	0.23	U	0.23	0.048	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Carbon disulfide	0.23	U	0.23	0.020	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Carbon tetrachloride	0.046	U	0.046	0.013	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Chlorobenzene	0.046	U	0.046	0.011	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Chloroethane	0.092	U	0.092	0.023	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Chloroform	0.046	U	0.046	0.011	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Chloromethane	0.092	U	0.092	0.023	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
cis-1,2-Dichloroethene	0.046	U	0.046	0.010	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
cis-1,3-Dichloropropene	0.046	U	0.046	0.013	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Dibromochloromethane	0.092	U	0.092	0.017	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
1,1-Dichloroethane	0.046	U	0.046	0.011	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
1,2-Dichloroethane	0.046	U	0.046	0.013	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
1,1-Dichloroethene	0.046	U	0.046	0.013	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
1,2-Dichloropropane	0.046	U	0.046	0.016	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Ethylbenzene	0.011	U	0.011	0.0064	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
2-Hexanone	0.23	U	0.23	0.026	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Methylene Chloride	0.23	U	0.23	0.029	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
methyl isobutyl ketone	0.23	U	0.23	0.036	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Methyl tert-butyl ether	0.092	U	0.092	0.022	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Styrene	0.046	U	0.046	0.012	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
1,1,2,2-Tetrachloroethane	0.046	U	0.046	0.016	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Tetrachloroethene	0.046	U	0.046	0.0099	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Toluene	0.011	U	0.011	0.0069	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
trans-1,2-Dichloroethene	0.046	U	0.046	0.012	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
trans-1,3-Dichloropropene	0.046	U	0.046	0.016	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
1,1,1-Trichloroethane	0.046	U	0.046	0.012	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
1,1,2-Trichloroethane	0.046	U	0.046	0.014	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Trichloroethene	0.011	U	0.011	0.0069	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Vinyl chloride	0.011	U	0.011	0.0058	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
Xylenes, Total	0.023	U	0.023	0.0059	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50
1,3-Dichloropropene, Total	0.046	U	0.046	0.013	mg/Kg	☼	10/04/11 10:50	10/14/11 22:39	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*	*10/04/11 10:50*	*10/14/11 22:39*	*50*
Dibromofluoromethane	*99*		*78 - 119*	*10/04/11 10:50*	*10/14/11 22:39*	*50*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*	*10/04/11 10:50*	*10/14/11 22:39*	*50*
Toluene-d8 (Surr)	*100*		*80 - 121*	*10/04/11 10:50*	*10/14/11 22:39*	*50*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Client Sample ID: 33-SB142-41
Date Collected: 10/04/11 10:50
Date Received: 10/05/11 10:30

Lab Sample ID: 500-40223-2
Matrix: Solid
Percent Solids: 81.5

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	0.0041	U	0.0041	0.00068	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Vinyl chloride	0.0041	U	0.0041	0.00058	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Bromomethane	0.0041	U	0.0041	0.00089	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Chloroethane	0.0041	U	0.0041	0.00087	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
1,1-Dichloroethene	0.0041	U	0.0041	0.00066	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Acetone	**0.0037**	**J**	0.0041	0.0020	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Carbon disulfide	0.0041	U	0.0041	0.00059	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Methylene Chloride	0.0041	U	0.0041	0.0012	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
trans-1,2-Dichloroethene	0.0041	U	0.0041	0.00059	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Methyl tert-butyl ether	0.0041	U	0.0041	0.00062	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
1,1-Dichloroethane	0.0041	U	0.0041	0.00066	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
cis-1,2-Dichloroethene	**0.022**		0.0041	0.00061	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Methyl Ethyl Ketone	0.0041	U	0.0041	0.00090	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Chloroform	0.0041	U	0.0041	0.00076	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
1,1,1-Trichloroethane	0.0041	U	0.0041	0.00080	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Carbon tetrachloride	0.0041	U	0.0041	0.00090	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Benzene	0.0041	U	0.0041	0.00045	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
1,2-Dichloroethane	0.0041	U	0.0041	0.00042	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
1,2-Dichloropropane	0.0041	U	0.0041	0.00094	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Bromodichloromethane	0.0041	U	0.0041	0.00063	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
cis-1,3-Dichloropropene	0.0041	U	0.0041	0.00047	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
methyl isobutyl ketone	0.0041	U *	0.0041	0.00071	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Toluene	0.0041	U	0.0041	0.00081	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
trans-1,3-Dichloropropene	0.0041	U	0.0041	0.00094	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
1,1,2-Trichloroethane	0.0041	U	0.0041	0.00056	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Tetrachloroethene	0.0041	U	0.0041	0.00079	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
2-Hexanone	0.0041	U	0.0041	0.00059	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Dibromochloromethane	0.0041	U	0.0041	0.00057	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Chlorobenzene	0.0041	U	0.0041	0.00066	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Ethylbenzene	0.0041	U	0.0041	0.00062	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Xylenes, Total	0.0083	U	0.0083	0.00058	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Styrene	0.0041	U	0.0041	0.00052	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Bromoform	0.0041	U	0.0041	0.00067	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
1,1,2,2-Tetrachloroethane	0.0041	U	0.0041	0.00056	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1
Trichloroethene	**0.42**		0.011	0.0069	mg/Kg	☼	10/04/11 10:50	10/18/11 05:23	50
1,3-Dichloropropene, Total	0.0041	U	0.0041	0.00047	mg/Kg	☼	10/04/11 10:50	10/13/11 16:45	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*	*10/04/11 10:50*	*10/18/11 05:23*	*50*
Dibromofluoromethane	*103*		*78 - 119*	*10/04/11 10:50*	*10/18/11 05:23*	*50*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*	*10/04/11 10:50*	*10/18/11 05:23*	*50*
Toluene-d8 (Surr)	*97*		*80 - 121*	*10/04/11 10:50*	*10/18/11 05:23*	*50*
1,2-Dichloroethane-d4 (Surr)	*92*		*69 - 120*	*10/04/11 10:50*	*10/13/11 16:45*	*1*
Toluene-d8 (Surr)	*102*		*69 - 122*	*10/04/11 10:50*	*10/13/11 16:45*	*1*
4-Bromofluorobenzene (Surr)	*105*		*67 - 120*	*10/04/11 10:50*	*10/13/11 16:45*	*1*
Dibromofluoromethane	*119*		*69 - 120*	*10/04/11 10:50*	*10/13/11 16:45*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Client Sample ID: 33-SB142-35
Date Collected: 10/04/11 10:41
Date Received: 10/05/11 10:30

Lab Sample ID: 500-40223-3
Matrix: Solid
Percent Solids: 82.0

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.52	U	0.52	0.20	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Benzene	0.026	U	0.026	0.0083	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Bromodichloromethane	0.21	U	0.21	0.028	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Bromoform	0.21	U	0.21	0.059	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Bromomethane	0.21	U	0.21	0.089	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Methyl Ethyl Ketone	0.52	U	0.52	0.11	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Carbon disulfide	0.52	U	0.52	0.045	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Carbon tetrachloride	0.10	U	0.10	0.029	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Chlorobenzene	0.10	U	0.10	0.025	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Chloroethane	0.21	U	0.21	0.051	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Chloroform	0.10	U	0.10	0.026	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Chloromethane	0.21	U	0.21	0.051	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
cis-1,2-Dichloroethene	**1.3**		0.10	0.023	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
cis-1,3-Dichloropropene	0.10	U	0.10	0.029	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Dibromochloromethane	0.21	U	0.21	0.039	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
1,1-Dichloroethane	0.10	U	0.10	0.025	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
1,2-Dichloroethane	0.10	U	0.10	0.029	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
1,1-Dichloroethene	0.10	U	0.10	0.030	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
1,2-Dichloropropane	0.10	U	0.10	0.037	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Ethylbenzene	0.026	U	0.026	0.014	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
2-Hexanone	0.52	U	0.52	0.058	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Methylene Chloride	0.52	U	0.52	0.065	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
methyl isobutyl ketone	0.52	U	0.52	0.082	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Methyl tert-butyl ether	0.21	U	0.21	0.049	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Styrene	0.10	U	0.10	0.027	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
1,1,2,2-Tetrachloroethane	0.10	U	0.10	0.036	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Tetrachloroethene	0.10	U	0.10	0.022	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Toluene	0.026	U	0.026	0.016	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
trans-1,2-Dichloroethene	0.10	U	0.10	0.028	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
trans-1,3-Dichloropropene	0.10	U	0.10	0.036	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
1,1,1-Trichloroethane	0.10	U	0.10	0.027	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
1,1,2-Trichloroethane	0.10	U	0.10	0.031	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Vinyl chloride	0.026	U	0.026	0.013	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
Xylenes, Total	0.052	U	0.052	0.013	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100
1,3-Dichloropropene, Total	0.10	U	0.10	0.029	mg/Kg	☼	10/04/11 10:41	10/15/11 00:11	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*	*10/04/11 10:41*	*10/15/11 00:11*	*100*
Dibromofluoromethane	*101*		*78 - 119*	*10/04/11 10:41*	*10/15/11 00:11*	*100*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*	*10/04/11 10:41*	*10/15/11 00:11*	*100*
Toluene-d8 (Surr)	*100*		*80 - 121*	*10/04/11 10:41*	*10/15/11 00:11*	*100*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**170**		0.26	0.16	mg/Kg	☼	10/04/11 10:41	10/15/11 00:34	1000

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*	*10/04/11 10:41*	*10/15/11 00:34*	*1000*
Dibromofluoromethane	*102*		*78 - 119*	*10/04/11 10:41*	*10/15/11 00:34*	*1000*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*	*10/04/11 10:41*	*10/15/11 00:34*	*1000*
Toluene-d8 (Surr)	*97*		*80 - 121*	*10/04/11 10:41*	*10/15/11 00:34*	*1000*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Client Sample ID: 33-SB135-27
Date Collected: 10/04/11 17:08
Date Received: 10/05/11 10:30

Lab Sample ID: 500-40223-5
Matrix: Solid
Percent Solids: 82.0

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.22	U	0.22	0.084	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Benzene	0.011	U	0.011	0.0035	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Bromodichloromethane	0.088	U	0.088	0.012	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Bromoform	0.088	U	0.088	0.025	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Bromomethane	0.088	U	0.088	0.038	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Methyl Ethyl Ketone	0.22	U	0.22	0.046	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Carbon disulfide	0.22	U	0.22	0.019	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Carbon tetrachloride	0.044	U	0.044	0.012	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Chlorobenzene	0.044	U	0.044	0.010	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Chloroethane	0.088	U	0.088	0.022	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Chloroform	0.044	U	0.044	0.011	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Chloromethane	0.088	U	0.088	0.022	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
cis-1,2-Dichloroethene	**3.4**		0.044	0.0098	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
cis-1,3-Dichloropropene	0.044	U	0.044	0.012	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Dibromochloromethane	0.088	U	0.088	0.017	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
1,1-Dichloroethane	0.044	U	0.044	0.011	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
1,2-Dichloroethane	0.044	U	0.044	0.012	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
1,1-Dichloroethene	0.044	U	0.044	0.013	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
1,2-Dichloropropane	0.044	U	0.044	0.016	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Ethylbenzene	0.011	U	0.011	0.0061	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
2-Hexanone	0.22	U	0.22	0.024	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Methylene Chloride	0.22	U	0.22	0.028	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
methyl isobutyl ketone	0.22	U	0.22	0.035	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Methyl tert-butyl ether	0.088	U	0.088	0.021	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Styrene	0.044	U	0.044	0.011	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
1,1,2,2-Tetrachloroethane	0.044	U	0.044	0.015	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Tetrachloroethene	**0.12**		0.044	0.0095	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Toluene	0.011	U	0.011	0.0066	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
trans-1,2-Dichloroethene	0.044	U	0.044	0.012	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
trans-1,3-Dichloropropene	0.044	U	0.044	0.015	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
1,1,1-Trichloroethane	0.044	U	0.044	0.011	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
1,1,2-Trichloroethane	**0.023**	**J**	0.044	0.013	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Vinyl chloride	**0.13**		0.011	0.0055	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
Xylenes, Total	0.022	U	0.022	0.0056	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50
1,3-Dichloropropene, Total	0.044	U	0.044	0.012	mg/Kg	☼	10/04/11 17:08	10/18/11 05:46	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*	*10/04/11 17:08*	*10/18/11 05:46*	*50*
Dibromofluoromethane	*103*		*78 - 119*	*10/04/11 17:08*	*10/18/11 05:46*	*50*
1,2-Dichloroethane-d4 (Surr)	*109*		*77 - 124*	*10/04/11 17:08*	*10/18/11 05:46*	*50*
Toluene-d8 (Surr)	*99*		*80 - 121*	*10/04/11 17:08*	*10/18/11 05:46*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**30**		0.11	0.066	mg/Kg	☼	10/04/11 17:08	10/18/11 06:10	500

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*95*		*77 - 112*	*10/04/11 17:08*	*10/18/11 06:10*	*500*
Dibromofluoromethane	*105*		*78 - 119*	*10/04/11 17:08*	*10/18/11 06:10*	*500*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*	*10/04/11 17:08*	*10/18/11 06:10*	*500*
Toluene-d8 (Surr)	*98*		*80 - 121*	*10/04/11 17:08*	*10/18/11 06:10*	*500*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Client Sample ID: 33-SB140-26
Date Collected: 10/04/11 16:53
Date Received: 10/05/11 10:30

Lab Sample ID: 500-40223-6
Matrix: Solid
Percent Solids: 84.1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.22	U	0.22	0.086	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Benzene	0.011	U	0.011	0.0036	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Bromodichloromethane	0.089	U	0.089	0.012	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Bromoform	0.089	U	0.089	0.025	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Bromomethane	0.089	U	0.089	0.038	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Methyl Ethyl Ketone	0.22	U	0.22	0.046	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Carbon disulfide	0.22	U	0.22	0.020	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Carbon tetrachloride	0.045	U	0.045	0.013	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Chlorobenzene	0.045	U	0.045	0.011	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Chloroethane	0.089	U	0.089	0.022	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Chloroform	0.045	U	0.045	0.011	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Chloromethane	0.089	U	0.089	0.022	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
cis-1,2-Dichloroethene	**2.5**		0.045	0.010	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
cis-1,3-Dichloropropene	0.045	U	0.045	0.012	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Dibromochloromethane	0.089	U	0.089	0.017	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
1,1-Dichloroethane	0.045	U	0.045	0.011	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
1,2-Dichloroethane	0.045	U	0.045	0.013	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
1,1-Dichloroethene	0.045	U	0.045	0.013	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
1,2-Dichloropropane	0.045	U	0.045	0.016	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Ethylbenzene	**0.018**		0.011	0.0063	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
2-Hexanone	0.22	U	0.22	0.025	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Methylene Chloride	0.22	U	0.22	0.028	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
methyl isobutyl ketone	0.22	U	0.22	0.035	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Methyl tert-butyl ether	0.089	U	0.089	0.021	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Styrene	0.045	U	0.045	0.012	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
1,1,2,2-Tetrachloroethane	0.045	U	0.045	0.016	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Tetrachloroethene	**0.18**		0.045	0.0097	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Toluene	0.011	U	0.011	0.0067	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
trans-1,2-Dichloroethene	0.045	U	0.045	0.012	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
trans-1,3-Dichloropropene	0.045	U	0.045	0.016	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
1,1,1-Trichloroethane	0.045	U	0.045	0.012	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
1,1,2-Trichloroethane	**0.027**	**J**	0.045	0.013	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Vinyl chloride	**0.078**		0.011	0.0056	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
Xylenes, Total	0.022	U	0.022	0.0058	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50
1,3-Dichloropropene, Total	0.045	U	0.045	0.012	mg/Kg	☼	10/04/11 16:53	10/18/11 06:33	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*	*10/04/11 16:53*	*10/18/11 06:33*	*50*
Dibromofluoromethane	*104*		*78 - 119*	*10/04/11 16:53*	*10/18/11 06:33*	*50*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*	*10/04/11 16:53*	*10/18/11 06:33*	*50*
Toluene-d8 (Surr)	*102*		*80 - 121*	*10/04/11 16:53*	*10/18/11 06:33*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**18**		0.056	0.034	mg/Kg	☼	10/04/11 16:53	10/18/11 06:56	250

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*	*10/04/11 16:53*	*10/18/11 06:56*	*250*
Dibromofluoromethane	*109*		*78 - 119*	*10/04/11 16:53*	*10/18/11 06:56*	*250*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*	*10/04/11 16:53*	*10/18/11 06:56*	*250*
Toluene-d8 (Surr)	*96*		*80 - 121*	*10/04/11 16:53*	*10/18/11 06:56*	*250*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Client Sample ID: 33-SB140-18
Date Collected: 10/04/11 16:47
Date Received: 10/05/11 10:30

Lab Sample ID: 500-40223-7
Matrix: Solid
Percent Solids: 82.4

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.24	U	0.24	0.090	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Benzene	0.012	U	0.012	0.0038	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Bromodichloromethane	0.094	U	0.094	0.013	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Bromoform	0.094	U	0.094	0.027	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Bromomethane	0.094	U	0.094	0.041	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Methyl Ethyl Ketone	0.24	U	0.24	0.049	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Carbon disulfide	0.24	U	0.24	0.021	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Carbon tetrachloride	0.047	U	0.047	0.013	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Chlorobenzene	0.047	U	0.047	0.011	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Chloroethane	0.094	U	0.094	0.023	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Chloroform	0.047	U	0.047	0.012	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Chloromethane	0.094	U	0.094	0.023	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
cis-1,2-Dichloroethene	**3.6**		0.047	0.011	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
cis-1,3-Dichloropropene	0.047	U	0.047	0.013	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Dibromochloromethane	0.094	U	0.094	0.018	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
1,1-Dichloroethane	0.047	U	0.047	0.011	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
1,2-Dichloroethane	0.047	U	0.047	0.013	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
1,1-Dichloroethene	0.047	U	0.047	0.014	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
1,2-Dichloropropane	0.047	U	0.047	0.017	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Ethylbenzene	0.012	U	0.012	0.0066	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
2-Hexanone	0.24	U	0.24	0.026	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Methylene Chloride	0.24	U	0.24	0.030	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
methyl isobutyl ketone	0.24	U	0.24	0.037	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Methyl tert-butyl ether	0.094	U	0.094	0.022	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Styrene	0.047	U	0.047	0.012	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
1,1,2,2-Tetrachloroethane	0.047	U	0.047	0.017	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Tetrachloroethene	0.047	U	0.047	0.010	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Toluene	0.012	U	0.012	0.0071	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
trans-1,2-Dichloroethene	0.047	U	0.047	0.013	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
trans-1,3-Dichloropropene	0.047	U	0.047	0.017	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
1,1,1-Trichloroethane	0.047	U	0.047	0.012	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
1,1,2-Trichloroethane	0.047	U	0.047	0.014	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Trichloroethene	**1.4**		0.012	0.0071	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Vinyl chloride	**0.016**		0.012	0.0059	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
Xylenes, Total	0.024	U	0.024	0.0061	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50
1,3-Dichloropropene, Total	0.047	U	0.047	0.013	mg/Kg	☼	10/04/11 16:47	10/18/11 07:19	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*	*10/04/11 16:47*	*10/18/11 07:19*	*50*
Dibromofluoromethane	*105*		*78 - 119*	*10/04/11 16:47*	*10/18/11 07:19*	*50*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*	*10/04/11 16:47*	*10/18/11 07:19*	*50*
Toluene-d8 (Surr)	*100*		*80 - 121*	*10/04/11 16:47*	*10/18/11 07:19*	*50*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Client Sample ID: TB-001-10042011

Date Collected: 10/04/11 07:40
Date Received: 10/05/11 10:30

Lab Sample ID: 500-40223-8

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/14/11 14:56	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/14/11 14:56	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/14/11 14:56	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/14/11 14:56	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/14/11 14:56	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/14/11 14:56	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/14/11 14:56	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/14/11 14:56	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/14/11 14:56	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/14/11 14:56	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/14/11 14:56	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/14/11 14:56	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/14/11 14:56	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/14/11 14:56	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/14/11 14:56	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/14/11 14:56	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/14/11 14:56	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/14/11 14:56	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/14/11 14:56	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/14/11 14:56	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/14/11 14:56	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/14/11 14:56	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/14/11 14:56	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/14/11 14:56	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/14/11 14:56	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/14/11 14:56	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/14/11 14:56	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/14/11 14:56	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/14/11 14:56	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/14/11 14:56	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/14/11 14:56	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/14/11 14:56	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/14/11 14:56	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/14/11 14:56	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/14/11 14:56	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/14/11 14:56	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/14/11 14:56*	*1*
Dibromofluoromethane	*91*		*78 - 119*		*10/14/11 14:56*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*77 - 124*		*10/14/11 14:56*	*1*
Toluene-d8 (Surr)	*97*		*80 - 121*		*10/14/11 14:56*	*1*

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	LCS or LCSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

GC/MS VOA

Prep Batch: 127945

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40223-2	33-SB142-41	Total/NA	Solid	5035	

Prep Batch: 127946

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40223-1	33-SB141-18	Total/NA	Solid	5035	
500-40223-1 MS	33-SB141-18	Total/NA	Solid	5035	
500-40223-1 MSD	33-SB141-18	Total/NA	Solid	5035	
500-40223-2	33-SB142-41	Total/NA	Solid	5035	
500-40223-3	33-SB142-35	Total/NA	Solid	5035	
500-40223-3 - DL	33-SB142-35	Total/NA	Solid	5035	
500-40223-5	33-SB135-27	Total/NA	Solid	5035	
500-40223-5 - DL	33-SB135-27	Total/NA	Solid	5035	
500-40223-6	33-SB140-26	Total/NA	Solid	5035	
500-40223-6 - DL	33-SB140-26	Total/NA	Solid	5035	
500-40223-7	33-SB140-18	Total/NA	Solid	5035	

Analysis Batch: 128674

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40223-2	33-SB142-41	Total/NA	Solid	8260B	127945
LCS 500-128674/5	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-128674/4	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 128908

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40223-1	33-SB141-18	Total/NA	Solid	8260B	127946
500-40223-1 MS	33-SB141-18	Total/NA	Solid	8260B	127946
500-40223-1 MSD	33-SB141-18	Total/NA	Solid	8260B	127946
500-40223-3	33-SB142-35	Total/NA	Solid	8260B	127946
500-40223-3 - DL	33-SB142-35	Total/NA	Solid	8260B	127946
LCS 500-128908/5	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-128908/33	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 128909

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40223-8	TB-001-10042011	Total/NA	Water	8260B	
LCS 500-128909/5	Lab Control Sample	Total/NA	Water	8260B	
MB 500-128909/33	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 129181

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40223-2	33-SB142-41	Total/NA	Solid	8260B	127946
500-40223-5	33-SB135-27	Total/NA	Solid	8260B	127946
500-40223-5 - DL	33-SB135-27	Total/NA	Solid	8260B	127946
500-40223-6	33-SB140-26	Total/NA	Solid	8260B	127946
500-40223-6 - DL	33-SB140-26	Total/NA	Solid	8260B	127946
500-40223-7	33-SB140-18	Total/NA	Solid	8260B	127946
LCS 500-129181/6	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-129181/5	Method Blank	Total/NA	Solid	8260B	

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

General Chemistry

Analysis Batch: 127751

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40223-1	33-SB141-18	Total/NA	Solid	Moisture	
500-40223-1 DU	33-SB141-18	Total/NA	Solid	Moisture	
500-40223-1 MS	33-SB141-18	Total/NA	Solid	Moisture	
500-40223-1 MSD	33-SB141-18	Total/NA	Solid	Moisture	
500-40223-2	33-SB142-41	Total/NA	Solid	Moisture	
500-40223-3	33-SB142-35	Total/NA	Solid	Moisture	
500-40223-6	33-SB140-26	Total/NA	Solid	Moisture	
500-40223-7	33-SB140-18	Total/NA	Solid	Moisture	

Analysis Batch: 128031

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40223-5	33-SB135-27	Total/NA	Solid	Moisture	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40223-1	33-SB141-18	98	99	104	100
500-40223-1 MS	33-SB141-18	103	104	104	99
500-40223-1 MSD	33-SB141-18	101	102	101	100
500-40223-2	33-SB142-41	99	103	106	97
500-40223-3	33-SB142-35	98	101	105	100
500-40223-3 - DL	33-SB142-35	97	102	104	97
500-40223-5	33-SB135-27	96	103	109	99
500-40223-5 - DL	33-SB135-27	95	105	107	98
500-40223-6	33-SB140-26	96	104	107	102
500-40223-6 - DL	33-SB140-26	93	109	106	96
500-40223-7	33-SB140-18	96	105	104	100
LCS 500-128908/5	Lab Control Sample	98	98	99	100
LCS 500-129181/6	Lab Control Sample	97	102	99	97
MB 500-129181/5	Method Blank	98	100	103	101

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		12DCE	TOL	BFB	DBFM
Lab Sample ID	Client Sample ID	(69-120)	(69-122)	(67-120)	(69-120)
500-40223-2	33-SB142-41	92	102	105	119
LCS 500-128674/5	Lab Control Sample	80	104	101	106
MB 500-128674/4	Method Blank	81	101	99	107

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40223-8	TB-001-10042011	98	91	97	97
LCS 500-128909/5	Lab Control Sample	98	98	99	100
MB 500-128908/33	Method Blank	100	94	100	99
MB 500-128909/33	Method Blank	100	94	100	99

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: 500-40223-1 MS | **Client Sample ID: 33-SB141-18**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 128908 | **Prep Batch: 127946**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.23	U	2.79	2.93		mg/Kg	☼	105	46 - 152
Benzene	0.011	U	2.79	2.66		mg/Kg	☼	95	74 - 112
Bromodichloromethane	0.092	U	2.79	2.97		mg/Kg	☼	106	73 - 122
Bromoform	0.092	U	2.79	2.62		mg/Kg	☼	94	62 - 119
Bromomethane	0.092	U	2.79	3.19		mg/Kg	☼	114	38 - 157
Methyl Ethyl Ketone	0.23	U	2.79	3.04		mg/Kg	☼	109	48 - 152
Carbon disulfide	0.23	U	2.79	2.16		mg/Kg	☼	77	38 - 112
Carbon tetrachloride	0.046	U	2.79	2.57		mg/Kg	☼	92	63 - 127
Chlorobenzene	0.046	U	2.79	2.72		mg/Kg	☼	97	80 - 110
Chloroethane	0.092	U	2.79	3.17		mg/Kg	☼	113	53 - 156
Chloroform	0.046	U	2.79	2.88		mg/Kg	☼	103	74 - 115
Chloromethane	0.092	U	2.79	3.13		mg/Kg	☼	112	44 - 148
cis-1,2-Dichloroethene	0.046	U	2.79	2.95		mg/Kg	☼	106	68 - 110
cis-1,3-Dichloropropene	0.046	U	3.00	3.02		mg/Kg	☼	100	65 - 116
Dibromochloromethane	0.092	U	2.79	2.61		mg/Kg	☼	94	66 - 123
1,1-Dichloroethane	0.046	U	2.79	2.75		mg/Kg	☼	98	69 - 118
1,2-Dichloroethane	0.046	U	2.79	2.82		mg/Kg	☼	101	66 - 120
1,1-Dichloroethene	0.046	U	2.79	2.56		mg/Kg	☼	92	60 - 123
1,2-Dichloropropane	0.046	U	2.79	2.81		mg/Kg	☼	101	72 - 124
Ethylbenzene	0.011	U	2.79	2.60		mg/Kg	☼	93	79 - 112
2-Hexanone	0.23	U	2.79	2.88		mg/Kg	☼	103	58 - 137
Methylene Chloride	0.23	U	2.79	2.80		mg/Kg	☼	100	67 - 126
methyl isobutyl ketone	0.23	U	2.79	2.87		mg/Kg	☼	103	58 - 135
Methyl tert-butyl ether	0.092	U	2.79	2.97		mg/Kg	☼	106	57 - 122
Styrene	0.046	U	2.79	2.91		mg/Kg	☼	104	77 - 115
1,1,2,2-Tetrachloroethane	0.046	U	2.79	2.89		mg/Kg	☼	104	73 - 119
Tetrachloroethene	0.046	U	2.79	2.55		mg/Kg	☼	91	76 - 112
Toluene	0.011	U	2.79	2.78		mg/Kg	☼	100	78 - 116
trans-1,2-Dichloroethene	0.046	U	2.79	2.88		mg/Kg	☼	103	70 - 119
trans-1,3-Dichloropropene	0.046	U	2.72	2.44		mg/Kg	☼	90	64 - 114
1,1,1-Trichloroethane	0.046	U	2.79	2.80		mg/Kg	☼	100	70 - 125
1,1,2-Trichloroethane	0.046	U	2.79	3.01		mg/Kg	☼	108	63 - 136
Trichloroethene	0.011	U	2.79	2.66		mg/Kg	☼	95	75 - 113
Vinyl chloride	0.011	U	2.79	3.20		mg/Kg	☼	115	58 - 136
Xylenes, Total	0.023	U	8.38	7.86		mg/Kg	☼	94	74 - 114

Surrogate	*MS % Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*103*		*77 - 112*
Dibromofluoromethane	*104*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*
Toluene-d8 (Surr)	*99*		*80 - 121*

Lab Sample ID: 500-40223-1 MSD | **Client Sample ID: 33-SB141-18**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 128908 | **Prep Batch: 127946**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	0.23	U	2.61	2.47		mg/Kg	☼	94	46 - 152	17	30
Benzene	0.011	U	2.61	2.46		mg/Kg	☼	94	74 - 112	8	30

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 500-40223-1 MSD — **Client Sample ID: 33-SB141-18**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 128908 — **Prep Batch: 127946**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Bromodichloromethane	0.092	U	2.61	2.72		mg/Kg	☼	104	73 - 122	9	30
Bromoform	0.092	U	2.61	2.33		mg/Kg	☼	89	62 - 119	12	30
Bromomethane	0.092	U	2.61	3.09		mg/Kg	☼	118	38 - 157	3	30
Methyl Ethyl Ketone	0.23	U	2.61	2.25		mg/Kg	☼	86	48 - 152	30	30
Carbon disulfide	0.23	U	2.61	2.03		mg/Kg	☼	78	38 - 112	6	30
Carbon tetrachloride	0.046	U	2.61	2.45		mg/Kg	☼	94	63 - 127	5	30
Chlorobenzene	0.046	U	2.61	2.51		mg/Kg	☼	96	80 - 110	8	30
Chloroethane	0.092	U	2.61	2.68		mg/Kg	☼	103	53 - 156	17	30
Chloroform	0.046	U	2.61	2.63		mg/Kg	☼	101	74 - 115	9	30
Chloromethane	0.092	U	2.61	2.79		mg/Kg	☼	107	44 - 148	12	30
cis-1,2-Dichloroethene	0.046	U	2.61	2.74		mg/Kg	☼	105	68 - 110	7	30
cis-1,3-Dichloropropene	0.046	U	2.81	2.81		mg/Kg	☼	100	65 - 116	7	30
Dibromochloromethane	0.092	U	2.61	2.36		mg/Kg	☼	90	66 - 123	10	30
1,1-Dichloroethane	0.046	U	2.61	2.54		mg/Kg	☼	97	69 - 118	8	30
1,2-Dichloroethane	0.046	U	2.61	2.56		mg/Kg	☼	98	66 - 120	10	30
1,1-Dichloroethene	0.046	U	2.61	2.38		mg/Kg	☼	91	60 - 123	8	30
1,2-Dichloropropane	0.046	U	2.61	2.64		mg/Kg	☼	101	72 - 124	6	30
Ethylbenzene	0.011	U	2.61	2.43		mg/Kg	☼	93	79 - 112	7	30
2-Hexanone	0.23	U	2.61	2.59		mg/Kg	☼	99	58 - 137	10	30
Methylene Chloride	0.23	U	2.61	2.64		mg/Kg	☼	101	67 - 126	6	30
methyl isobutyl ketone	0.23	U	2.61	2.62		mg/Kg	☼	100	58 - 135	9	30
Methyl tert-butyl ether	0.092	U	2.61	2.61		mg/Kg	☼	100	57 - 122	13	30
Styrene	0.046	U	2.61	2.65		mg/Kg	☼	102	77 - 115	9	30
1,1,2,2-Tetrachloroethane	0.046	U	2.61	2.74		mg/Kg	☼	105	73 - 119	5	30
Tetrachloroethene	0.046	U	2.61	2.29		mg/Kg	☼	88	76 - 112	11	30
Toluene	0.011	U	2.61	2.63		mg/Kg	☼	101	78 - 116	5	30
trans-1,2-Dichloroethene	0.046	U	2.61	2.63		mg/Kg	☼	101	70 - 119	9	30
trans-1,3-Dichloropropene	0.046	U	2.54	2.41		mg/Kg	☼	95	64 - 114	1	30
1,1,1-Trichloroethane	0.046	U	2.61	2.65		mg/Kg	☼	101	70 - 125	6	30
1,1,2-Trichloroethane	0.046	U	2.61	2.83		mg/Kg	☼	108	63 - 136	6	30
Trichloroethene	0.011	U	2.61	2.45		mg/Kg	☼	94	75 - 113	8	30
Vinyl chloride	0.011	U	2.61	2.86		mg/Kg	☼	110	58 - 136	11	30
Xylenes, Total	0.023	U	7.84	7.20		mg/Kg	☼	92	74 - 114	9	30

Surrogate	*MSD % Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*101*		*77 - 112*
Dibromofluoromethane	*102*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*101*		*77 - 124*
Toluene-d8 (Surr)	*100*		*80 - 121*

Lab Sample ID: MB 500-128674/4 — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 128674

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0025	mg/Kg			10/13/11 08:42	1
Bromomethane	0.0050	U	0.0050	0.0011	mg/Kg			10/13/11 08:42	1
Carbon disulfide	0.0050	U	0.0050	0.00071	mg/Kg			10/13/11 08:42	1
Chloroethane	0.0050	U	0.0050	0.0011	mg/Kg			10/13/11 08:42	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-128674/4
Matrix: Solid
Analysis Batch: 128674

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	0.0050	U	0.0050	0.00082	mg/Kg			10/13/11 08:42	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0011	mg/Kg			10/13/11 08:42	1
Chloroform	0.0050	U	0.0050	0.00092	mg/Kg			10/13/11 08:42	1
cis-1,2-Dichloroethene	0.0050	U	0.0050	0.00073	mg/Kg			10/13/11 08:42	1
Carbon tetrachloride	0.0050	U	0.0050	0.0011	mg/Kg			10/13/11 08:42	1
Benzene	0.0050	U	0.0050	0.00054	mg/Kg			10/13/11 08:42	1
1,1-Dichloroethane	0.0050	U	0.0050	0.00079	mg/Kg			10/13/11 08:42	1
1,1-Dichloroethene	0.0050	U	0.0050	0.00079	mg/Kg			10/13/11 08:42	1
Bromodichloromethane	0.0050	U	0.0050	0.00076	mg/Kg			10/13/11 08:42	1
1,2-Dichloropropane	0.0050	U	0.0050	0.0011	mg/Kg			10/13/11 08:42	1
cis-1,3-Dichloropropene	0.0050	U	0.0050	0.00057	mg/Kg			10/13/11 08:42	1
Methylene Chloride	0.0050	U	0.0050	0.0014	mg/Kg			10/13/11 08:42	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00085	mg/Kg			10/13/11 08:42	1
Methyl tert-butyl ether	0.0050	U	0.0050	0.00075	mg/Kg			10/13/11 08:42	1
2-Hexanone	0.0050	U	0.0050	0.00071	mg/Kg			10/13/11 08:42	1
Dibromochloromethane	0.0050	U	0.0050	0.00069	mg/Kg			10/13/11 08:42	1
Chlorobenzene	0.0050	U	0.0050	0.00079	mg/Kg			10/13/11 08:42	1
Ethylbenzene	0.0050	U	0.0050	0.00075	mg/Kg			10/13/11 08:42	1
Tetrachloroethene	0.0050	U	0.0050	0.00095	mg/Kg			10/13/11 08:42	1
Toluene	0.0050	U	0.0050	0.00097	mg/Kg			10/13/11 08:42	1
Styrene	0.0050	U	0.0050	0.00063	mg/Kg			10/13/11 08:42	1
trans-1,2-Dichloroethene	0.0050	U	0.0050	0.00071	mg/Kg			10/13/11 08:42	1
Bromoform	0.0050	U	0.0050	0.00081	mg/Kg			10/13/11 08:42	1
trans-1,3-Dichloropropene	0.0050	U	0.0050	0.0011	mg/Kg			10/13/11 08:42	1
1,1,1-Trichloroethane	0.0050	U	0.0050	0.00096	mg/Kg			10/13/11 08:42	1
1,1,2,2-Tetrachloroethane	0.0050	U	0.0050	0.00068	mg/Kg			10/13/11 08:42	1
1,1,2-Trichloroethane	0.0050	U	0.0050	0.00067	mg/Kg			10/13/11 08:42	1
Trichloroethene	0.0050	U	0.0050	0.00081	mg/Kg			10/13/11 08:42	1
Vinyl chloride	0.0050	U	0.0050	0.00070	mg/Kg			10/13/11 08:42	1
1,2-Dichloroethane	0.0050	U	0.0050	0.00051	mg/Kg			10/13/11 08:42	1
Xylenes, Total	0.010	U	0.010	0.00070	mg/Kg			10/13/11 08:42	1
1,3-Dichloropropene, Total	0.0050	U	0.0050	0.00057	mg/Kg			10/13/11 08:42	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*81*		*69 - 120*		*10/13/11 08:42*	*1*
Toluene-d8 (Surr)	*101*		*69 - 122*		*10/13/11 08:42*	*1*
4-Bromofluorobenzene (Surr)	*99*		*67 - 120*		*10/13/11 08:42*	*1*
Dibromofluoromethane	*107*		*69 - 120*		*10/13/11 08:42*	*1*

Lab Sample ID: LCS 500-128674/5
Matrix: Solid
Analysis Batch: 128674

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0333		mg/Kg		67	43 - 149
Bromomethane	0.0500	0.0611		mg/Kg		122	36 - 146
Carbon disulfide	0.0500	0.0412		mg/Kg		82	27 - 107
Chloroethane	0.0500	0.0643		mg/Kg		129	34 - 144
Chloromethane	0.0500	0.0345		mg/Kg		69	48 - 136

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-128674/5
Matrix: Solid
Analysis Batch: 128674

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Methyl Ethyl Ketone	0.0500	0.0371		mg/Kg		74	58 - 140
Chloroform	0.0500	0.0522		mg/Kg		104	70 - 112
cis-1,2-Dichloroethene	0.0500	0.0550		mg/Kg		110	62 - 111
Carbon tetrachloride	0.0500	0.0453		mg/Kg		91	64 - 116
Benzene	0.0500	0.0491		mg/Kg		98	74 - 112
1,1-Dichloroethane	0.0500	0.0439		mg/Kg		88	70 - 113
1,1-Dichloroethene	0.0500	0.0497		mg/Kg		99	60 - 128
Bromodichloromethane	0.0500	0.0472		mg/Kg		94	76 - 108
1,2-Dichloropropane	0.0500	0.0425		mg/Kg		85	77 - 116
cis-1,3-Dichloropropene	0.0538	0.0467		mg/Kg		87	68 - 103
Methylene Chloride	0.0500	0.0526		mg/Kg		105	49 - 125
methyl isobutyl ketone	0.0500	0.0320	*	mg/Kg		64	65 - 127
Methyl tert-butyl ether	0.0500	0.0464		mg/Kg		93	55 - 116
2-Hexanone	0.0500	0.0318		mg/Kg		64	58 - 138
Dibromochloromethane	0.0500	0.0513		mg/Kg		103	76 - 110
Chlorobenzene	0.0500	0.0551		mg/Kg		110	80 - 110
Ethylbenzene	0.0500	0.0514		mg/Kg		103	78 - 112
Tetrachloroethene	0.0500	0.0481		mg/Kg		96	76 - 114
Toluene	0.0500	0.0505		mg/Kg		101	77 - 113
Styrene	0.0500	0.0520		mg/Kg		104	78 - 109
trans-1,2-Dichloroethene	0.0500	0.0544		mg/Kg		109	62 - 119
Bromoform	0.0500	0.0491		mg/Kg		98	66 - 115
trans-1,3-Dichloropropene	0.0486	0.0414		mg/Kg		85	63 - 107
1,1,1-Trichloroethane	0.0500	0.0535		mg/Kg		107	67 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0534		mg/Kg		107	73 - 114
1,1,2-Trichloroethane	0.0500	0.0518		mg/Kg		104	69 - 118
Trichloroethene	0.0500	0.0508		mg/Kg		102	76 - 111
Vinyl chloride	0.0500	0.0431		mg/Kg		86	44 - 130
1,2-Dichloroethane	0.0500	0.0410		mg/Kg		82	74 - 114
Xylenes, Total	0.150	0.157		mg/Kg		104	77 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*80*		*69 - 120*
Toluene-d8 (Surr)	*104*		*69 - 122*
4-Bromofluorobenzene (Surr)	*101*		*67 - 120*
Dibromofluoromethane	*106*		*69 - 120*

Lab Sample ID: MB 500-128908/33
Matrix: Water
Analysis Batch: 128908

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/14/11 15:43	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/14/11 15:43	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/14/11 15:43	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/14/11 15:43	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/14/11 15:43	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/14/11 15:43	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/14/11 15:43	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-128908/33
Matrix: Water
Analysis Batch: 128908

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/14/11 15:43	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/14/11 15:43	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/14/11 15:43	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/14/11 15:43	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/14/11 15:43	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/14/11 15:43	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/14/11 15:43	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/14/11 15:43	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/14/11 15:43	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/14/11 15:43	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/14/11 15:43	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/14/11 15:43	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/14/11 15:43	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/14/11 15:43	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/14/11 15:43	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/14/11 15:43	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/14/11 15:43	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/14/11 15:43	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/14/11 15:43	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/14/11 15:43	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/14/11 15:43	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/14/11 15:43	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/14/11 15:43	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/14/11 15:43	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/14/11 15:43	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/14/11 15:43	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/14/11 15:43	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/14/11 15:43	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/14/11 15:43	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*		*10/14/11 15:43*	*1*
Toluene-d8 (Surr)	*99*		*80 - 121*		*10/14/11 15:43*	*1*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/14/11 15:43*	*1*
Dibromofluoromethane	*94*		*78 - 119*		*10/14/11 15:43*	*1*

Lab Sample ID: LCS 500-128908/5
Matrix: Solid
Analysis Batch: 128908

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0442		mg/L		88	43 - 153
Bromomethane	0.0500	0.0562		mg/L		112	46 - 155
Carbon disulfide	0.0500	0.0375		mg/L		75	36 - 110
Chloroethane	0.0500	0.0504		mg/L		101	54 - 149
Chloromethane	0.0500	0.0496		mg/L		99	36 - 148
Methyl Ethyl Ketone	0.0500	0.0417		mg/L		83	42 - 152
Chloroform	0.0500	0.0463		mg/L		93	71 - 116
cis-1,2-Dichloroethene	0.0500	0.0478		mg/L		96	66 - 111

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-128908/5
Matrix: Solid
Analysis Batch: 128908

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Carbon tetrachloride	0.0500	0.0443		mg/L		89	58 - 132
Benzene	0.0500	0.0453		mg/L		91	74 - 113
1,1-Dichloroethane	0.0500	0.0451		mg/L		90	64 - 117
1,1-Dichloroethene	0.0500	0.0419		mg/L		84	60 - 126
Bromodichloromethane	0.0500	0.0491		mg/L		98	73 - 120
1,2-Dichloropropane	0.0500	0.0477		mg/L		95	68 - 123
cis-1,3-Dichloropropene	0.0538	0.0517		mg/L		96	65 - 114
Methylene Chloride	0.0500	0.0477		mg/L		95	65 - 125
methyl isobutyl ketone	0.0500	0.0477		mg/L		95	56 - 138
Methyl tert-butyl ether	0.0500	0.0487		mg/L		97	57 - 119
2-Hexanone	0.0500	0.0481		mg/L		96	55 - 138
Dibromochloromethane	0.0500	0.0431		mg/L		86	73 - 118
Chlorobenzene	0.0500	0.0469		mg/L		94	81 - 111
Ethylbenzene	0.0500	0.0461		mg/L		92	79 - 114
Tetrachloroethene	0.0500	0.0441		mg/L		88	76 - 114
Toluene	0.0500	0.0477		mg/L		95	76 - 121
Styrene	0.0500	0.0483		mg/L		97	76 - 118
trans-1,2-Dichloroethene	0.0500	0.0470		mg/L		94	67 - 120
Bromoform	0.0500	0.0409		mg/L		82	64 - 126
trans-1,3-Dichloropropene	0.0486	0.0424		mg/L		87	60 - 119
1,1,1-Trichloroethane	0.0500	0.0476		mg/L		95	66 - 128
1,1,2,2-Tetrachloroethane	0.0500	0.0516		mg/L		103	66 - 121
1,1,2-Trichloroethane	0.0500	0.0485		mg/L		97	62 - 137
Trichloroethene	0.0500	0.0453		mg/L		91	75 - 116
Vinyl chloride	0.0500	0.0520		mg/L		104	47 - 138
1,2-Dichloroethane	0.0500	0.0471		mg/L		94	69 - 115
Xylenes, Total	0.150	0.136		mg/L		91	74 - 117

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*
Toluene-d8 (Surr)	*100*		*80 - 121*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*
Dibromofluoromethane	*98*		*78 - 119*

Lab Sample ID: MB 500-128909/33
Matrix: Water
Analysis Batch: 128909

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/14/11 15:43	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/14/11 15:43	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/14/11 15:43	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/14/11 15:43	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/14/11 15:43	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/14/11 15:43	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/14/11 15:43	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/14/11 15:43	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/14/11 15:43	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/14/11 15:43	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-128909/33
Matrix: Water
Analysis Batch: 128909

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/14/11 15:43	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/14/11 15:43	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/14/11 15:43	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/14/11 15:43	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/14/11 15:43	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/14/11 15:43	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/14/11 15:43	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/14/11 15:43	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/14/11 15:43	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/14/11 15:43	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/14/11 15:43	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/14/11 15:43	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/14/11 15:43	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/14/11 15:43	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/14/11 15:43	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/14/11 15:43	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/14/11 15:43	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/14/11 15:43	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/14/11 15:43	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/14/11 15:43	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/14/11 15:43	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/14/11 15:43	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/14/11 15:43	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/14/11 15:43	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/14/11 15:43	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/14/11 15:43	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*		*10/14/11 15:43*	*1*
Toluene-d8 (Surr)	*99*		*80 - 121*		*10/14/11 15:43*	*1*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/14/11 15:43*	*1*
Dibromofluoromethane	*94*		*78 - 119*		*10/14/11 15:43*	*1*

Lab Sample ID: LCS 500-128909/5
Matrix: Water
Analysis Batch: 128909

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0442		mg/L		88	43 - 153
Bromomethane	0.0500	0.0568		mg/L		114	46 - 155
Carbon disulfide	0.0500	0.0375		mg/L		75	36 - 110
Chloroethane	0.0500	0.0504		mg/L		101	54 - 149
Chloromethane	0.0500	0.0496		mg/L		99	36 - 148
Methyl Ethyl Ketone	0.0500	0.0417		mg/L		83	42 - 152
Chloroform	0.0500	0.0463		mg/L		93	71 - 116
cis-1,2-Dichloroethene	0.0500	0.0478		mg/L		96	66 - 111
Carbon tetrachloride	0.0500	0.0443		mg/L		89	58 - 132
Benzene	0.0500	0.0453		mg/L		91	74 - 113
1,1-Dichloroethane	0.0500	0.0451		mg/L		90	64 - 117

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-128909/5
Matrix: Water
Analysis Batch: 128909

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
1,1-Dichloroethene	0.0500	0.0419		mg/L		84	60 - 126
Bromodichloromethane	0.0500	0.0491		mg/L		98	73 - 120
1,2-Dichloropropane	0.0500	0.0477		mg/L		95	68 - 123
cis-1,3-Dichloropropene	0.0538	0.0517		mg/L		96	65 - 114
Methylene Chloride	0.0500	0.0477		mg/L		95	65 - 125
methyl isobutyl ketone	0.0500	0.0477		mg/L		95	56 - 138
Methyl tert-butyl ether	0.0500	0.0487		mg/L		97	57 - 119
2-Hexanone	0.0500	0.0481		mg/L		96	55 - 138
Dibromochloromethane	0.0500	0.0431		mg/L		86	73 - 118
Chlorobenzene	0.0500	0.0469		mg/L		94	81 - 111
Ethylbenzene	0.0500	0.0461		mg/L		92	79 - 114
Tetrachloroethene	0.0500	0.0441		mg/L		88	76 - 114
Toluene	0.0500	0.0469		mg/L		94	76 - 121
Styrene	0.0500	0.0483		mg/L		97	76 - 118
trans-1,2-Dichloroethene	0.0500	0.0470		mg/L		94	67 - 120
Bromoform	0.0500	0.0409		mg/L		82	64 - 126
trans-1,3-Dichloropropene	0.0486	0.0424		mg/L		87	60 - 119
1,1,1-Trichloroethane	0.0500	0.0476		mg/L		95	66 - 128
1,1,2,2-Tetrachloroethane	0.0500	0.0516		mg/L		103	66 - 121
1,1,2-Trichloroethane	0.0500	0.0485		mg/L		97	62 - 137
Trichloroethene	0.0500	0.0453		mg/L		91	75 - 116
Vinyl chloride	0.0500	0.0520		mg/L		104	47 - 138
1,2-Dichloroethane	0.0500	0.0471		mg/L		94	69 - 115
Xylenes, Total	0.150	0.136		mg/L		91	74 - 117

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*
Toluene-d8 (Surr)	*100*		*80 - 121*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*
Dibromofluoromethane	*98*		*78 - 119*

Lab Sample ID: MB 500-129181/5
Matrix: Solid
Analysis Batch: 129181

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			10/17/11 21:42	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			10/17/11 21:42	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			10/17/11 21:42	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			10/17/11 21:42	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			10/17/11 21:42	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			10/17/11 21:42	1
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			10/17/11 21:42	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/17/11 21:42	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			10/17/11 21:42	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			10/17/11 21:42	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			10/17/11 21:42	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			10/17/11 21:42	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			10/17/11 21:42	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-129181/5
Matrix: Solid
Analysis Batch: 129181

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			10/17/11 21:42	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			10/17/11 21:42	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/Kg			10/17/11 21:42	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			10/17/11 21:42	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			10/17/11 21:42	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			10/17/11 21:42	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			10/17/11 21:42	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			10/17/11 21:42	1
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			10/17/11 21:42	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/17/11 21:42	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			10/17/11 21:42	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			10/17/11 21:42	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			10/17/11 21:42	1
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			10/17/11 21:42	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			10/17/11 21:42	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			10/17/11 21:42	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			10/17/11 21:42	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			10/17/11 21:42	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			10/17/11 21:42	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			10/17/11 21:42	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			10/17/11 21:42	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			10/17/11 21:42	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			10/17/11 21:42	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*103*		*77 - 124*		*10/17/11 21:42*	*1*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/17/11 21:42*	*1*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/17/11 21:42*	*1*
Dibromofluoromethane	*100*		*78 - 119*		*10/17/11 21:42*	*1*

Lab Sample ID: LCS 500-129181/6
Matrix: Solid
Analysis Batch: 129181

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0437		mg/Kg		87	46 - 152
Bromomethane	0.0500	0.0469		mg/Kg		94	38 - 157
Carbon disulfide	0.0500	0.0318		mg/Kg		64	38 - 112
Chloroethane	0.0500	0.0501		mg/Kg		100	53 - 156
Chloromethane	0.0500	0.0390		mg/Kg		78	44 - 148
Methyl Ethyl Ketone	0.0500	0.0457		mg/Kg		91	48 - 152
Chloroform	0.0500	0.0478		mg/Kg		96	74 - 115
cis-1,2-Dichloroethene	0.0500	0.0484		mg/Kg		97	68 - 110
Carbon tetrachloride	0.0500	0.0412		mg/Kg		82	63 - 127
Benzene	0.0500	0.0439		mg/Kg		88	74 - 112
1,1-Dichloroethane	0.0500	0.0448		mg/Kg		90	69 - 118
1,1-Dichloroethene	0.0500	0.0395		mg/Kg		79	60 - 123
Bromodichloromethane	0.0500	0.0479		mg/Kg		96	73 - 122
1,2-Dichloropropane	0.0500	0.0469		mg/Kg		94	72 - 124

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-129181/6
Matrix: Solid
Analysis Batch: 129181

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
cis-1,3-Dichloropropene	0.0538	0.0485		mg/Kg		90	65 - 116
Methylene Chloride	0.0500	0.0484		mg/Kg		97	67 - 126
methyl isobutyl ketone	0.0500	0.0462		mg/Kg		92	58 - 135
Methyl tert-butyl ether	0.0500	0.0486		mg/Kg		97	57 - 122
2-Hexanone	0.0500	0.0461		mg/Kg		92	58 - 137
Dibromochloromethane	0.0500	0.0428		mg/Kg		86	66 - 123
Chlorobenzene	0.0500	0.0453		mg/Kg		91	80 - 110
Ethylbenzene	0.0500	0.0438		mg/Kg		88	79 - 112
Tetrachloroethene	0.0500	0.0420		mg/Kg		84	76 - 112
Toluene	0.0500	0.0449		mg/Kg		90	78 - 116
Styrene	0.0500	0.0465		mg/Kg		93	77 - 115
trans-1,2-Dichloroethene	0.0500	0.0459		mg/Kg		92	70 - 119
Bromoform	0.0500	0.0413		mg/Kg		83	62 - 119
trans-1,3-Dichloropropene	0.0486	0.0394		mg/Kg		81	64 - 114
1,1,1-Trichloroethane	0.0500	0.0457		mg/Kg		91	70 - 125
1,1,2,2-Tetrachloroethane	0.0500	0.0509		mg/Kg		102	73 - 119
1,1,2-Trichloroethane	0.0500	0.0492		mg/Kg		98	63 - 136
Trichloroethene	0.0500	0.0436		mg/Kg		87	75 - 113
Vinyl chloride	0.0500	0.0436		mg/Kg		87	58 - 136
1,2-Dichloroethane	0.0500	0.0452		mg/Kg		90	66 - 120
Xylenes, Total	0.150	0.131		mg/Kg		87	74 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*
Toluene-d8 (Surr)	*97*		*80 - 121*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*
Dibromofluoromethane	*102*		*78 - 119*

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40223-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40223
Chain of Custody Number:
Page ____ of ____
Temperature °C of Cooler: 2.8

Client: CH2M HILL
Client Project #:
Project Name: COWR Plume 2
Project Location/State: Marion, IL
Lab Project #:
Sampler: Jason Burkard/Carrie Wallestad
Lab PM: Jim Knapp

Preservative: (7) ice; DI H2O; methanol; sodium bisulfate; HCl
Parameter: % Soil Moisture; VOCs; VOCs; VOCs; VOCs

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	% Soil Moisture	VOCs	VOCs	VOCs	VOCs					Comments
1	✓	33-SB141-18	10/4/11	1050	15	SO	3	6	3	3						
2		33-SB142-41	10/4/11	1050	5	SO	1	2	1	1						
3		33-SB142-35	10/4/11	1041	5	SO	1	2	1	1						
4		33-SB135-9	10/4/11	1700	5	SO	1	1	2	1						*HOLD*
5		33-SB135-27	10/4/11	1708	5	SO	1	2	1	1						*HOLD*
6		33-SB140-26	10/4/11	1653	5	SO	1	2	1	1						
7		33-SB140-18	10/4/11	1647	5	SO	1	2	1	1						
8		TB-001-10042011	10/4/11	0740	2	W					1					

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days Prelim 10 Days Final ~~15~~ 14 Days _____ Other
Requested Due Date _____

Sample Disposal
☐ Return to Client ☑ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Carrie Wallestad	CH2M	10/4/11	1830	FedEx			
				[signature]	TA	10/5/11	1030

Lab Courier:
Shipped: FX
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SF – Sediment
SO – Soil
L – Leachate
Wi – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TA-IL-SOP-006 (12/08)

Knapp, Jim

From: Shannon.Olson@CH2M.com
Sent: Thursday, October 06, 2011 11:02 AM
To: Ingersoll, Donna
Subject: Crab Orchard Sampling
Attachments: coc_1004.pdf

Donna,
There were two samples that were placed on hold. Could you please analyze sample 33-SB135-27? You can dispose sample 33-SB135-9. Thanks!

Shannon Olson
Environmental Chemist
135 S. 84th St. Suite 400
Milwaukee, WI 53214
Tel (414) 847-0227
Mobile (262) 388-3899
Fax (414) 454-8786
www.ch2mhill.com

Solutions Without Boundaries

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-40223-1

Login Number: 40223
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	2.8
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

TestAmerica

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-40292-1
Client Project/Site: Crab Orchard Wildlife Refuge #2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/20/2011 03:53:55 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 6
Sample Summary 7
Client Sample Results 8
Definitions 22
QC Association 23
Surrogate Summary 25
QC Sample Results 26
Certification Summary 32
Chain of Custody 33
Receipt Checklists 35

Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Job ID: 500-40292-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-40292-1

Comments
No additional comments.

Receipt
Client requested that samples 33-SB137-04 & 33-SB137-20 be placed on hold until further notice.

All other samples were received in good condition within temperature requirements.

GC/MS VOA
No analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Client Sample ID: 33-SB144-11 — Lab Sample ID: 500-40292-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.31		0.046	0.010	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene	8.2		0.011	0.0069	mg/Kg	50	☼	8260B	Total/NA

Client Sample ID: 33-SB149-27 — Lab Sample ID: 500-40292-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Toluene	0.29		0.048	0.029	mg/Kg	200	☼	8260B	Total/NA
1,1,2-Trichloroethane	0.13	J	0.19	0.058	mg/Kg	200	☼	8260B	Total/NA
Xylenes, Total	0.16		0.096	0.025	mg/Kg	200	☼	8260B	Total/NA
Trichloroethene - DL	270		0.48	0.29	mg/Kg	2000	☼	8260B	Total/NA

Client Sample ID: 33-FDUP-003 — Lab Sample ID: 500-40292-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.31		0.049	0.011	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene	8.1		0.012	0.0074	mg/Kg	50	☼	8260B	Total/NA

Client Sample ID: 33-SB144-33 — Lab Sample ID: 500-40292-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Ethylbenzene	0.061		0.024	0.013	mg/Kg	100	☼	8260B	Total/NA
Tetrachloroethene	0.036	J	0.095	0.021	mg/Kg	100	☼	8260B	Total/NA
Toluene	0.089		0.024	0.014	mg/Kg	100	☼	8260B	Total/NA
Xylenes, Total	0.31		0.048	0.012	mg/Kg	100	☼	8260B	Total/NA
Trichloroethene - DL	97		0.24	0.14	mg/Kg	1000	☼	8260B	Total/NA

Client Sample ID: 33-SB148-28 — Lab Sample ID: 500-40292-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	2.6		0.045	0.010	mg/Kg	50	☼	8260B	Total/NA
Vinyl chloride	0.041		0.011	0.0056	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	14		0.11	0.067	mg/Kg	500	☼	8260B	Total/NA

Client Sample ID: 33-SB146-15 — Lab Sample ID: 500-40292-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	1.5		0.047	0.011	mg/Kg	50	☼	8260B	Total/NA
Vinyl chloride	0.024		0.012	0.0059	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	40		0.12	0.071	mg/Kg	500	☼	8260B	Total/NA

Client Sample ID: FB-001-100511 — Lab Sample ID: 500-40292-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloroform	0.0015		0.0010	0.00025	mg/L	1		8260B	Total/NA

Client Sample ID: TB-001-100511 — Lab Sample ID: 500-40292-8

No Detections

Client Sample ID: 33-SB137-31 — Lab Sample ID: 500-40292-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	1.3		0.046	0.010	mg/Kg	50	☼	8260B	Total/NA
Vinyl chloride	0.029		0.011	0.0057	mg/Kg	50	☼	8260B	Total/NA

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Client Sample ID: 33-SB137-31 (Continued) — Lab Sample ID: 500-40292-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Trichloroethene - DL	46		0.11	0.069	mg/Kg	500	☼	8260B	Total/NA

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-40292-1	33-SB144-11	Solid	10/05/11 09:55	10/06/11 10:30
500-40292-2	33-SB149-27	Solid	10/05/11 10:00	10/06/11 10:30
500-40292-3	33-FDUP-003	Solid	10/05/11 10:00	10/06/11 10:30
500-40292-4	33-SB144-33	Solid	10/05/11 10:10	10/06/11 10:30
500-40292-5	33-SB148-28	Solid	10/05/11 12:25	10/06/11 10:30
500-40292-6	33-SB146-15	Solid	10/05/11 12:45	10/06/11 10:30
500-40292-7	FB-001-100511	Water	10/05/11 09:00	10/06/11 10:30
500-40292-8	TB-001-100511	Water	10/05/11 00:00	10/06/11 10:30
500-40292-9	33-SB137-31	Solid	10/05/11 15:45	10/06/11 10:30

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Client Sample ID: 33-SB144-11
Date Collected: 10/05/11 09:55
Date Received: 10/06/11 10:30

Lab Sample ID: 500-40292-1
Matrix: Solid
Percent Solids: 82.3

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.23	U	0.23	0.088	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Benzene	0.011	U	0.011	0.0037	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Bromodichloromethane	0.092	U	0.092	0.013	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Bromoform	0.092	U	0.092	0.026	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Bromomethane	0.092	U	0.092	0.039	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Methyl Ethyl Ketone	0.23	U	0.23	0.048	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Carbon disulfide	0.23	U	0.23	0.020	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Carbon tetrachloride	0.046	U	0.046	0.013	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Chlorobenzene	0.046	U	0.046	0.011	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Chloroethane	0.092	U	0.092	0.023	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Chloroform	0.046	U	0.046	0.011	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Chloromethane	0.092	U	0.092	0.023	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
cis-1,2-Dichloroethene	**0.31**		0.046	0.010	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
cis-1,3-Dichloropropene	0.046	U	0.046	0.013	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Dibromochloromethane	0.092	U	0.092	0.017	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
1,1-Dichloroethane	0.046	U	0.046	0.011	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
1,2-Dichloroethane	0.046	U	0.046	0.013	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
1,1-Dichloroethene	0.046	U	0.046	0.013	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
1,2-Dichloropropane	0.046	U	0.046	0.016	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Ethylbenzene	0.011	U	0.011	0.0064	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
2-Hexanone	0.23	U	0.23	0.026	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Methylene Chloride	0.23	U	0.23	0.029	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
methyl isobutyl ketone	0.23	U	0.23	0.036	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Methyl tert-butyl ether	0.092	U	0.092	0.022	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Styrene	0.046	U	0.046	0.012	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
1,1,2,2-Tetrachloroethane	0.046	U	0.046	0.016	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Tetrachloroethene	0.046	U	0.046	0.0099	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Toluene	0.011	U	0.011	0.0069	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
trans-1,2-Dichloroethene	0.046	U	0.046	0.012	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
trans-1,3-Dichloropropene	0.046	U	0.046	0.016	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
1,1,1-Trichloroethane	0.046	U	0.046	0.012	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
1,1,2-Trichloroethane	0.046	U	0.046	0.014	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Trichloroethene	**8.2**		0.011	0.0069	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Vinyl chloride	0.011	U	0.011	0.0058	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
Xylenes, Total	0.023	U	0.023	0.0059	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50
1,3-Dichloropropene, Total	0.046	U	0.046	0.013	mg/Kg	☼	10/05/11 09:55	10/15/11 06:53	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*95*		*77 - 112*	*10/05/11 09:55*	*10/15/11 06:53*	*50*
Dibromofluoromethane	*106*		*78 - 119*	*10/05/11 09:55*	*10/15/11 06:53*	*50*
1,2-Dichloroethane-d4 (Surr)	*112*		*77 - 124*	*10/05/11 09:55*	*10/15/11 06:53*	*50*
Toluene-d8 (Surr)	*106*		*80 - 121*	*10/05/11 09:55*	*10/15/11 06:53*	*50*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Client Sample ID: 33-SB149-27
Date Collected: 10/05/11 10:00
Date Received: 10/06/11 10:30

Lab Sample ID: 500-40292-2
Matrix: Solid
Percent Solids: 80.0

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.96	U	0.96	0.37	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Benzene	0.048	U	0.048	0.015	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Bromodichloromethane	0.38	U	0.38	0.053	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Bromoform	0.38	U	0.38	0.11	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Bromomethane	0.38	U	0.38	0.16	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Methyl Ethyl Ketone	0.96	U	0.96	0.20	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Carbon disulfide	0.96	U	0.96	0.084	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Carbon tetrachloride	0.19	U	0.19	0.054	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Chlorobenzene	0.19	U	0.19	0.046	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Chloroethane	0.38	U	0.38	0.095	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Chloroform	0.19	U	0.19	0.048	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Chloromethane	0.38	U	0.38	0.095	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
cis-1,2-Dichloroethene	0.19	U	0.19	0.043	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
cis-1,3-Dichloropropene	0.19	U	0.19	0.053	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Dibromochloromethane	0.38	U	0.38	0.072	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
1,1-Dichloroethane	0.19	U	0.19	0.047	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
1,2-Dichloroethane	0.19	U	0.19	0.054	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
1,1-Dichloroethene	0.19	U	0.19	0.056	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
1,2-Dichloropropane	0.19	U	0.19	0.068	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Ethylbenzene	0.048	U	0.048	0.027	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
2-Hexanone	0.96	U	0.96	0.11	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Methylene Chloride	0.96	U	0.96	0.12	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
methyl isobutyl ketone	0.96	U	0.96	0.15	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Methyl tert-butyl ether	0.38	U	0.38	0.092	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Styrene	0.19	U	0.19	0.050	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
1,1,2,2-Tetrachloroethane	0.19	U	0.19	0.067	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Tetrachloroethene	0.19	U	0.19	0.042	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Toluene	**0.29**		0.048	0.029	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
trans-1,2-Dichloroethene	0.19	U	0.19	0.052	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
trans-1,3-Dichloropropene	0.19	U	0.19	0.067	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
1,1,1-Trichloroethane	0.19	U	0.19	0.050	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
1,1,2-Trichloroethane	**0.13**	**J**	0.19	0.058	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Vinyl chloride	0.048	U	0.048	0.024	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
Xylenes, Total	**0.16**		0.096	0.025	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200
1,3-Dichloropropene, Total	0.19	U	0.19	0.053	mg/Kg	☼	10/05/11 10:00	10/15/11 07:18	200

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*	*10/05/11 10:00*	*10/15/11 07:18*	*200*
Dibromofluoromethane	*108*		*78 - 119*	*10/05/11 10:00*	*10/15/11 07:18*	*200*
1,2-Dichloroethane-d4 (Surr)	*115*		*77 - 124*	*10/05/11 10:00*	*10/15/11 07:18*	*200*
Toluene-d8 (Surr)	*107*		*80 - 121*	*10/05/11 10:00*	*10/15/11 07:18*	*200*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**270**		0.48	0.29	mg/Kg	☼	10/05/11 10:00	10/15/11 07:42	2000

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*101*		*77 - 112*	*10/05/11 10:00*	*10/15/11 07:42*	*2000*
Dibromofluoromethane	*114*		*78 - 119*	*10/05/11 10:00*	*10/15/11 07:42*	*2000*
1,2-Dichloroethane-d4 (Surr)	*117*		*77 - 124*	*10/05/11 10:00*	*10/15/11 07:42*	*2000*
Toluene-d8 (Surr)	*108*		*80 - 121*	*10/05/11 10:00*	*10/15/11 07:42*	*2000*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Client Sample ID: 33-FDUP-003
Date Collected: 10/05/11 10:00
Date Received: 10/06/11 10:30

Lab Sample ID: 500-40292-3
Matrix: Solid
Percent Solids: 82.6

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.25	U	0.25	0.094	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Benzene	0.012	U	0.012	0.0039	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Bromodichloromethane	0.098	U	0.098	0.014	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Bromoform	0.098	U	0.098	0.028	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Bromomethane	0.098	U	0.098	0.042	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Methyl Ethyl Ketone	0.25	U	0.25	0.051	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Carbon disulfide	0.25	U	0.25	0.022	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Carbon tetrachloride	0.049	U	0.049	0.014	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Chlorobenzene	0.049	U	0.049	0.012	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Chloroethane	0.098	U	0.098	0.024	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Chloroform	0.049	U	0.049	0.012	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Chloromethane	0.098	U	0.098	0.024	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
cis-1,2-Dichloroethene	**0.31**		0.049	0.011	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
cis-1,3-Dichloropropene	0.049	U	0.049	0.014	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Dibromochloromethane	0.098	U	0.098	0.019	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
1,1-Dichloroethane	0.049	U	0.049	0.012	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
1,2-Dichloroethane	0.049	U	0.049	0.014	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
1,1-Dichloroethene	0.049	U	0.049	0.014	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
1,2-Dichloropropane	0.049	U	0.049	0.018	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Ethylbenzene	0.012	U	0.012	0.0069	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
2-Hexanone	0.25	U	0.25	0.027	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Methylene Chloride	0.25	U	0.25	0.031	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
methyl isobutyl ketone	0.25	U	0.25	0.039	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Methyl tert-butyl ether	0.098	U	0.098	0.024	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Styrene	0.049	U	0.049	0.013	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
1,1,2,2-Tetrachloroethane	0.049	U	0.049	0.017	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Tetrachloroethene	0.049	U	0.049	0.011	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Toluene	0.012	U	0.012	0.0074	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
trans-1,2-Dichloroethene	0.049	U	0.049	0.013	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
trans-1,3-Dichloropropene	0.049	U	0.049	0.017	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
1,1,1-Trichloroethane	0.049	U	0.049	0.013	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
1,1,2-Trichloroethane	0.049	U	0.049	0.015	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Trichloroethene	**8.1**		0.012	0.0074	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Vinyl chloride	0.012	U	0.012	0.0062	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
Xylenes, Total	0.025	U	0.025	0.0063	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50
1,3-Dichloropropene, Total	0.049	U	0.049	0.014	mg/Kg	☼	10/05/11 10:00	10/15/11 08:06	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*	*10/05/11 10:00*	*10/15/11 08:06*	*50*
Dibromofluoromethane	*108*		*78 - 119*	*10/05/11 10:00*	*10/15/11 08:06*	*50*
1,2-Dichloroethane-d4 (Surr)	*115*		*77 - 124*	*10/05/11 10:00*	*10/15/11 08:06*	*50*
Toluene-d8 (Surr)	*109*		*80 - 121*	*10/05/11 10:00*	*10/15/11 08:06*	*50*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Client Sample ID: 33-SB144-33
Date Collected: 10/05/11 10:10
Date Received: 10/06/11 10:30

Lab Sample ID: 500-40292-4
Matrix: Solid
Percent Solids: 83.2

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.48	U	0.48	0.18	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Benzene	0.024	U	0.024	0.0076	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Bromodichloromethane	0.19	U	0.19	0.026	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Bromoform	0.19	U	0.19	0.054	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Bromomethane	0.19	U	0.19	0.082	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Methyl Ethyl Ketone	0.48	U	0.48	0.099	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Carbon disulfide	0.48	U	0.48	0.042	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Carbon tetrachloride	0.095	U	0.095	0.027	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Chlorobenzene	0.095	U	0.095	0.023	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Chloroethane	0.19	U	0.19	0.047	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Chloroform	0.095	U	0.095	0.024	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Chloromethane	0.19	U	0.19	0.047	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
cis-1,2-Dichloroethene	0.095	U	0.095	0.021	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
cis-1,3-Dichloropropene	0.095	U	0.095	0.027	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Dibromochloromethane	0.19	U	0.19	0.036	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
1,1-Dichloroethane	0.095	U	0.095	0.023	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
1,2-Dichloroethane	0.095	U	0.095	0.027	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
1,1-Dichloroethene	0.095	U	0.095	0.028	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
1,2-Dichloropropane	0.095	U	0.095	0.034	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Ethylbenzene	**0.061**		0.024	0.013	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
2-Hexanone	0.48	U	0.48	0.053	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Methylene Chloride	0.48	U	0.48	0.060	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
methyl isobutyl ketone	0.48	U	0.48	0.075	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Methyl tert-butyl ether	0.19	U	0.19	0.046	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Styrene	0.095	U	0.095	0.025	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
1,1,2,2-Tetrachloroethane	0.095	U	0.095	0.034	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Tetrachloroethene	**0.036**	**J**	0.095	0.021	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Toluene	**0.089**		0.024	0.014	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
trans-1,2-Dichloroethene	0.095	U	0.095	0.026	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
trans-1,3-Dichloropropene	0.095	U	0.095	0.034	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
1,1,1-Trichloroethane	0.095	U	0.095	0.025	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
1,1,2-Trichloroethane	0.095	U	0.095	0.029	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Vinyl chloride	0.024	U	0.024	0.012	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
Xylenes, Total	**0.31**		0.048	0.012	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100
1,3-Dichloropropene, Total	0.095	U	0.095	0.027	mg/Kg	☼	10/05/11 10:10	10/15/11 08:30	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*	*10/05/11 10:10*	*10/15/11 08:30*	*100*
Dibromofluoromethane	*110*		*78 - 119*	*10/05/11 10:10*	*10/15/11 08:30*	*100*
1,2-Dichloroethane-d4 (Surr)	*112*		*77 - 124*	*10/05/11 10:10*	*10/15/11 08:30*	*100*
Toluene-d8 (Surr)	*105*		*80 - 121*	*10/05/11 10:10*	*10/15/11 08:30*	*100*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**97**		0.24	0.14	mg/Kg	☼	10/05/11 10:10	10/15/11 08:54	1000

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*	*10/05/11 10:10*	*10/15/11 08:54*	*1000*
Dibromofluoromethane	*116*		*78 - 119*	*10/05/11 10:10*	*10/15/11 08:54*	*1000*
1,2-Dichloroethane-d4 (Surr)	*117*		*77 - 124*	*10/05/11 10:10*	*10/15/11 08:54*	*1000*
Toluene-d8 (Surr)	*110*		*80 - 121*	*10/05/11 10:10*	*10/15/11 08:54*	*1000*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Client Sample ID: 33-SB148-28
Date Collected: 10/05/11 12:25
Date Received: 10/06/11 10:30

Lab Sample ID: 500-40292-5
Matrix: Solid
Percent Solids: 83.8

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.22	U	0.22	0.085	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Benzene	0.011	U	0.011	0.0036	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Bromodichloromethane	0.089	U	0.089	0.012	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Bromoform	0.089	U	0.089	0.025	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Bromomethane	0.089	U	0.089	0.038	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Methyl Ethyl Ketone	0.22	U	0.22	0.046	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Carbon disulfide	0.22	U	0.22	0.020	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Carbon tetrachloride	0.045	U	0.045	0.013	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Chlorobenzene	0.045	U	0.045	0.011	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Chloroethane	0.089	U	0.089	0.022	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Chloroform	0.045	U	0.045	0.011	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Chloromethane	0.089	U	0.089	0.022	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
cis-1,2-Dichloroethene	**2.6**		0.045	0.010	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
cis-1,3-Dichloropropene	0.045	U	0.045	0.012	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Dibromochloromethane	0.089	U	0.089	0.017	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
1,1-Dichloroethane	0.045	U	0.045	0.011	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
1,2-Dichloroethane	0.045	U	0.045	0.013	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
1,1-Dichloroethene	0.045	U	0.045	0.013	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
1,2-Dichloropropane	0.045	U	0.045	0.016	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Ethylbenzene	0.011	U	0.011	0.0062	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
2-Hexanone	0.22	U	0.22	0.025	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Methylene Chloride	0.22	U	0.22	0.028	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
methyl isobutyl ketone	0.22	U	0.22	0.035	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Methyl tert-butyl ether	0.089	U	0.089	0.021	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Styrene	0.045	U	0.045	0.012	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
1,1,2,2-Tetrachloroethane	0.045	U	0.045	0.016	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Tetrachloroethene	0.045	U	0.045	0.0097	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Toluene	0.011	U	0.011	0.0067	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
trans-1,2-Dichloroethene	0.045	U	0.045	0.012	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
trans-1,3-Dichloropropene	0.045	U	0.045	0.016	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
1,1,1-Trichloroethane	0.045	U	0.045	0.012	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
1,1,2-Trichloroethane	0.045	U	0.045	0.013	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Vinyl chloride	**0.041**		0.011	0.0056	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
Xylenes, Total	0.022	U	0.022	0.0057	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50
1,3-Dichloropropene, Total	0.045	U	0.045	0.012	mg/Kg	☼	10/05/11 12:25	10/15/11 09:19	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*89*		*77 - 112*	*10/05/11 12:25*	*10/15/11 09:19*	*50*
Dibromofluoromethane	*102*		*78 - 119*	*10/05/11 12:25*	*10/15/11 09:19*	*50*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*	*10/05/11 12:25*	*10/15/11 09:19*	*50*
Toluene-d8 (Surr)	*99*		*80 - 121*	*10/05/11 12:25*	*10/15/11 09:19*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**14**		0.11	0.067	mg/Kg	☼	10/05/11 12:25	10/17/11 14:38	500

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*	*10/05/11 12:25*	*10/17/11 14:38*	*500*
Dibromofluoromethane	*101*		*78 - 119*	*10/05/11 12:25*	*10/17/11 14:38*	*500*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*	*10/05/11 12:25*	*10/17/11 14:38*	*500*
Toluene-d8 (Surr)	*101*		*80 - 121*	*10/05/11 12:25*	*10/17/11 14:38*	*500*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Client Sample ID: 33-SB146-15
Date Collected: 10/05/11 12:45
Date Received: 10/06/11 10:30

Lab Sample ID: 500-40292-6
Matrix: Solid
Percent Solids: 79.4

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.23	U	0.23	0.090	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Benzene	0.012	U	0.012	0.0038	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Bromodichloromethane	0.094	U	0.094	0.013	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Bromoform	0.094	U	0.094	0.027	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Bromomethane	0.094	U	0.094	0.040	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Methyl Ethyl Ketone	0.23	U	0.23	0.049	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Carbon disulfide	0.23	U	0.23	0.021	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Carbon tetrachloride	0.047	U	0.047	0.013	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Chlorobenzene	0.047	U	0.047	0.011	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Chloroethane	0.094	U	0.094	0.023	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Chloroform	0.047	U	0.047	0.012	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Chloromethane	0.094	U	0.094	0.023	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
cis-1,2-Dichloroethene	**1.5**		0.047	0.011	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
cis-1,3-Dichloropropene	0.047	U	0.047	0.013	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Dibromochloromethane	0.094	U	0.094	0.018	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
1,1-Dichloroethane	0.047	U	0.047	0.011	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
1,2-Dichloroethane	0.047	U	0.047	0.013	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
1,1-Dichloroethene	0.047	U	0.047	0.014	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
1,2-Dichloropropane	0.047	U	0.047	0.017	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Ethylbenzene	0.012	U	0.012	0.0066	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
2-Hexanone	0.23	U	0.23	0.026	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Methylene Chloride	0.23	U	0.23	0.030	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
methyl isobutyl ketone	0.23	U	0.23	0.037	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Methyl tert-butyl ether	0.094	U	0.094	0.022	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Styrene	0.047	U	0.047	0.012	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
1,1,2,2-Tetrachloroethane	0.047	U	0.047	0.017	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Tetrachloroethene	0.047	U	0.047	0.010	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Toluene	0.012	U	0.012	0.0071	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
trans-1,2-Dichloroethene	0.047	U	0.047	0.013	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
trans-1,3-Dichloropropene	0.047	U	0.047	0.016	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
1,1,1-Trichloroethane	0.047	U	0.047	0.012	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
1,1,2-Trichloroethane	0.047	U	0.047	0.014	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Vinyl chloride	**0.024**		0.012	0.0059	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
Xylenes, Total	0.023	U	0.023	0.0061	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50
1,3-Dichloropropene, Total	0.047	U	0.047	0.013	mg/Kg	☼	10/05/11 12:45	10/15/11 09:43	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*	*10/05/11 12:45*	*10/15/11 09:43*	*50*
Dibromofluoromethane	*115*		*78 - 119*	*10/05/11 12:45*	*10/15/11 09:43*	*50*
1,2-Dichloroethane-d4 (Surr)	*115*		*77 - 124*	*10/05/11 12:45*	*10/15/11 09:43*	*50*
Toluene-d8 (Surr)	*107*		*80 - 121*	*10/05/11 12:45*	*10/15/11 09:43*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**40**		0.12	0.071	mg/Kg	☼	10/05/11 12:45	10/15/11 10:07	500

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*	*10/05/11 12:45*	*10/15/11 10:07*	*500*
Dibromofluoromethane	*116*		*78 - 119*	*10/05/11 12:45*	*10/15/11 10:07*	*500*
1,2-Dichloroethane-d4 (Surr)	*117*		*77 - 124*	*10/05/11 12:45*	*10/15/11 10:07*	*500*
Toluene-d8 (Surr)	*108*		*80 - 121*	*10/05/11 12:45*	*10/15/11 10:07*	*500*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Client Sample ID: FB-001-100511

Date Collected: 10/05/11 09:00
Date Received: 10/06/11 10:30

Lab Sample ID: 500-40292-7

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/15/11 04:27	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/15/11 04:27	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/15/11 04:27	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/15/11 04:27	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/15/11 04:27	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/15/11 04:27	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/15/11 04:27	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/15/11 04:27	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/15/11 04:27	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/15/11 04:27	1
Chloroform	**0.0015**		0.0010	0.00025	mg/L			10/15/11 04:27	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/15/11 04:27	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/15/11 04:27	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/15/11 04:27	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/15/11 04:27	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/15/11 04:27	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/15/11 04:27	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/15/11 04:27	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/15/11 04:27	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/15/11 04:27	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/15/11 04:27	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/15/11 04:27	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/15/11 04:27	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/15/11 04:27	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/15/11 04:27	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/15/11 04:27	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/15/11 04:27	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/15/11 04:27	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/15/11 04:27	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/15/11 04:27	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/15/11 04:27	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/15/11 04:27	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/15/11 04:27	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/15/11 04:27	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/15/11 04:27	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/15/11 04:27	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/15/11 04:27*	*1*
Dibromofluoromethane	*112*		*78 - 119*		*10/15/11 04:27*	*1*
1,2-Dichloroethane-d4 (Surr)	*115*		*77 - 124*		*10/15/11 04:27*	*1*
Toluene-d8 (Surr)	*111*		*80 - 121*		*10/15/11 04:27*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Client Sample ID: TB-001-100511

Date Collected: 10/05/11 00:00
Date Received: 10/06/11 10:30

Lab Sample ID: 500-40292-8

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/15/11 04:52	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/15/11 04:52	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/15/11 04:52	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/15/11 04:52	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/15/11 04:52	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/15/11 04:52	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/15/11 04:52	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/15/11 04:52	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/15/11 04:52	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/15/11 04:52	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/15/11 04:52	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/15/11 04:52	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/15/11 04:52	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/15/11 04:52	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/15/11 04:52	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/15/11 04:52	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/15/11 04:52	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/15/11 04:52	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/15/11 04:52	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/15/11 04:52	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/15/11 04:52	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/15/11 04:52	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/15/11 04:52	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/15/11 04:52	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/15/11 04:52	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/15/11 04:52	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/15/11 04:52	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/15/11 04:52	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/15/11 04:52	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/15/11 04:52	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/15/11 04:52	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/15/11 04:52	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/15/11 04:52	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/15/11 04:52	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/15/11 04:52	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/15/11 04:52	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/15/11 04:52*	*1*
Dibromofluoromethane	*109*		*78 - 119*		*10/15/11 04:52*	*1*
1,2-Dichloroethane-d4 (Surr)	*115*		*77 - 124*		*10/15/11 04:52*	*1*
Toluene-d8 (Surr)	*109*		*80 - 121*		*10/15/11 04:52*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Client Sample ID: 33-SB137-31
Date Collected: 10/05/11 15:45
Date Received: 10/06/11 10:30

Lab Sample ID: 500-40292-9
Matrix: Solid
Percent Solids: 85.0

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.23	U	0.23	0.087	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Benzene	0.011	U	0.011	0.0036	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Bromodichloromethane	0.091	U	0.091	0.013	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Bromoform	0.091	U	0.091	0.026	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Bromomethane	0.091	U	0.091	0.039	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Methyl Ethyl Ketone	0.23	U	0.23	0.047	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Carbon disulfide	0.23	U	0.23	0.020	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Carbon tetrachloride	0.046	U	0.046	0.013	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Chlorobenzene	0.046	U	0.046	0.011	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Chloroethane	0.091	U	0.091	0.023	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Chloroform	0.046	U	0.046	0.011	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Chloromethane	0.091	U	0.091	0.023	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
cis-1,2-Dichloroethene	**1.3**		0.046	0.010	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
cis-1,3-Dichloropropene	0.046	U	0.046	0.013	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Dibromochloromethane	0.091	U	0.091	0.017	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
1,1-Dichloroethane	0.046	U	0.046	0.011	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
1,2-Dichloroethane	0.046	U	0.046	0.013	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
1,1-Dichloroethene	0.046	U	0.046	0.013	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
1,2-Dichloropropane	0.046	U	0.046	0.016	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Ethylbenzene	0.011	U	0.011	0.0064	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
2-Hexanone	0.23	U	0.23	0.025	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Methylene Chloride	0.23	U	0.23	0.029	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
methyl isobutyl ketone	0.23	U	0.23	0.036	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Methyl tert-butyl ether	0.091	U	0.091	0.022	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Styrene	0.046	U	0.046	0.012	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
1,1,2,2-Tetrachloroethane	0.046	U	0.046	0.016	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Tetrachloroethene	0.046	U	0.046	0.0099	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Toluene	0.011	U	0.011	0.0069	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
trans-1,2-Dichloroethene	0.046	U	0.046	0.012	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
trans-1,3-Dichloropropene	0.046	U	0.046	0.016	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
1,1,1-Trichloroethane	0.046	U	0.046	0.012	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
1,1,2-Trichloroethane	0.046	U	0.046	0.014	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Vinyl chloride	**0.029**		0.011	0.0057	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
Xylenes, Total	0.023	U	0.023	0.0059	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50
1,3-Dichloropropene, Total	0.046	U	0.046	0.013	mg/Kg	☼	10/05/11 15:45	10/15/11 10:31	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*102*		*77 - 112*	*10/05/11 15:45*	*10/15/11 10:31*	*50*
Dibromofluoromethane	*117*		*78 - 119*	*10/05/11 15:45*	*10/15/11 10:31*	*50*
1,2-Dichloroethane-d4 (Surr)	*118*		*77 - 124*	*10/05/11 15:45*	*10/15/11 10:31*	*50*
Toluene-d8 (Surr)	*111*		*80 - 121*	*10/05/11 15:45*	*10/15/11 10:31*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**46**		0.11	0.069	mg/Kg	☼	10/05/11 15:45	10/15/11 10:56	500

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*	*10/05/11 15:45*	*10/15/11 10:56*	*500*
Dibromofluoromethane	*118*		*78 - 119*	*10/05/11 15:45*	*10/15/11 10:56*	*500*
1,2-Dichloroethane-d4 (Surr)	*118*		*77 - 124*	*10/05/11 15:45*	*10/15/11 10:56*	*500*
Toluene-d8 (Surr)	*111*		*80 - 121*	*10/05/11 15:45*	*10/15/11 10:56*	*500*

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

GC/MS VOA

Prep Batch: 127958

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40292-1	33-SB144-11	Total/NA	Solid	5035	
500-40292-2	33-SB149-27	Total/NA	Solid	5035	
500-40292-2 - DL	33-SB149-27	Total/NA	Solid	5035	
500-40292-3	33-FDUP-003	Total/NA	Solid	5035	
500-40292-4	33-SB144-33	Total/NA	Solid	5035	
500-40292-4 - DL	33-SB144-33	Total/NA	Solid	5035	
500-40292-5	33-SB148-28	Total/NA	Solid	5035	
500-40292-5 - DL	33-SB148-28	Total/NA	Solid	5035	
500-40292-6	33-SB146-15	Total/NA	Solid	5035	
500-40292-6 - DL	33-SB146-15	Total/NA	Solid	5035	
500-40292-9	33-SB137-31	Total/NA	Solid	5035	
500-40292-9 - DL	33-SB137-31	Total/NA	Solid	5035	

Analysis Batch: 128967

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40292-7	FB-001-100511	Total/NA	Water	8260B	
500-40292-8	TB-001-100511	Total/NA	Water	8260B	
LCS 500-128967/4	Lab Control Sample	Total/NA	Water	8260B	
MB 500-128967/3	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 128968

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40292-1	33-SB144-11	Total/NA	Solid	8260B	127958
500-40292-2	33-SB149-27	Total/NA	Solid	8260B	127958
500-40292-2 - DL	33-SB149-27	Total/NA	Solid	8260B	127958
500-40292-3	33-FDUP-003	Total/NA	Solid	8260B	127958
500-40292-4	33-SB144-33	Total/NA	Solid	8260B	127958
500-40292-4 - DL	33-SB144-33	Total/NA	Solid	8260B	127958
500-40292-5	33-SB148-28	Total/NA	Solid	8260B	127958
500-40292-6	33-SB146-15	Total/NA	Solid	8260B	127958
500-40292-6 - DL	33-SB146-15	Total/NA	Solid	8260B	127958
500-40292-9	33-SB137-31	Total/NA	Solid	8260B	127958
500-40292-9 - DL	33-SB137-31	Total/NA	Solid	8260B	127958
LCS 500-128968/4	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-128968/3	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 129120

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40292-5 - DL	33-SB148-28	Total/NA	Solid	8260B	127958
LCS 500-129120/5	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-129120/4	Method Blank	Total/NA	Solid	8260B	

General Chemistry

Analysis Batch: 127919

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40292-1	33-SB144-11	Total/NA	Solid	Moisture	
500-40292-2	33-SB149-27	Total/NA	Solid	Moisture	
500-40292-3	33-FDUP-003	Total/NA	Solid	Moisture	
500-40292-4	33-SB144-33	Total/NA	Solid	Moisture	
500-40292-5	33-SB148-28	Total/NA	Solid	Moisture	
500-40292-6	33-SB146-15	Total/NA	Solid	Moisture	

General Chemistry (Continued)

Analysis Batch: 127919 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40292-9	33-SB137-31	Total/NA	Solid	Moisture	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40292-1	33-SB144-11	95	106	112	106
500-40292-2	33-SB149-27	98	108	115	107
500-40292-2 - DL	33-SB149-27	101	114	117	108
500-40292-3	33-FDUP-003	97	108	115	109
500-40292-4	33-SB144-33	97	110	112	105
500-40292-4 - DL	33-SB144-33	96	116	117	110
500-40292-5	33-SB148-28	89	102	105	99
500-40292-5 - DL	33-SB148-28	99	101	107	101
500-40292-6	33-SB146-15	98	115	115	107
500-40292-6 - DL	33-SB146-15	97	116	117	108
500-40292-9	33-SB137-31	102	117	118	111
500-40292-9 - DL	33-SB137-31	97	118	118	111
LCS 500-128968/4	Lab Control Sample	107	109	112	112
LCS 500-129120/5	Lab Control Sample	102	101	102	101
MB 500-128968/3	Method Blank	89	97	100	103
MB 500-129120/4	Method Blank	94	91	99	100

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40292-7	FB-001-100511	98	112	115	111
500-40292-8	TB-001-100511	100	109	115	109
LCS 500-128967/4	Lab Control Sample	107	109	112	112
MB 500-128967/3	Method Blank	89	97	100	103

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-128967/3
Matrix: Water
Analysis Batch: 128967

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/15/11 00:38	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/15/11 00:38	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/15/11 00:38	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/15/11 00:38	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/15/11 00:38	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/15/11 00:38	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/15/11 00:38	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/15/11 00:38	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/15/11 00:38	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/15/11 00:38	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/15/11 00:38	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/15/11 00:38	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/15/11 00:38	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/15/11 00:38	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/15/11 00:38	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/15/11 00:38	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/15/11 00:38	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/15/11 00:38	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/15/11 00:38	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/15/11 00:38	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/15/11 00:38	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/15/11 00:38	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/15/11 00:38	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/15/11 00:38	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/15/11 00:38	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/15/11 00:38	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/15/11 00:38	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/15/11 00:38	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/15/11 00:38	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/15/11 00:38	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/15/11 00:38	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/15/11 00:38	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/15/11 00:38	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/15/11 00:38	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/15/11 00:38	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/15/11 00:38	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*89*		*77 - 112*		*10/15/11 00:38*	*1*
Dibromofluoromethane	*97*		*78 - 119*		*10/15/11 00:38*	*1*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*		*10/15/11 00:38*	*1*
Toluene-d8 (Surr)	*103*		*80 - 121*		*10/15/11 00:38*	*1*

Lab Sample ID: LCS 500-128967/4
Matrix: Water
Analysis Batch: 128967

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0622		mg/L		124	43 - 153

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-128967/4
Matrix: Water
Analysis Batch: 128967

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Benzene	0.0500	0.0510		mg/L		102	74 - 113
Bromodichloromethane	0.0500	0.0526		mg/L		105	73 - 120
Bromoform	0.0500	0.0509		mg/L		102	64 - 126
Bromomethane	0.0500	0.0492		mg/L		98	46 - 155
Methyl Ethyl Ketone	0.0500	0.0550		mg/L		110	42 - 152
Carbon disulfide	0.0500	0.0367		mg/L		73	36 - 110
Carbon tetrachloride	0.0500	0.0527		mg/L		105	58 - 132
Chlorobenzene	0.0500	0.0521		mg/L		104	81 - 111
Chloroethane	0.0500	0.0552		mg/L		110	54 - 149
Chloroform	0.0500	0.0522		mg/L		104	71 - 116
Chloromethane	0.0500	0.0456		mg/L		91	36 - 148
cis-1,2-Dichloroethene	0.0500	0.0494		mg/L		99	66 - 111
cis-1,3-Dichloropropene	0.0538	0.0513		mg/L		95	65 - 114
Dibromochloromethane	0.0500	0.0519		mg/L		104	73 - 118
1,1-Dichloroethane	0.0500	0.0501		mg/L		100	64 - 117
1,1-Dichloroethene	0.0500	0.0456		mg/L		91	60 - 126
1,2-Dichloropropane	0.0500	0.0529		mg/L		106	68 - 123
Ethylbenzene	0.0500	0.0546		mg/L		109	79 - 114
2-Hexanone	0.0500	0.0520		mg/L		104	55 - 138
Methylene Chloride	0.0500	0.0481		mg/L		96	65 - 125
methyl isobutyl ketone	0.0500	0.0501		mg/L		100	56 - 138
Methyl tert-butyl ether	0.0500	0.0486		mg/L		97	57 - 119
Styrene	0.0500	0.0525		mg/L		105	76 - 118
1,1,2,2-Tetrachloroethane	0.0500	0.0527		mg/L		105	66 - 121
Tetrachloroethene	0.0500	0.0526		mg/L		105	76 - 114
Toluene	0.0500	0.0537		mg/L		107	76 - 121
trans-1,2-Dichloroethene	0.0500	0.0510		mg/L		102	67 - 120
trans-1,3-Dichloropropene	0.0486	0.0467		mg/L		96	60 - 119
1,1,1-Trichloroethane	0.0500	0.0535		mg/L		107	66 - 128
1,1,2-Trichloroethane	0.0500	0.0529		mg/L		106	62 - 137
Trichloroethene	0.0500	0.0525		mg/L		105	75 - 116
Vinyl chloride	0.0500	0.0506		mg/L		101	47 - 138
1,2-Dichloroethane	0.0500	0.0533		mg/L		107	69 - 115
Xylenes, Total	0.150	0.163		mg/L		109	74 - 117

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*107*		*77 - 112*
Dibromofluoromethane	*109*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*112*		*77 - 124*
Toluene-d8 (Surr)	*112*		*80 - 121*

Lab Sample ID: MB 500-128968/3
Matrix: Solid
Analysis Batch: 128968

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			10/15/11 00:38	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			10/15/11 00:38	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			10/15/11 00:38	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-128968/3
Matrix: Solid
Analysis Batch: 128968

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			10/15/11 00:38	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			10/15/11 00:38	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			10/15/11 00:38	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			10/15/11 00:38	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			10/15/11 00:38	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			10/15/11 00:38	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			10/15/11 00:38	1
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			10/15/11 00:38	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			10/15/11 00:38	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/15/11 00:38	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			10/15/11 00:38	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			10/15/11 00:38	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			10/15/11 00:38	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			10/15/11 00:38	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			10/15/11 00:38	1
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			10/15/11 00:38	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			10/15/11 00:38	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/Kg			10/15/11 00:38	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			10/15/11 00:38	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			10/15/11 00:38	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			10/15/11 00:38	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			10/15/11 00:38	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/15/11 00:38	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			10/15/11 00:38	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			10/15/11 00:38	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			10/15/11 00:38	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			10/15/11 00:38	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			10/15/11 00:38	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			10/15/11 00:38	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			10/15/11 00:38	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			10/15/11 00:38	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			10/15/11 00:38	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			10/15/11 00:38	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*89*		*77 - 112*		*10/15/11 00:38*	*1*
Dibromofluoromethane	*97*		*78 - 119*		*10/15/11 00:38*	*1*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*		*10/15/11 00:38*	*1*
Toluene-d8 (Surr)	*103*		*80 - 121*		*10/15/11 00:38*	*1*

Lab Sample ID: LCS 500-128968/4
Matrix: Solid
Analysis Batch: 128968

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0622		mg/Kg		124	46 - 152
Benzene	0.0500	0.0510		mg/Kg		102	74 - 112
Bromodichloromethane	0.0500	0.0526		mg/Kg		105	73 - 122
Bromoform	0.0500	0.0509		mg/Kg		102	62 - 119

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-128968/4
Matrix: Solid
Analysis Batch: 128968

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Bromomethane	0.0500	0.0492		mg/Kg		98	38 - 157
Methyl Ethyl Ketone	0.0500	0.0550		mg/Kg		110	48 - 152
Carbon disulfide	0.0500	0.0367		mg/Kg		73	38 - 112
Carbon tetrachloride	0.0500	0.0527		mg/Kg		105	63 - 127
Chlorobenzene	0.0500	0.0521		mg/Kg		104	80 - 110
Chloroethane	0.0500	0.0552		mg/Kg		110	53 - 156
Chloroform	0.0500	0.0522		mg/Kg		104	74 - 115
Chloromethane	0.0500	0.0456		mg/Kg		91	44 - 148
cis-1,2-Dichloroethene	0.0500	0.0494		mg/Kg		99	68 - 110
cis-1,3-Dichloropropene	0.0538	0.0513		mg/Kg		95	65 - 116
Dibromochloromethane	0.0500	0.0519		mg/Kg		104	66 - 123
1,1-Dichloroethane	0.0500	0.0501		mg/Kg		100	69 - 118
1,1-Dichloroethene	0.0500	0.0456		mg/Kg		91	60 - 123
1,2-Dichloropropane	0.0500	0.0529		mg/Kg		106	72 - 124
Ethylbenzene	0.0500	0.0546		mg/Kg		109	79 - 112
2-Hexanone	0.0500	0.0520		mg/Kg		104	58 - 137
Methylene Chloride	0.0500	0.0481		mg/Kg		96	67 - 126
methyl isobutyl ketone	0.0500	0.0501		mg/Kg		100	58 - 135
Methyl tert-butyl ether	0.0500	0.0486		mg/Kg		97	57 - 122
Styrene	0.0500	0.0525		mg/Kg		105	77 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0527		mg/Kg		105	73 - 119
Tetrachloroethene	0.0500	0.0526		mg/Kg		105	76 - 112
Toluene	0.0500	0.0537		mg/Kg		107	78 - 116
trans-1,2-Dichloroethene	0.0500	0.0510		mg/Kg		102	70 - 119
trans-1,3-Dichloropropene	0.0486	0.0467		mg/Kg		96	64 - 114
1,1,1-Trichloroethane	0.0500	0.0535		mg/Kg		107	70 - 125
1,1,2-Trichloroethane	0.0500	0.0529		mg/Kg		106	63 - 136
Trichloroethene	0.0500	0.0525		mg/Kg		105	75 - 113
Vinyl chloride	0.0500	0.0506		mg/Kg		101	58 - 136
1,2-Dichloroethane	0.0500	0.0533		mg/Kg		107	66 - 120
Xylenes, Total	0.150	0.163		mg/Kg		109	74 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*107*		*77 - 112*
Dibromofluoromethane	*109*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*112*		*77 - 124*
Toluene-d8 (Surr)	*112*		*80 - 121*

Lab Sample ID: MB 500-129120/4
Matrix: Solid
Analysis Batch: 129120

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			10/17/11 08:16	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			10/17/11 08:16	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			10/17/11 08:16	1
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			10/17/11 08:16	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			10/17/11 08:16	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			10/17/11 08:16	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-129120/4
Matrix: Solid
Analysis Batch: 129120

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			10/17/11 08:16	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			10/17/11 08:16	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			10/17/11 08:16	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			10/17/11 08:16	1
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			10/17/11 08:16	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			10/17/11 08:16	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/17/11 08:16	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			10/17/11 08:16	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			10/17/11 08:16	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			10/17/11 08:16	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			10/17/11 08:16	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			10/17/11 08:16	1
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			10/17/11 08:16	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			10/17/11 08:16	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/Kg			10/17/11 08:16	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			10/17/11 08:16	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			10/17/11 08:16	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			10/17/11 08:16	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			10/17/11 08:16	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/17/11 08:16	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			10/17/11 08:16	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			10/17/11 08:16	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			10/17/11 08:16	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			10/17/11 08:16	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			10/17/11 08:16	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			10/17/11 08:16	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			10/17/11 08:16	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			10/17/11 08:16	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			10/17/11 08:16	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			10/17/11 08:16	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*77 - 112*		*10/17/11 08:16*	*1*
Dibromofluoromethane	*91*		*78 - 119*		*10/17/11 08:16*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*		*10/17/11 08:16*	*1*
Toluene-d8 (Surr)	*100*		*80 - 121*		*10/17/11 08:16*	*1*

Lab Sample ID: LCS 500-129120/5
Matrix: Solid
Analysis Batch: 129120

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0441		mg/Kg		88	46 - 152
Benzene	0.0500	0.0429		mg/Kg		86	74 - 112
Bromodichloromethane	0.0500	0.0459		mg/Kg		92	73 - 122
Bromoform	0.0500	0.0403		mg/Kg		81	62 - 119
Bromomethane	0.0500	0.0473		mg/Kg		95	38 - 157
Methyl Ethyl Ketone	0.0500	0.0478		mg/Kg		96	48 - 152
Carbon disulfide	0.0500	0.0325		mg/Kg		65	38 - 112

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-129120/5
Matrix: Solid
Analysis Batch: 129120

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Carbon tetrachloride	0.0500	0.0445		mg/Kg		89	63 - 127
Chlorobenzene	0.0500	0.0435		mg/Kg		87	80 - 110
Chloroethane	0.0500	0.0441		mg/Kg		88	53 - 156
Chloroform	0.0500	0.0449		mg/Kg		90	74 - 115
Chloromethane	0.0500	0.0372		mg/Kg		74	44 - 148
cis-1,2-Dichloroethene	0.0500	0.0450		mg/Kg		90	68 - 110
cis-1,3-Dichloropropene	0.0538	0.0482		mg/Kg		90	65 - 116
Dibromochloromethane	0.0500	0.0402		mg/Kg		80	66 - 123
1,1-Dichloroethane	0.0500	0.0426		mg/Kg		85	69 - 118
1,1-Dichloroethene	0.0500	0.0387		mg/Kg		77	60 - 123
1,2-Dichloropropane	0.0500	0.0455		mg/Kg		91	72 - 124
Ethylbenzene	0.0500	0.0431		mg/Kg		86	79 - 112
2-Hexanone	0.0500	0.0448		mg/Kg		90	58 - 137
Methylene Chloride	0.0500	0.0448		mg/Kg		90	67 - 126
methyl isobutyl ketone	0.0500	0.0446		mg/Kg		89	58 - 135
Methyl tert-butyl ether	0.0500	0.0448		mg/Kg		90	57 - 122
Styrene	0.0500	0.0454		mg/Kg		91	77 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0481		mg/Kg		96	73 - 119
Tetrachloroethene	0.0500	0.0420		mg/Kg		84	76 - 112
Toluene	0.0500	0.0450		mg/Kg		90	78 - 116
trans-1,2-Dichloroethene	0.0500	0.0447		mg/Kg		89	70 - 119
trans-1,3-Dichloropropene	0.0486	0.0397		mg/Kg		82	64 - 114
1,1,1-Trichloroethane	0.0500	0.0461		mg/Kg		92	70 - 125
1,1,2-Trichloroethane	0.0500	0.0462		mg/Kg		92	63 - 136
Trichloroethene	0.0500	0.0430		mg/Kg		86	75 - 113
Vinyl chloride	0.0500	0.0411		mg/Kg		82	58 - 136
1,2-Dichloroethane	0.0500	0.0448		mg/Kg		90	66 - 120
Xylenes, Total	0.150	0.127		mg/Kg		85	74 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*102*		*77 - 112*
Dibromofluoromethane	*101*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*102*		*77 - 124*
Toluene-d8 (Surr)	*101*		*80 - 121*

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40292-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40292
Chain of Custody Number:
Page 1 of 2
Temperature °C of Cooler: 2.7

Client: CH2M HILL
Client Project #: 423535.02.SI
Project Name: Crab Orchard National Wildlife Refuge - Plume 2
Project Location/State: Marion, IL
Lab Project #: 500005970
Sampler: J. Burkard/C. Wallestad
Lab PM: Jim Knapp

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOCs 8260B	VOCs 8260B	VOCs 8260B	Percent Moisture	VOCs 8260B	PCBs 8082				Comments
Preservative							H_2O Cool to 4°	Methanol Cool to 4°	Sodium Bisulfate Cool to 4°	7	1	1				
1		33-SB144-11	10/5/11	0955	5	SO	2	1	1	1	—	—				
2		33-SB149-27	10/5/11	1000	5	SO	2	1	1	1	—	—				
3		33-FDUP-003	10/5/11	1000	5	SO	2	1	1	1	—	—				
4		33-SB144-33	10/5/11	1010	5	SO	2	1	1	1	—	—				
5		33-SB148-28	10/5/11	~~1255~~ 1235	5	SO	2	1	1	1	—	—				
6		33-SB146-15	10/5/11	1245	5	SO	2	1	1	1	—	—				
7		FB-001-100511	10/5/11	0900	3	~~SW~~ WW	—	—	—	—	3	—				
8		TB-001-100511	—	—	2	W	—	—	—	—	2	—				
9		33-SB137-31	10/5/11	1545	5	SO	2	1	1	1	—	—				
10		33-SB137-04	10/5/11	1600	1	SO	—	—	—	—	—	1				

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days (Prelim) ___ 15 Days X 14d (Final) ___ Other
Requested Due Date _____

Sample Disposal
[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/5/11		[signature]	TA	10/6/11	1030

Lab Courier:
Shipped: FX
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Lab Job #: 500-40292

Chain of Custody Number:

Page 2 of 2

Temperature °C of Cooler:

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Client: CH2MHILL
Client Project #: 423535.02.SI
Project Name: Crab Orchard National Wildlife Refuge - Plume 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: J. Burkard / C. Wallsted
Lab PM: Jim Knapp

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Preservative 1 / Parameter: PCBs 8082	Comments
11		33-SB137-20	10/5/11	1610	1	SO	1	

M. Martin

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days (Prelim) ___ 15 Days X (Final 14d) ___ Other
Requested Due Date

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Howard Martin	CH2MHILL	10/5/11		[signature]	TA	10/6/11	1030
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier
Shipped: FX
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
Wi – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-609 (1209)

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-40292-1

Login Number: 40292
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	2.7
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-40292-2
Client Project/Site: Crab Orchard Wildlife Refuge Plume 2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/20/2011 06:16:59 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

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Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Definitions 9
QC Association 10
Surrogate Summary 11
QC Sample Results 12
Certification Summary 13
Chain of Custody 14
Receipt Checklists 16

Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40292-2

Job ID: 500-40292-2

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-40292-2

Comments
No additional comments.

Receipt
Client requested that samples 33-SB137-04 & 33-SB137-20 be placed on hold until further notice.

All other samples were received in good condition within temperature requirements.

GC Semi VOA
Method(s) 8082: The following samples were diluted due to the abundance of target analytes: 33-SB137-04 (500-40292-10). Elevated reporting limits (RLs) are provided.

Method(s) 8082: The grand mean exception, as outlined in EPA Method 8000B, was applied to the continuing calibration verification (CCV) standard associated with batch 129408. This rule states that when one or more compounds in the CCV fail to meet acceptance criteria, the data may be reported if the average %D (the grand mean) of all the compounds in the CCV is less than or equal to 15%D. The following compounds are affected: AR1016.33-SB137-04 (500-40292-10), 33-SB137-20 (500-40292-11)

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

Organic Prep
No analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40292-2

Client Sample ID: 33-SB137-04 — Lab Sample ID: 500-40292-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
PCB-1254	1.0		0.10	0.029	mg/Kg	5	☼	8082	Total/NA
Polychlorinated biphenyls, Total	1.0		0.10	0.016	mg/Kg	5	☼	8082	Total/NA

Client Sample ID: 33-SB137-20 — Lab Sample ID: 500-40292-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
PCB-1254	0.011	J	0.019	0.0055	mg/Kg	1	☼	8082	Total/NA
Polychlorinated biphenyls, Total	0.011	J	0.019	0.0030	mg/Kg	1	☼	8082	Total/NA

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40292-2

Method	Method Description	Protocol	Laboratory
8082	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40292-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-40292-10	33-SB137-04	Solid	10/05/11 16:00	10/06/11 10:30
500-40292-11	33-SB137-20	Solid	10/05/11 16:10	10/06/11 10:30

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40292-2

Client Sample ID: 33-SB137-04

Date Collected: 10/05/11 16:00
Date Received: 10/06/11 10:30

Lab Sample ID: 500-40292-10

Matrix: Solid
Percent Solids: 82.2

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.10	U	0.10	0.036	mg/Kg	☼	10/18/11 23:03	10/20/11 10:53	5
PCB-1221	0.10	U	0.10	0.081	mg/Kg	☼	10/18/11 23:03	10/20/11 10:53	5
PCB-1232	0.10	U	0.10	0.039	mg/Kg	☼	10/18/11 23:03	10/20/11 10:53	5
PCB-1242	0.10	U	0.10	0.048	mg/Kg	☼	10/18/11 23:03	10/20/11 10:53	5
PCB-1248	0.10	U	0.10	0.037	mg/Kg	☼	10/18/11 23:03	10/20/11 10:53	5
PCB-1254	**1.0**		0.10	0.029	mg/Kg	☼	10/18/11 23:03	10/20/11 10:53	5
PCB-1260	0.10	U	0.10	0.024	mg/Kg	☼	10/18/11 23:03	10/20/11 10:53	5
Polychlorinated biphenyls, Total	**1.0**		0.10	0.016	mg/Kg	☼	10/18/11 23:03	10/20/11 10:53	5

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*117*		*28 - 124*	*10/18/11 23:03*	*10/20/11 10:53*	*5*
DCB Decachlorobiphenyl	*128*		*38 - 130*	*10/18/11 23:03*	*10/20/11 10:53*	*5*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40292-2

Client Sample ID: 33-SB137-20

Date Collected: 10/05/11 16:10
Date Received: 10/06/11 10:30

Lab Sample ID: 500-40292-11

Matrix: Solid
Percent Solids: 82.4

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.019	U	0.019	0.0069	mg/Kg	☼	10/18/11 23:03	10/19/11 18:48	1
PCB-1221	0.019	U	0.019	0.016	mg/Kg	☼	10/18/11 23:03	10/19/11 18:48	1
PCB-1232	0.019	U	0.019	0.0075	mg/Kg	☼	10/18/11 23:03	10/19/11 18:48	1
PCB-1242	0.019	U	0.019	0.0092	mg/Kg	☼	10/18/11 23:03	10/19/11 18:48	1
PCB-1248	0.019	U	0.019	0.0070	mg/Kg	☼	10/18/11 23:03	10/19/11 18:48	1
PCB-1254	**0.011**	**J**	0.019	0.0055	mg/Kg	☼	10/18/11 23:03	10/19/11 18:48	1
PCB-1260	0.019	U	0.019	0.0045	mg/Kg	☼	10/18/11 23:03	10/19/11 18:48	1
Polychlorinated biphenyls, Total	**0.011**	**J**	0.019	0.0030	mg/Kg	☼	10/18/11 23:03	10/19/11 18:48	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*87*		*28 - 124*	*10/18/11 23:03*	*10/19/11 18:48*	*1*
DCB Decachlorobiphenyl	*88*		*38 - 130*	*10/18/11 23:03*	*10/19/11 18:48*	*1*

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40292-2

Qualifiers

GC Semi VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40292-2

GC Semi VOA

Prep Batch: 129408

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40292-10	33-SB137-04	Total/NA	Solid	3541	
500-40292-11	33-SB137-20	Total/NA	Solid	3541	
LCS 500-129408/3-A	Lab Control Sample	Total/NA	Solid	3541	
MB 500-129408/1-A	Method Blank	Total/NA	Solid	3541	

Analysis Batch: 129497

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40292-10	33-SB137-04	Total/NA	Solid	8082	129408
500-40292-11	33-SB137-20	Total/NA	Solid	8082	129408
LCS 500-129408/3-A	Lab Control Sample	Total/NA	Solid	8082	129408
MB 500-129408/1-A	Method Blank	Total/NA	Solid	8082	129408

General Chemistry

Analysis Batch: 129193

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40292-10	33-SB137-04	Total/NA	Solid	Moisture	
500-40292-11	33-SB137-20	Total/NA	Solid	Moisture	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40292-2

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)							
		TCX1	DCB1						
Lab Sample ID	Client Sample ID	(28-124)	(38-130)						
500-40292-10	33-SB137-04	117	128						
500-40292-11	33-SB137-20	87	88						
LCS 500-129408/3-A	Lab Control Sample	80	97						
MB 500-129408/1-A	Method Blank	78	94						

Surrogate Legend

TCX = Tetrachloro-m-xylene

DCB = DCB Decachlorobiphenyl

QC Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40292-2

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Lab Sample ID: MB 500-129408/1-A
Matrix: Solid
Analysis Batch: 129497

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 129408

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.017	U	0.017	0.0060	mg/Kg		10/18/11 23:03	10/19/11 15:20	1
PCB-1221	0.017	U	0.017	0.014	mg/Kg		10/18/11 23:03	10/19/11 15:20	1
PCB-1232	0.017	U	0.017	0.0065	mg/Kg		10/18/11 23:03	10/19/11 15:20	1
PCB-1242	0.017	U	0.017	0.0080	mg/Kg		10/18/11 23:03	10/19/11 15:20	1
PCB-1248	0.017	U	0.017	0.0061	mg/Kg		10/18/11 23:03	10/19/11 15:20	1
PCB-1254	0.017	U	0.017	0.0048	mg/Kg		10/18/11 23:03	10/19/11 15:20	1
PCB-1260	0.017	U	0.017	0.0039	mg/Kg		10/18/11 23:03	10/19/11 15:20	1
Polychlorinated biphenyls, Total	0.017	U	0.017	0.0026	mg/Kg		10/18/11 23:03	10/19/11 15:20	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*78*		*28 - 124*	*10/18/11 23:03*	*10/19/11 15:20*	*1*
DCB Decachlorobiphenyl	*94*		*38 - 130*	*10/18/11 23:03*	*10/19/11 15:20*	*1*

Lab Sample ID: LCS 500-129408/3-A
Matrix: Solid
Analysis Batch: 129497

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 129408

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits		
PCB-1016			0.167	0.152		mg/Kg		91	47 - 117		
PCB-1260			0.167	0.170		mg/Kg		102	57 - 122		

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
Tetrachloro-m-xylene	*80*		*28 - 124*
DCB Decachlorobiphenyl	*97*		*38 - 130*

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40292-2

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

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2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40292
Chain of Custody Number:
Page 1 of 2
Temperature °C of Cooler: 2.7

Client: CH2M HILL
Client Project #: 423535.02.SI
Project Name: Crab Orchard National Wildlife Refuge - Plume 2
Project Location/State: Marion, IL
Lab Project #: 500005970
Sampler: J. Burkard/C. Wallestad
Lab PM: Jim Knapp

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOCs 8260B	VOCs 8260B	VOCs 8260B	Percent Moisture	VOCs 8260B	PCBs 8082				Comments
Preservative							H_2O Cool to 4°	Methanol Cool to 4°	Sodium Bisulfate Cool to 4°	7	1	1				
1		33-SB144-11	10/5/11	0955	5	SO	2	1	1	1	—	—				
2		33-SB149-27	10/5/11	1000	5	SO	2	1	1	1	—	—				
3		33-FDUP-003	10/5/11	1000	5	SO	2	1	1	1	—	—				
4		33-SB144-33	10/5/11	1010	5	SO	2	1	1	1	—	—				
5		33-SB148-28	10/5/11	~~1255~~ 1235	5	SO	2	1	1	1	—	—				
6		33-SB146-15	10/5/11	1245	5	SO	2	1	1	1	—	—				
7		FB-001-100511	10/5/11	0900	3	~~SW~~ WW	—	—	—	—	3	—				
8		TB-001-100511	—	—	2	W	—	—	—	—	2	—				
9		33-SB137-31	10/5/11	1545	5	SO	2	1	1	1	—	—				
10		33-SB137-04	10/5/11	1600	1	SO	—	—	—	—	—	1				

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days (Prelim) ___ 15 Days X 14d (Final) ___ Other
Requested Due Date _____

Sample Disposal
[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/5/11		[signature]	TA	10/6/11	1030

Lab Courier:
Shipped: FX
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40292
Chain of Custody Number:
Page 2 of 2
Temperature °C of Cooler:

Client: CH2MHILL
Client Project #: 423535.02.SI
Project Name: Crab Orchard National Wildlife Refuge - Plume 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: J. Burkard / C. Wallsted
Lab PM: Jim Knapp

Preservative: 1
Parameter: PCBs 8082

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	PCBs 8082	Comments
11		33-SB137-20	10/5/11	1610	1	SO	1	

M. Martin

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days (prelim) ___ 15 Days X (final 14d) Other
Requested Due Date

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/5/11			TA	10/6/11	1030
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier
Shipped: FX
Hand Delivered

Matrix Key
WW - Wastewater
W - Water
S - Soil
SL - Sludge
MS - Miscellaneous
OL - Oil
A - Air
SE - Sediment
SO - Soil
L - Leachate
Wi - Wipe
DW - Drinking Water
O - Other

Client Comments

Lab Comments:

TAL-4124-609 (1209)

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-40292-2

Login Number: 40292
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	2.7
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-40426-1
Client Project/Site: Crab Orchard Wildlife Refuge #2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/24/2011 12:19:02 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Definitions 20
QC Association 21
Surrogate Summary 22
QC Sample Results 23
Certification Summary 29
Chain of Custody 30
Receipt Checklists 31

Job ID: 500-40426-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-40426-1

Comments
No additional comments.

Receipt
All other samples were received in good condition within temperature requirements.

GC/MS VOA
Method(s) 8260B: The following samples were diluted due to the abundance of target analytes: 33-FDUP-004 (500-40426-6), 33-GG144-30 (500-40426-5), 33-GG144-30 (500-40426-5 MS), 33-GG144-30 (500-40426-5 MSD), 33-GG146-17.5 (500-40426-3), 33-GG146-26 (500-40426-4), 33-GG149-22 (500-40426-1), 33-GG149-29 (500-40426-2). Elevated reporting limits (RLs) are provided.

Method(s) 8260B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for sample -5 were outside control limits for Chloroethane and Trichloroethene. The associated laboratory control sample (LCS) recovery met acceptance criteria.33-GG144-30 (500-40426-5 MS), 33-GG144-30 (500-40426-5 MSD)

No other analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Client Sample ID: 33-GG149-22 — Lab Sample ID: 500-40426-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.19		0.020	0.0044	mg/L	20		8260B	Total/NA
Vinyl chloride	0.015		0.010	0.0026	mg/L	20		8260B	Total/NA
Trichloroethene - DL	17		0.10	0.036	mg/L	200		8260B	Total/NA

Client Sample ID: 33-GG149-29 — Lab Sample ID: 500-40426-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.14		0.10	0.022	mg/L	100		8260B	Total/NA
Toluene	0.040	J	0.050	0.015	mg/L	100		8260B	Total/NA
1,1,2-Trichloroethane	0.11		0.10	0.030	mg/L	100		8260B	Total/NA
Vinyl chloride	0.032	J	0.050	0.013	mg/L	100		8260B	Total/NA
Trichloroethene - DL	63		0.50	0.18	mg/L	1000		8260B	Total/NA

Client Sample ID: 33-GG146-17.5 — Lab Sample ID: 500-40426-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	3.8		0.050	0.011	mg/L	50		8260B	Total/NA
trans-1,2-Dichloroethene	0.051		0.050	0.014	mg/L	50		8260B	Total/NA
1,1,2-Trichloroethane	0.064		0.050	0.015	mg/L	50		8260B	Total/NA
Vinyl chloride	0.062		0.025	0.0065	mg/L	50		8260B	Total/NA
Trichloroethene - DL	54		0.25	0.090	mg/L	500		8260B	Total/NA

Client Sample ID: 33-GG146-26 — Lab Sample ID: 500-40426-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.44		0.020	0.0044	mg/L	20		8260B	Total/NA
trans-1,2-Dichloroethene	0.011	J	0.020	0.0054	mg/L	20		8260B	Total/NA
Vinyl chloride	0.018		0.010	0.0026	mg/L	20		8260B	Total/NA
Trichloroethene - DL	7.5		0.10	0.036	mg/L	200		8260B	Total/NA

Client Sample ID: 33-GG144-30 — Lab Sample ID: 500-40426-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.33	J	0.50	0.11	mg/L	500		8260B	Total/NA
Ethylbenzene	0.17	J	0.25	0.070	mg/L	500		8260B	Total/NA
methyl isobutyl ketone	1.2	J	2.5	0.40	mg/L	500		8260B	Total/NA
Toluene	1.1		0.25	0.075	mg/L	500		8260B	Total/NA
1,1,1-Trichloroethane	0.27	J	0.50	0.13	mg/L	500		8260B	Total/NA
1,1,2-Trichloroethane	0.22	J	0.50	0.15	mg/L	500		8260B	Total/NA
Trichloroethene - DL	1300		10	3.6	mg/L	20000		8260B	Total/NA

Client Sample ID: 33-FDUP-004 — Lab Sample ID: 500-40426-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.48		0.010	0.0022	mg/L	10		8260B	Total/NA
trans-1,2-Dichloroethene	0.012		0.010	0.0027	mg/L	10		8260B	Total/NA
Vinyl chloride	0.018		0.0050	0.0013	mg/L	10		8260B	Total/NA
Trichloroethene - DL	6.5		0.050	0.018	mg/L	100		8260B	Total/NA

Client Sample ID: TB-001-100611 — Lab Sample ID: 500-40426-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Trichloroethene	0.00052		0.00050	0.00018	mg/L	1		8260B	Total/NA

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-40426-1	33-GG149-22	Water	10/06/11 15:55	10/08/11 09:00
500-40426-2	33-GG149-29	Water	10/06/11 17:00	10/08/11 09:00
500-40426-3	33-GG146-17.5	Water	10/06/11 09:30	10/08/11 09:00
500-40426-4	33-GG146-26	Water	10/06/11 11:35	10/08/11 09:00
500-40426-5	33-GG144-30	Water	10/06/11 15:45	10/08/11 09:00
500-40426-6	33-FDUP-004	Water	10/06/11 11:40	10/08/11 09:00
500-40426-7	TB-001-100611	Water	10/06/11 10:00	10/08/11 09:00

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Client Sample ID: 33-GG149-22
Date Collected: 10/06/11 15:55
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40426-1
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.10	U	0.10	0.038	mg/L			10/20/11 10:34	20
Benzene	0.010	U	0.010	0.0024	mg/L			10/20/11 10:34	20
Bromodichloromethane	0.020	U	0.020	0.0046	mg/L			10/20/11 10:34	20
Bromoform	0.020	U	0.020	0.0090	mg/L			10/20/11 10:34	20
Bromomethane	0.020	U	0.020	0.0098	mg/L			10/20/11 10:34	20
Methyl Ethyl Ketone	0.10	U	0.10	0.020	mg/L			10/20/11 10:34	20
Carbon disulfide	0.10	U	0.10	0.0088	mg/L			10/20/11 10:34	20
Carbon tetrachloride	0.020	U	0.020	0.0056	mg/L			10/20/11 10:34	20
Chlorobenzene	0.020	U	0.020	0.0048	mg/L			10/20/11 10:34	20
Chloroethane	0.020	U	0.020	0.0066	mg/L			10/20/11 10:34	20
Chloroform	0.020	U	0.020	0.0050	mg/L			10/20/11 10:34	20
Chloromethane	0.020	U	0.020	0.0048	mg/L			10/20/11 10:34	20
cis-1,2-Dichloroethene	**0.19**		0.020	0.0044	mg/L			10/20/11 10:34	20
cis-1,3-Dichloropropene	0.020	U	0.020	0.0056	mg/L			10/20/11 10:34	20
Dibromochloromethane	0.020	U	0.020	0.0050	mg/L			10/20/11 10:34	20
1,1-Dichloroethane	0.020	U	0.020	0.0048	mg/L			10/20/11 10:34	20
1,1-Dichloroethene	0.020	U	0.020	0.0058	mg/L			10/20/11 10:34	20
1,2-Dichloropropane	0.020	U	0.020	0.0072	mg/L			10/20/11 10:34	20
Ethylbenzene	0.010	U	0.010	0.0028	mg/L			10/20/11 10:34	20
2-Hexanone	0.10	U	0.10	0.011	mg/L			10/20/11 10:34	20
Methylene Chloride	0.10	U	0.10	0.013	mg/L			10/20/11 10:34	20
methyl isobutyl ketone	0.10	U	0.10	0.016	mg/L			10/20/11 10:34	20
Methyl tert-butyl ether	0.020	U	0.020	0.0056	mg/L			10/20/11 10:34	20
Styrene	0.020	U	0.020	0.0052	mg/L			10/20/11 10:34	20
1,1,2,2-Tetrachloroethane	0.020	U	0.020	0.0070	mg/L			10/20/11 10:34	20
Tetrachloroethene	0.020	U	0.020	0.0044	mg/L			10/20/11 10:34	20
Toluene	0.010	U	0.010	0.0030	mg/L			10/20/11 10:34	20
trans-1,2-Dichloroethene	0.020	U	0.020	0.0054	mg/L			10/20/11 10:34	20
trans-1,3-Dichloropropene	0.020	U	0.020	0.0070	mg/L			10/20/11 10:34	20
1,1,1-Trichloroethane	0.020	U	0.020	0.0052	mg/L			10/20/11 10:34	20
1,1,2-Trichloroethane	0.020	U	0.020	0.0060	mg/L			10/20/11 10:34	20
Vinyl chloride	**0.015**		0.010	0.0026	mg/L			10/20/11 10:34	20
Xylenes, Total	0.020	U	0.020	0.0060	mg/L			10/20/11 10:34	20
1,2-Dichloroethane	0.020	U	0.020	0.0056	mg/L			10/20/11 10:34	20
1,3-Dichloropropene, Total	0.020	U	0.020	0.010	mg/L			10/20/11 10:34	20

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*		*10/20/11 10:34*	*20*
Dibromofluoromethane	*98*		*78 - 119*		*10/20/11 10:34*	*20*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*		*10/20/11 10:34*	*20*
Toluene-d8 (Surr)	*100*		*80 - 121*		*10/20/11 10:34*	*20*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**17**		0.10	0.036	mg/L			10/20/11 10:57	200

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*101*		*77 - 112*		*10/20/11 10:57*	*200*
Dibromofluoromethane	*101*		*78 - 119*		*10/20/11 10:57*	*200*
1,2-Dichloroethane-d4 (Surr)	*111*		*77 - 124*		*10/20/11 10:57*	*200*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/20/11 10:57*	*200*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Client Sample ID: 33-GG149-29

Date Collected: 10/06/11 17:00
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40426-2

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.50	U	0.50	0.19	mg/L			10/20/11 11:21	100
Benzene	0.050	U	0.050	0.012	mg/L			10/20/11 11:21	100
Bromodichloromethane	0.10	U	0.10	0.023	mg/L			10/20/11 11:21	100
Bromoform	0.10	U	0.10	0.045	mg/L			10/20/11 11:21	100
Bromomethane	0.10	U	0.10	0.049	mg/L			10/20/11 11:21	100
Methyl Ethyl Ketone	0.50	U	0.50	0.10	mg/L			10/20/11 11:21	100
Carbon disulfide	0.50	U	0.50	0.044	mg/L			10/20/11 11:21	100
Carbon tetrachloride	0.10	U	0.10	0.028	mg/L			10/20/11 11:21	100
Chlorobenzene	0.10	U	0.10	0.024	mg/L			10/20/11 11:21	100
Chloroethane	0.10	U	0.10	0.033	mg/L			10/20/11 11:21	100
Chloroform	0.10	U	0.10	0.025	mg/L			10/20/11 11:21	100
Chloromethane	0.10	U	0.10	0.024	mg/L			10/20/11 11:21	100
cis-1,2-Dichloroethene	**0.14**		0.10	0.022	mg/L			10/20/11 11:21	100
cis-1,3-Dichloropropene	0.10	U	0.10	0.028	mg/L			10/20/11 11:21	100
Dibromochloromethane	0.10	U	0.10	0.025	mg/L			10/20/11 11:21	100
1,1-Dichloroethane	0.10	U	0.10	0.024	mg/L			10/20/11 11:21	100
1,1-Dichloroethene	0.10	U	0.10	0.029	mg/L			10/20/11 11:21	100
1,2-Dichloropropane	0.10	U	0.10	0.036	mg/L			10/20/11 11:21	100
Ethylbenzene	0.050	U	0.050	0.014	mg/L			10/20/11 11:21	100
2-Hexanone	0.50	U	0.50	0.056	mg/L			10/20/11 11:21	100
Methylene Chloride	0.50	U	0.50	0.063	mg/L			10/20/11 11:21	100
methyl isobutyl ketone	0.50	U	0.50	0.079	mg/L			10/20/11 11:21	100
Methyl tert-butyl ether	0.10	U	0.10	0.028	mg/L			10/20/11 11:21	100
Styrene	0.10	U	0.10	0.026	mg/L			10/20/11 11:21	100
1,1,2,2-Tetrachloroethane	0.10	U	0.10	0.035	mg/L			10/20/11 11:21	100
Tetrachloroethene	0.10	U	0.10	0.022	mg/L			10/20/11 11:21	100
Toluene	**0.040**	**J**	0.050	0.015	mg/L			10/20/11 11:21	100
trans-1,2-Dichloroethene	0.10	U	0.10	0.027	mg/L			10/20/11 11:21	100
trans-1,3-Dichloropropene	0.10	U	0.10	0.035	mg/L			10/20/11 11:21	100
1,1,1-Trichloroethane	0.10	U	0.10	0.026	mg/L			10/20/11 11:21	100
1,1,2-Trichloroethane	**0.11**		0.10	0.030	mg/L			10/20/11 11:21	100
Vinyl chloride	**0.032**	**J**	0.050	0.013	mg/L			10/20/11 11:21	100
Xylenes, Total	0.10	U	0.10	0.030	mg/L			10/20/11 11:21	100
1,2-Dichloroethane	0.10	U	0.10	0.028	mg/L			10/20/11 11:21	100
1,3-Dichloropropene, Total	0.10	U	0.10	0.050	mg/L			10/20/11 11:21	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/20/11 11:21*	*100*
Dibromofluoromethane	*103*		*78 - 119*		*10/20/11 11:21*	*100*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*		*10/20/11 11:21*	*100*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/20/11 11:21*	*100*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**63**		0.50	0.18	mg/L			10/20/11 11:45	1000

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*		*10/20/11 11:45*	*1000*
Dibromofluoromethane	*100*		*78 - 119*		*10/20/11 11:45*	*1000*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*		*10/20/11 11:45*	*1000*
Toluene-d8 (Surr)	*100*		*80 - 121*		*10/20/11 11:45*	*1000*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Client Sample ID: 33-GG146-17.5

Date Collected: 10/06/11 09:30
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40426-3

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.25	U	0.25	0.095	mg/L			10/20/11 12:08	50
Benzene	0.025	U	0.025	0.0060	mg/L			10/20/11 12:08	50
Bromodichloromethane	0.050	U	0.050	0.012	mg/L			10/20/11 12:08	50
Bromoform	0.050	U	0.050	0.023	mg/L			10/20/11 12:08	50
Bromomethane	0.050	U	0.050	0.025	mg/L			10/20/11 12:08	50
Methyl Ethyl Ketone	0.25	U	0.25	0.050	mg/L			10/20/11 12:08	50
Carbon disulfide	0.25	U	0.25	0.022	mg/L			10/20/11 12:08	50
Carbon tetrachloride	0.050	U	0.050	0.014	mg/L			10/20/11 12:08	50
Chlorobenzene	0.050	U	0.050	0.012	mg/L			10/20/11 12:08	50
Chloroethane	0.050	U	0.050	0.017	mg/L			10/20/11 12:08	50
Chloroform	0.050	U	0.050	0.013	mg/L			10/20/11 12:08	50
Chloromethane	0.050	U	0.050	0.012	mg/L			10/20/11 12:08	50
cis-1,2-Dichloroethene	**3.8**		0.050	0.011	mg/L			10/20/11 12:08	50
cis-1,3-Dichloropropene	0.050	U	0.050	0.014	mg/L			10/20/11 12:08	50
Dibromochloromethane	0.050	U	0.050	0.013	mg/L			10/20/11 12:08	50
1,1-Dichloroethane	0.050	U	0.050	0.012	mg/L			10/20/11 12:08	50
1,1-Dichloroethene	0.050	U	0.050	0.015	mg/L			10/20/11 12:08	50
1,2-Dichloropropane	0.050	U	0.050	0.018	mg/L			10/20/11 12:08	50
Ethylbenzene	0.025	U	0.025	0.0070	mg/L			10/20/11 12:08	50
2-Hexanone	0.25	U	0.25	0.028	mg/L			10/20/11 12:08	50
Methylene Chloride	0.25	U	0.25	0.032	mg/L			10/20/11 12:08	50
methyl isobutyl ketone	0.25	U	0.25	0.040	mg/L			10/20/11 12:08	50
Methyl tert-butyl ether	0.050	U	0.050	0.014	mg/L			10/20/11 12:08	50
Styrene	0.050	U	0.050	0.013	mg/L			10/20/11 12:08	50
1,1,2,2-Tetrachloroethane	0.050	U	0.050	0.018	mg/L			10/20/11 12:08	50
Tetrachloroethene	0.050	U	0.050	0.011	mg/L			10/20/11 12:08	50
Toluene	0.025	U	0.025	0.0075	mg/L			10/20/11 12:08	50
trans-1,2-Dichloroethene	**0.051**		0.050	0.014	mg/L			10/20/11 12:08	50
trans-1,3-Dichloropropene	0.050	U	0.050	0.018	mg/L			10/20/11 12:08	50
1,1,1-Trichloroethane	0.050	U	0.050	0.013	mg/L			10/20/11 12:08	50
1,1,2-Trichloroethane	**0.064**		0.050	0.015	mg/L			10/20/11 12:08	50
Vinyl chloride	**0.062**		0.025	0.0065	mg/L			10/20/11 12:08	50
Xylenes, Total	0.050	U	0.050	0.015	mg/L			10/20/11 12:08	50
1,2-Dichloroethane	0.050	U	0.050	0.014	mg/L			10/20/11 12:08	50
1,3-Dichloropropene, Total	0.050	U	0.050	0.025	mg/L			10/20/11 12:08	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/20/11 12:08*	*50*
Dibromofluoromethane	*101*		*78 - 119*		*10/20/11 12:08*	*50*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*		*10/20/11 12:08*	*50*
Toluene-d8 (Surr)	*100*		*80 - 121*		*10/20/11 12:08*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**54**		0.25	0.090	mg/L			10/20/11 12:32	500

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/20/11 12:32*	*500*
Dibromofluoromethane	*101*		*78 - 119*		*10/20/11 12:32*	*500*
1,2-Dichloroethane-d4 (Surr)	*109*		*77 - 124*		*10/20/11 12:32*	*500*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/20/11 12:32*	*500*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Client Sample ID: 33-GG146-26
Date Collected: 10/06/11 11:35
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40426-4
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.10	U	0.10	0.038	mg/L			10/20/11 12:56	20
Benzene	0.010	U	0.010	0.0024	mg/L			10/20/11 12:56	20
Bromodichloromethane	0.020	U	0.020	0.0046	mg/L			10/20/11 12:56	20
Bromoform	0.020	U	0.020	0.0090	mg/L			10/20/11 12:56	20
Bromomethane	0.020	U	0.020	0.0098	mg/L			10/20/11 12:56	20
Methyl Ethyl Ketone	0.10	U	0.10	0.020	mg/L			10/20/11 12:56	20
Carbon disulfide	0.10	U	0.10	0.0088	mg/L			10/20/11 12:56	20
Carbon tetrachloride	0.020	U	0.020	0.0056	mg/L			10/20/11 12:56	20
Chlorobenzene	0.020	U	0.020	0.0048	mg/L			10/20/11 12:56	20
Chloroethane	0.020	U	0.020	0.0066	mg/L			10/20/11 12:56	20
Chloroform	0.020	U	0.020	0.0050	mg/L			10/20/11 12:56	20
Chloromethane	0.020	U	0.020	0.0048	mg/L			10/20/11 12:56	20
cis-1,2-Dichloroethene	**0.44**		0.020	0.0044	mg/L			10/20/11 12:56	20
cis-1,3-Dichloropropene	0.020	U	0.020	0.0056	mg/L			10/20/11 12:56	20
Dibromochloromethane	0.020	U	0.020	0.0050	mg/L			10/20/11 12:56	20
1,1-Dichloroethane	0.020	U	0.020	0.0048	mg/L			10/20/11 12:56	20
1,1-Dichloroethene	0.020	U	0.020	0.0058	mg/L			10/20/11 12:56	20
1,2-Dichloropropane	0.020	U	0.020	0.0072	mg/L			10/20/11 12:56	20
Ethylbenzene	0.010	U	0.010	0.0028	mg/L			10/20/11 12:56	20
2-Hexanone	0.10	U	0.10	0.011	mg/L			10/20/11 12:56	20
Methylene Chloride	0.10	U	0.10	0.013	mg/L			10/20/11 12:56	20
methyl isobutyl ketone	0.10	U	0.10	0.016	mg/L			10/20/11 12:56	20
Methyl tert-butyl ether	0.020	U	0.020	0.0056	mg/L			10/20/11 12:56	20
Styrene	0.020	U	0.020	0.0052	mg/L			10/20/11 12:56	20
1,1,2,2-Tetrachloroethane	0.020	U	0.020	0.0070	mg/L			10/20/11 12:56	20
Tetrachloroethene	0.020	U	0.020	0.0044	mg/L			10/20/11 12:56	20
Toluene	0.010	U	0.010	0.0030	mg/L			10/20/11 12:56	20
trans-1,2-Dichloroethene	**0.011**	**J**	0.020	0.0054	mg/L			10/20/11 12:56	20
trans-1,3-Dichloropropene	0.020	U	0.020	0.0070	mg/L			10/20/11 12:56	20
1,1,1-Trichloroethane	0.020	U	0.020	0.0052	mg/L			10/20/11 12:56	20
1,1,2-Trichloroethane	0.020	U	0.020	0.0060	mg/L			10/20/11 12:56	20
Vinyl chloride	**0.018**		0.010	0.0026	mg/L			10/20/11 12:56	20
Xylenes, Total	0.020	U	0.020	0.0060	mg/L			10/20/11 12:56	20
1,2-Dichloroethane	0.020	U	0.020	0.0056	mg/L			10/20/11 12:56	20
1,3-Dichloropropene, Total	0.020	U	0.020	0.010	mg/L			10/20/11 12:56	20

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*		*10/20/11 12:56*	*20*
Dibromofluoromethane	*105*		*78 - 119*		*10/20/11 12:56*	*20*
1,2-Dichloroethane-d4 (Surr)	*112*		*77 - 124*		*10/20/11 12:56*	*20*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/20/11 12:56*	*20*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**7.5**		0.10	0.036	mg/L			10/20/11 13:19	200

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*		*10/20/11 13:19*	*200*
Dibromofluoromethane	*102*		*78 - 119*		*10/20/11 13:19*	*200*
1,2-Dichloroethane-d4 (Surr)	*111*		*77 - 124*		*10/20/11 13:19*	*200*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/20/11 13:19*	*200*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Client Sample ID: 33-GG144-30

Date Collected: 10/06/11 15:45
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40426-5

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	2.5	U	2.5	0.95	mg/L			10/20/11 13:43	500
Benzene	0.25	U	0.25	0.060	mg/L			10/20/11 13:43	500
Bromodichloromethane	0.50	U	0.50	0.12	mg/L			10/20/11 13:43	500
Bromoform	0.50	U	0.50	0.23	mg/L			10/20/11 13:43	500
Bromomethane	0.50	U	0.50	0.25	mg/L			10/20/11 13:43	500
Methyl Ethyl Ketone	2.5	U	2.5	0.50	mg/L			10/20/11 13:43	500
Carbon disulfide	2.5	U	2.5	0.22	mg/L			10/20/11 13:43	500
Carbon tetrachloride	0.50	U	0.50	0.14	mg/L			10/20/11 13:43	500
Chlorobenzene	0.50	U	0.50	0.12	mg/L			10/20/11 13:43	500
Chloroethane	0.50	U	0.50	0.17	mg/L			10/20/11 13:43	500
Chloroform	0.50	U	0.50	0.13	mg/L			10/20/11 13:43	500
Chloromethane	0.50	U	0.50	0.12	mg/L			10/20/11 13:43	500
cis-1,2-Dichloroethene	**0.33**	**J**	0.50	0.11	mg/L			10/20/11 13:43	500
cis-1,3-Dichloropropene	0.50	U	0.50	0.14	mg/L			10/20/11 13:43	500
Dibromochloromethane	0.50	U	0.50	0.13	mg/L			10/20/11 13:43	500
1,1-Dichloroethane	0.50	U	0.50	0.12	mg/L			10/20/11 13:43	500
1,1-Dichloroethene	0.50	U	0.50	0.15	mg/L			10/20/11 13:43	500
1,2-Dichloropropane	0.50	U	0.50	0.18	mg/L			10/20/11 13:43	500
Ethylbenzene	**0.17**	**J**	0.25	0.070	mg/L			10/20/11 13:43	500
2-Hexanone	2.5	U	2.5	0.28	mg/L			10/20/11 13:43	500
Methylene Chloride	2.5	U	2.5	0.32	mg/L			10/20/11 13:43	500
methyl isobutyl ketone	**1.2**	**J**	2.5	0.40	mg/L			10/20/11 13:43	500
Methyl tert-butyl ether	0.50	U	0.50	0.14	mg/L			10/20/11 13:43	500
Styrene	0.50	U	0.50	0.13	mg/L			10/20/11 13:43	500
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.18	mg/L			10/20/11 13:43	500
Tetrachloroethene	0.50	U	0.50	0.11	mg/L			10/20/11 13:43	500
Toluene	**1.1**		0.25	0.075	mg/L			10/20/11 13:43	500
trans-1,2-Dichloroethene	0.50	U	0.50	0.14	mg/L			10/20/11 13:43	500
trans-1,3-Dichloropropene	0.50	U	0.50	0.18	mg/L			10/20/11 13:43	500
1,1,1-Trichloroethane	**0.27**	**J**	0.50	0.13	mg/L			10/20/11 13:43	500
1,1,2-Trichloroethane	**0.22**	**J**	0.50	0.15	mg/L			10/20/11 13:43	500
Vinyl chloride	0.25	U	0.25	0.065	mg/L			10/20/11 13:43	500
Xylenes, Total	0.50	U	0.50	0.15	mg/L			10/20/11 13:43	500
1,2-Dichloroethane	0.50	U	0.50	0.14	mg/L			10/20/11 13:43	500
1,3-Dichloropropene, Total	0.50	U	0.50	0.25	mg/L			10/20/11 13:43	500

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*		*10/20/11 13:43*	*500*
Dibromofluoromethane	*100*		*78 - 119*		*10/20/11 13:43*	*500*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*		*10/20/11 13:43*	*500*
Toluene-d8 (Surr)	*97*		*80 - 121*		*10/20/11 13:43*	*500*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**1300**		10	3.6	mg/L			10/20/11 22:02	20000

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/20/11 22:02*	*20000*
Dibromofluoromethane	*102*		*78 - 119*		*10/20/11 22:02*	*20000*
1,2-Dichloroethane-d4 (Surr)	*103*		*77 - 124*		*10/20/11 22:02*	*20000*
Toluene-d8 (Surr)	*102*		*80 - 121*		*10/20/11 22:02*	*20000*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Client Sample ID: 33-FDUP-004

Date Collected: 10/06/11 11:40
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40426-6

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.050	U	0.050	0.019	mg/L			10/20/11 14:30	10
Benzene	0.0050	U	0.0050	0.0012	mg/L			10/20/11 14:30	10
Bromodichloromethane	0.010	U	0.010	0.0023	mg/L			10/20/11 14:30	10
Bromoform	0.010	U	0.010	0.0045	mg/L			10/20/11 14:30	10
Bromomethane	0.010	U	0.010	0.0049	mg/L			10/20/11 14:30	10
Methyl Ethyl Ketone	0.050	U	0.050	0.010	mg/L			10/20/11 14:30	10
Carbon disulfide	0.050	U	0.050	0.0044	mg/L			10/20/11 14:30	10
Carbon tetrachloride	0.010	U	0.010	0.0028	mg/L			10/20/11 14:30	10
Chlorobenzene	0.010	U	0.010	0.0024	mg/L			10/20/11 14:30	10
Chloroethane	0.010	U	0.010	0.0033	mg/L			10/20/11 14:30	10
Chloroform	0.010	U	0.010	0.0025	mg/L			10/20/11 14:30	10
Chloromethane	0.010	U	0.010	0.0024	mg/L			10/20/11 14:30	10
cis-1,2-Dichloroethene	**0.48**		0.010	0.0022	mg/L			10/20/11 14:30	10
cis-1,3-Dichloropropene	0.010	U	0.010	0.0028	mg/L			10/20/11 14:30	10
Dibromochloromethane	0.010	U	0.010	0.0025	mg/L			10/20/11 14:30	10
1,1-Dichloroethane	0.010	U	0.010	0.0024	mg/L			10/20/11 14:30	10
1,1-Dichloroethene	0.010	U	0.010	0.0029	mg/L			10/20/11 14:30	10
1,2-Dichloropropane	0.010	U	0.010	0.0036	mg/L			10/20/11 14:30	10
Ethylbenzene	0.0050	U	0.0050	0.0014	mg/L			10/20/11 14:30	10
2-Hexanone	0.050	U	0.050	0.0056	mg/L			10/20/11 14:30	10
Methylene Chloride	0.050	U	0.050	0.0063	mg/L			10/20/11 14:30	10
methyl isobutyl ketone	0.050	U	0.050	0.0079	mg/L			10/20/11 14:30	10
Methyl tert-butyl ether	0.010	U	0.010	0.0028	mg/L			10/20/11 14:30	10
Styrene	0.010	U	0.010	0.0026	mg/L			10/20/11 14:30	10
1,1,2,2-Tetrachloroethane	0.010	U	0.010	0.0035	mg/L			10/20/11 14:30	10
Tetrachloroethene	0.010	U	0.010	0.0022	mg/L			10/20/11 14:30	10
Toluene	0.0050	U	0.0050	0.0015	mg/L			10/20/11 14:30	10
trans-1,2-Dichloroethene	**0.012**		0.010	0.0027	mg/L			10/20/11 14:30	10
trans-1,3-Dichloropropene	0.010	U	0.010	0.0035	mg/L			10/20/11 14:30	10
1,1,1-Trichloroethane	0.010	U	0.010	0.0026	mg/L			10/20/11 14:30	10
1,1,2-Trichloroethane	0.010	U	0.010	0.0030	mg/L			10/20/11 14:30	10
Vinyl chloride	**0.018**		0.0050	0.0013	mg/L			10/20/11 14:30	10
Xylenes, Total	0.010	U	0.010	0.0030	mg/L			10/20/11 14:30	10
1,2-Dichloroethane	0.010	U	0.010	0.0028	mg/L			10/20/11 14:30	10
1,3-Dichloropropene, Total	0.010	U	0.010	0.0050	mg/L			10/20/11 14:30	10

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/20/11 14:30*	*10*
Dibromofluoromethane	*105*		*78 - 119*		*10/20/11 14:30*	*10*
1,2-Dichloroethane-d4 (Surr)	*109*		*77 - 124*		*10/20/11 14:30*	*10*
Toluene-d8 (Surr)	*99*		*80 - 121*		*10/20/11 14:30*	*10*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**6.5**		0.050	0.018	mg/L			10/20/11 14:54	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*		*10/20/11 14:54*	*100*
Dibromofluoromethane	*103*		*78 - 119*		*10/20/11 14:54*	*100*
1,2-Dichloroethane-d4 (Surr)	*109*		*77 - 124*		*10/20/11 14:54*	*100*
Toluene-d8 (Surr)	*99*		*80 - 121*		*10/20/11 14:54*	*100*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Client Sample ID: TB-001-100611

Date Collected: 10/06/11 10:00
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40426-7

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/20/11 10:10	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/20/11 10:10	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/20/11 10:10	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/20/11 10:10	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/20/11 10:10	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/20/11 10:10	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/20/11 10:10	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/20/11 10:10	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/20/11 10:10	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/20/11 10:10	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/20/11 10:10	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/20/11 10:10	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/20/11 10:10	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/20/11 10:10	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/20/11 10:10	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/20/11 10:10	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/20/11 10:10	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/20/11 10:10	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/20/11 10:10	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/20/11 10:10	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/20/11 10:10	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/20/11 10:10	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/20/11 10:10	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/20/11 10:10	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/20/11 10:10	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/20/11 10:10	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/20/11 10:10	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/20/11 10:10	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/20/11 10:10	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/20/11 10:10	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/20/11 10:10	1
Trichloroethene	**0.00052**		0.00050	0.00018	mg/L			10/20/11 10:10	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/20/11 10:10	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/20/11 10:10	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/20/11 10:10	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/20/11 10:10	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*		*10/20/11 10:10*	*1*
Dibromofluoromethane	*97*		*78 - 119*		*10/20/11 10:10*	*1*
1,2-Dichloroethane-d4 (Surr)	*108*		*77 - 124*		*10/20/11 10:10*	*1*
Toluene-d8 (Surr)	*100*		*80 - 121*		*10/20/11 10:10*	*1*

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
F	MS or MSD exceeds the control limits
4	MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.
E	Result exceeded calibration range.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

GC/MS VOA

Analysis Batch: 129516

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40426-1	33-GG149-22	Total/NA	Water	8260B	
500-40426-1 - DL	33-GG149-22	Total/NA	Water	8260B	
500-40426-2	33-GG149-29	Total/NA	Water	8260B	
500-40426-2 - DL	33-GG149-29	Total/NA	Water	8260B	
500-40426-3	33-GG146-17.5	Total/NA	Water	8260B	
500-40426-3 - DL	33-GG146-17.5	Total/NA	Water	8260B	
500-40426-4	33-GG146-26	Total/NA	Water	8260B	
500-40426-4 - DL	33-GG146-26	Total/NA	Water	8260B	
500-40426-5	33-GG144-30	Total/NA	Water	8260B	
500-40426-5 MS	33-GG144-30	Total/NA	Water	8260B	
500-40426-5 MSD	33-GG144-30	Total/NA	Water	8260B	
500-40426-6	33-FDUP-004	Total/NA	Water	8260B	
500-40426-6 - DL	33-FDUP-004	Total/NA	Water	8260B	
500-40426-7	TB-001-100611	Total/NA	Water	8260B	
LCS 500-129516/4	Lab Control Sample	Total/NA	Water	8260B	
MB 500-129516/6	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 129652

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40426-5 - DL	33-GG144-30	Total/NA	Water	8260B	
LCS 500-129652/6	Lab Control Sample	Total/NA	Water	8260B	
MB 500-129652/5	Method Blank	Total/NA	Water	8260B	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40426-1	33-GG149-22	96	98	106	100
500-40426-1 - DL	33-GG149-22	101	101	111	101
500-40426-2	33-GG149-29	98	103	107	101
500-40426-2 - DL	33-GG149-29	96	100	107	100
500-40426-3	33-GG146-17.5	100	101	107	100
500-40426-3 - DL	33-GG146-17.5	98	101	109	101
500-40426-4	33-GG146-26	99	105	112	101
500-40426-4 - DL	33-GG146-26	99	102	111	101
500-40426-5	33-GG144-30	93	100	105	97
500-40426-5 - DL	33-GG144-30	98	102	103	102
500-40426-5 MS	33-GG144-30	101	104	109	102
500-40426-5 MSD	33-GG144-30	96	101	107	99
500-40426-6	33-FDUP-004	100	105	109	99
500-40426-6 - DL	33-FDUP-004	97	103	109	99
500-40426-7	TB-001-100611	99	97	108	100
LCS 500-129516/4	Lab Control Sample	99	103	105	98
LCS 500-129652/6	Lab Control Sample	98	100	98	109
MB 500-129516/6	Method Blank	102	103	107	102
MB 500-129652/5	Method Blank	98	94	99	103

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-129516/6
Matrix: Water
Analysis Batch: 129516

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/20/11 07:02	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/20/11 07:02	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/20/11 07:02	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/20/11 07:02	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/20/11 07:02	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/20/11 07:02	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/20/11 07:02	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/20/11 07:02	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/20/11 07:02	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/20/11 07:02	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/20/11 07:02	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/20/11 07:02	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/20/11 07:02	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/20/11 07:02	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/20/11 07:02	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/20/11 07:02	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/20/11 07:02	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/20/11 07:02	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/20/11 07:02	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/20/11 07:02	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/20/11 07:02	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/20/11 07:02	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/20/11 07:02	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/20/11 07:02	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/20/11 07:02	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/20/11 07:02	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/20/11 07:02	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/20/11 07:02	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/20/11 07:02	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/20/11 07:02	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/20/11 07:02	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/20/11 07:02	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/20/11 07:02	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/20/11 07:02	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/20/11 07:02	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/20/11 07:02	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*102*		*77 - 112*		*10/20/11 07:02*	*1*
Dibromofluoromethane	*103*		*78 - 119*		*10/20/11 07:02*	*1*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*		*10/20/11 07:02*	*1*
Toluene-d8 (Surr)	*102*		*80 - 121*		*10/20/11 07:02*	*1*

Lab Sample ID: LCS 500-129516/4
Matrix: Water
Analysis Batch: 129516

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0586		mg/L		117	43 - 153

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-129516/4
Matrix: Water
Analysis Batch: 129516

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Benzene	0.0500	0.0436		mg/L		87	74 - 113
Bromodichloromethane	0.0500	0.0486		mg/L		97	73 - 120
Bromoform	0.0500	0.0532		mg/L		106	64 - 126
Bromomethane	0.0500	0.0411		mg/L		82	46 - 155
Methyl Ethyl Ketone	0.0500	0.0547		mg/L		109	42 - 152
Carbon disulfide	0.0500	0.0269		mg/L		54	36 - 110
Carbon tetrachloride	0.0500	0.0459		mg/L		92	58 - 132
Chlorobenzene	0.0500	0.0466		mg/L		93	81 - 111
Chloroethane	0.0500	0.0483		mg/L		97	54 - 149
Chloroform	0.0500	0.0467		mg/L		93	71 - 116
Chloromethane	0.0500	0.0516		mg/L		103	36 - 148
cis-1,2-Dichloroethene	0.0500	0.0449		mg/L		90	66 - 111
cis-1,3-Dichloropropene	0.0538	0.0483		mg/L		90	65 - 114
Dibromochloromethane	0.0500	0.0516		mg/L		103	73 - 118
1,1-Dichloroethane	0.0500	0.0425		mg/L		85	64 - 117
1,1-Dichloroethene	0.0500	0.0364		mg/L		73	60 - 126
1,2-Dichloropropane	0.0500	0.0468		mg/L		94	68 - 123
Ethylbenzene	0.0500	0.0465		mg/L		93	79 - 114
2-Hexanone	0.0500	0.0553		mg/L		111	55 - 138
Methylene Chloride	0.0500	0.0422		mg/L		84	65 - 125
methyl isobutyl ketone	0.0500	0.0537		mg/L		107	56 - 138
Methyl tert-butyl ether	0.0500	0.0511		mg/L		102	57 - 119
Styrene	0.0500	0.0478		mg/L		96	76 - 118
1,1,2,2-Tetrachloroethane	0.0500	0.0501		mg/L		100	66 - 121
Tetrachloroethene	0.0500	0.0433		mg/L		87	76 - 114
Toluene	0.0500	0.0456		mg/L		91	76 - 121
trans-1,2-Dichloroethene	0.0500	0.0450		mg/L		90	67 - 120
trans-1,3-Dichloropropene	0.0486	0.0448		mg/L		92	60 - 119
1,1,1-Trichloroethane	0.0500	0.0464		mg/L		93	66 - 128
1,1,2-Trichloroethane	0.0500	0.0482		mg/L		96	62 - 137
Trichloroethene	0.0500	0.0422		mg/L		84	75 - 116
Vinyl chloride	0.0500	0.0535		mg/L		107	47 - 138
Xylenes, Total	0.150	0.140		mg/L		93	74 - 117
1,2-Dichloroethane	0.0500	0.0471		mg/L		94	69 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*
Dibromofluoromethane	*103*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*
Toluene-d8 (Surr)	*98*		*80 - 121*

Lab Sample ID: 500-40426-5 MS
Matrix: Water
Analysis Batch: 129516

Client Sample ID: 33-GG144-30
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	2.5	U	25.0	29.1		mg/L		116	43 - 153
Benzene	0.25	U	25.0	21.7		mg/L		87	74 - 113
Bromodichloromethane	0.50	U	25.0	25.3		mg/L		101	73 - 120

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 500-40426-5 MS
Matrix: Water
Analysis Batch: 129516

Client Sample ID: 33-GG144-30
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Bromoform	0.50	U	25.0	27.1		mg/L		108	64 - 126
Bromomethane	0.50	U	25.0	23.5		mg/L		94	46 - 155
Methyl Ethyl Ketone	2.5	U	25.0	25.2		mg/L		101	42 - 152
Carbon disulfide	2.5	U	25.0	13.4		mg/L		54	36 - 110
Carbon tetrachloride	0.50	U	25.0	25.3		mg/L		101	58 - 132
Chlorobenzene	0.50	U	25.0	23.3		mg/L		93	81 - 111
Chloroethane	0.50	U	25.0	62.5	F	mg/L		250	54 - 149
Chloroform	0.50	U	25.0	22.9		mg/L		91	71 - 116
Chloromethane	0.50	U	25.0	31.9		mg/L		128	36 - 148
cis-1,2-Dichloroethene	0.33	J	25.0	22.1		mg/L		87	66 - 111
cis-1,3-Dichloropropene	0.50	U	26.9	24.0		mg/L		89	65 - 114
Dibromochloromethane	0.50	U	25.0	26.3		mg/L		105	73 - 118
1,1-Dichloroethane	0.50	U	25.0	21.1		mg/L		84	64 - 117
1,1-Dichloroethene	0.50	U	25.0	17.7		mg/L		71	60 - 126
1,2-Dichloropropane	0.50	U	25.0	23.7		mg/L		95	68 - 123
Ethylbenzene	0.17	J	25.0	23.3		mg/L		92	79 - 114
2-Hexanone	2.5	U	25.0	27.5		mg/L		110	55 - 138
Methylene Chloride	2.5	U	25.0	20.1		mg/L		80	65 - 125
methyl isobutyl ketone	1.2	J	25.0	26.3		mg/L		100	56 - 138
Methyl tert-butyl ether	0.50	U	25.0	23.4		mg/L		93	57 - 119
Styrene	0.50	U	25.0	24.2		mg/L		97	76 - 118
1,1,2,2-Tetrachloroethane	0.50	U	25.0	25.1		mg/L		100	66 - 121
Tetrachloroethene	0.50	U	25.0	22.4		mg/L		90	76 - 114
Toluene	1.1		25.0	24.0		mg/L		91	76 - 121
trans-1,2-Dichloroethene	0.50	U	25.0	21.5		mg/L		86	67 - 120
trans-1,3-Dichloropropene	0.50	U	24.3	22.6		mg/L		93	60 - 119
1,1,1-Trichloroethane	0.27	J	25.0	23.2		mg/L		92	66 - 128
1,1,2-Trichloroethane	0.22	J	25.0	24.1		mg/L		95	62 - 137
Trichloroethene	1000		25.0	1060	E 4	mg/L		30	75 - 116
Vinyl chloride	0.25	U	25.0	30.9		mg/L		123	47 - 138
Xylenes, Total	0.50	U	75.0	70.0		mg/L		93	74 - 117
1,2-Dichloroethane	0.50	U	25.0	24.2		mg/L		97	69 - 115

Surrogate	*MS % Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*101*		*77 - 112*
Dibromofluoromethane	*104*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*109*		*77 - 124*
Toluene-d8 (Surr)	*102*		*80 - 121*

Lab Sample ID: 500-40426-5 MSD
Matrix: Water
Analysis Batch: 129516

Client Sample ID: 33-GG144-30
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	2.5	U	25.0	30.0		mg/L		120	43 - 153	3	20
Benzene	0.25	U	25.0	22.4		mg/L		89	74 - 113	3	20
Bromodichloromethane	0.50	U	25.0	26.3		mg/L		105	73 - 120	4	20
Bromoform	0.50	U	25.0	28.9		mg/L		115	64 - 126	6	20
Bromomethane	0.50	U	25.0	25.7		mg/L		103	46 - 155	9	20

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 500-40426-5 MSD — **Client Sample ID: 33-GG144-30**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 129516

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Methyl Ethyl Ketone	2.5	U	25.0	27.2		mg/L		109	42 - 152	8	20
Carbon disulfide	2.5	U	25.0	14.2		mg/L		57	36 - 110	6	20
Carbon tetrachloride	0.50	U	25.0	27.7		mg/L		111	58 - 132	9	20
Chlorobenzene	0.50	U	25.0	24.1		mg/L		96	81 - 111	3	20
Chloroethane	0.50	U	25.0	63.6	F	mg/L		254	54 - 149	2	20
Chloroform	0.50	U	25.0	24.2		mg/L		97	71 - 116	6	20
Chloromethane	0.50	U	25.0	31.4		mg/L		125	36 - 148	2	20
cis-1,2-Dichloroethene	0.33	J	25.0	23.2		mg/L		91	66 - 111	5	20
cis-1,3-Dichloropropene	0.50	U	26.9	25.3		mg/L		94	65 - 114	5	20
Dibromochloromethane	0.50	U	25.0	28.1		mg/L		112	73 - 118	6	20
1,1-Dichloroethane	0.50	U	25.0	22.3		mg/L		89	64 - 117	6	20
1,1-Dichloroethene	0.50	U	25.0	18.8		mg/L		75	60 - 126	6	20
1,2-Dichloropropane	0.50	U	25.0	24.8		mg/L		99	68 - 123	4	20
Ethylbenzene	0.17	J	25.0	24.4		mg/L		97	79 - 114	5	20
2-Hexanone	2.5	U	25.0	29.4		mg/L		118	55 - 138	7	20
Methylene Chloride	2.5	U	25.0	21.1		mg/L		84	65 - 125	5	20
methyl isobutyl ketone	1.2	J	25.0	30.5		mg/L		117	56 - 138	15	20
Methyl tert-butyl ether	0.50	U	25.0	25.7		mg/L		103	57 - 119	9	20
Styrene	0.50	U	25.0	24.6		mg/L		98	76 - 118	2	20
1,1,2,2-Tetrachloroethane	0.50	U	25.0	28.4		mg/L		114	66 - 121	13	20
Tetrachloroethene	0.50	U	25.0	22.9		mg/L		91	76 - 114	2	20
Toluene	1.1		25.0	24.8		mg/L		94	76 - 121	3	20
trans-1,2-Dichloroethene	0.50	U	25.0	22.5		mg/L		90	67 - 120	5	20
trans-1,3-Dichloropropene	0.50	U	24.3	24.2		mg/L		99	60 - 119	7	20
1,1,1-Trichloroethane	0.27	J	25.0	25.0		mg/L		99	66 - 128	7	20
1,1,2-Trichloroethane	0.22	J	25.0	25.4		mg/L		101	62 - 137	5	20
Trichloroethene	1000		25.0	1090	E 4	mg/L		153	75 - 116	3	20
Vinyl chloride	0.25	U	25.0	31.2		mg/L		125	47 - 138	1	20
Xylenes, Total	0.50	U	75.0	71.4		mg/L		95	74 - 117	2	20
1,2-Dichloroethane	0.50	U	25.0	25.4		mg/L		102	69 - 115	5	20

Surrogate	*MSD % Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*
Dibromofluoromethane	*101*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*
Toluene-d8 (Surr)	*99*		*80 - 121*

Lab Sample ID: MB 500-129652/5 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 129652

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/20/11 16:20	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/20/11 16:20	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/20/11 16:20	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/20/11 16:20	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/20/11 16:20	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/20/11 16:20	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/20/11 16:20	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-129652/5
Matrix: Water
Analysis Batch: 129652

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/20/11 16:20	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/20/11 16:20	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/20/11 16:20	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/20/11 16:20	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/20/11 16:20	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/20/11 16:20	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/20/11 16:20	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/20/11 16:20	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/20/11 16:20	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/20/11 16:20	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/20/11 16:20	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/20/11 16:20	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/20/11 16:20	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/20/11 16:20	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/20/11 16:20	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/20/11 16:20	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/20/11 16:20	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/20/11 16:20	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/20/11 16:20	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/20/11 16:20	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/20/11 16:20	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/20/11 16:20	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/20/11 16:20	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/20/11 16:20	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/20/11 16:20	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/20/11 16:20	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/20/11 16:20	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/20/11 16:20	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/20/11 16:20	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/20/11 16:20*	*1*
Dibromofluoromethane	*94*		*78 - 119*		*10/20/11 16:20*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*		*10/20/11 16:20*	*1*
Toluene-d8 (Surr)	*103*		*80 - 121*		*10/20/11 16:20*	*1*

Lab Sample ID: LCS 500-129652/6
Matrix: Water
Analysis Batch: 129652

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0387		mg/L		77	43 - 153
Benzene	0.0500	0.0407		mg/L		81	74 - 113
Bromodichloromethane	0.0500	0.0462		mg/L		92	73 - 120
Bromoform	0.0500	0.0386		mg/L		77	64 - 126
Bromomethane	0.0500	0.0579		mg/L		116	46 - 155
Methyl Ethyl Ketone	0.0500	0.0371		mg/L		74	42 - 152
Carbon disulfide	0.0500	0.0246		mg/L		49	36 - 110
Carbon tetrachloride	0.0500	0.0397		mg/L		79	58 - 132

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-129652/6
Matrix: Water
Analysis Batch: 129652

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chlorobenzene	0.0500	0.0438		mg/L		88	81 - 111
Chloroethane	0.0500	0.0520		mg/L		104	54 - 149
Chloroform	0.0500	0.0421		mg/L		84	71 - 116
Chloromethane	0.0500	0.0504		mg/L		101	36 - 148
cis-1,2-Dichloroethene	0.0500	0.0421		mg/L		84	66 - 111
cis-1,3-Dichloropropene	0.0538	0.0500		mg/L		93	65 - 114
Dibromochloromethane	0.0500	0.0395		mg/L		79	73 - 118
1,1-Dichloroethane	0.0500	0.0393		mg/L		79	64 - 117
1,1-Dichloroethene	0.0500	0.0327		mg/L		65	60 - 126
1,2-Dichloropropane	0.0500	0.0446		mg/L		89	68 - 123
Ethylbenzene	0.0500	0.0429		mg/L		86	79 - 114
2-Hexanone	0.0500	0.0428		mg/L		86	55 - 138
Methylene Chloride	0.0500	0.0418		mg/L		84	65 - 125
methyl isobutyl ketone	0.0500	0.0464		mg/L		93	56 - 138
Methyl tert-butyl ether	0.0500	0.0413		mg/L		83	57 - 119
Styrene	0.0500	0.0450		mg/L		90	76 - 118
1,1,2,2-Tetrachloroethane	0.0500	0.0491		mg/L		98	66 - 121
Tetrachloroethene	0.0500	0.0407		mg/L		81	76 - 114
Toluene	0.0500	0.0465		mg/L		93	76 - 121
trans-1,2-Dichloroethene	0.0500	0.0407		mg/L		81	67 - 120
trans-1,3-Dichloropropene	0.0486	0.0429		mg/L		88	60 - 119
1,1,1-Trichloroethane	0.0500	0.0422		mg/L		84	66 - 128
1,1,2-Trichloroethane	0.0500	0.0492		mg/L		98	62 - 137
Trichloroethene	0.0500	0.0412		mg/L		82	75 - 116
Vinyl chloride	0.0500	0.0534		mg/L		107	47 - 138
Xylenes, Total	0.150	0.126		mg/L		84	74 - 117
1,2-Dichloroethane	0.0500	0.0412		mg/L		82	69 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*
Dibromofluoromethane	*100*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*98*		*77 - 124*
Toluene-d8 (Surr)	*109*		*80 - 121*

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40426-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40426

Chain of Custody Number:

Page ___ of ___

Temperature °C of Cooler: 2.6

Client: CH2M HILL
Client Project #: 423535.02.SJ
Project Name: CONWR Phase 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: Carrie Wallstedt, Jason Bickel
Lab PM: Jim Knapp

Preservative: HCl
Parameter: VOC

Preservative Key
1. HCL, Cool to 4°
2. HZSO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOC	Comments
1		33-GG149-22	10/6/11	1555	2	W	2	
2		33-GG149-29	10/6/11	1700	3	W	3	
3		33-GG146-17.5	10/6/11	~~1040~~ 0930	2	W	2	
4		33-GG146-26	10/6/11	1135	2	W	2	
5	✓	33-GG149-30	10/6/11	1545	6	W	6	
6		33-FDUP-004	10/6/11	~~1140~~ 1140	2	W	2	
7		TB-001-100611	10/6/11	1000	2	W	2	

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days ___ 10 Days ___ ~~15~~ Days ___ Other
Requested Due Date ___

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for ___ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Carrie Wallstedt	CH2M	10/6/11	1900	FedEx			

Received By	Company	Date	Time
	TA	10/8/11	0900

Lab Courier:
Shipped: FX
Hand Delivered:

Matrix Key
WW - Wastewater
W - Water
S - Soil
SL - Sludge
MS - Miscellaneous
OL - Oil
A - Air
SE - Sediment
SO - Soil
L - Leachate
WI - Wipe
DW - Drinking Water
O - Other

Client Comments

Lab Comments:

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-40426-1

Login Number: 40426
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	2.6
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	False	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-40434-1
Client Project/Site: Crab Orchard Wildlife Refuge #2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/24/2011 12:23:30 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

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Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Definitions 17
QC Association 18
Surrogate Summary 19
QC Sample Results 20
Certification Summary 22
Chain of Custody 23
Receipt Checklists 24

Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Job ID: 500-40434-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-40434-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC/MS VOA
Method(s) 8260B: The following samples were diluted due to the abundance of target analytes: 33-FDUP-005 (500-40434-3), 33-GG141-21 (500-40434-4), 33-GG141-38 (500-40434-2), 33-GG142-20 (500-40434-5), 33-GG142-35 (500-40434-6). Elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Client Sample ID: TB-001-100711 — Lab Sample ID: 500-40434-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Trichloroethene	0.00068		0.00050	0.00018	mg/L	1		8260B	Total/NA

Client Sample ID: 33-GG141-38 — Lab Sample ID: 500-40434-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chlorobenzene	0.0098	J	0.010	0.0024	mg/L	10		8260B	Total/NA
cis-1,2-Dichloroethene	1.2		0.010	0.0022	mg/L	10		8260B	Total/NA
Tetrachloroethene	0.063		0.010	0.0022	mg/L	10		8260B	Total/NA
trans-1,2-Dichloroethene	0.013		0.010	0.0027	mg/L	10		8260B	Total/NA
Vinyl chloride	0.0052		0.0050	0.0013	mg/L	10		8260B	Total/NA
Trichloroethene - DL	4.3		0.050	0.018	mg/L	100		8260B	Total/NA

Client Sample ID: 33-FDUP-005 — Lab Sample ID: 500-40434-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chlorobenzene	0.013		0.010	0.0024	mg/L	10		8260B	Total/NA
cis-1,2-Dichloroethene	1.2		0.010	0.0022	mg/L	10		8260B	Total/NA
Tetrachloroethene	0.11		0.010	0.0022	mg/L	10		8260B	Total/NA
Vinyl chloride	0.0050		0.0050	0.0013	mg/L	10		8260B	Total/NA
Trichloroethene - DL	5.2		0.050	0.018	mg/L	100		8260B	Total/NA

Client Sample ID: 33-GG141-21 — Lab Sample ID: 500-40434-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chlorobenzene	0.046		0.020	0.0048	mg/L	20		8260B	Total/NA
cis-1,2-Dichloroethene	0.017	J	0.020	0.0044	mg/L	20		8260B	Total/NA
Tetrachloroethene	0.12		0.020	0.0044	mg/L	20		8260B	Total/NA
Trichloroethene	0.96		0.010	0.0036	mg/L	20		8260B	Total/NA

Client Sample ID: 33-GG142-20 — Lab Sample ID: 500-40434-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	2.7		0.020	0.0044	mg/L	20		8260B	Total/NA
trans-1,2-Dichloroethene	0.017	J	0.020	0.0054	mg/L	20		8260B	Total/NA
Trichloroethene	2.7		0.010	0.0036	mg/L	20		8260B	Total/NA
Vinyl chloride	0.097		0.010	0.0026	mg/L	20		8260B	Total/NA
Tetrachloroethene - DL	5.7		0.20	0.044	mg/L	200		8260B	Total/NA

Client Sample ID: 33-GG142-35 — Lab Sample ID: 500-40434-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	8.0		0.10	0.022	mg/L	100		8260B	Total/NA
1,1,2-Trichloroethane	0.17		0.10	0.030	mg/L	100		8260B	Total/NA
Vinyl chloride	0.093		0.050	0.013	mg/L	100		8260B	Total/NA
Trichloroethene - DL	79		0.50	0.18	mg/L	1000		8260B	Total/NA

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-40434-1	TB-001-100711	Water	10/07/11 11:30	10/08/11 09:00
500-40434-2	33-GG141-38	Water	10/07/11 10:40	10/08/11 09:00
500-40434-3	33-FDUP-005	Water	10/07/11 10:50	10/08/11 09:00
500-40434-4	33-GG141-21	Water	10/07/11 09:30	10/08/11 09:00
500-40434-5	33-GG142-20	Water	10/07/11 10:20	10/08/11 09:00
500-40434-6	33-GG142-35	Water	10/07/11 12:05	10/08/11 09:00

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Client Sample ID: TB-001-100711

Date Collected: 10/07/11 11:30
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40434-1

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/20/11 22:25	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/20/11 22:25	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/20/11 22:25	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/20/11 22:25	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/20/11 22:25	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/20/11 22:25	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/20/11 22:25	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/20/11 22:25	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/20/11 22:25	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/20/11 22:25	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/20/11 22:25	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/20/11 22:25	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/20/11 22:25	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/20/11 22:25	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/20/11 22:25	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/20/11 22:25	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/20/11 22:25	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/20/11 22:25	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/20/11 22:25	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/20/11 22:25	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/20/11 22:25	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/20/11 22:25	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/20/11 22:25	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/20/11 22:25	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/20/11 22:25	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/20/11 22:25	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/20/11 22:25	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/20/11 22:25	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/20/11 22:25	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/20/11 22:25	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/20/11 22:25	1
Trichloroethene	**0.00068**		0.00050	0.00018	mg/L			10/20/11 22:25	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/20/11 22:25	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/20/11 22:25	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/20/11 22:25	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/20/11 22:25	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*95*		*77 - 112*		*10/20/11 22:25*	*1*
Dibromofluoromethane	*97*		*78 - 119*		*10/20/11 22:25*	*1*
1,2-Dichloroethane-d4 (Surr)	*103*		*77 - 124*		*10/20/11 22:25*	*1*
Toluene-d8 (Surr)	*100*		*80 - 121*		*10/20/11 22:25*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Client Sample ID: 33-GG141-38

Date Collected: 10/07/11 10:40
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40434-2

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.050	U	0.050	0.019	mg/L			10/20/11 22:46	10
Benzene	0.0050	U	0.0050	0.0012	mg/L			10/20/11 22:46	10
Bromodichloromethane	0.010	U	0.010	0.0023	mg/L			10/20/11 22:46	10
Bromoform	0.010	U	0.010	0.0045	mg/L			10/20/11 22:46	10
Bromomethane	0.010	U	0.010	0.0049	mg/L			10/20/11 22:46	10
Methyl Ethyl Ketone	0.050	U	0.050	0.010	mg/L			10/20/11 22:46	10
Carbon disulfide	0.050	U	0.050	0.0044	mg/L			10/20/11 22:46	10
Carbon tetrachloride	0.010	U	0.010	0.0028	mg/L			10/20/11 22:46	10
Chlorobenzene	**0.0098**	**J**	0.010	0.0024	mg/L			10/20/11 22:46	10
Chloroethane	0.010	U	0.010	0.0033	mg/L			10/20/11 22:46	10
Chloroform	0.010	U	0.010	0.0025	mg/L			10/20/11 22:46	10
Chloromethane	0.010	U	0.010	0.0024	mg/L			10/20/11 22:46	10
cis-1,2-Dichloroethene	**1.2**		0.010	0.0022	mg/L			10/20/11 22:46	10
cis-1,3-Dichloropropene	0.010	U	0.010	0.0028	mg/L			10/20/11 22:46	10
Dibromochloromethane	0.010	U	0.010	0.0025	mg/L			10/20/11 22:46	10
1,1-Dichloroethane	0.010	U	0.010	0.0024	mg/L			10/20/11 22:46	10
1,1-Dichloroethene	0.010	U	0.010	0.0029	mg/L			10/20/11 22:46	10
1,2-Dichloropropane	0.010	U	0.010	0.0036	mg/L			10/20/11 22:46	10
Ethylbenzene	0.0050	U	0.0050	0.0014	mg/L			10/20/11 22:46	10
2-Hexanone	0.050	U	0.050	0.0056	mg/L			10/20/11 22:46	10
Methylene Chloride	0.050	U	0.050	0.0063	mg/L			10/20/11 22:46	10
methyl isobutyl ketone	0.050	U	0.050	0.0079	mg/L			10/20/11 22:46	10
Methyl tert-butyl ether	0.010	U	0.010	0.0028	mg/L			10/20/11 22:46	10
Styrene	0.010	U	0.010	0.0026	mg/L			10/20/11 22:46	10
1,1,2,2-Tetrachloroethane	0.010	U	0.010	0.0035	mg/L			10/20/11 22:46	10
Tetrachloroethene	**0.063**		0.010	0.0022	mg/L			10/20/11 22:46	10
Toluene	0.0050	U	0.0050	0.0015	mg/L			10/20/11 22:46	10
trans-1,2-Dichloroethene	**0.013**		0.010	0.0027	mg/L			10/20/11 22:46	10
trans-1,3-Dichloropropene	0.010	U	0.010	0.0035	mg/L			10/20/11 22:46	10
1,1,1-Trichloroethane	0.010	U	0.010	0.0026	mg/L			10/20/11 22:46	10
1,1,2-Trichloroethane	0.010	U	0.010	0.0030	mg/L			10/20/11 22:46	10
Vinyl chloride	**0.0052**		0.0050	0.0013	mg/L			10/20/11 22:46	10
Xylenes, Total	0.010	U	0.010	0.0030	mg/L			10/20/11 22:46	10
1,2-Dichloroethane	0.010	U	0.010	0.0028	mg/L			10/20/11 22:46	10
1,3-Dichloropropene, Total	0.010	U	0.010	0.0050	mg/L			10/20/11 22:46	10

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/20/11 22:46*	*10*
Dibromofluoromethane	*102*		*78 - 119*		*10/20/11 22:46*	*10*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*		*10/20/11 22:46*	*10*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/20/11 22:46*	*10*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**4.3**		0.050	0.018	mg/L			10/20/11 23:07	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/20/11 23:07*	*100*
Dibromofluoromethane	*97*		*78 - 119*		*10/20/11 23:07*	*100*
1,2-Dichloroethane-d4 (Surr)	*103*		*77 - 124*		*10/20/11 23:07*	*100*
Toluene-d8 (Surr)	*97*		*80 - 121*		*10/20/11 23:07*	*100*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Client Sample ID: 33-FDUP-005

Date Collected: 10/07/11 10:50
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40434-3

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.050	U	0.050	0.019	mg/L			10/20/11 23:28	10
Benzene	0.0050	U	0.0050	0.0012	mg/L			10/20/11 23:28	10
Bromodichloromethane	0.010	U	0.010	0.0023	mg/L			10/20/11 23:28	10
Bromoform	0.010	U	0.010	0.0045	mg/L			10/20/11 23:28	10
Bromomethane	0.010	U	0.010	0.0049	mg/L			10/20/11 23:28	10
Methyl Ethyl Ketone	0.050	U	0.050	0.010	mg/L			10/20/11 23:28	10
Carbon disulfide	0.050	U	0.050	0.0044	mg/L			10/20/11 23:28	10
Carbon tetrachloride	0.010	U	0.010	0.0028	mg/L			10/20/11 23:28	10
Chlorobenzene	**0.013**		0.010	0.0024	mg/L			10/20/11 23:28	10
Chloroethane	0.010	U	0.010	0.0033	mg/L			10/20/11 23:28	10
Chloroform	0.010	U	0.010	0.0025	mg/L			10/20/11 23:28	10
Chloromethane	0.010	U	0.010	0.0024	mg/L			10/20/11 23:28	10
cis-1,2-Dichloroethene	**1.2**		0.010	0.0022	mg/L			10/20/11 23:28	10
cis-1,3-Dichloropropene	0.010	U	0.010	0.0028	mg/L			10/20/11 23:28	10
Dibromochloromethane	0.010	U	0.010	0.0025	mg/L			10/20/11 23:28	10
1,1-Dichloroethane	0.010	U	0.010	0.0024	mg/L			10/20/11 23:28	10
1,1-Dichloroethene	0.010	U	0.010	0.0029	mg/L			10/20/11 23:28	10
1,2-Dichloropropane	0.010	U	0.010	0.0036	mg/L			10/20/11 23:28	10
Ethylbenzene	0.0050	U	0.0050	0.0014	mg/L			10/20/11 23:28	10
2-Hexanone	0.050	U	0.050	0.0056	mg/L			10/20/11 23:28	10
Methylene Chloride	0.050	U	0.050	0.0063	mg/L			10/20/11 23:28	10
methyl isobutyl ketone	0.050	U	0.050	0.0079	mg/L			10/20/11 23:28	10
Methyl tert-butyl ether	0.010	U	0.010	0.0028	mg/L			10/20/11 23:28	10
Styrene	0.010	U	0.010	0.0026	mg/L			10/20/11 23:28	10
1,1,2,2-Tetrachloroethane	0.010	U	0.010	0.0035	mg/L			10/20/11 23:28	10
Tetrachloroethene	**0.11**		0.010	0.0022	mg/L			10/20/11 23:28	10
Toluene	0.0050	U	0.0050	0.0015	mg/L			10/20/11 23:28	10
trans-1,2-Dichloroethene	0.010	U	0.010	0.0027	mg/L			10/20/11 23:28	10
trans-1,3-Dichloropropene	0.010	U	0.010	0.0035	mg/L			10/20/11 23:28	10
1,1,1-Trichloroethane	0.010	U	0.010	0.0026	mg/L			10/20/11 23:28	10
1,1,2-Trichloroethane	0.010	U	0.010	0.0030	mg/L			10/20/11 23:28	10
Vinyl chloride	**0.0050**		0.0050	0.0013	mg/L			10/20/11 23:28	10
Xylenes, Total	0.010	U	0.010	0.0030	mg/L			10/20/11 23:28	10
1,2-Dichloroethane	0.010	U	0.010	0.0028	mg/L			10/20/11 23:28	10
1,3-Dichloropropene, Total	0.010	U	0.010	0.0050	mg/L			10/20/11 23:28	10

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/20/11 23:28*	*10*
Dibromofluoromethane	*106*		*78 - 119*		*10/20/11 23:28*	*10*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*		*10/20/11 23:28*	*10*
Toluene-d8 (Surr)	*102*		*80 - 121*		*10/20/11 23:28*	*10*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**5.2**		0.050	0.018	mg/L			10/20/11 23:49	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*		*10/20/11 23:49*	*100*
Dibromofluoromethane	*99*		*78 - 119*		*10/20/11 23:49*	*100*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*		*10/20/11 23:49*	*100*
Toluene-d8 (Surr)	*98*		*80 - 121*		*10/20/11 23:49*	*100*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Client Sample ID: 33-GG141-21

Date Collected: 10/07/11 09:30
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40434-4

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.10	U	0.10	0.038	mg/L			10/21/11 00:12	20
Benzene	0.010	U	0.010	0.0024	mg/L			10/21/11 00:12	20
Bromodichloromethane	0.020	U	0.020	0.0046	mg/L			10/21/11 00:12	20
Bromoform	0.020	U	0.020	0.0090	mg/L			10/21/11 00:12	20
Bromomethane	0.020	U	0.020	0.0098	mg/L			10/21/11 00:12	20
Methyl Ethyl Ketone	0.10	U	0.10	0.020	mg/L			10/21/11 00:12	20
Carbon disulfide	0.10	U	0.10	0.0088	mg/L			10/21/11 00:12	20
Carbon tetrachloride	0.020	U	0.020	0.0056	mg/L			10/21/11 00:12	20
Chlorobenzene	**0.046**		0.020	0.0048	mg/L			10/21/11 00:12	20
Chloroethane	0.020	U	0.020	0.0066	mg/L			10/21/11 00:12	20
Chloroform	0.020	U	0.020	0.0050	mg/L			10/21/11 00:12	20
Chloromethane	0.020	U	0.020	0.0048	mg/L			10/21/11 00:12	20
cis-1,2-Dichloroethene	**0.017**	**J**	0.020	0.0044	mg/L			10/21/11 00:12	20
cis-1,3-Dichloropropene	0.020	U	0.020	0.0056	mg/L			10/21/11 00:12	20
Dibromochloromethane	0.020	U	0.020	0.0050	mg/L			10/21/11 00:12	20
1,1-Dichloroethane	0.020	U	0.020	0.0048	mg/L			10/21/11 00:12	20
1,1-Dichloroethene	0.020	U	0.020	0.0058	mg/L			10/21/11 00:12	20
1,2-Dichloropropane	0.020	U	0.020	0.0072	mg/L			10/21/11 00:12	20
Ethylbenzene	0.010	U	0.010	0.0028	mg/L			10/21/11 00:12	20
2-Hexanone	0.10	U	0.10	0.011	mg/L			10/21/11 00:12	20
Methylene Chloride	0.10	U	0.10	0.013	mg/L			10/21/11 00:12	20
methyl isobutyl ketone	0.10	U	0.10	0.016	mg/L			10/21/11 00:12	20
Methyl tert-butyl ether	0.020	U	0.020	0.0056	mg/L			10/21/11 00:12	20
Styrene	0.020	U	0.020	0.0052	mg/L			10/21/11 00:12	20
1,1,2,2-Tetrachloroethane	0.020	U	0.020	0.0070	mg/L			10/21/11 00:12	20
Tetrachloroethene	**0.12**		0.020	0.0044	mg/L			10/21/11 00:12	20
Toluene	0.010	U	0.010	0.0030	mg/L			10/21/11 00:12	20
trans-1,2-Dichloroethene	0.020	U	0.020	0.0054	mg/L			10/21/11 00:12	20
trans-1,3-Dichloropropene	0.020	U	0.020	0.0070	mg/L			10/21/11 00:12	20
1,1,1-Trichloroethane	0.020	U	0.020	0.0052	mg/L			10/21/11 00:12	20
1,1,2-Trichloroethane	0.020	U	0.020	0.0060	mg/L			10/21/11 00:12	20
Trichloroethene	**0.96**		0.010	0.0036	mg/L			10/21/11 00:12	20
Vinyl chloride	0.010	U	0.010	0.0026	mg/L			10/21/11 00:12	20
Xylenes, Total	0.020	U	0.020	0.0060	mg/L			10/21/11 00:12	20
1,2-Dichloroethane	0.020	U	0.020	0.0056	mg/L			10/21/11 00:12	20
1,3-Dichloropropene, Total	0.020	U	0.020	0.010	mg/L			10/21/11 00:12	20

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*		*10/21/11 00:12*	*20*
Dibromofluoromethane	*103*		*78 - 119*		*10/21/11 00:12*	*20*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*		*10/21/11 00:12*	*20*
Toluene-d8 (Surr)	*99*		*80 - 121*		*10/21/11 00:12*	*20*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Client Sample ID: 33-GG142-20

Date Collected: 10/07/11 10:20
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40434-5

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.10	U	0.10	0.038	mg/L			10/21/11 00:55	20
Benzene	0.010	U	0.010	0.0024	mg/L			10/21/11 00:55	20
Bromodichloromethane	0.020	U	0.020	0.0046	mg/L			10/21/11 00:55	20
Bromoform	0.020	U	0.020	0.0090	mg/L			10/21/11 00:55	20
Bromomethane	0.020	U	0.020	0.0098	mg/L			10/21/11 00:55	20
Methyl Ethyl Ketone	0.10	U	0.10	0.020	mg/L			10/21/11 00:55	20
Carbon disulfide	0.10	U	0.10	0.0088	mg/L			10/21/11 00:55	20
Carbon tetrachloride	0.020	U	0.020	0.0056	mg/L			10/21/11 00:55	20
Chlorobenzene	0.020	U	0.020	0.0048	mg/L			10/21/11 00:55	20
Chloroethane	0.020	U	0.020	0.0066	mg/L			10/21/11 00:55	20
Chloroform	0.020	U	0.020	0.0050	mg/L			10/21/11 00:55	20
Chloromethane	0.020	U	0.020	0.0048	mg/L			10/21/11 00:55	20
cis-1,2-Dichloroethene	**2.7**		0.020	0.0044	mg/L			10/21/11 00:55	20
cis-1,3-Dichloropropene	0.020	U	0.020	0.0056	mg/L			10/21/11 00:55	20
Dibromochloromethane	0.020	U	0.020	0.0050	mg/L			10/21/11 00:55	20
1,1-Dichloroethane	0.020	U	0.020	0.0048	mg/L			10/21/11 00:55	20
1,1-Dichloroethene	0.020	U	0.020	0.0058	mg/L			10/21/11 00:55	20
1,2-Dichloropropane	0.020	U	0.020	0.0072	mg/L			10/21/11 00:55	20
Ethylbenzene	0.010	U	0.010	0.0028	mg/L			10/21/11 00:55	20
2-Hexanone	0.10	U	0.10	0.011	mg/L			10/21/11 00:55	20
Methylene Chloride	0.10	U	0.10	0.013	mg/L			10/21/11 00:55	20
methyl isobutyl ketone	0.10	U	0.10	0.016	mg/L			10/21/11 00:55	20
Methyl tert-butyl ether	0.020	U	0.020	0.0056	mg/L			10/21/11 00:55	20
Styrene	0.020	U	0.020	0.0052	mg/L			10/21/11 00:55	20
1,1,2,2-Tetrachloroethane	0.020	U	0.020	0.0070	mg/L			10/21/11 00:55	20
Toluene	0.010	U	0.010	0.0030	mg/L			10/21/11 00:55	20
trans-1,2-Dichloroethene	**0.017**	**J**	0.020	0.0054	mg/L			10/21/11 00:55	20
trans-1,3-Dichloropropene	0.020	U	0.020	0.0070	mg/L			10/21/11 00:55	20
1,1,1-Trichloroethane	0.020	U	0.020	0.0052	mg/L			10/21/11 00:55	20
1,1,2-Trichloroethane	0.020	U	0.020	0.0060	mg/L			10/21/11 00:55	20
Trichloroethene	**2.7**		0.010	0.0036	mg/L			10/21/11 00:55	20
Vinyl chloride	**0.097**		0.010	0.0026	mg/L			10/21/11 00:55	20
Xylenes, Total	0.020	U	0.020	0.0060	mg/L			10/21/11 00:55	20
1,2-Dichloroethane	0.020	U	0.020	0.0056	mg/L			10/21/11 00:55	20
1,3-Dichloropropene, Total	0.020	U	0.020	0.010	mg/L			10/21/11 00:55	20

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*		*10/21/11 00:55*	*20*
Dibromofluoromethane	*100*		*78 - 119*		*10/21/11 00:55*	*20*
1,2-Dichloroethane-d4 (Surr)	*102*		*77 - 124*		*10/21/11 00:55*	*20*
Toluene-d8 (Surr)	*102*		*80 - 121*		*10/21/11 00:55*	*20*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	**5.7**		0.20	0.044	mg/L			10/21/11 01:18	200

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/21/11 01:18*	*200*
Dibromofluoromethane	*102*		*78 - 119*		*10/21/11 01:18*	*200*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*		*10/21/11 01:18*	*200*
Toluene-d8 (Surr)	*98*		*80 - 121*		*10/21/11 01:18*	*200*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Client Sample ID: 33-GG142-35

Date Collected: 10/07/11 12:05
Date Received: 10/08/11 09:00

Lab Sample ID: 500-40434-6

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.50	U	0.50	0.19	mg/L			10/21/11 01:39	100
Benzene	0.050	U	0.050	0.012	mg/L			10/21/11 01:39	100
Bromodichloromethane	0.10	U	0.10	0.023	mg/L			10/21/11 01:39	100
Bromoform	0.10	U	0.10	0.045	mg/L			10/21/11 01:39	100
Bromomethane	0.10	U	0.10	0.049	mg/L			10/21/11 01:39	100
Methyl Ethyl Ketone	0.50	U	0.50	0.10	mg/L			10/21/11 01:39	100
Carbon disulfide	0.50	U	0.50	0.044	mg/L			10/21/11 01:39	100
Carbon tetrachloride	0.10	U	0.10	0.028	mg/L			10/21/11 01:39	100
Chlorobenzene	0.10	U	0.10	0.024	mg/L			10/21/11 01:39	100
Chloroethane	0.10	U	0.10	0.033	mg/L			10/21/11 01:39	100
Chloroform	0.10	U	0.10	0.025	mg/L			10/21/11 01:39	100
Chloromethane	0.10	U	0.10	0.024	mg/L			10/21/11 01:39	100
cis-1,2-Dichloroethene	**8.0**		0.10	0.022	mg/L			10/21/11 01:39	100
cis-1,3-Dichloropropene	0.10	U	0.10	0.028	mg/L			10/21/11 01:39	100
Dibromochloromethane	0.10	U	0.10	0.025	mg/L			10/21/11 01:39	100
1,1-Dichloroethane	0.10	U	0.10	0.024	mg/L			10/21/11 01:39	100
1,1-Dichloroethene	0.10	U	0.10	0.029	mg/L			10/21/11 01:39	100
1,2-Dichloropropane	0.10	U	0.10	0.036	mg/L			10/21/11 01:39	100
Ethylbenzene	0.050	U	0.050	0.014	mg/L			10/21/11 01:39	100
2-Hexanone	0.50	U	0.50	0.056	mg/L			10/21/11 01:39	100
Methylene Chloride	0.50	U	0.50	0.063	mg/L			10/21/11 01:39	100
methyl isobutyl ketone	0.50	U	0.50	0.079	mg/L			10/21/11 01:39	100
Methyl tert-butyl ether	0.10	U	0.10	0.028	mg/L			10/21/11 01:39	100
Styrene	0.10	U	0.10	0.026	mg/L			10/21/11 01:39	100
1,1,2,2-Tetrachloroethane	0.10	U	0.10	0.035	mg/L			10/21/11 01:39	100
Tetrachloroethene	0.10	U	0.10	0.022	mg/L			10/21/11 01:39	100
Toluene	0.050	U	0.050	0.015	mg/L			10/21/11 01:39	100
trans-1,2-Dichloroethene	0.10	U	0.10	0.027	mg/L			10/21/11 01:39	100
trans-1,3-Dichloropropene	0.10	U	0.10	0.035	mg/L			10/21/11 01:39	100
1,1,1-Trichloroethane	0.10	U	0.10	0.026	mg/L			10/21/11 01:39	100
1,1,2-Trichloroethane	**0.17**		0.10	0.030	mg/L			10/21/11 01:39	100
Vinyl chloride	**0.093**		0.050	0.013	mg/L			10/21/11 01:39	100
Xylenes, Total	0.10	U	0.10	0.030	mg/L			10/21/11 01:39	100
1,2-Dichloroethane	0.10	U	0.10	0.028	mg/L			10/21/11 01:39	100
1,3-Dichloropropene, Total	0.10	U	0.10	0.050	mg/L			10/21/11 01:39	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*103*		*77 - 112*		*10/21/11 01:39*	*100*
Dibromofluoromethane	*106*		*78 - 119*		*10/21/11 01:39*	*100*
1,2-Dichloroethane-d4 (Surr)	*111*		*77 - 124*		*10/21/11 01:39*	*100*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/21/11 01:39*	*100*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**79**		0.50	0.18	mg/L			10/21/11 02:01	1000

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/21/11 02:01*	*1000*
Dibromofluoromethane	*103*		*78 - 119*		*10/21/11 02:01*	*1000*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*		*10/21/11 02:01*	*1000*
Toluene-d8 (Surr)	*98*		*80 - 121*		*10/21/11 02:01*	*1000*

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

GC/MS VOA

Analysis Batch: 129652

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40434-1	TB-001-100711	Total/NA	Water	8260B	
500-40434-2	33-GG141-38	Total/NA	Water	8260B	
500-40434-2 - DL	33-GG141-38	Total/NA	Water	8260B	
500-40434-3	33-FDUP-005	Total/NA	Water	8260B	
500-40434-3 - DL	33-FDUP-005	Total/NA	Water	8260B	
500-40434-4	33-GG141-21	Total/NA	Water	8260B	
500-40434-5	33-GG142-20	Total/NA	Water	8260B	
500-40434-5 - DL	33-GG142-20	Total/NA	Water	8260B	
500-40434-6	33-GG142-35	Total/NA	Water	8260B	
500-40434-6 - DL	33-GG142-35	Total/NA	Water	8260B	
LCS 500-129652/6	Lab Control Sample	Total/NA	Water	8260B	
MB 500-129652/5	Method Blank	Total/NA	Water	8260B	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40434-1	TB-001-100711	95	97	103	100
500-40434-2	33-GG141-38	98	102	104	101
500-40434-2 - DL	33-GG141-38	100	97	103	97
500-40434-3	33-FDUP-005	100	106	107	102
500-40434-3 - DL	33-FDUP-005	97	99	104	98
500-40434-4	33-GG141-21	99	103	106	99
500-40434-5	33-GG142-20	93	100	102	102
500-40434-5 - DL	33-GG142-20	100	102	105	98
500-40434-6	33-GG142-35	103	106	111	101
500-40434-6 - DL	33-GG142-35	98	103	107	98
LCS 500-129652/6	Lab Control Sample	98	100	98	109
MB 500-129652/5	Method Blank	98	94	99	103

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-129652/5
Matrix: Water
Analysis Batch: 129652

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/20/11 16:20	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/20/11 16:20	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/20/11 16:20	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/20/11 16:20	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/20/11 16:20	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/20/11 16:20	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/20/11 16:20	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/20/11 16:20	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/20/11 16:20	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/20/11 16:20	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/20/11 16:20	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/20/11 16:20	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/20/11 16:20	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/20/11 16:20	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/20/11 16:20	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/20/11 16:20	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/20/11 16:20	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/20/11 16:20	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/20/11 16:20	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/20/11 16:20	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/20/11 16:20	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/20/11 16:20	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/20/11 16:20	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/20/11 16:20	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/20/11 16:20	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/20/11 16:20	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/20/11 16:20	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/20/11 16:20	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/20/11 16:20	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/20/11 16:20	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/20/11 16:20	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/20/11 16:20	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/20/11 16:20	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/20/11 16:20	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/20/11 16:20	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/20/11 16:20	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/20/11 16:20*	*1*
Dibromofluoromethane	*94*		*78 - 119*		*10/20/11 16:20*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*		*10/20/11 16:20*	*1*
Toluene-d8 (Surr)	*103*		*80 - 121*		*10/20/11 16:20*	*1*

Lab Sample ID: LCS 500-129652/6
Matrix: Water
Analysis Batch: 129652

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0387		mg/L		77	43 - 153

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-129652/6
Matrix: Water
Analysis Batch: 129652

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Benzene	0.0500	0.0407		mg/L		81	74 - 113
Bromodichloromethane	0.0500	0.0462		mg/L		92	73 - 120
Bromoform	0.0500	0.0386		mg/L		77	64 - 126
Bromomethane	0.0500	0.0579		mg/L		116	46 - 155
Methyl Ethyl Ketone	0.0500	0.0371		mg/L		74	42 - 152
Carbon disulfide	0.0500	0.0246		mg/L		49	36 - 110
Carbon tetrachloride	0.0500	0.0397		mg/L		79	58 - 132
Chlorobenzene	0.0500	0.0438		mg/L		88	81 - 111
Chloroethane	0.0500	0.0520		mg/L		104	54 - 149
Chloroform	0.0500	0.0421		mg/L		84	71 - 116
Chloromethane	0.0500	0.0504		mg/L		101	36 - 148
cis-1,2-Dichloroethene	0.0500	0.0421		mg/L		84	66 - 111
cis-1,3-Dichloropropene	0.0538	0.0500		mg/L		93	65 - 114
Dibromochloromethane	0.0500	0.0395		mg/L		79	73 - 118
1,1-Dichloroethane	0.0500	0.0393		mg/L		79	64 - 117
1,1-Dichloroethene	0.0500	0.0327		mg/L		65	60 - 126
1,2-Dichloropropane	0.0500	0.0446		mg/L		89	68 - 123
Ethylbenzene	0.0500	0.0429		mg/L		86	79 - 114
2-Hexanone	0.0500	0.0428		mg/L		86	55 - 138
Methylene Chloride	0.0500	0.0418		mg/L		84	65 - 125
methyl isobutyl ketone	0.0500	0.0464		mg/L		93	56 - 138
Methyl tert-butyl ether	0.0500	0.0413		mg/L		83	57 - 119
Styrene	0.0500	0.0450		mg/L		90	76 - 118
1,1,2,2-Tetrachloroethane	0.0500	0.0491		mg/L		98	66 - 121
Tetrachloroethene	0.0500	0.0407		mg/L		81	76 - 114
Toluene	0.0500	0.0465		mg/L		93	76 - 121
trans-1,2-Dichloroethene	0.0500	0.0407		mg/L		81	67 - 120
trans-1,3-Dichloropropene	0.0486	0.0429		mg/L		88	60 - 119
1,1,1-Trichloroethane	0.0500	0.0422		mg/L		84	66 - 128
1,1,2-Trichloroethane	0.0500	0.0492		mg/L		98	62 - 137
Trichloroethene	0.0500	0.0412		mg/L		82	75 - 116
Vinyl chloride	0.0500	0.0534		mg/L		107	47 - 138
Xylenes, Total	0.150	0.126		mg/L		84	74 - 117
1,2-Dichloroethane	0.0500	0.0412		mg/L		82	69 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*
Dibromofluoromethane	*100*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*98*		*77 - 124*
Toluene-d8 (Surr)	*109*		*80 - 121*

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40434-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40434
Chain of Custody Number:
Page ____ of ____
Temperature °C of Cooler: 3.0

Client: CH2M HILL
Client Project #: 423535.02.SI
Project Name: CONWR Plume
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: JAYSON BURKARD
Lab PM: Jim Knapp

Preservative: HCL
Parameter: VOCs

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOCs	Comments
1		TB-001-100711	10/7/11	1130	2	W	2	
2		33-GG141-38	10/7/11	1040	3	W	3	
3		33-FDUP-005	10/7/11	~~1045~~	3	W	3	Sample Time 1050
4		33-GG141-21	10/7/11	0930	3	W	3	
5		33-GG142-20	10/7/11	1020	3	W	3	
6		33-GG142-35	10/7/11	1205	3	W	3	

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days Rush ___ 10 Days Final ___ 15 Days _____ Other
Requested Due Date _____

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Jayson Burkard	CH2M	10/07/11	1900	FEDEX			
				[signature]	TA	10/8/11	0900

Lab Courier
Shipped: FX
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1208)

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-40434-1

Login Number: 40434
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	3.0
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

TestAmerica

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-40474-1
Client Project/Site: Crab Orchard Wildlife Refuge Plume 2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/25/2011 01:24:39 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 6
Sample Summary 7
Client Sample Results 8
Definitions 20
QC Association 21
Surrogate Summary 22
QC Sample Results 23
Certification Summary 30
Chain of Custody 31
Receipt Checklists 33

Job ID: 500-40474-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-40474-1

Comments
No additional comments.

Receipt
Sample 33-SB138-29 will be analyzed for moisture and VOCs per client request.

All other samples were received in good condition within temperature requirements.

GC/MS VOA
Method(s) 8260B: The laboratory control sample (LCS) and / or the laboratory control sample duplicate (LCSD) for batch 129573 exceeded control limits for the following analytes: 1,2-Dichloropropane and 4-Methyl-2-pentanone.

Method(s) 8260B: The following sample(s) was diluted due to the abundance of target analytes: 33-GG150-23 (500-40474-2), 33-GG151-28 (500-40474-5), 33-GG151-38 (500-40474-6), 33-SB138-29 (500-40474-10). Elevated reporting limits (RLs) are provided.

Method(s) 8260B: The following sample(s) submitted for volatiles analysis was received with insufficient preservation (pH =7): 33-GG150-18 (500-40474-1), 33-GG150-23 (500-40474-2), 33-GG150-34 (500-40474-3), 33-GG151-38 (500-40474-6).

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Client Sample ID: 33-GG150-18 — Lab Sample ID: 500-40474-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	0.011		0.0050	0.0019	mg/L	1		8260B	Total/NA
cis-1,2-Dichloroethene	0.0045		0.0010	0.00022	mg/L	1		8260B	Total/NA
Toluene	0.00045	J	0.00050	0.00015	mg/L	1		8260B	Total/NA
Trichloroethene	0.067		0.00050	0.00018	mg/L	1		8260B	Total/NA

Client Sample ID: 33-GG150-23 — Lab Sample ID: 500-40474-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.079		0.010	0.0022	mg/L	10		8260B	Total/NA
Trichloroethene - DL	4.3		0.050	0.018	mg/L	100		8260B	Total/NA

Client Sample ID: 33-GG150-34 — Lab Sample ID: 500-40474-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	0.0084		0.0050	0.0019	mg/L	1		8260B	Total/NA
Trichloroethene	0.030		0.00050	0.00018	mg/L	1		8260B	Total/NA

Client Sample ID: FB-001-101011 — Lab Sample ID: 500-40474-4

No Detections

Client Sample ID: 33-GG151-28 — Lab Sample ID: 500-40474-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chlorobenzene	0.0047		0.0020	0.00048	mg/L	2		8260B	Total/NA
cis-1,2-Dichloroethene	0.14		0.0020	0.00044	mg/L	2		8260B	Total/NA
Tetrachloroethene	0.0055		0.0020	0.00044	mg/L	2		8260B	Total/NA
trans-1,2-Dichloroethene	0.0023		0.0020	0.00054	mg/L	2		8260B	Total/NA
Vinyl chloride	0.0034		0.0010	0.00026	mg/L	2		8260B	Total/NA
Trichloroethene - DL	0.71		0.010	0.0036	mg/L	20		8260B	Total/NA

Client Sample ID: 33-GG151-38 — Lab Sample ID: 500-40474-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.42		0.010	0.0022	mg/L	10		8260B	Total/NA
Trichloroethene - DL	3.0		0.050	0.018	mg/L	100		8260B	Total/NA

Client Sample ID: 33-SB138-11 — Lab Sample ID: 500-40474-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Vinyl chloride	0.0091		0.0043	0.00060	mg/Kg	1	☼	8260B	Total/NA
Acetone	0.0080		0.0043	0.0021	mg/Kg	1	☼	8260B	Total/NA
Methylene Chloride	0.0051		0.0043	0.0012	mg/Kg	1	☼	8260B	Total/NA
cis-1,2-Dichloroethene	0.038		0.0043	0.00063	mg/Kg	1	☼	8260B	Total/NA
Trichloroethene	0.0061		0.0043	0.00069	mg/Kg	1	☼	8260B	Total/NA

Client Sample ID: TB-001-101011 — Lab Sample ID: 500-40474-8

No Detections

Client Sample ID: 33-SB138-29 — Lab Sample ID: 500-40474-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chlorobenzene	0.075		0.059	0.014	mg/Kg	50	☼	8260B	Total/NA

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Client Sample ID: 33-SB138-29 (Continued) — Lab Sample ID: 500-40474-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.091		0.059	0.013	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene	1.0		0.015	0.0089	mg/Kg	50	☼	8260B	Total/NA

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-40474-1	33-GG150-18	Water	10/10/11 10:50	10/11/11 10:10
500-40474-2	33-GG150-23	Water	10/10/11 11:45	10/11/11 10:10
500-40474-3	33-GG150-34	Water	10/10/11 12:40	10/11/11 10:10
500-40474-4	FB-001-101011	Water	10/10/11 15:10	10/11/11 10:10
500-40474-5	33-GG151-28	Water	10/10/11 11:05	10/11/11 10:10
500-40474-6	33-GG151-38	Water	10/10/11 12:30	10/11/11 10:10
500-40474-7	33-SB138-11	Solid	10/10/11 16:05	10/11/11 10:10
500-40474-8	TB-001-101011	Water	10/10/11 00:00	10/11/11 10:10
500-40474-10	33-SB138-29	Solid	10/10/11 16:45	10/11/11 10:10

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Client Sample ID: 33-GG150-18

Date Collected: 10/10/11 10:50
Date Received: 10/11/11 10:10

Lab Sample ID: 500-40474-1

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**0.011**		0.0050	0.0019	mg/L			10/22/11 06:00	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/22/11 06:00	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/22/11 06:00	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/22/11 06:00	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/22/11 06:00	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/22/11 06:00	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/22/11 06:00	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/22/11 06:00	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/22/11 06:00	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/22/11 06:00	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/22/11 06:00	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/22/11 06:00	1
cis-1,2-Dichloroethene	**0.0045**		0.0010	0.00022	mg/L			10/22/11 06:00	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/22/11 06:00	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/22/11 06:00	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/22/11 06:00	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/22/11 06:00	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/22/11 06:00	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/22/11 06:00	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/22/11 06:00	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/22/11 06:00	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/22/11 06:00	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/22/11 06:00	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/22/11 06:00	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/22/11 06:00	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/22/11 06:00	1
Toluene	**0.00045**	**J**	0.00050	0.00015	mg/L			10/22/11 06:00	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/22/11 06:00	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/22/11 06:00	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/22/11 06:00	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/22/11 06:00	1
Trichloroethene	**0.067**		0.00050	0.00018	mg/L			10/22/11 06:00	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/22/11 06:00	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/22/11 06:00	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/22/11 06:00	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/22/11 06:00	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*77 - 112*		*10/22/11 06:00*	*1*
Dibromofluoromethane	*89*		*78 - 119*		*10/22/11 06:00*	*1*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*		*10/22/11 06:00*	*1*
Toluene-d8 (Surr)	*97*		*80 - 121*		*10/22/11 06:00*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Client Sample ID: 33-GG150-23

Date Collected: 10/10/11 11:45
Date Received: 10/11/11 10:10

Lab Sample ID: 500-40474-2

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.050	U	0.050	0.019	mg/L			10/22/11 06:24	10
Benzene	0.0050	U	0.0050	0.0012	mg/L			10/22/11 06:24	10
Bromodichloromethane	0.010	U	0.010	0.0023	mg/L			10/22/11 06:24	10
Bromoform	0.010	U	0.010	0.0045	mg/L			10/22/11 06:24	10
Bromomethane	0.010	U	0.010	0.0049	mg/L			10/22/11 06:24	10
Methyl Ethyl Ketone	0.050	U	0.050	0.010	mg/L			10/22/11 06:24	10
Carbon disulfide	0.050	U	0.050	0.0044	mg/L			10/22/11 06:24	10
Carbon tetrachloride	0.010	U	0.010	0.0028	mg/L			10/22/11 06:24	10
Chlorobenzene	0.010	U	0.010	0.0024	mg/L			10/22/11 06:24	10
Chloroethane	0.010	U	0.010	0.0033	mg/L			10/22/11 06:24	10
Chloroform	0.010	U	0.010	0.0025	mg/L			10/22/11 06:24	10
Chloromethane	0.010	U	0.010	0.0024	mg/L			10/22/11 06:24	10
cis-1,2-Dichloroethene	**0.079**		0.010	0.0022	mg/L			10/22/11 06:24	10
cis-1,3-Dichloropropene	0.010	U	0.010	0.0028	mg/L			10/22/11 06:24	10
Dibromochloromethane	0.010	U	0.010	0.0025	mg/L			10/22/11 06:24	10
1,1-Dichloroethane	0.010	U	0.010	0.0024	mg/L			10/22/11 06:24	10
1,1-Dichloroethene	0.010	U	0.010	0.0029	mg/L			10/22/11 06:24	10
1,2-Dichloropropane	0.010	U	0.010	0.0036	mg/L			10/22/11 06:24	10
Ethylbenzene	0.0050	U	0.0050	0.0014	mg/L			10/22/11 06:24	10
2-Hexanone	0.050	U	0.050	0.0056	mg/L			10/22/11 06:24	10
Methylene Chloride	0.050	U	0.050	0.0063	mg/L			10/22/11 06:24	10
methyl isobutyl ketone	0.050	U	0.050	0.0079	mg/L			10/22/11 06:24	10
Methyl tert-butyl ether	0.010	U	0.010	0.0028	mg/L			10/22/11 06:24	10
Styrene	0.010	U	0.010	0.0026	mg/L			10/22/11 06:24	10
1,1,2,2-Tetrachloroethane	0.010	U	0.010	0.0035	mg/L			10/22/11 06:24	10
Tetrachloroethene	0.010	U	0.010	0.0022	mg/L			10/22/11 06:24	10
Toluene	0.0050	U	0.0050	0.0015	mg/L			10/22/11 06:24	10
trans-1,2-Dichloroethene	0.010	U	0.010	0.0027	mg/L			10/22/11 06:24	10
trans-1,3-Dichloropropene	0.010	U	0.010	0.0035	mg/L			10/22/11 06:24	10
1,1,1-Trichloroethane	0.010	U	0.010	0.0026	mg/L			10/22/11 06:24	10
1,1,2-Trichloroethane	0.010	U	0.010	0.0030	mg/L			10/22/11 06:24	10
Vinyl chloride	0.0050	U	0.0050	0.0013	mg/L			10/22/11 06:24	10
Xylenes, Total	0.010	U	0.010	0.0030	mg/L			10/22/11 06:24	10
1,2-Dichloroethane	0.010	U	0.010	0.0028	mg/L			10/22/11 06:24	10
1,3-Dichloropropene, Total	0.010	U	0.010	0.0050	mg/L			10/22/11 06:24	10

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*		*10/22/11 06:24*	*10*
Dibromofluoromethane	*89*		*78 - 119*		*10/22/11 06:24*	*10*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*		*10/22/11 06:24*	*10*
Toluene-d8 (Surr)	*100*		*80 - 121*		*10/22/11 06:24*	*10*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**4.3**		0.050	0.018	mg/L			10/22/11 06:47	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*		*10/22/11 06:47*	*100*
Dibromofluoromethane	*96*		*78 - 119*		*10/22/11 06:47*	*100*
1,2-Dichloroethane-d4 (Surr)	*110*		*77 - 124*		*10/22/11 06:47*	*100*
Toluene-d8 (Surr)	*102*		*80 - 121*		*10/22/11 06:47*	*100*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Client Sample ID: 33-GG150-34

Date Collected: 10/10/11 12:40
Date Received: 10/11/11 10:10

Lab Sample ID: 500-40474-3

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**0.0084**		0.0050	0.0019	mg/L			10/22/11 07:10	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/22/11 07:10	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/22/11 07:10	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/22/11 07:10	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/22/11 07:10	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/22/11 07:10	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/22/11 07:10	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/22/11 07:10	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/22/11 07:10	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/22/11 07:10	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/22/11 07:10	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/22/11 07:10	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/22/11 07:10	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/22/11 07:10	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/22/11 07:10	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/22/11 07:10	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/22/11 07:10	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/22/11 07:10	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/22/11 07:10	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/22/11 07:10	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/22/11 07:10	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/22/11 07:10	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/22/11 07:10	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/22/11 07:10	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/22/11 07:10	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/22/11 07:10	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/22/11 07:10	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/22/11 07:10	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/22/11 07:10	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/22/11 07:10	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/22/11 07:10	1
Trichloroethene	**0.030**		0.00050	0.00018	mg/L			10/22/11 07:10	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/22/11 07:10	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/22/11 07:10	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/22/11 07:10	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/22/11 07:10	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/22/11 07:10*	*1*
Dibromofluoromethane	*91*		*78 - 119*		*10/22/11 07:10*	*1*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*		*10/22/11 07:10*	*1*
Toluene-d8 (Surr)	*99*		*80 - 121*		*10/22/11 07:10*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Client Sample ID: FB-001-101011

Date Collected: 10/10/11 15:10
Date Received: 10/11/11 10:10

Lab Sample ID: 500-40474-4

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/22/11 07:34	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/22/11 07:34	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/22/11 07:34	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/22/11 07:34	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/22/11 07:34	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/22/11 07:34	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/22/11 07:34	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/22/11 07:34	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/22/11 07:34	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/22/11 07:34	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/22/11 07:34	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/22/11 07:34	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/22/11 07:34	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/22/11 07:34	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/22/11 07:34	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/22/11 07:34	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/22/11 07:34	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/22/11 07:34	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/22/11 07:34	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/22/11 07:34	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/22/11 07:34	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/22/11 07:34	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/22/11 07:34	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/22/11 07:34	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/22/11 07:34	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/22/11 07:34	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/22/11 07:34	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/22/11 07:34	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/22/11 07:34	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/22/11 07:34	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/22/11 07:34	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/22/11 07:34	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/22/11 07:34	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/22/11 07:34	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/22/11 07:34	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/22/11 07:34	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/22/11 07:34*	*1*
Dibromofluoromethane	*96*		*78 - 119*		*10/22/11 07:34*	*1*
1,2-Dichloroethane-d4 (Surr)	*109*		*77 - 124*		*10/22/11 07:34*	*1*
Toluene-d8 (Surr)	*102*		*80 - 121*		*10/22/11 07:34*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Client Sample ID: 33-GG151-28
Date Collected: 10/10/11 11:05
Date Received: 10/11/11 10:10

Lab Sample ID: 500-40474-5
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.010	U	0.010	0.0038	mg/L			10/22/11 07:57	2
Benzene	0.0010	U	0.0010	0.00024	mg/L			10/22/11 07:57	2
Bromodichloromethane	0.0020	U	0.0020	0.00046	mg/L			10/22/11 07:57	2
Bromoform	0.0020	U	0.0020	0.00090	mg/L			10/22/11 07:57	2
Bromomethane	0.0020	U	0.0020	0.00098	mg/L			10/22/11 07:57	2
Methyl Ethyl Ketone	0.010	U	0.010	0.0020	mg/L			10/22/11 07:57	2
Carbon disulfide	0.010	U	0.010	0.00088	mg/L			10/22/11 07:57	2
Carbon tetrachloride	0.0020	U	0.0020	0.00056	mg/L			10/22/11 07:57	2
Chlorobenzene	**0.0047**		0.0020	0.00048	mg/L			10/22/11 07:57	2
Chloroethane	0.0020	U	0.0020	0.00066	mg/L			10/22/11 07:57	2
Chloroform	0.0020	U	0.0020	0.00050	mg/L			10/22/11 07:57	2
Chloromethane	0.0020	U	0.0020	0.00048	mg/L			10/22/11 07:57	2
cis-1,2-Dichloroethene	**0.14**		0.0020	0.00044	mg/L			10/22/11 07:57	2
cis-1,3-Dichloropropene	0.0020	U	0.0020	0.00056	mg/L			10/22/11 07:57	2
Dibromochloromethane	0.0020	U	0.0020	0.00050	mg/L			10/22/11 07:57	2
1,1-Dichloroethane	0.0020	U	0.0020	0.00048	mg/L			10/22/11 07:57	2
1,1-Dichloroethene	0.0020	U	0.0020	0.00058	mg/L			10/22/11 07:57	2
1,2-Dichloropropane	0.0020	U	0.0020	0.00072	mg/L			10/22/11 07:57	2
Ethylbenzene	0.0010	U	0.0010	0.00028	mg/L			10/22/11 07:57	2
2-Hexanone	0.010	U	0.010	0.0011	mg/L			10/22/11 07:57	2
Methylene Chloride	0.010	U	0.010	0.0013	mg/L			10/22/11 07:57	2
methyl isobutyl ketone	0.010	U	0.010	0.0016	mg/L			10/22/11 07:57	2
Methyl tert-butyl ether	0.0020	U	0.0020	0.00056	mg/L			10/22/11 07:57	2
Styrene	0.0020	U	0.0020	0.00052	mg/L			10/22/11 07:57	2
1,1,2,2-Tetrachloroethane	0.0020	U	0.0020	0.00070	mg/L			10/22/11 07:57	2
Tetrachloroethene	**0.0055**		0.0020	0.00044	mg/L			10/22/11 07:57	2
Toluene	0.0010	U	0.0010	0.00030	mg/L			10/22/11 07:57	2
trans-1,2-Dichloroethene	**0.0023**		0.0020	0.00054	mg/L			10/22/11 07:57	2
trans-1,3-Dichloropropene	0.0020	U	0.0020	0.00070	mg/L			10/22/11 07:57	2
1,1,1-Trichloroethane	0.0020	U	0.0020	0.00052	mg/L			10/22/11 07:57	2
1,1,2-Trichloroethane	0.0020	U	0.0020	0.00060	mg/L			10/22/11 07:57	2
Vinyl chloride	**0.0034**		0.0010	0.00026	mg/L			10/22/11 07:57	2
Xylenes, Total	0.0020	U	0.0020	0.00060	mg/L			10/22/11 07:57	2
1,2-Dichloroethane	0.0020	U	0.0020	0.00056	mg/L			10/22/11 07:57	2
1,3-Dichloropropene, Total	0.0020	U	0.0020	0.0010	mg/L			10/22/11 07:57	2

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*95*		*77 - 112*		*10/22/11 07:57*	*2*
Dibromofluoromethane	*94*		*78 - 119*		*10/22/11 07:57*	*2*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*		*10/22/11 07:57*	*2*
Toluene-d8 (Surr)	*97*		*80 - 121*		*10/22/11 07:57*	*2*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**0.71**		0.010	0.0036	mg/L			10/22/11 08:20	20

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*		*10/22/11 08:20*	*20*
Dibromofluoromethane	*91*		*78 - 119*		*10/22/11 08:20*	*20*
1,2-Dichloroethane-d4 (Surr)	*103*		*77 - 124*		*10/22/11 08:20*	*20*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/22/11 08:20*	*20*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Client Sample ID: 33-GG151-38
Date Collected: 10/10/11 12:30
Date Received: 10/11/11 10:10

Lab Sample ID: 500-40474-6
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.050	U	0.050	0.019	mg/L			10/22/11 08:43	10
Benzene	0.0050	U	0.0050	0.0012	mg/L			10/22/11 08:43	10
Bromodichloromethane	0.010	U	0.010	0.0023	mg/L			10/22/11 08:43	10
Bromoform	0.010	U	0.010	0.0045	mg/L			10/22/11 08:43	10
Bromomethane	0.010	U	0.010	0.0049	mg/L			10/22/11 08:43	10
Methyl Ethyl Ketone	0.050	U	0.050	0.010	mg/L			10/22/11 08:43	10
Carbon disulfide	0.050	U	0.050	0.0044	mg/L			10/22/11 08:43	10
Carbon tetrachloride	0.010	U	0.010	0.0028	mg/L			10/22/11 08:43	10
Chlorobenzene	0.010	U	0.010	0.0024	mg/L			10/22/11 08:43	10
Chloroethane	0.010	U	0.010	0.0033	mg/L			10/22/11 08:43	10
Chloroform	0.010	U	0.010	0.0025	mg/L			10/22/11 08:43	10
Chloromethane	0.010	U	0.010	0.0024	mg/L			10/22/11 08:43	10
cis-1,2-Dichloroethene	**0.42**		0.010	0.0022	mg/L			10/22/11 08:43	10
cis-1,3-Dichloropropene	0.010	U	0.010	0.0028	mg/L			10/22/11 08:43	10
Dibromochloromethane	0.010	U	0.010	0.0025	mg/L			10/22/11 08:43	10
1,1-Dichloroethane	0.010	U	0.010	0.0024	mg/L			10/22/11 08:43	10
1,1-Dichloroethene	0.010	U	0.010	0.0029	mg/L			10/22/11 08:43	10
1,2-Dichloropropane	0.010	U	0.010	0.0036	mg/L			10/22/11 08:43	10
Ethylbenzene	0.0050	U	0.0050	0.0014	mg/L			10/22/11 08:43	10
2-Hexanone	0.050	U	0.050	0.0056	mg/L			10/22/11 08:43	10
Methylene Chloride	0.050	U	0.050	0.0063	mg/L			10/22/11 08:43	10
methyl isobutyl ketone	0.050	U	0.050	0.0079	mg/L			10/22/11 08:43	10
Methyl tert-butyl ether	0.010	U	0.010	0.0028	mg/L			10/22/11 08:43	10
Styrene	0.010	U	0.010	0.0026	mg/L			10/22/11 08:43	10
1,1,2,2-Tetrachloroethane	0.010	U	0.010	0.0035	mg/L			10/22/11 08:43	10
Tetrachloroethene	0.010	U	0.010	0.0022	mg/L			10/22/11 08:43	10
Toluene	0.0050	U	0.0050	0.0015	mg/L			10/22/11 08:43	10
trans-1,2-Dichloroethene	0.010	U	0.010	0.0027	mg/L			10/22/11 08:43	10
trans-1,3-Dichloropropene	0.010	U	0.010	0.0035	mg/L			10/22/11 08:43	10
1,1,1-Trichloroethane	0.010	U	0.010	0.0026	mg/L			10/22/11 08:43	10
1,1,2-Trichloroethane	0.010	U	0.010	0.0030	mg/L			10/22/11 08:43	10
Vinyl chloride	0.0050	U	0.0050	0.0013	mg/L			10/22/11 08:43	10
Xylenes, Total	0.010	U	0.010	0.0030	mg/L			10/22/11 08:43	10
1,2-Dichloroethane	0.010	U	0.010	0.0028	mg/L			10/22/11 08:43	10
1,3-Dichloropropene, Total	0.010	U	0.010	0.0050	mg/L			10/22/11 08:43	10

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*		*10/22/11 08:43*	*10*
Dibromofluoromethane	*97*		*78 - 119*		*10/22/11 08:43*	*10*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*		*10/22/11 08:43*	*10*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/22/11 08:43*	*10*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**3.0**		0.050	0.018	mg/L			10/22/11 09:07	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*95*		*77 - 112*		*10/22/11 09:07*	*100*
Dibromofluoromethane	*96*		*78 - 119*		*10/22/11 09:07*	*100*
1,2-Dichloroethane-d4 (Surr)	*103*		*77 - 124*		*10/22/11 09:07*	*100*
Toluene-d8 (Surr)	*100*		*80 - 121*		*10/22/11 09:07*	*100*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Client Sample ID: 33-SB138-11

Date Collected: 10/10/11 16:05
Date Received: 10/11/11 10:10

Lab Sample ID: 500-40474-7

Matrix: Solid
Percent Solids: 83.4

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	0.0043	U	0.0043	0.00070	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Vinyl chloride	**0.0091**		0.0043	0.00060	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Bromomethane	0.0043	U	0.0043	0.00092	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Chloroethane	0.0043	U	0.0043	0.00090	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
1,1-Dichloroethene	0.0043	U	0.0043	0.00068	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Acetone	**0.0080**		0.0043	0.0021	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Carbon disulfide	0.0043	U	0.0043	0.00061	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Methylene Chloride	**0.0051**		0.0043	0.0012	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
trans-1,2-Dichloroethene	0.0043	U	0.0043	0.00061	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Methyl tert-butyl ether	0.0043	U	0.0043	0.00064	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
1,1-Dichloroethane	0.0043	U	0.0043	0.00068	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
cis-1,2-Dichloroethene	**0.038**		0.0043	0.00063	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Methyl Ethyl Ketone	0.0043	U	0.0043	0.00093	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Chloroform	0.0043	U	0.0043	0.00079	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
1,1,1-Trichloroethane	0.0043	U	0.0043	0.00082	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Carbon tetrachloride	0.0043	U	0.0043	0.00093	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Benzene	0.0043	U	0.0043	0.00046	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
1,2-Dichloroethane	0.0043	U	0.0043	0.00044	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Trichloroethene	**0.0061**		0.0043	0.00069	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
1,2-Dichloropropane	0.0043	U *	0.0043	0.00097	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Bromodichloromethane	0.0043	U	0.0043	0.00065	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
cis-1,3-Dichloropropene	0.0043	U	0.0043	0.00049	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
methyl isobutyl ketone	0.0043	U *	0.0043	0.00073	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Toluene	0.0043	U	0.0043	0.00083	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
trans-1,3-Dichloropropene	0.0043	U	0.0043	0.00097	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
1,1,2-Trichloroethane	0.0043	U	0.0043	0.00057	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Tetrachloroethene	0.0043	U	0.0043	0.00081	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
2-Hexanone	0.0043	U	0.0043	0.00061	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Dibromochloromethane	0.0043	U	0.0043	0.00059	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Chlorobenzene	0.0043	U	0.0043	0.00068	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Ethylbenzene	0.0043	U	0.0043	0.00064	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Xylenes, Total	0.0086	U	0.0086	0.00060	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Styrene	0.0043	U	0.0043	0.00054	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
Bromoform	0.0043	U	0.0043	0.00069	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
1,1,2,2-Tetrachloroethane	0.0043	U	0.0043	0.00058	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1
1,3-Dichloropropene, Total	0.0043	U	0.0043	0.00049	mg/Kg	☼	10/10/11 16:05	10/20/11 13:00	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*84*		*69 - 120*	*10/10/11 16:05*	*10/20/11 13:00*	*1*
Toluene-d8 (Surr)	*100*		*69 - 122*	*10/10/11 16:05*	*10/20/11 13:00*	*1*
4-Bromofluorobenzene (Surr)	*97*		*67 - 120*	*10/10/11 16:05*	*10/20/11 13:00*	*1*
Dibromofluoromethane	*108*		*69 - 120*	*10/10/11 16:05*	*10/20/11 13:00*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Client Sample ID: TB-001-101011

Date Collected: 10/10/11 00:00
Date Received: 10/11/11 10:10

Lab Sample ID: 500-40474-8

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/22/11 09:30	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/22/11 09:30	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/22/11 09:30	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/22/11 09:30	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/22/11 09:30	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/22/11 09:30	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/22/11 09:30	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/22/11 09:30	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/22/11 09:30	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/22/11 09:30	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/22/11 09:30	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/22/11 09:30	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/22/11 09:30	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/22/11 09:30	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/22/11 09:30	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/22/11 09:30	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/22/11 09:30	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/22/11 09:30	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/22/11 09:30	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/22/11 09:30	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/22/11 09:30	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/22/11 09:30	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/22/11 09:30	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/22/11 09:30	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/22/11 09:30	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/22/11 09:30	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/22/11 09:30	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/22/11 09:30	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/22/11 09:30	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/22/11 09:30	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/22/11 09:30	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/22/11 09:30	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/22/11 09:30	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/22/11 09:30	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/22/11 09:30	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/22/11 09:30	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/22/11 09:30*	*1*
Dibromofluoromethane	*92*		*78 - 119*		*10/22/11 09:30*	*1*
1,2-Dichloroethane-d4 (Surr)	*103*		*77 - 124*		*10/22/11 09:30*	*1*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/22/11 09:30*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Client Sample ID: 33-SB138-29
Date Collected: 10/10/11 16:45
Date Received: 10/11/11 10:10

Lab Sample ID: 500-40474-10
Matrix: Solid
Percent Solids: 85.6

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.30	U	0.30	0.11	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Benzene	0.015	U	0.015	0.0047	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Bromodichloromethane	0.12	U	0.12	0.016	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Bromoform	0.12	U	0.12	0.034	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Bromomethane	0.12	U	0.12	0.051	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Methyl Ethyl Ketone	0.30	U	0.30	0.062	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Carbon disulfide	0.30	U	0.30	0.026	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Carbon tetrachloride	0.059	U	0.059	0.017	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Chlorobenzene	**0.075**		0.059	0.014	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Chloroethane	0.12	U	0.12	0.029	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Chloroform	0.059	U	0.059	0.015	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Chloromethane	0.12	U	0.12	0.029	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
cis-1,2-Dichloroethene	**0.091**		0.059	0.013	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
cis-1,3-Dichloropropene	0.059	U	0.059	0.017	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Dibromochloromethane	0.12	U	0.12	0.022	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
1,1-Dichloroethane	0.059	U	0.059	0.014	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
1,2-Dichloroethane	0.059	U	0.059	0.017	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
1,1-Dichloroethene	0.059	U	0.059	0.017	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
1,2-Dichloropropane	0.059	U	0.059	0.021	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Ethylbenzene	0.015	U	0.015	0.0083	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
2-Hexanone	0.30	U	0.30	0.033	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Methylene Chloride	0.30	U	0.30	0.037	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
methyl isobutyl ketone	0.30	U	0.30	0.047	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Methyl tert-butyl ether	0.12	U	0.12	0.028	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Styrene	0.059	U	0.059	0.015	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
1,1,2,2-Tetrachloroethane	0.059	U	0.059	0.021	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Tetrachloroethene	0.059	U	0.059	0.013	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Toluene	0.015	U	0.015	0.0089	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
trans-1,2-Dichloroethene	0.059	U	0.059	0.016	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
trans-1,3-Dichloropropene	0.059	U	0.059	0.021	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
1,1,1-Trichloroethane	0.059	U	0.059	0.016	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
1,1,2-Trichloroethane	0.059	U	0.059	0.018	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Trichloroethene	**1.0**		0.015	0.0089	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Vinyl chloride	0.015	U	0.015	0.0075	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
Xylenes, Total	0.030	U	0.030	0.0076	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50
1,3-Dichloropropene, Total	0.059	U	0.059	0.017	mg/Kg	☼	10/10/11 16:45	10/24/11 01:13	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*77 - 112*	*10/10/11 16:45*	*10/24/11 01:13*	*50*
Dibromofluoromethane	*88*		*78 - 119*	*10/10/11 16:45*	*10/24/11 01:13*	*50*
1,2-Dichloroethane-d4 (Surr)	*96*		*77 - 124*	*10/10/11 16:45*	*10/24/11 01:13*	*50*
Toluene-d8 (Surr)	*97*		*80 - 121*	*10/10/11 16:45*	*10/24/11 01:13*	*50*

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	LCS or LCSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

GC/MS VOA

Prep Batch: 128526

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40474-10	33-SB138-29	Total/NA	Solid	5035	

Prep Batch: 128625

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40474-7	33-SB138-11	Total/NA	Solid	5035	

Analysis Batch: 129573

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40474-7	33-SB138-11	Total/NA	Solid	8260B	128625
LCS 500-129573/5	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-129573/4	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 129883

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40474-1	33-GG150-18	Total/NA	Water	8260B	
500-40474-2	33-GG150-23	Total/NA	Water	8260B	
500-40474-2 - DL	33-GG150-23	Total/NA	Water	8260B	
500-40474-3	33-GG150-34	Total/NA	Water	8260B	
500-40474-4	FB-001-101011	Total/NA	Water	8260B	
500-40474-5	33-GG151-28	Total/NA	Water	8260B	
500-40474-5 - DL	33-GG151-28	Total/NA	Water	8260B	
500-40474-6	33-GG151-38	Total/NA	Water	8260B	
500-40474-6 - DL	33-GG151-38	Total/NA	Water	8260B	
500-40474-8	TB-001-101011	Total/NA	Water	8260B	
LCS 500-129883/6	Lab Control Sample	Total/NA	Water	8260B	
MB 500-129883/5	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 129980

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40474-10	33-SB138-29	Total/NA	Solid	8260B	128526
LCS 500-129980/7	Lab Control Sample	Total/NA	Solid	8260B	
LCSD 500-129980/28	Lab Control Sample Dup	Total/NA	Solid	8260B	
MB 500-129980/6	Method Blank	Total/NA	Solid	8260B	

General Chemistry

Analysis Batch: 128458

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40474-7	33-SB138-11	Total/NA	Solid	Moisture	

Analysis Batch: 128615

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40474-10	33-SB138-29	Total/NA	Solid	Moisture	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40474-10	33-SB138-29	92	88	96	97
LCS 500-129980/7	Lab Control Sample	100	101	100	106
LCSD 500-129980/28	Lab Control Sample Dup	95	99	100	98
MB 500-129980/6	Method Blank	100	91	102	99

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		12DCE	TOL	BFB	DBFM
Lab Sample ID	Client Sample ID	(69-120)	(69-122)	(67-120)	(69-120)
500-40474-7	33-SB138-11	84	100	97	108
LCS 500-129573/5	Lab Control Sample	81	101	98	107
MB 500-129573/4	Method Blank	82	100	98	106

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40474-1	33-GG150-18	94	89	105	97
500-40474-2	33-GG150-23	96	89	104	100
500-40474-2 - DL	33-GG150-23	96	96	110	102
500-40474-3	33-GG150-34	98	91	106	99
500-40474-4	FB-001-101011	100	96	109	102
500-40474-5	33-GG151-28	95	94	106	97
500-40474-5 - DL	33-GG151-28	96	91	103	101
500-40474-6	33-GG151-38	97	97	107	101
500-40474-6 - DL	33-GG151-38	95	96	103	100
500-40474-8	TB-001-101011	98	92	103	101
LCS 500-129883/6	Lab Control Sample	106	96	110	100
MB 500-129883/5	Method Blank	96	87	105	94

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-129573/4
Matrix: Solid
Analysis Batch: 129573

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0025	mg/Kg			10/20/11 08:16	1
Bromomethane	0.0050	U	0.0050	0.0011	mg/Kg			10/20/11 08:16	1
Carbon disulfide	0.0050	U	0.0050	0.00071	mg/Kg			10/20/11 08:16	1
Chloroethane	0.0050	U	0.0050	0.0011	mg/Kg			10/20/11 08:16	1
Chloromethane	0.0050	U	0.0050	0.00082	mg/Kg			10/20/11 08:16	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0011	mg/Kg			10/20/11 08:16	1
Chloroform	0.0050	U	0.0050	0.00092	mg/Kg			10/20/11 08:16	1
cis-1,2-Dichloroethene	0.0050	U	0.0050	0.00073	mg/Kg			10/20/11 08:16	1
Carbon tetrachloride	0.0050	U	0.0050	0.0011	mg/Kg			10/20/11 08:16	1
Benzene	0.0050	U	0.0050	0.00054	mg/Kg			10/20/11 08:16	1
1,1-Dichloroethane	0.0050	U	0.0050	0.00079	mg/Kg			10/20/11 08:16	1
1,1-Dichloroethene	0.0050	U	0.0050	0.00079	mg/Kg			10/20/11 08:16	1
Bromodichloromethane	0.0050	U	0.0050	0.00076	mg/Kg			10/20/11 08:16	1
1,2-Dichloropropane	0.0050	U	0.0050	0.0011	mg/Kg			10/20/11 08:16	1
cis-1,3-Dichloropropene	0.0050	U	0.0050	0.00057	mg/Kg			10/20/11 08:16	1
Methylene Chloride	0.0050	U	0.0050	0.0014	mg/Kg			10/20/11 08:16	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00085	mg/Kg			10/20/11 08:16	1
Methyl tert-butyl ether	0.0050	U	0.0050	0.00075	mg/Kg			10/20/11 08:16	1
2-Hexanone	0.0050	U	0.0050	0.00071	mg/Kg			10/20/11 08:16	1
Dibromochloromethane	0.0050	U	0.0050	0.00069	mg/Kg			10/20/11 08:16	1
Chlorobenzene	0.0050	U	0.0050	0.00079	mg/Kg			10/20/11 08:16	1
Ethylbenzene	0.0050	U	0.0050	0.00075	mg/Kg			10/20/11 08:16	1
Tetrachloroethene	0.0050	U	0.0050	0.00095	mg/Kg			10/20/11 08:16	1
Toluene	0.0050	U	0.0050	0.00097	mg/Kg			10/20/11 08:16	1
Styrene	0.0050	U	0.0050	0.00063	mg/Kg			10/20/11 08:16	1
trans-1,2-Dichloroethene	0.0050	U	0.0050	0.00071	mg/Kg			10/20/11 08:16	1
Bromoform	0.0050	U	0.0050	0.00081	mg/Kg			10/20/11 08:16	1
trans-1,3-Dichloropropene	0.0050	U	0.0050	0.0011	mg/Kg			10/20/11 08:16	1
1,1,1-Trichloroethane	0.0050	U	0.0050	0.00096	mg/Kg			10/20/11 08:16	1
1,1,2,2-Tetrachloroethane	0.0050	U	0.0050	0.00068	mg/Kg			10/20/11 08:16	1
1,1,2-Trichloroethane	0.0050	U	0.0050	0.00067	mg/Kg			10/20/11 08:16	1
Trichloroethene	0.0050	U	0.0050	0.00081	mg/Kg			10/20/11 08:16	1
Vinyl chloride	0.0050	U	0.0050	0.00070	mg/Kg			10/20/11 08:16	1
1,2-Dichloroethane	0.0050	U	0.0050	0.00051	mg/Kg			10/20/11 08:16	1
Xylenes, Total	0.010	U	0.010	0.00070	mg/Kg			10/20/11 08:16	1
1,3-Dichloropropene, Total	0.0050	U	0.0050	0.00057	mg/Kg			10/20/11 08:16	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*82*		*69 - 120*		*10/20/11 08:16*	*1*
Toluene-d8 (Surr)	*100*		*69 - 122*		*10/20/11 08:16*	*1*
4-Bromofluorobenzene (Surr)	*98*		*67 - 120*		*10/20/11 08:16*	*1*
Dibromofluoromethane	*106*		*69 - 120*		*10/20/11 08:16*	*1*

Lab Sample ID: LCS 500-129573/5
Matrix: Solid
Analysis Batch: 129573

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0329		mg/Kg		66	43 - 149

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-129573/5
Matrix: Solid
Analysis Batch: 129573

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Bromomethane	0.0500	0.0606		mg/Kg		121	36 - 146
Carbon disulfide	0.0500	0.0263		mg/Kg		53	27 - 107
Chloroethane	0.0500	0.0654		mg/Kg		131	34 - 144
Chloromethane	0.0500	0.0337		mg/Kg		67	48 - 136
Methyl Ethyl Ketone	0.0500	0.0347		mg/Kg		69	58 - 140
Chloroform	0.0500	0.0457		mg/Kg		91	70 - 112
cis-1,2-Dichloroethene	0.0500	0.0481		mg/Kg		96	62 - 111
Carbon tetrachloride	0.0500	0.0399		mg/Kg		80	64 - 116
Benzene	0.0500	0.0430		mg/Kg		86	74 - 112
1,1-Dichloroethane	0.0500	0.0379		mg/Kg		76	70 - 113
1,1-Dichloroethene	0.0500	0.0368		mg/Kg		74	60 - 128
Bromodichloromethane	0.0500	0.0438		mg/Kg		88	76 - 108
1,2-Dichloropropane	0.0500	0.0378	*	mg/Kg		76	77 - 116
cis-1,3-Dichloropropene	0.0538	0.0406		mg/Kg		76	68 - 103
Methylene Chloride	0.0500	0.0485		mg/Kg		97	49 - 125
methyl isobutyl ketone	0.0500	0.0313	*	mg/Kg		63	65 - 127
Methyl tert-butyl ether	0.0500	0.0419		mg/Kg		84	55 - 116
2-Hexanone	0.0500	0.0324		mg/Kg		65	58 - 138
Dibromochloromethane	0.0500	0.0500		mg/Kg		100	76 - 110
Chlorobenzene	0.0500	0.0505		mg/Kg		101	80 - 110
Ethylbenzene	0.0500	0.0482		mg/Kg		96	78 - 112
Tetrachloroethene	0.0500	0.0442		mg/Kg		88	76 - 114
Toluene	0.0500	0.0452		mg/Kg		90	77 - 113
Styrene	0.0500	0.0471		mg/Kg		94	78 - 109
trans-1,2-Dichloroethene	0.0500	0.0448		mg/Kg		90	62 - 119
Bromoform	0.0500	0.0494		mg/Kg		99	66 - 115
trans-1,3-Dichloropropene	0.0486	0.0372		mg/Kg		77	63 - 107
1,1,1-Trichloroethane	0.0500	0.0468		mg/Kg		94	67 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0523		mg/Kg		105	73 - 114
1,1,2-Trichloroethane	0.0500	0.0470		mg/Kg		94	69 - 118
Trichloroethene	0.0500	0.0443		mg/Kg		89	76 - 111
Vinyl chloride	0.0500	0.0424		mg/Kg		85	44 - 130
1,2-Dichloroethane	0.0500	0.0370		mg/Kg		74	74 - 114
Xylenes, Total	0.150	0.142		mg/Kg		95	77 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*81*		*69 - 120*
Toluene-d8 (Surr)	*101*		*69 - 122*
4-Bromofluorobenzene (Surr)	*98*		*67 - 120*
Dibromofluoromethane	*107*		*69 - 120*

Lab Sample ID: MB 500-129883/5
Matrix: Water
Analysis Batch: 129883

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/22/11 00:28	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/22/11 00:28	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/22/11 00:28	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-129883/5
Matrix: Water
Analysis Batch: 129883

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/22/11 00:28	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/22/11 00:28	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/22/11 00:28	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/22/11 00:28	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/22/11 00:28	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/22/11 00:28	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/22/11 00:28	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/22/11 00:28	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/22/11 00:28	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/22/11 00:28	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/22/11 00:28	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/22/11 00:28	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/22/11 00:28	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/22/11 00:28	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/22/11 00:28	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/22/11 00:28	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/22/11 00:28	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/22/11 00:28	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/22/11 00:28	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/22/11 00:28	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/22/11 00:28	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/22/11 00:28	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/22/11 00:28	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/22/11 00:28	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/22/11 00:28	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/22/11 00:28	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/22/11 00:28	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/22/11 00:28	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/22/11 00:28	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/22/11 00:28	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/22/11 00:28	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/22/11 00:28	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/22/11 00:28	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*		*10/22/11 00:28*	*1*
Toluene-d8 (Surr)	*94*		*80 - 121*		*10/22/11 00:28*	*1*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*		*10/22/11 00:28*	*1*
Dibromofluoromethane	*87*		*78 - 119*		*10/22/11 00:28*	*1*

Lab Sample ID: LCS 500-129883/6
Matrix: Water
Analysis Batch: 129883

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0408		mg/L		82	43 - 153
Bromomethane	0.0500	0.0368		mg/L		74	46 - 155
Carbon disulfide	0.0500	0.0304		mg/L		61	36 - 110
Chloroethane	0.0500	0.0393		mg/L		79	54 - 149

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-129883/6
Matrix: Water
Analysis Batch: 129883

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloromethane	0.0500	0.0376		mg/L		75	36 - 148
Methyl Ethyl Ketone	0.0500	0.0439		mg/L		88	42 - 152
Chloroform	0.0500	0.0416		mg/L		83	71 - 116
cis-1,2-Dichloroethene	0.0500	0.0411		mg/L		82	66 - 111
Carbon tetrachloride	0.0500	0.0506		mg/L		101	58 - 132
Benzene	0.0500	0.0407		mg/L		81	74 - 113
1,1-Dichloroethane	0.0500	0.0403		mg/L		81	64 - 117
1,1-Dichloroethene	0.0500	0.0384		mg/L		77	60 - 126
Bromodichloromethane	0.0500	0.0455		mg/L		91	73 - 120
1,2-Dichloropropane	0.0500	0.0420		mg/L		84	68 - 123
cis-1,3-Dichloropropene	0.0538	0.0443		mg/L		82	65 - 114
Methylene Chloride	0.0500	0.0385		mg/L		77	65 - 125
methyl isobutyl ketone	0.0500	0.0472		mg/L		94	56 - 138
Methyl tert-butyl ether	0.0500	0.0438		mg/L		88	57 - 119
2-Hexanone	0.0500	0.0454		mg/L		91	55 - 138
Dibromochloromethane	0.0500	0.0490		mg/L		98	73 - 118
Chlorobenzene	0.0500	0.0440		mg/L		88	81 - 111
Ethylbenzene	0.0500	0.0432		mg/L		86	79 - 114
Tetrachloroethene	0.0500	0.0447		mg/L		89	76 - 114
Toluene	0.0500	0.0434		mg/L		87	76 - 121
Styrene	0.0500	0.0471		mg/L		94	76 - 118
trans-1,2-Dichloroethene	0.0500	0.0416		mg/L		83	67 - 120
Bromoform	0.0500	0.0539		mg/L		108	64 - 126
trans-1,3-Dichloropropene	0.0486	0.0437		mg/L		90	60 - 119
1,1,1-Trichloroethane	0.0500	0.0462		mg/L		92	66 - 128
1,1,2,2-Tetrachloroethane	0.0500	0.0393		mg/L		79	66 - 121
1,1,2-Trichloroethane	0.0500	0.0448		mg/L		90	62 - 137
Trichloroethene	0.0500	0.0478		mg/L		96	75 - 116
Vinyl chloride	0.0500	0.0409		mg/L		82	47 - 138
1,2-Dichloroethane	0.0500	0.0494		mg/L		99	69 - 115
Xylenes, Total	0.150	0.132		mg/L		88	74 - 117

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*110*		*77 - 124*
Toluene-d8 (Surr)	*100*		*80 - 121*
4-Bromofluorobenzene (Surr)	*106*		*77 - 112*
Dibromofluoromethane	*96*		*78 - 119*

Lab Sample ID: MB 500-129980/6
Matrix: Solid
Analysis Batch: 129980

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			10/23/11 21:45	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			10/23/11 21:45	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			10/23/11 21:45	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			10/23/11 21:45	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			10/23/11 21:45	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			10/23/11 21:45	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-129980/6 — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 129980

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			10/23/11 21:45	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/23/11 21:45	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			10/23/11 21:45	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			10/23/11 21:45	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			10/23/11 21:45	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			10/23/11 21:45	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			10/23/11 21:45	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			10/23/11 21:45	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			10/23/11 21:45	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/Kg			10/23/11 21:45	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			10/23/11 21:45	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			10/23/11 21:45	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			10/23/11 21:45	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			10/23/11 21:45	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			10/23/11 21:45	1
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			10/23/11 21:45	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/23/11 21:45	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			10/23/11 21:45	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			10/23/11 21:45	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			10/23/11 21:45	1
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			10/23/11 21:45	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			10/23/11 21:45	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			10/23/11 21:45	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			10/23/11 21:45	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			10/23/11 21:45	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			10/23/11 21:45	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			10/23/11 21:45	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			10/23/11 21:45	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			10/23/11 21:45	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			10/23/11 21:45	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*102*		*77 - 124*		*10/23/11 21:45*	*1*
Toluene-d8 (Surr)	*99*		*80 - 121*		*10/23/11 21:45*	*1*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/23/11 21:45*	*1*
Dibromofluoromethane	*91*		*78 - 119*		*10/23/11 21:45*	*1*

Lab Sample ID: LCS 500-129980/7 — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 129980

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0558		mg/Kg		112	46 - 152
Bromomethane	0.0500	0.0577		mg/Kg		115	38 - 157
Carbon disulfide	0.0500	0.0364		mg/Kg		73	38 - 112
Chloroethane	0.0500	0.0586		mg/Kg		117	53 - 156
Chloromethane	0.0500	0.0541		mg/Kg		108	44 - 148
Methyl Ethyl Ketone	0.0500	0.0443		mg/Kg		89	48 - 152
Chloroform	0.0500	0.0459		mg/Kg		92	74 - 115

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-129980/7
Matrix: Solid
Analysis Batch: 129980

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
cis-1,2-Dichloroethene	0.0500	0.0476		mg/Kg		95	68 - 110
Carbon tetrachloride	0.0500	0.0444		mg/Kg		89	63 - 127
Benzene	0.0500	0.0442		mg/Kg		88	74 - 112
1,1-Dichloroethane	0.0500	0.0441		mg/Kg		88	69 - 118
1,1-Dichloroethene	0.0500	0.0426		mg/Kg		85	60 - 123
Bromodichloromethane	0.0500	0.0486		mg/Kg		97	73 - 122
1,2-Dichloropropane	0.0500	0.0472		mg/Kg		94	72 - 124
cis-1,3-Dichloropropene	0.0538	0.0545		mg/Kg		101	65 - 116
Methylene Chloride	0.0500	0.0467		mg/Kg		93	67 - 126
methyl isobutyl ketone	0.0500	0.0492		mg/Kg		98	58 - 135
Methyl tert-butyl ether	0.0500	0.0473		mg/Kg		95	57 - 122
2-Hexanone	0.0500	0.0501		mg/Kg		100	58 - 137
Dibromochloromethane	0.0500	0.0431		mg/Kg		86	66 - 123
Chlorobenzene	0.0500	0.0456		mg/Kg		91	80 - 110
Ethylbenzene	0.0500	0.0445		mg/Kg		89	79 - 112
Tetrachloroethene	0.0500	0.0428		mg/Kg		86	76 - 112
Toluene	0.0500	0.0483		mg/Kg		97	78 - 116
Styrene	0.0500	0.0472		mg/Kg		94	77 - 115
trans-1,2-Dichloroethene	0.0500	0.0471		mg/Kg		94	70 - 119
Bromoform	0.0500	0.0430		mg/Kg		86	62 - 119
trans-1,3-Dichloropropene	0.0486	0.0449		mg/Kg		92	64 - 114
1,1,1-Trichloroethane	0.0500	0.0465		mg/Kg		93	70 - 125
1,1,2,2-Tetrachloroethane	0.0500	0.0509		mg/Kg		102	73 - 119
1,1,2-Trichloroethane	0.0500	0.0513		mg/Kg		103	63 - 136
Trichloroethene	0.0500	0.0440		mg/Kg		88	75 - 113
Vinyl chloride	0.0500	0.0564		mg/Kg		113	58 - 136
1,2-Dichloroethane	0.0500	0.0453		mg/Kg		91	66 - 120
Xylenes, Total	0.150	0.131		mg/Kg		87	74 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*
Toluene-d8 (Surr)	*106*		*80 - 121*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*
Dibromofluoromethane	*101*		*78 - 119*

Lab Sample ID: LCSD 500-129980/28
Matrix: Solid
Analysis Batch: 129980

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	0.0500	0.0502		mg/Kg		100	46 - 152	11	30
Bromomethane	0.0500	0.0569		mg/Kg		114	38 - 157	1	30
Carbon disulfide	0.0500	0.0355		mg/Kg		71	38 - 112	3	30
Chloroethane	0.0500	0.0590		mg/Kg		118	53 - 156	1	30
Chloromethane	0.0500	0.0535		mg/Kg		107	44 - 148	1	30
Methyl Ethyl Ketone	0.0500	0.0536		mg/Kg		107	48 - 152	19	30
Chloroform	0.0500	0.0473		mg/Kg		95	74 - 115	3	30
cis-1,2-Dichloroethene	0.0500	0.0483		mg/Kg		97	68 - 110	1	30
Carbon tetrachloride	0.0500	0.0435		mg/Kg		87	63 - 127	2	30

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 500-129980/28
Matrix: Solid
Analysis Batch: 129980

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Benzene	0.0500	0.0448		mg/Kg		90	74 - 112	1	30
1,1-Dichloroethane	0.0500	0.0451		mg/Kg		90	69 - 118	2	30
1,1-Dichloroethene	0.0500	0.0416		mg/Kg		83	60 - 123	2	30
Bromodichloromethane	0.0500	0.0479		mg/Kg		96	73 - 122	1	30
1,2-Dichloropropane	0.0500	0.0470		mg/Kg		94	72 - 124	0	30
cis-1,3-Dichloropropene	0.0538	0.0494		mg/Kg		92	65 - 116	10	30
Methylene Chloride	0.0500	0.0464		mg/Kg		93	67 - 126	1	30
methyl isobutyl ketone	0.0500	0.0478		mg/Kg		96	58 - 135	3	30
Methyl tert-butyl ether	0.0500	0.0463		mg/Kg		93	57 - 122	2	30
2-Hexanone	0.0500	0.0494		mg/Kg		99	58 - 137	1	30
Dibromochloromethane	0.0500	0.0426		mg/Kg		85	66 - 123	1	30
Chlorobenzene	0.0500	0.0452		mg/Kg		90	80 - 110	1	30
Ethylbenzene	0.0500	0.0445		mg/Kg		89	79 - 112	0	30
Tetrachloroethene	0.0500	0.0434		mg/Kg		87	76 - 112	1	30
Toluene	0.0500	0.0464		mg/Kg		93	78 - 116	4	30
Styrene	0.0500	0.0468		mg/Kg		94	77 - 115	1	30
trans-1,2-Dichloroethene	0.0500	0.0473		mg/Kg		95	70 - 119	0	30
Bromoform	0.0500	0.0410		mg/Kg		82	62 - 119	5	30
trans-1,3-Dichloropropene	0.0486	0.0398		mg/Kg		82	64 - 114	12	30
1,1,1-Trichloroethane	0.0500	0.0460		mg/Kg		92	70 - 125	1	30
1,1,2,2-Tetrachloroethane	0.0500	0.0520		mg/Kg		104	73 - 119	2	30
1,1,2-Trichloroethane	0.0500	0.0485		mg/Kg		97	63 - 136	6	30
Trichloroethene	0.0500	0.0443		mg/Kg		89	75 - 113	1	30
Vinyl chloride	0.0500	0.0567		mg/Kg		113	58 - 136	1	30
1,2-Dichloroethane	0.0500	0.0460		mg/Kg		92	66 - 120	2	30
Xylenes, Total	0.150	0.131		mg/Kg		87	74 - 114	0	30

Surrogate	*LCSD % Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*
Toluene-d8 (Surr)	*98*		*80 - 121*
4-Bromofluorobenzene (Surr)	*95*		*77 - 112*
Dibromofluoromethane	*99*		*78 - 119*

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40474

Chain of Custody Number:

Page ____ of ____

Temperature °C of Cooler: 2.4

Client: CH2MHILL
Client Project #: 423535.02.SI
Project Name: CONWR Plume 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: JMB/MMM
Lab PM: Jim Knapp

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOCs 8260B	VOCs 8260B	VOCs 8260B	VOCs 8260B	Percent Moisture	PCBs 8082				Comments
Preservative							1	Water Cool to 4°	Methanol Cool to 4°	Sodium Bisulfate Cool to 4°	7	7				
1		33-GG150-18	10/10/11	1050	3	W	3									
2		33-GG150-23		1145	3	W	3									
3		33-GG150-34		1240	3	W	3									
4		FB-001-101011		1510	3	W	3									
5		33-GG151-28		1105	3	W	3									
6		33-GG151-38		1230	3	W	3									
7		33-SB138-11		11605	5	SO		2	1	1	1					
8		TB-001-101011		—	2	W	2									
9		33-SB138-04		1535	1	SO						1				*HOLD*
10		33-SB138-29		1645	5	SO										

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days ___ Other Prelim Final 14 days
Requested Due Date _____

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/10/11	1800	[signature]	TA	10/11/11	1010
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier
Shipped: FX
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TestAmerica

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2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40474
Chain of Custody Number:
Page ____ of ____
Temperature °C of Cooler:

Client: CH2MHILL
Client Project #: 423535.02.5I
Project Name: CONWR Plume 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: JMB
Lab PM: J

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOCs 8260B (Preservative: Water cool to 4°)	VOCs 8260B (Preservative: Methanol cool to 4°)	VOCs 8260B (Preservative: Sodium Bisulfate cool to 4°)	Percent Moisture (Preservative: 7)						Comments
11		33-SB138-38	10/10/11	1700	5	SO	2	1	1	1						*HOLD*

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days (Prelim) ___ 15 Days 14d (Final) Other
Requested Due Date _____

Sample Disposal
[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/10/11	1800	[signature]	TA	10/11/11	1010
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier:
Shipped: FX
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-40474-1

Login Number: 40474
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	2.4
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-40474-3
Client Project/Site: Crab Orchard Wildlife Refuge Plume 2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/28/2011 02:46:54 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

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Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Definitions 9
QC Association 10
Surrogate Summary 11
QC Sample Results 12
Certification Summary 15
Chain of Custody 16
Receipt Checklists 19

Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-3

Job ID: 500-40474-3

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-40474-3

Comments
No additional comments.

Receipt
Sample 33-SB138-29 will be analyzed for moisture and VOCs per client request.

All other samples were received in good condition within temperature requirements.

GC/MS VOA
Method(s) 8260B: The following sample(s) was diluted due to the abundance of target analytes: 33-SB138-38 (500-40474-11). Elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-3

Client Sample ID: 33-SB138-38 — Lab Sample ID: 500-40474-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.44		0.047	0.011	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	11		0.12	0.071	mg/Kg	500	☼	8260B	Total/NA

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-3

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-3

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-40474-11	33-SB138-38	Solid	10/10/11 17:00	10/11/11 10:10

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-3

Client Sample ID: 33-SB138-38
Date Collected: 10/10/11 17:00
Date Received: 10/11/11 10:10

Lab Sample ID: 500-40474-11
Matrix: Solid
Percent Solids: 88.2

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.23	U	0.23	0.090	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Benzene	0.012	U	0.012	0.0038	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Bromodichloromethane	0.094	U	0.094	0.013	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Bromoform	0.094	U	0.094	0.027	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Bromomethane	0.094	U	0.094	0.040	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Methyl Ethyl Ketone	0.23	U	0.23	0.049	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Carbon disulfide	0.23	U	0.23	0.021	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Carbon tetrachloride	0.047	U	0.047	0.013	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Chlorobenzene	0.047	U	0.047	0.011	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Chloroethane	0.094	U	0.094	0.023	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Chloroform	0.047	U	0.047	0.012	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Chloromethane	0.094	U	0.094	0.023	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
cis-1,2-Dichloroethene	**0.44**		0.047	0.011	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
cis-1,3-Dichloropropene	0.047	U	0.047	0.013	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Dibromochloromethane	0.094	U	0.094	0.018	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
1,1-Dichloroethane	0.047	U	0.047	0.011	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
1,2-Dichloroethane	0.047	U	0.047	0.013	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
1,1-Dichloroethene	0.047	U	0.047	0.014	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
1,2-Dichloropropane	0.047	U	0.047	0.017	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Ethylbenzene	0.012	U	0.012	0.0066	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
2-Hexanone	0.23	U	0.23	0.026	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Methylene Chloride	0.23	U	0.23	0.030	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
methyl isobutyl ketone	0.23	U	0.23	0.037	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Methyl tert-butyl ether	0.094	U	0.094	0.022	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Styrene	0.047	U	0.047	0.012	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
1,1,2,2-Tetrachloroethane	0.047	U	0.047	0.017	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Tetrachloroethene	0.047	U	0.047	0.010	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Toluene	0.012	U	0.012	0.0071	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
trans-1,2-Dichloroethene	0.047	U	0.047	0.013	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
trans-1,3-Dichloropropene	0.047	U	0.047	0.016	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
1,1,1-Trichloroethane	0.047	U	0.047	0.012	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
1,1,2-Trichloroethane	0.047	U	0.047	0.014	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Vinyl chloride	0.012	U	0.012	0.0059	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
Xylenes, Total	0.023	U	0.023	0.0061	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50
1,3-Dichloropropene, Total	0.047	U	0.047	0.013	mg/Kg	☼	10/10/11 17:00	10/24/11 01:36	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*	*10/10/11 17:00*	*10/24/11 01:36*	*50*
Dibromofluoromethane	*97*		*78 - 119*	*10/10/11 17:00*	*10/24/11 01:36*	*50*
1,2-Dichloroethane-d4 (Surr)	*103*		*77 - 124*	*10/10/11 17:00*	*10/24/11 01:36*	*50*
Toluene-d8 (Surr)	*99*		*80 - 121*	*10/10/11 17:00*	*10/24/11 01:36*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**11**		0.12	0.071	mg/Kg	☼	10/10/11 17:00	10/24/11 01:59	500

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*	*10/10/11 17:00*	*10/24/11 01:59*	*500*
Dibromofluoromethane	*98*		*78 - 119*	*10/10/11 17:00*	*10/24/11 01:59*	*500*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*	*10/10/11 17:00*	*10/24/11 01:59*	*500*
Toluene-d8 (Surr)	*100*		*80 - 121*	*10/10/11 17:00*	*10/24/11 01:59*	*500*

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-3

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-3

GC/MS VOA

Prep Batch: 128526

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40474-11	33-SB138-38	Total/NA	Solid	5035	
500-40474-11 - DL	33-SB138-38	Total/NA	Solid	5035	

Analysis Batch: 129980

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40474-11	33-SB138-38	Total/NA	Solid	8260B	128526
500-40474-11 - DL	33-SB138-38	Total/NA	Solid	8260B	128526
LCS 500-129980/7	Lab Control Sample	Total/NA	Solid	8260B	
LCSD 500-129980/28	Lab Control Sample Dup	Total/NA	Solid	8260B	
MB 500-129980/6	Method Blank	Total/NA	Solid	8260B	

General Chemistry

Analysis Batch: 129193

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40474-11	33-SB138-38	Total/NA	Solid	Moisture	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-3

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40474-11	33-SB138-38	99	97	103	99
500-40474-11 - DL	33-SB138-38	98	98	104	100
LCS 500-129980/7	Lab Control Sample	100	101	100	106
LCSD 500-129980/28	Lab Control Sample Dup	95	99	100	98
MB 500-129980/6	Method Blank	100	91	102	99

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-129980/6
Matrix: Solid
Analysis Batch: 129980

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			10/23/11 21:45	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			10/23/11 21:45	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			10/23/11 21:45	1
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			10/23/11 21:45	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			10/23/11 21:45	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			10/23/11 21:45	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			10/23/11 21:45	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			10/23/11 21:45	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			10/23/11 21:45	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			10/23/11 21:45	1
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			10/23/11 21:45	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			10/23/11 21:45	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/23/11 21:45	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			10/23/11 21:45	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			10/23/11 21:45	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			10/23/11 21:45	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			10/23/11 21:45	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			10/23/11 21:45	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			10/23/11 21:45	1
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			10/23/11 21:45	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			10/23/11 21:45	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/Kg			10/23/11 21:45	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			10/23/11 21:45	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			10/23/11 21:45	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			10/23/11 21:45	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			10/23/11 21:45	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/23/11 21:45	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			10/23/11 21:45	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			10/23/11 21:45	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			10/23/11 21:45	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			10/23/11 21:45	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			10/23/11 21:45	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			10/23/11 21:45	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			10/23/11 21:45	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			10/23/11 21:45	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			10/23/11 21:45	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/23/11 21:45*	*1*
Dibromofluoromethane	*91*		*78 - 119*		*10/23/11 21:45*	*1*
1,2-Dichloroethane-d4 (Surr)	*102*		*77 - 124*		*10/23/11 21:45*	*1*
Toluene-d8 (Surr)	*99*		*80 - 121*		*10/23/11 21:45*	*1*

Lab Sample ID: LCS 500-129980/7
Matrix: Solid
Analysis Batch: 129980

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0558		mg/Kg		112	46 - 152

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-129980/7
Matrix: Solid
Analysis Batch: 129980

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Benzene	0.0500	0.0442		mg/Kg		88	74 - 112
Bromodichloromethane	0.0500	0.0486		mg/Kg		97	73 - 122
Bromoform	0.0500	0.0430		mg/Kg		86	62 - 119
Bromomethane	0.0500	0.0577		mg/Kg		115	38 - 157
Methyl Ethyl Ketone	0.0500	0.0443		mg/Kg		89	48 - 152
Carbon disulfide	0.0500	0.0364		mg/Kg		73	38 - 112
Carbon tetrachloride	0.0500	0.0444		mg/Kg		89	63 - 127
Chlorobenzene	0.0500	0.0456		mg/Kg		91	80 - 110
Chloroethane	0.0500	0.0586		mg/Kg		117	53 - 156
Chloroform	0.0500	0.0459		mg/Kg		92	74 - 115
Chloromethane	0.0500	0.0541		mg/Kg		108	44 - 148
cis-1,2-Dichloroethene	0.0500	0.0476		mg/Kg		95	68 - 110
cis-1,3-Dichloropropene	0.0538	0.0545		mg/Kg		101	65 - 116
Dibromochloromethane	0.0500	0.0431		mg/Kg		86	66 - 123
1,1-Dichloroethane	0.0500	0.0441		mg/Kg		88	69 - 118
1,2-Dichloroethane	0.0500	0.0453		mg/Kg		91	66 - 120
1,1-Dichloroethene	0.0500	0.0426		mg/Kg		85	60 - 123
1,2-Dichloropropane	0.0500	0.0472		mg/Kg		94	72 - 124
Ethylbenzene	0.0500	0.0445		mg/Kg		89	79 - 112
2-Hexanone	0.0500	0.0501		mg/Kg		100	58 - 137
Methylene Chloride	0.0500	0.0467		mg/Kg		93	67 - 126
methyl isobutyl ketone	0.0500	0.0492		mg/Kg		98	58 - 135
Methyl tert-butyl ether	0.0500	0.0473		mg/Kg		95	57 - 122
Styrene	0.0500	0.0472		mg/Kg		94	77 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0509		mg/Kg		102	73 - 119
Tetrachloroethene	0.0500	0.0428		mg/Kg		86	76 - 112
Toluene	0.0500	0.0483		mg/Kg		97	78 - 116
trans-1,2-Dichloroethene	0.0500	0.0471		mg/Kg		94	70 - 119
trans-1,3-Dichloropropene	0.0486	0.0449		mg/Kg		92	64 - 114
1,1,1-Trichloroethane	0.0500	0.0465		mg/Kg		93	70 - 125
1,1,2-Trichloroethane	0.0500	0.0513		mg/Kg		103	63 - 136
Trichloroethene	0.0500	0.0440		mg/Kg		88	75 - 113
Vinyl chloride	0.0500	0.0564		mg/Kg		113	58 - 136
Xylenes, Total	0.150	0.131		mg/Kg		87	74 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*
Dibromofluoromethane	*101*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*
Toluene-d8 (Surr)	*106*		*80 - 121*

Lab Sample ID: LCSD 500-129980/28
Matrix: Solid
Analysis Batch: 129980

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	0.0500	0.0502		mg/Kg		100	46 - 152	11	30
Benzene	0.0500	0.0448		mg/Kg		90	74 - 112	1	30
Bromodichloromethane	0.0500	0.0479		mg/Kg		96	73 - 122	1	30

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 500-129980/28
Matrix: Solid
Analysis Batch: 129980

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Bromoform	0.0500	0.0410		mg/Kg		82	62 - 119	5	30
Bromomethane	0.0500	0.0569		mg/Kg		114	38 - 157	1	30
Methyl Ethyl Ketone	0.0500	0.0536		mg/Kg		107	48 - 152	19	30
Carbon disulfide	0.0500	0.0355		mg/Kg		71	38 - 112	3	30
Carbon tetrachloride	0.0500	0.0435		mg/Kg		87	63 - 127	2	30
Chlorobenzene	0.0500	0.0452		mg/Kg		90	80 - 110	1	30
Chloroethane	0.0500	0.0590		mg/Kg		118	53 - 156	1	30
Chloroform	0.0500	0.0473		mg/Kg		95	74 - 115	3	30
Chloromethane	0.0500	0.0535		mg/Kg		107	44 - 148	1	30
cis-1,2-Dichloroethene	0.0500	0.0483		mg/Kg		97	68 - 110	1	30
cis-1,3-Dichloropropene	0.0538	0.0494		mg/Kg		92	65 - 116	10	30
Dibromochloromethane	0.0500	0.0426		mg/Kg		85	66 - 123	1	30
1,1-Dichloroethane	0.0500	0.0451		mg/Kg		90	69 - 118	2	30
1,2-Dichloroethane	0.0500	0.0460		mg/Kg		92	66 - 120	2	30
1,1-Dichloroethene	0.0500	0.0416		mg/Kg		83	60 - 123	2	30
1,2-Dichloropropane	0.0500	0.0470		mg/Kg		94	72 - 124	0	30
Ethylbenzene	0.0500	0.0445		mg/Kg		89	79 - 112	0	30
2-Hexanone	0.0500	0.0494		mg/Kg		99	58 - 137	1	30
Methylene Chloride	0.0500	0.0464		mg/Kg		93	67 - 126	1	30
methyl isobutyl ketone	0.0500	0.0478		mg/Kg		96	58 - 135	3	30
Methyl tert-butyl ether	0.0500	0.0463		mg/Kg		93	57 - 122	2	30
Styrene	0.0500	0.0468		mg/Kg		94	77 - 115	1	30
1,1,2,2-Tetrachloroethane	0.0500	0.0520		mg/Kg		104	73 - 119	2	30
Tetrachloroethene	0.0500	0.0434		mg/Kg		87	76 - 112	1	30
Toluene	0.0500	0.0464		mg/Kg		93	78 - 116	4	30
trans-1,2-Dichloroethene	0.0500	0.0473		mg/Kg		95	70 - 119	0	30
trans-1,3-Dichloropropene	0.0486	0.0398		mg/Kg		82	64 - 114	12	30
1,1,1-Trichloroethane	0.0500	0.0460		mg/Kg		92	70 - 125	1	30
1,1,2-Trichloroethane	0.0500	0.0485		mg/Kg		97	63 - 136	6	30
Trichloroethene	0.0500	0.0443		mg/Kg		89	75 - 113	1	30
Vinyl chloride	0.0500	0.0567		mg/Kg		113	58 - 136	1	30
Xylenes, Total	0.150	0.131		mg/Kg		87	74 - 114	0	30

Surrogate	*LCSD % Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*95*		*77 - 112*
Dibromofluoromethane	*99*		*78 - 119*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*
Toluene-d8 (Surr)	*98*		*80 - 121*

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40474-3

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40474
Chain of Custody Number:
Page ____ of ____
Temperature °C of Cooler: 2.4

Client: CH2MHILL
Client Project #: 423535.02.SI
Project Name: CONWR Plume 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: JMB/MMM
Lab PM: Jim Knapp

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOCs 8260B (Preservative: 1)	VOCs 8260B (Water Cool to 4°)	VOCs 8260B (Methanol Cool to 4°)	VOCs 8260B (Sodium Bisulfate Cool to 4°)	Percent Moisture (7)	PCBs 8082 (7)				Comments
1		33-GG150-18	10/10/11	1050	3	W	3									
2		33-GG150-23		1145	3	W	3									
3		33-GG150-34		1240	3	W	3									
4		FB-001-101011		1510	3	W	3									
5		33-GG151-28		1105	3	W	3									
6		33-GG151-38		1230	3	W	3									
7		33-SB138-11		11005	5	SO		2	1	1	1					
8		TB-001-101011		—	2	W	2									
9		33-SB138-04		1535	1	SO						1				*HOLD*
10		33-SB138-29		1645	5	SO										

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days (Prelim) ___ 15 Days ___ Other (Final 14 days)
Requested Due Date _____

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/10/11	1800	[signature]	TA	10/11/11	1010

Lab Courier
Shipped: FX
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40474
Chain of Custody Number:
Page ____ of ____
Temperature °C of Cooler:

Client: CH2MHILL
Client Project #: 423535.02.5I
Project Name: CONWR Plume 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: JMB
Lab PM: J

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOCs 8260B (Preservative: Water cool to 4°)	VOCs 8260B (Preservative: Methanol cool to 4°)	VOCs 8260B (Preservative: Sodium Bisulfate cool to 4°)	Percent Moisture (Preservative: 7)						Comments
11		33-SB138-38	10/10/11	1700	5	SO	2	1	1	1						*HOLD*

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days (Prelim) ___ 15 Days 14d (Final) Other
Requested Due Date _____

Sample Disposal
[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/10/11	1800	[signature]	TA	10/11/11	1010
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier:
Shipped: FX
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

Knapp, Jim

From: Shannon.Olson@CH2M.com
Sent: Monday, October 17, 2011 8:44 AM
To: Knapp, Jim
Subject: Crab Orchard

Jim,
Could you please analyze sample 33-SB138-38 for VOCs that was previously on hold? I believe we are still within hold time. Thanks!

Shannon Olson
Environmental Chemist
135 S. 84th St. Suite 400
Milwaukee, WI 53214
Tel (414) 847-0227
Mobile (262) 388-3899
Fax (414) 454-8786
www.ch2mhill.com

Solutions Without Boundaries

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-40474-3

Login Number: 40474
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	2.4
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

TestAmerica

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-40530-1
Client Project/Site: Crab Orchard Wildlife Refuge Plume 2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/26/2011 04:05:45 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 6
Sample Summary 7
Client Sample Results 8
Definitions 20
QC Association 21
Surrogate Summary 23
QC Sample Results 25
Certification Summary 41
Chain of Custody 42
Receipt Checklists 44

Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Job ID: 500-40530-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-40530-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC/MS VOA
Method(s) 8260B: The following samples were diluted due to the abundance of target analytes: 33-FDUP-006 (500-40530-8), 33-GG135-34 (500-40530-1), 33-GG148-22.5 (500-40530-2), 33-SB139-28 (500-40530-5). Elevated reporting limits (RLs) are provided.

Method(s) 8260B: The following sample was diluted due to the abundance of non-target analytes: 33-SB145-11 (500-40530-12). Elevated reporting limits (RLs) are provided.

Method(s) 8260B: The %RPD of the laboratory control sample (LCS) and laboratory control standard duplicate (LCSD) for preparation batch 130034 exceeded control limits for the following analyte: Acetone.

Method(s) 8260B: The method blank for preparation batches 130095 and 130096 contained Methylene Chloride above the reporting limit (RL). None of the samples associated with this method blank contained the target compound; therefore, re-analysis of samples were not performed.

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Client Sample ID: 33-GG135-34 — Lab Sample ID: 500-40530-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	0.27		0.10	0.038	mg/L	20		8260B	Total/NA
Chloroform	0.011	J	0.020	0.0050	mg/L	20		8260B	Total/NA
Tetrachloroethene	0.018	J	0.020	0.0044	mg/L	20		8260B	Total/NA
trans-1,2-Dichloroethene	0.086		0.020	0.0054	mg/L	20		8260B	Total/NA
1,1,2-Trichloroethane	0.068		0.020	0.0060	mg/L	20		8260B	Total/NA
Vinyl chloride	0.10		0.010	0.0026	mg/L	20		8260B	Total/NA
cis-1,2-Dichloroethene - DL	6.8		0.050	0.011	mg/L	50		8260B	Total/NA
Trichloroethene - DL	8.8		0.025	0.0090	mg/L	50		8260B	Total/NA

Client Sample ID: 33-GG148-22.5 — Lab Sample ID: 500-40530-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
trans-1,2-Dichloroethene	0.28		0.10	0.027	mg/L	100		8260B	Total/NA
1,1,2-Trichloroethane	0.12		0.10	0.030	mg/L	100		8260B	Total/NA
Vinyl chloride	1.1		0.050	0.013	mg/L	100		8260B	Total/NA
cis-1,2-Dichloroethene - DL	29		1.0	0.22	mg/L	1000		8260B	Total/NA
Trichloroethene - DL	58		0.50	0.18	mg/L	1000		8260B	Total/NA

Client Sample ID: TB-001-101111 — Lab Sample ID: 500-40530-3

No Detections

Client Sample ID: 33-SB139-11 — Lab Sample ID: 500-40530-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloroethane	0.0025	J	0.0045	0.00095	mg/Kg	1	☼	8260B	Total/NA
1,1-Dichloroethene	0.055		0.0045	0.00071	mg/Kg	1	☼	8260B	Total/NA
1,1-Dichloroethane	0.036		0.0045	0.00071	mg/Kg	1	☼	8260B	Total/NA
cis-1,2-Dichloroethene	0.041		0.0045	0.00066	mg/Kg	1	☼	8260B	Total/NA
Trichloroethene	0.012		0.0045	0.00073	mg/Kg	1	☼	8260B	Total/NA

Client Sample ID: 33-SB139-28 — Lab Sample ID: 500-40530-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	2.7		0.043	0.0097	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene	8.3		0.011	0.0065	mg/Kg	50	☼	8260B	Total/NA
Vinyl chloride	0.14		0.011	0.0054	mg/Kg	50	☼	8260B	Total/NA

Client Sample ID: 33-FDUP-006 — Lab Sample ID: 500-40530-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.011		0.011	0.0036	mg/Kg	50	☼	8260B	Total/NA
Chlorobenzene	0.038	J	0.045	0.011	mg/Kg	50	☼	8260B	Total/NA
cis-1,2-Dichloroethene	3.0		0.045	0.010	mg/Kg	50	☼	8260B	Total/NA
1,1-Dichloroethene	0.026	J	0.045	0.013	mg/Kg	50	☼	8260B	Total/NA
trans-1,2-Dichloroethene	0.021	J	0.045	0.012	mg/Kg	50	☼	8260B	Total/NA
Vinyl chloride	0.11		0.011	0.0057	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	15		0.023	0.014	mg/Kg	100	☼	8260B	Total/NA

Client Sample ID: FB-001-101111 — Lab Sample ID: 500-40530-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloroform	0.0012		0.0010	0.00025	mg/L	1		8260B	Total/NA

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Client Sample ID: FB-002-101111 — Lab Sample ID: 500-40530-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloroform	0.0013		0.0010	0.00025	mg/L	1		8260B	Total/NA

Client Sample ID: 33-SB145-11 — Lab Sample ID: 500-40530-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Trichloroethene	0.11		0.011	0.0068	mg/Kg	50	☼	8260B	Total/NA

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-40530-1	33-GG135-34	Water	10/11/11 08:50	10/12/11 10:30
500-40530-2	33-GG148-22.5	Water	10/11/11 09:45	10/12/11 10:30
500-40530-3	TB-001-101111	Water	10/11/11 00:00	10/12/11 10:30
500-40530-4	33-SB139-11	Solid	10/11/11 10:20	10/12/11 10:30
500-40530-5	33-SB139-28	Solid	10/11/11 10:30	10/12/11 10:30
500-40530-8	33-FDUP-006	Solid	10/11/11 10:35	10/12/11 10:30
500-40530-9	FB-001-101111	Water	10/11/11 15:30	10/12/11 10:30
500-40530-10	FB-002-101111	Water	10/11/11 15:40	10/12/11 10:30
500-40530-12	33-SB145-11	Solid	10/11/11 14:00	10/12/11 10:30

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Client Sample ID: 33-GG135-34
Date Collected: 10/11/11 08:50
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-1
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**0.27**		0.10	0.038	mg/L			10/25/11 13:23	20
Benzene	0.010	U	0.010	0.0024	mg/L			10/25/11 13:23	20
Bromodichloromethane	0.020	U	0.020	0.0046	mg/L			10/25/11 13:23	20
Bromoform	0.020	U	0.020	0.0090	mg/L			10/25/11 13:23	20
Bromomethane	0.020	U	0.020	0.0098	mg/L			10/25/11 13:23	20
Methyl Ethyl Ketone	0.10	U	0.10	0.020	mg/L			10/25/11 13:23	20
Carbon disulfide	0.10	U	0.10	0.0088	mg/L			10/25/11 13:23	20
Carbon tetrachloride	0.020	U	0.020	0.0056	mg/L			10/25/11 13:23	20
Chlorobenzene	0.020	U	0.020	0.0048	mg/L			10/25/11 13:23	20
Chloroethane	0.020	U	0.020	0.0066	mg/L			10/25/11 13:23	20
Chloroform	**0.011**	**J**	0.020	0.0050	mg/L			10/25/11 13:23	20
Chloromethane	0.020	U	0.020	0.0048	mg/L			10/25/11 13:23	20
cis-1,3-Dichloropropene	0.020	U	0.020	0.0056	mg/L			10/25/11 13:23	20
Dibromochloromethane	0.020	U	0.020	0.0050	mg/L			10/25/11 13:23	20
1,1-Dichloroethane	0.020	U	0.020	0.0048	mg/L			10/25/11 13:23	20
1,1-Dichloroethene	0.020	U	0.020	0.0058	mg/L			10/25/11 13:23	20
1,2-Dichloropropane	0.020	U	0.020	0.0072	mg/L			10/25/11 13:23	20
Ethylbenzene	0.010	U	0.010	0.0028	mg/L			10/25/11 13:23	20
2-Hexanone	0.10	U	0.10	0.011	mg/L			10/25/11 13:23	20
Methylene Chloride	0.10	U	0.10	0.013	mg/L			10/25/11 13:23	20
methyl isobutyl ketone	0.10	U	0.10	0.016	mg/L			10/25/11 13:23	20
Methyl tert-butyl ether	0.020	U	0.020	0.0056	mg/L			10/25/11 13:23	20
Styrene	0.020	U	0.020	0.0052	mg/L			10/25/11 13:23	20
1,1,2,2-Tetrachloroethane	0.020	U	0.020	0.0070	mg/L			10/25/11 13:23	20
Tetrachloroethene	**0.018**	**J**	0.020	0.0044	mg/L			10/25/11 13:23	20
Toluene	0.010	U	0.010	0.0030	mg/L			10/25/11 13:23	20
trans-1,2-Dichloroethene	**0.086**		0.020	0.0054	mg/L			10/25/11 13:23	20
trans-1,3-Dichloropropene	0.020	U	0.020	0.0070	mg/L			10/25/11 13:23	20
1,1,1-Trichloroethane	0.020	U	0.020	0.0052	mg/L			10/25/11 13:23	20
1,1,2-Trichloroethane	**0.068**		0.020	0.0060	mg/L			10/25/11 13:23	20
Vinyl chloride	**0.10**		0.010	0.0026	mg/L			10/25/11 13:23	20
Xylenes, Total	0.020	U	0.020	0.0060	mg/L			10/25/11 13:23	20
1,2-Dichloroethane	0.020	U	0.020	0.0056	mg/L			10/25/11 13:23	20
1,3-Dichloropropene, Total	0.020	U	0.020	0.010	mg/L			10/25/11 13:23	20

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*		*10/25/11 13:23*	*20*
Dibromofluoromethane	*90*		*78 - 119*		*10/25/11 13:23*	*20*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*		*10/25/11 13:23*	*20*
Toluene-d8 (Surr)	*94*		*80 - 121*		*10/25/11 13:23*	*20*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	**6.8**		0.050	0.011	mg/L			10/24/11 22:25	50
Trichloroethene	**8.8**		0.025	0.0090	mg/L			10/24/11 22:25	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*		*10/24/11 22:25*	*50*
Dibromofluoromethane	*105*		*78 - 119*		*10/24/11 22:25*	*50*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*		*10/24/11 22:25*	*50*
Toluene-d8 (Surr)	*100*		*80 - 121*		*10/24/11 22:25*	*50*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Client Sample ID: 33-GG148-22.5

Date Collected: 10/11/11 09:45
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-2

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.50	U *	0.50	0.19	mg/L			10/24/11 23:11	100
Benzene	0.050	U	0.050	0.012	mg/L			10/24/11 23:11	100
Bromodichloromethane	0.10	U	0.10	0.023	mg/L			10/24/11 23:11	100
Bromoform	0.10	U	0.10	0.045	mg/L			10/24/11 23:11	100
Bromomethane	0.10	U	0.10	0.049	mg/L			10/24/11 23:11	100
Methyl Ethyl Ketone	0.50	U	0.50	0.10	mg/L			10/24/11 23:11	100
Carbon disulfide	0.50	U	0.50	0.044	mg/L			10/24/11 23:11	100
Carbon tetrachloride	0.10	U	0.10	0.028	mg/L			10/24/11 23:11	100
Chlorobenzene	0.10	U	0.10	0.024	mg/L			10/24/11 23:11	100
Chloroethane	0.10	U	0.10	0.033	mg/L			10/24/11 23:11	100
Chloroform	0.10	U	0.10	0.025	mg/L			10/24/11 23:11	100
Chloromethane	0.10	U	0.10	0.024	mg/L			10/24/11 23:11	100
cis-1,3-Dichloropropene	0.10	U	0.10	0.028	mg/L			10/24/11 23:11	100
Dibromochloromethane	0.10	U	0.10	0.025	mg/L			10/24/11 23:11	100
1,1-Dichloroethane	0.10	U	0.10	0.024	mg/L			10/24/11 23:11	100
1,1-Dichloroethene	0.10	U	0.10	0.029	mg/L			10/24/11 23:11	100
1,2-Dichloropropane	0.10	U	0.10	0.036	mg/L			10/24/11 23:11	100
Ethylbenzene	0.050	U	0.050	0.014	mg/L			10/24/11 23:11	100
2-Hexanone	0.50	U	0.50	0.056	mg/L			10/24/11 23:11	100
Methylene Chloride	0.50	U	0.50	0.063	mg/L			10/24/11 23:11	100
methyl isobutyl ketone	0.50	U	0.50	0.079	mg/L			10/24/11 23:11	100
Methyl tert-butyl ether	0.10	U	0.10	0.028	mg/L			10/24/11 23:11	100
Styrene	0.10	U	0.10	0.026	mg/L			10/24/11 23:11	100
1,1,2,2-Tetrachloroethane	0.10	U	0.10	0.035	mg/L			10/24/11 23:11	100
Tetrachloroethene	0.10	U	0.10	0.022	mg/L			10/24/11 23:11	100
Toluene	0.050	U	0.050	0.015	mg/L			10/24/11 23:11	100
trans-1,2-Dichloroethene	**0.28**		0.10	0.027	mg/L			10/24/11 23:11	100
trans-1,3-Dichloropropene	0.10	U	0.10	0.035	mg/L			10/24/11 23:11	100
1,1,1-Trichloroethane	0.10	U	0.10	0.026	mg/L			10/24/11 23:11	100
1,1,2-Trichloroethane	**0.12**		0.10	0.030	mg/L			10/24/11 23:11	100
Vinyl chloride	**1.1**		0.050	0.013	mg/L			10/24/11 23:11	100
Xylenes, Total	0.10	U	0.10	0.030	mg/L			10/24/11 23:11	100
1,2-Dichloroethane	0.10	U	0.10	0.028	mg/L			10/24/11 23:11	100
1,3-Dichloropropene, Total	0.10	U	0.10	0.050	mg/L			10/24/11 23:11	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*		*10/24/11 23:11*	*100*
Dibromofluoromethane	*108*		*78 - 119*		*10/24/11 23:11*	*100*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*		*10/24/11 23:11*	*100*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/24/11 23:11*	*100*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	**29**		1.0	0.22	mg/L			10/24/11 23:34	1000
Trichloroethene	**58**		0.50	0.18	mg/L			10/24/11 23:34	1000

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/24/11 23:34*	*1000*
Dibromofluoromethane	*106*		*78 - 119*		*10/24/11 23:34*	*1000*
1,2-Dichloroethane-d4 (Surr)	*109*		*77 - 124*		*10/24/11 23:34*	*1000*
Toluene-d8 (Surr)	*98*		*80 - 121*		*10/24/11 23:34*	*1000*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Client Sample ID: TB-001-101111

Date Collected: 10/11/11 00:00
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-3

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U *	0.0050	0.0019	mg/L			10/24/11 22:02	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/24/11 22:02	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/24/11 22:02	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/24/11 22:02	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/24/11 22:02	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/24/11 22:02	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/24/11 22:02	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/24/11 22:02	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/24/11 22:02	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/24/11 22:02	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/24/11 22:02	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/24/11 22:02	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/24/11 22:02	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/24/11 22:02	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/24/11 22:02	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/24/11 22:02	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/24/11 22:02	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/24/11 22:02	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/24/11 22:02	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/24/11 22:02	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/24/11 22:02	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/24/11 22:02	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/24/11 22:02	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/24/11 22:02	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/24/11 22:02	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/24/11 22:02	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/24/11 22:02	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/24/11 22:02	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/24/11 22:02	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/24/11 22:02	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/24/11 22:02	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/24/11 22:02	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/24/11 22:02	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/24/11 22:02	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/24/11 22:02	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/24/11 22:02	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*		*10/24/11 22:02*	*1*
Dibromofluoromethane	*105*		*78 - 119*		*10/24/11 22:02*	*1*
1,2-Dichloroethane-d4 (Surr)	*103*		*77 - 124*		*10/24/11 22:02*	*1*
Toluene-d8 (Surr)	*99*		*80 - 121*		*10/24/11 22:02*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Client Sample ID: 33-SB139-11
Date Collected: 10/11/11 10:20
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-4
Matrix: Solid
Percent Solids: 83.7

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	0.0045	U	0.0045	0.00074	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Vinyl chloride	0.0045	U	0.0045	0.00063	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Bromomethane	0.0045	U	0.0045	0.00096	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Chloroethane	**0.0025**	**J**	0.0045	0.00095	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
1,1-Dichloroethene	**0.055**		0.0045	0.00071	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Acetone	0.0045	U	0.0045	0.0022	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Carbon disulfide	0.0045	U	0.0045	0.00064	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Methylene Chloride	0.0045	U	0.0045	0.0013	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
trans-1,2-Dichloroethene	0.0045	U	0.0045	0.00064	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Methyl tert-butyl ether	0.0045	U	0.0045	0.00068	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
1,1-Dichloroethane	**0.036**		0.0045	0.00071	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
cis-1,2-Dichloroethene	**0.041**		0.0045	0.00066	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Methyl Ethyl Ketone	0.0045	U	0.0045	0.00097	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Chloroform	0.0045	U	0.0045	0.00083	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
1,1,1-Trichloroethane	0.0045	U	0.0045	0.00086	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Carbon tetrachloride	0.0045	U	0.0045	0.00098	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Benzene	0.0045	U	0.0045	0.00049	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
1,2-Dichloroethane	0.0045	U	0.0045	0.00046	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Trichloroethene	**0.012**		0.0045	0.00073	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
1,2-Dichloropropane	0.0045	U	0.0045	0.0010	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Bromodichloromethane	0.0045	U	0.0045	0.00068	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
cis-1,3-Dichloropropene	0.0045	U	0.0045	0.00051	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
methyl isobutyl ketone	0.0045	U	0.0045	0.00077	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Toluene	0.0045	U	0.0045	0.00087	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
trans-1,3-Dichloropropene	0.0045	U	0.0045	0.0010	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
1,1,2-Trichloroethane	0.0045	U	0.0045	0.00060	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Tetrachloroethene	0.0045	U	0.0045	0.00086	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
2-Hexanone	0.0045	U	0.0045	0.00064	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Dibromochloromethane	0.0045	U	0.0045	0.00062	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Chlorobenzene	0.0045	U	0.0045	0.00071	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Ethylbenzene	0.0045	U	0.0045	0.00068	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Xylenes, Total	0.0090	U	0.0090	0.00063	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Styrene	0.0045	U	0.0045	0.00057	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
Bromoform	0.0045	U	0.0045	0.00073	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
1,1,2,2-Tetrachloroethane	0.0045	U	0.0045	0.00061	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1
1,3-Dichloropropene, Total	0.0045	U	0.0045	0.00051	mg/Kg	☼	10/11/11 10:20	10/21/11 12:39	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*98*		*69 - 120*	*10/11/11 10:20*	*10/21/11 12:39*	*1*
Toluene-d8 (Surr)	*101*		*69 - 122*	*10/11/11 10:20*	*10/21/11 12:39*	*1*
4-Bromofluorobenzene (Surr)	*99*		*67 - 120*	*10/11/11 10:20*	*10/21/11 12:39*	*1*
Dibromofluoromethane	*102*		*69 - 120*	*10/11/11 10:20*	*10/21/11 12:39*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Client Sample ID: 33-SB139-28
Date Collected: 10/11/11 10:30
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-5
Matrix: Solid
Percent Solids: 85.1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.22	U	0.22	0.083	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Benzene	0.011	U	0.011	0.0035	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Bromodichloromethane	0.086	U	0.086	0.012	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Bromoform	0.086	U	0.086	0.025	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Bromomethane	0.086	U	0.086	0.037	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Methyl Ethyl Ketone	0.22	U	0.22	0.045	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Carbon disulfide	0.22	U	0.22	0.019	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Carbon tetrachloride	0.043	U	0.043	0.012	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Chlorobenzene	0.043	U	0.043	0.010	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Chloroethane	0.086	U	0.086	0.021	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Chloroform	0.043	U	0.043	0.011	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Chloromethane	0.086	U	0.086	0.021	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
cis-1,2-Dichloroethene	**2.7**		0.043	0.0097	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
cis-1,3-Dichloropropene	0.043	U	0.043	0.012	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Dibromochloromethane	0.086	U	0.086	0.016	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
1,1-Dichloroethane	0.043	U	0.043	0.011	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
1,2-Dichloroethane	0.043	U	0.043	0.012	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
1,1-Dichloroethene	0.043	U	0.043	0.013	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
1,2-Dichloropropane	0.043	U	0.043	0.015	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Ethylbenzene	0.011	U	0.011	0.0060	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
2-Hexanone	0.22	U	0.22	0.024	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Methylene Chloride	0.22	U	0.22	0.027	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
methyl isobutyl ketone	0.22	U	0.22	0.034	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Methyl tert-butyl ether	0.086	U	0.086	0.021	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Styrene	0.043	U	0.043	0.011	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
1,1,2,2-Tetrachloroethane	0.043	U	0.043	0.015	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Tetrachloroethene	0.043	U	0.043	0.0094	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Toluene	0.011	U	0.011	0.0065	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
trans-1,2-Dichloroethene	0.043	U	0.043	0.012	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
trans-1,3-Dichloropropene	0.043	U	0.043	0.015	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
1,1,1-Trichloroethane	0.043	U	0.043	0.011	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
1,1,2-Trichloroethane	0.043	U	0.043	0.013	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Trichloroethene	**8.3**		0.011	0.0065	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Vinyl chloride	**0.14**		0.011	0.0054	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
Xylenes, Total	0.022	U	0.022	0.0056	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50
1,3-Dichloropropene, Total	0.043	U	0.043	0.012	mg/Kg	☼	10/11/11 10:30	10/25/11 01:07	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*	*10/11/11 10:30*	*10/25/11 01:07*	*50*
Dibromofluoromethane	*105*		*78 - 119*	*10/11/11 10:30*	*10/25/11 01:07*	*50*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*	*10/11/11 10:30*	*10/25/11 01:07*	*50*
Toluene-d8 (Surr)	*99*		*80 - 121*	*10/11/11 10:30*	*10/25/11 01:07*	*50*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Client Sample ID: 33-FDUP-006
Date Collected: 10/11/11 10:35
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-8
Matrix: Solid
Percent Solids: 84.8

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.23	U	0.23	0.087	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Benzene	**0.011**		0.011	0.0036	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Bromodichloromethane	0.091	U	0.091	0.012	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Bromoform	0.091	U	0.091	0.026	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Bromomethane	0.091	U	0.091	0.039	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Methyl Ethyl Ketone	0.23	U	0.23	0.047	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Carbon disulfide	0.23	U	0.23	0.020	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Carbon tetrachloride	0.045	U	0.045	0.013	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Chlorobenzene	**0.038**	**J**	0.045	0.011	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Chloroethane	0.091	U	0.091	0.022	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Chloroform	0.045	U	0.045	0.011	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Chloromethane	0.091	U	0.091	0.022	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
cis-1,2-Dichloroethene	**3.0**		0.045	0.010	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
cis-1,3-Dichloropropene	0.045	U	0.045	0.013	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Dibromochloromethane	0.091	U	0.091	0.017	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
1,1-Dichloroethane	0.045	U	0.045	0.011	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
1,2-Dichloroethane	0.045	U	0.045	0.013	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
1,1-Dichloroethene	**0.026**	**J**	0.045	0.013	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
1,2-Dichloropropane	0.045	U	0.045	0.016	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Ethylbenzene	0.011	U	0.011	0.0063	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
2-Hexanone	0.23	U	0.23	0.025	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Methylene Chloride	0.23	U	0.23	0.029	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
methyl isobutyl ketone	0.23	U	0.23	0.036	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Methyl tert-butyl ether	0.091	U	0.091	0.022	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Styrene	0.045	U	0.045	0.012	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
1,1,2,2-Tetrachloroethane	0.045	U	0.045	0.016	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Tetrachloroethene	0.045	U	0.045	0.0098	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Toluene	0.011	U	0.011	0.0068	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
trans-1,2-Dichloroethene	**0.021**	**J**	0.045	0.012	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
trans-1,3-Dichloropropene	0.045	U	0.045	0.016	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
1,1,1-Trichloroethane	0.045	U	0.045	0.012	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
1,1,2-Trichloroethane	0.045	U	0.045	0.014	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Vinyl chloride	**0.11**		0.011	0.0057	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
Xylenes, Total	0.023	U	0.023	0.0058	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50
1,3-Dichloropropene, Total	0.045	U	0.045	0.013	mg/Kg	☼	10/11/11 10:35	10/25/11 13:47	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*102*		*77 - 112*	*10/11/11 10:35*	*10/25/11 13:47*	*50*
Dibromofluoromethane	*93*		*78 - 119*	*10/11/11 10:35*	*10/25/11 13:47*	*50*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*	*10/11/11 10:35*	*10/25/11 13:47*	*50*
Toluene-d8 (Surr)	*100*		*80 - 121*	*10/11/11 10:35*	*10/25/11 13:47*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**15**		0.023	0.014	mg/Kg	☼	10/11/11 10:35	10/25/11 17:54	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*109*		*77 - 112*	*10/11/11 10:35*	*10/25/11 17:54*	*100*
Dibromofluoromethane	*102*		*78 - 119*	*10/11/11 10:35*	*10/25/11 17:54*	*100*
1,2-Dichloroethane-d4 (Surr)	*111*		*77 - 124*	*10/11/11 10:35*	*10/25/11 17:54*	*100*
Toluene-d8 (Surr)	*106*		*80 - 121*	*10/11/11 10:35*	*10/25/11 17:54*	*100*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Client Sample ID: FB-001-101111

Date Collected: 10/11/11 15:30
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-9

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/25/11 13:00	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/25/11 13:00	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/25/11 13:00	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/25/11 13:00	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/25/11 13:00	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/25/11 13:00	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/25/11 13:00	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/25/11 13:00	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/25/11 13:00	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/25/11 13:00	1
Chloroform	**0.0012**		0.0010	0.00025	mg/L			10/25/11 13:00	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/25/11 13:00	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/25/11 13:00	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/25/11 13:00	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/25/11 13:00	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/25/11 13:00	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/25/11 13:00	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/25/11 13:00	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/25/11 13:00	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/25/11 13:00	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/25/11 13:00	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/25/11 13:00	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/25/11 13:00	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/25/11 13:00	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/25/11 13:00	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/25/11 13:00	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/25/11 13:00	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/25/11 13:00	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/25/11 13:00	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/25/11 13:00	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/25/11 13:00	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/25/11 13:00	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/25/11 13:00	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/25/11 13:00	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/25/11 13:00	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/25/11 13:00	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/25/11 13:00*	*1*
Dibromofluoromethane	*91*		*78 - 119*		*10/25/11 13:00*	*1*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*		*10/25/11 13:00*	*1*
Toluene-d8 (Surr)	*97*		*80 - 121*		*10/25/11 13:00*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Client Sample ID: FB-002-101111

Date Collected: 10/11/11 15:40
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-10

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U *	0.0050	0.0019	mg/L			10/25/11 00:44	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/25/11 00:44	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/25/11 00:44	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/25/11 00:44	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/25/11 00:44	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/25/11 00:44	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/25/11 00:44	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/25/11 00:44	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/25/11 00:44	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/25/11 00:44	1
Chloroform	**0.0013**		0.0010	0.00025	mg/L			10/25/11 00:44	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/25/11 00:44	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/25/11 00:44	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/25/11 00:44	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/25/11 00:44	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/25/11 00:44	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/25/11 00:44	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/25/11 00:44	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/25/11 00:44	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/25/11 00:44	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/25/11 00:44	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/25/11 00:44	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/25/11 00:44	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/25/11 00:44	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/25/11 00:44	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/25/11 00:44	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/25/11 00:44	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/25/11 00:44	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/25/11 00:44	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/25/11 00:44	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/25/11 00:44	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/25/11 00:44	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/25/11 00:44	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/25/11 00:44	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/25/11 00:44	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/25/11 00:44	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*		*10/25/11 00:44*	*1*
Dibromofluoromethane	*112*		*78 - 119*		*10/25/11 00:44*	*1*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*		*10/25/11 00:44*	*1*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/25/11 00:44*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Client Sample ID: 33-SB145-11
Date Collected: 10/11/11 14:00
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-12
Matrix: Solid
Percent Solids: 83.0

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.22	U	0.22	0.086	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Benzene	0.011	U	0.011	0.0036	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Bromodichloromethane	0.090	U	0.090	0.012	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Bromoform	0.090	U	0.090	0.026	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Bromomethane	0.090	U	0.090	0.039	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Methyl Ethyl Ketone	0.22	U	0.22	0.047	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Carbon disulfide	0.22	U	0.22	0.020	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Carbon tetrachloride	0.045	U	0.045	0.013	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Chlorobenzene	0.045	U	0.045	0.011	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Chloroethane	0.090	U	0.090	0.022	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Chloroform	0.045	U	0.045	0.011	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Chloromethane	0.090	U	0.090	0.022	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
cis-1,2-Dichloroethene	0.045	U	0.045	0.010	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
cis-1,3-Dichloropropene	0.045	U	0.045	0.013	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Dibromochloromethane	0.090	U	0.090	0.017	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
1,1-Dichloroethane	0.045	U	0.045	0.011	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
1,2-Dichloroethane	0.045	U	0.045	0.013	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
1,1-Dichloroethene	0.045	U	0.045	0.013	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
1,2-Dichloropropane	0.045	U	0.045	0.016	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Ethylbenzene	0.011	U	0.011	0.0063	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
2-Hexanone	0.22	U	0.22	0.025	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Methylene Chloride	0.22	U	0.22	0.028	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
methyl isobutyl ketone	0.22	U	0.22	0.035	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Methyl tert-butyl ether	0.090	U	0.090	0.021	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Styrene	0.045	U	0.045	0.012	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
1,1,2,2-Tetrachloroethane	0.045	U	0.045	0.016	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Tetrachloroethene	0.045	U	0.045	0.0097	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Toluene	0.011	U	0.011	0.0068	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
trans-1,2-Dichloroethene	0.045	U	0.045	0.012	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
trans-1,3-Dichloropropene	0.045	U	0.045	0.016	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
1,1,1-Trichloroethane	0.045	U	0.045	0.012	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
1,1,2-Trichloroethane	0.045	U	0.045	0.014	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Trichloroethene	**0.11**		0.011	0.0068	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Vinyl chloride	0.011	U	0.011	0.0057	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
Xylenes, Total	0.022	U	0.022	0.0058	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50
1,3-Dichloropropene, Total	0.045	U	0.045	0.013	mg/Kg	☼	10/11/11 14:00	10/25/11 14:11	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*101*		*77 - 112*	*10/11/11 14:00*	*10/25/11 14:11*	*50*
Dibromofluoromethane	*93*		*78 - 119*	*10/11/11 14:00*	*10/25/11 14:11*	*50*
1,2-Dichloroethane-d4 (Surr)	*102*		*77 - 124*	*10/11/11 14:00*	*10/25/11 14:11*	*50*
Toluene-d8 (Surr)	*99*		*80 - 121*	*10/11/11 14:00*	*10/25/11 14:11*	*50*

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	RPD of the LCS and LCSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

GC/MS VOA

Prep Batch: 128635

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-4	33-SB139-11	Total/NA	Solid	5035	

Prep Batch: 128641

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-5	33-SB139-28	Total/NA	Solid	5035	
500-40530-8	33-FDUP-006	Total/NA	Solid	5035	
500-40530-8 - DL	33-FDUP-006	Total/NA	Solid	5035	
500-40530-12	33-SB145-11	Total/NA	Solid	5035	

Analysis Batch: 129746

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-4	33-SB139-11	Total/NA	Solid	8260B	128635
LCS 500-129746/5	Lab Control Sample	Total/NA	Solid	8260B	
LCSD 500-129746/6	Lab Control Sample Dup	Total/NA	Solid	8260B	
MB 500-129746/4	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 130033

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-5	33-SB139-28	Total/NA	Solid	8260B	128641
LCS 500-130033/5	Lab Control Sample	Total/NA	Solid	8260B	
LCSD 500-130033/32	Lab Control Sample Dup	Total/NA	Solid	8260B	
MB 500-130033/27	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 130034

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-1 - DL	33-GG135-34	Total/NA	Water	8260B	
500-40530-2	33-GG148-22.5	Total/NA	Water	8260B	
500-40530-2 - DL	33-GG148-22.5	Total/NA	Water	8260B	
500-40530-3	TB-001-101111	Total/NA	Water	8260B	
500-40530-10	FB-002-101111	Total/NA	Water	8260B	
LCS 500-130034/5	Lab Control Sample	Total/NA	Water	8260B	
LCSD 500-130034/32	Lab Control Sample Dup	Total/NA	Water	8260B	
MB 500-130034/27	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 130095

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-1	33-GG135-34	Total/NA	Water	8260B	
500-40530-9	FB-001-101111	Total/NA	Water	8260B	
LCS 500-130095/4	Lab Control Sample	Total/NA	Water	8260B	
MB 500-130095/7	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 130096

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-8	33-FDUP-006	Total/NA	Solid	8260B	128641
500-40530-12	33-SB145-11	Total/NA	Solid	8260B	128641
LCS 500-130096/4	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-130096/7	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 130219

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-8 - DL	33-FDUP-006	Total/NA	Solid	8260B	128641
LCS 500-130219/4	Lab Control Sample	Total/NA	Solid	8260B	

GC/MS VOA (Continued)

Analysis Batch: 130219 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCSD 500-130219/27	Lab Control Sample Dup	Total/NA	Solid	8260B	
MB 500-130219/6	Method Blank	Total/NA	Solid	8260B	

General Chemistry

Analysis Batch: 128615

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-4	33-SB139-11	Total/NA	Solid	Moisture	
500-40530-5	33-SB139-28	Total/NA	Solid	Moisture	
500-40530-8	33-FDUP-006	Total/NA	Solid	Moisture	
500-40530-12	33-SB145-11	Total/NA	Solid	Moisture	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40530-5	33-SB139-28	100	105	106	99
500-40530-8	33-FDUP-006	102	93	104	100
500-40530-8 - DL	33-FDUP-006	109	102	111	106
500-40530-12	33-SB145-11	101	93	102	99
LCS 500-130033/5	Lab Control Sample	98	108	103	103
LCS 500-130096/4	Lab Control Sample	100	99	106	101
LCS 500-130219/4	Lab Control Sample	102	96	104	100
LCSD 500-130033/32	Lab Control Sample Dup	96	111	104	101
LCSD 500-130219/27	Lab Control Sample Dup	99	102	106	99
MB 500-130033/27	Method Blank	100	93	99	98
MB 500-130096/7	Method Blank	93	98	102	95
MB 500-130219/6	Method Blank	94	91	99	94

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		12DCE	TOL	BFB	DBFM
Lab Sample ID	Client Sample ID	(69-120)	(69-122)	(67-120)	(69-120)
500-40530-4	33-SB139-11	98	101	99	102
LCS 500-129746/5	Lab Control Sample	95	102	98	98
LCSD 500-129746/6	Lab Control Sample Dup	96	101	98	99
MB 500-129746/4	Method Blank	95	107	104	100

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40530-1 - DL	33-GG135-34	99	105	105	100
500-40530-1	33-GG135-34	97	90	100	94
500-40530-2	33-GG148-22.5	98	108	107	101
500-40530-2 - DL	33-GG148-22.5	100	106	109	98
500-40530-3	TB-001-101111	99	105	103	99
500-40530-9	FB-001-101111	100	91	100	97
500-40530-10	FB-002-101111	97	112	106	101
LCS 500-130034/5	Lab Control Sample	98	108	103	103
LCS 500-130095/4	Lab Control Sample	100	99	106	101

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
LCSD 500-130034/32	Lab Control Sample Dup	96	111	104	101
MB 500-130034/27	Method Blank	100	93	99	98
MB 500-130095/7	Method Blank	93	98	102	95

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-129746/4
Matrix: Solid
Analysis Batch: 129746

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0025	mg/Kg			10/21/11 08:20	1
Bromomethane	0.0050	U	0.0050	0.0011	mg/Kg			10/21/11 08:20	1
Carbon disulfide	0.0050	U	0.0050	0.00071	mg/Kg			10/21/11 08:20	1
Chloroethane	0.0050	U	0.0050	0.0011	mg/Kg			10/21/11 08:20	1
Chloromethane	0.0050	U	0.0050	0.00082	mg/Kg			10/21/11 08:20	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0011	mg/Kg			10/21/11 08:20	1
Chloroform	0.0050	U	0.0050	0.00092	mg/Kg			10/21/11 08:20	1
cis-1,2-Dichloroethene	0.0050	U	0.0050	0.00073	mg/Kg			10/21/11 08:20	1
Carbon tetrachloride	0.0050	U	0.0050	0.0011	mg/Kg			10/21/11 08:20	1
Benzene	0.0050	U	0.0050	0.00054	mg/Kg			10/21/11 08:20	1
1,1-Dichloroethane	0.0050	U	0.0050	0.00079	mg/Kg			10/21/11 08:20	1
1,1-Dichloroethene	0.0050	U	0.0050	0.00079	mg/Kg			10/21/11 08:20	1
Bromodichloromethane	0.0050	U	0.0050	0.00076	mg/Kg			10/21/11 08:20	1
1,2-Dichloropropane	0.0050	U	0.0050	0.0011	mg/Kg			10/21/11 08:20	1
cis-1,3-Dichloropropene	0.0050	U	0.0050	0.00057	mg/Kg			10/21/11 08:20	1
Methylene Chloride	0.0050	U	0.0050	0.0014	mg/Kg			10/21/11 08:20	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00085	mg/Kg			10/21/11 08:20	1
Methyl tert-butyl ether	0.0050	U	0.0050	0.00075	mg/Kg			10/21/11 08:20	1
2-Hexanone	0.0050	U	0.0050	0.00071	mg/Kg			10/21/11 08:20	1
Dibromochloromethane	0.0050	U	0.0050	0.00069	mg/Kg			10/21/11 08:20	1
Chlorobenzene	0.0050	U	0.0050	0.00079	mg/Kg			10/21/11 08:20	1
Ethylbenzene	0.0050	U	0.0050	0.00075	mg/Kg			10/21/11 08:20	1
Tetrachloroethene	0.0050	U	0.0050	0.00095	mg/Kg			10/21/11 08:20	1
Toluene	0.0050	U	0.0050	0.00097	mg/Kg			10/21/11 08:20	1
Styrene	0.0050	U	0.0050	0.00063	mg/Kg			10/21/11 08:20	1
trans-1,2-Dichloroethene	0.0050	U	0.0050	0.00071	mg/Kg			10/21/11 08:20	1
Bromoform	0.0050	U	0.0050	0.00081	mg/Kg			10/21/11 08:20	1
trans-1,3-Dichloropropene	0.0050	U	0.0050	0.0011	mg/Kg			10/21/11 08:20	1
1,1,1-Trichloroethane	0.0050	U	0.0050	0.00096	mg/Kg			10/21/11 08:20	1
1,1,2,2-Tetrachloroethane	0.0050	U	0.0050	0.00068	mg/Kg			10/21/11 08:20	1
1,1,2-Trichloroethane	0.0050	U	0.0050	0.00067	mg/Kg			10/21/11 08:20	1
Trichloroethene	0.0050	U	0.0050	0.00081	mg/Kg			10/21/11 08:20	1
Vinyl chloride	0.0050	U	0.0050	0.00070	mg/Kg			10/21/11 08:20	1
1,2-Dichloroethane	0.0050	U	0.0050	0.00051	mg/Kg			10/21/11 08:20	1
Xylenes, Total	0.010	U	0.010	0.00070	mg/Kg			10/21/11 08:20	1
1,3-Dichloropropene, Total	0.0050	U	0.0050	0.00057	mg/Kg			10/21/11 08:20	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*95*		*69 - 120*		*10/21/11 08:20*	*1*
Toluene-d8 (Surr)	*107*		*69 - 122*		*10/21/11 08:20*	*1*
4-Bromofluorobenzene (Surr)	*104*		*67 - 120*		*10/21/11 08:20*	*1*
Dibromofluoromethane	*100*		*69 - 120*		*10/21/11 08:20*	*1*

Lab Sample ID: LCS 500-129746/5
Matrix: Solid
Analysis Batch: 129746

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0384		mg/Kg		77	43 - 149

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-129746/5
Matrix: Solid
Analysis Batch: 129746

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Bromomethane	0.0500	0.0496		mg/Kg		99	36 - 146
Carbon disulfide	0.0500	0.0384		mg/Kg		77	27 - 107
Chloroethane	0.0500	0.0510		mg/Kg		102	34 - 144
Chloromethane	0.0500	0.0460		mg/Kg		92	48 - 136
Methyl Ethyl Ketone	0.0500	0.0437		mg/Kg		87	58 - 140
Chloroform	0.0500	0.0491		mg/Kg		98	70 - 112
cis-1,2-Dichloroethene	0.0500	0.0493		mg/Kg		99	62 - 111
Carbon tetrachloride	0.0500	0.0478		mg/Kg		96	64 - 116
Benzene	0.0500	0.0492		mg/Kg		98	74 - 112
1,1-Dichloroethane	0.0500	0.0472		mg/Kg		94	70 - 113
1,1-Dichloroethene	0.0500	0.0464		mg/Kg		93	60 - 128
Bromodichloromethane	0.0500	0.0465		mg/Kg		93	76 - 108
1,2-Dichloropropane	0.0500	0.0471		mg/Kg		94	77 - 116
cis-1,3-Dichloropropene	0.0538	0.0457		mg/Kg		85	68 - 103
Methylene Chloride	0.0500	0.0525		mg/Kg		105	49 - 125
methyl isobutyl ketone	0.0500	0.0460		mg/Kg		92	65 - 127
Methyl tert-butyl ether	0.0500	0.0507		mg/Kg		101	55 - 116
2-Hexanone	0.0500	0.0440		mg/Kg		88	58 - 138
Dibromochloromethane	0.0500	0.0463		mg/Kg		93	76 - 110
Chlorobenzene	0.0500	0.0465		mg/Kg		93	80 - 110
Ethylbenzene	0.0500	0.0472		mg/Kg		94	78 - 112
Tetrachloroethene	0.0500	0.0442		mg/Kg		88	76 - 114
Toluene	0.0500	0.0472		mg/Kg		94	77 - 113
Styrene	0.0500	0.0488		mg/Kg		98	78 - 109
trans-1,2-Dichloroethene	0.0500	0.0497		mg/Kg		99	62 - 119
Bromoform	0.0500	0.0464		mg/Kg		93	66 - 115
trans-1,3-Dichloropropene	0.0486	0.0419		mg/Kg		86	63 - 107
1,1,1-Trichloroethane	0.0500	0.0477		mg/Kg		95	67 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0494		mg/Kg		99	73 - 114
1,1,2-Trichloroethane	0.0500	0.0458		mg/Kg		92	69 - 118
Trichloroethene	0.0500	0.0460		mg/Kg		92	76 - 111
Vinyl chloride	0.0500	0.0490		mg/Kg		98	44 - 130
1,2-Dichloroethane	0.0500	0.0475		mg/Kg		95	74 - 114
Xylenes, Total	0.150	0.147		mg/Kg		98	77 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*95*		*69 - 120*
Toluene-d8 (Surr)	*102*		*69 - 122*
4-Bromofluorobenzene (Surr)	*98*		*67 - 120*
Dibromofluoromethane	*98*		*69 - 120*

Lab Sample ID: LCSD 500-129746/6
Matrix: Solid
Analysis Batch: 129746

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	0.0500	0.0415		mg/Kg		83	43 - 149	8	30
Bromomethane	0.0500	0.0460		mg/Kg		92	36 - 146	8	30
Carbon disulfide	0.0500	0.0411		mg/Kg		82	27 - 107	7	30

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 500-129746/6
Matrix: Solid
Analysis Batch: 129746

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Chloroethane	0.0500	0.0541		mg/Kg		108	34 - 144	6	30
Chloromethane	0.0500	0.0478		mg/Kg		96	48 - 136	4	30
Methyl Ethyl Ketone	0.0500	0.0471		mg/Kg		94	58 - 140	7	30
Chloroform	0.0500	0.0524		mg/Kg		105	70 - 112	7	30
cis-1,2-Dichloroethene	0.0500	0.0534		mg/Kg		107	62 - 111	8	30
Carbon tetrachloride	0.0500	0.0538		mg/Kg		108	64 - 116	12	30
Benzene	0.0500	0.0530		mg/Kg		106	74 - 112	7	30
1,1-Dichloroethane	0.0500	0.0516		mg/Kg		103	70 - 113	9	30
1,1-Dichloroethene	0.0500	0.0513		mg/Kg		103	60 - 128	10	30
Bromodichloromethane	0.0500	0.0503		mg/Kg		101	76 - 108	8	30
1,2-Dichloropropane	0.0500	0.0507		mg/Kg		101	77 - 116	7	30
cis-1,3-Dichloropropene	0.0538	0.0474		mg/Kg		88	68 - 103	4	30
Methylene Chloride	0.0500	0.0513		mg/Kg		103	49 - 125	2	30
methyl isobutyl ketone	0.0500	0.0507		mg/Kg		101	65 - 127	10	30
Methyl tert-butyl ether	0.0500	0.0543		mg/Kg		109	55 - 116	7	30
2-Hexanone	0.0500	0.0508		mg/Kg		102	58 - 138	14	30
Dibromochloromethane	0.0500	0.0493		mg/Kg		99	76 - 110	6	30
Chlorobenzene	0.0500	0.0497		mg/Kg		99	80 - 110	7	30
Ethylbenzene	0.0500	0.0506		mg/Kg		101	78 - 112	7	30
Tetrachloroethene	0.0500	0.0474		mg/Kg		95	76 - 114	7	30
Toluene	0.0500	0.0498		mg/Kg		100	77 - 113	5	30
Styrene	0.0500	0.0519		mg/Kg		104	78 - 109	6	30
trans-1,2-Dichloroethene	0.0500	0.0534		mg/Kg		107	62 - 119	7	30
Bromoform	0.0500	0.0509		mg/Kg		102	66 - 115	9	30
trans-1,3-Dichloropropene	0.0486	0.0432		mg/Kg		89	63 - 107	3	30
1,1,1-Trichloroethane	0.0500	0.0522		mg/Kg		104	67 - 115	9	30
1,1,2,2-Tetrachloroethane	0.0500	0.0537		mg/Kg		107	73 - 114	8	30
1,1,2-Trichloroethane	0.0500	0.0477		mg/Kg		95	69 - 118	4	30
Trichloroethene	0.0500	0.0506		mg/Kg		101	76 - 111	10	30
Vinyl chloride	0.0500	0.0503		mg/Kg		101	44 - 130	3	30
1,2-Dichloroethane	0.0500	0.0515		mg/Kg		103	74 - 114	8	30
Xylenes, Total	0.150	0.159		mg/Kg		106	77 - 114	8	30

Surrogate	*LCSD % Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*96*		*69 - 120*
Toluene-d8 (Surr)	*101*		*69 - 122*
4-Bromofluorobenzene (Surr)	*98*		*67 - 120*
Dibromofluoromethane	*99*		*69 - 120*

Lab Sample ID: MB 500-130033/27
Matrix: Solid
Analysis Batch: 130033

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			10/24/11 16:17	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			10/24/11 16:17	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			10/24/11 16:17	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			10/24/11 16:17	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			10/24/11 16:17	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-130033/27
Matrix: Solid
Analysis Batch: 130033

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			10/24/11 16:17	1
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			10/24/11 16:17	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/24/11 16:17	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			10/24/11 16:17	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			10/24/11 16:17	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			10/24/11 16:17	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			10/24/11 16:17	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			10/24/11 16:17	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			10/24/11 16:17	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			10/24/11 16:17	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/Kg			10/24/11 16:17	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			10/24/11 16:17	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			10/24/11 16:17	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			10/24/11 16:17	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			10/24/11 16:17	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			10/24/11 16:17	1
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			10/24/11 16:17	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/24/11 16:17	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			10/24/11 16:17	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			10/24/11 16:17	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			10/24/11 16:17	1
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			10/24/11 16:17	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			10/24/11 16:17	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			10/24/11 16:17	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			10/24/11 16:17	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			10/24/11 16:17	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			10/24/11 16:17	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			10/24/11 16:17	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			10/24/11 16:17	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			10/24/11 16:17	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			10/24/11 16:17	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*		*10/24/11 16:17*	*1*
Toluene-d8 (Surr)	*98*		*80 - 121*		*10/24/11 16:17*	*1*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/24/11 16:17*	*1*
Dibromofluoromethane	*93*		*78 - 119*		*10/24/11 16:17*	*1*

Lab Sample ID: LCS 500-130033/5
Matrix: Solid
Analysis Batch: 130033

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0518		mg/Kg		104	46 - 152
Bromomethane	0.0500	0.0574		mg/Kg		115	38 - 157
Carbon disulfide	0.0500	0.0384		mg/Kg		77	38 - 112
Chloroethane	0.0500	0.0565		mg/Kg		113	53 - 156
Chloromethane	0.0500	0.0589		mg/Kg		118	44 - 148
Methyl Ethyl Ketone	0.0500	0.0612		mg/Kg		122	48 - 152

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-130033/5
Matrix: Solid
Analysis Batch: 130033

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloroform	0.0500	0.0528		mg/Kg		106	74 - 115
cis-1,2-Dichloroethene	0.0500	0.0525		mg/Kg		105	68 - 110
Carbon tetrachloride	0.0500	0.0447		mg/Kg		89	63 - 127
Benzene	0.0500	0.0468		mg/Kg		94	74 - 112
1,1-Dichloroethane	0.0500	0.0488		mg/Kg		98	69 - 118
1,1-Dichloroethene	0.0500	0.0450		mg/Kg		90	60 - 123
Bromodichloromethane	0.0500	0.0520		mg/Kg		104	73 - 122
1,2-Dichloropropane	0.0500	0.0502		mg/Kg		100	72 - 124
cis-1,3-Dichloropropene	0.0538	0.0571		mg/Kg		106	65 - 116
Methylene Chloride	0.0500	0.0525		mg/Kg		105	67 - 126
methyl isobutyl ketone	0.0500	0.0590		mg/Kg		118	58 - 135
Methyl tert-butyl ether	0.0500	0.0548		mg/Kg		110	57 - 122
2-Hexanone	0.0500	0.0568		mg/Kg		114	58 - 137
Dibromochloromethane	0.0500	0.0437		mg/Kg		87	66 - 123
Chlorobenzene	0.0500	0.0464		mg/Kg		93	80 - 110
Ethylbenzene	0.0500	0.0444		mg/Kg		89	79 - 112
Tetrachloroethene	0.0500	0.0400		mg/Kg		80	76 - 112
Toluene	0.0500	0.0496		mg/Kg		99	78 - 116
Styrene	0.0500	0.0474		mg/Kg		95	77 - 115
trans-1,2-Dichloroethene	0.0500	0.0509		mg/Kg		102	70 - 119
Bromoform	0.0500	0.0437		mg/Kg		87	62 - 119
trans-1,3-Dichloropropene	0.0486	0.0475		mg/Kg		98	64 - 114
1,1,1-Trichloroethane	0.0500	0.0512		mg/Kg		102	70 - 125
1,1,2,2-Tetrachloroethane	0.0500	0.0574		mg/Kg		115	73 - 119
1,1,2-Trichloroethane	0.0500	0.0579		mg/Kg		116	63 - 136
Trichloroethene	0.0500	0.0437		mg/Kg		87	75 - 113
Vinyl chloride	0.0500	0.0547		mg/Kg		109	58 - 136
1,2-Dichloroethane	0.0500	0.0480		mg/Kg		96	66 - 120
Xylenes, Total	0.150	0.132		mg/Kg		88	74 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*103*		*77 - 124*
Toluene-d8 (Surr)	*103*		*80 - 121*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*
Dibromofluoromethane	*108*		*78 - 119*

Lab Sample ID: LCSD 500-130033/32
Matrix: Solid
Analysis Batch: 130033

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	0.0500	0.0642		mg/Kg		128	46 - 152	21	30
Bromomethane	0.0500	0.0594		mg/Kg		119	38 - 157	3	30
Carbon disulfide	0.0500	0.0383		mg/Kg		77	38 - 112	0	30
Chloroethane	0.0500	0.0631		mg/Kg		126	53 - 156	11	30
Chloromethane	0.0500	0.0618		mg/Kg		124	44 - 148	5	30
Methyl Ethyl Ketone	0.0500	0.0544		mg/Kg		109	48 - 152	12	30
Chloroform	0.0500	0.0559		mg/Kg		112	74 - 115	6	30
cis-1,2-Dichloroethene	0.0500	0.0551		mg/Kg		110	68 - 110	5	30

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 500-130033/32
Matrix: Solid
Analysis Batch: 130033

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Carbon tetrachloride	0.0500	0.0442		mg/Kg		88	63 - 127	1	30
Benzene	0.0500	0.0471		mg/Kg		94	74 - 112	1	30
1,1-Dichloroethane	0.0500	0.0521		mg/Kg		104	69 - 118	7	30
1,1-Dichloroethene	0.0500	0.0454		mg/Kg		91	60 - 123	1	30
Bromodichloromethane	0.0500	0.0518		mg/Kg		104	73 - 122	0	30
1,2-Dichloropropane	0.0500	0.0505		mg/Kg		101	72 - 124	1	30
cis-1,3-Dichloropropene	0.0538	0.0550		mg/Kg		102	65 - 116	4	30
Methylene Chloride	0.0500	0.0556		mg/Kg		111	67 - 126	6	30
methyl isobutyl ketone	0.0500	0.0586		mg/Kg		117	58 - 135	1	30
Methyl tert-butyl ether	0.0500	0.0540		mg/Kg		108	57 - 122	1	30
2-Hexanone	0.0500	0.0582		mg/Kg		116	58 - 137	2	30
Dibromochloromethane	0.0500	0.0436		mg/Kg		87	66 - 123	0	30
Chlorobenzene	0.0500	0.0471		mg/Kg		94	80 - 110	1	30
Ethylbenzene	0.0500	0.0448		mg/Kg		90	79 - 112	1	30
Tetrachloroethene	0.0500	0.0402		mg/Kg		80	76 - 112	0	30
Toluene	0.0500	0.0498		mg/Kg		100	78 - 116	0	30
Styrene	0.0500	0.0476		mg/Kg		95	77 - 115	0	30
trans-1,2-Dichloroethene	0.0500	0.0536		mg/Kg		107	70 - 119	5	30
Bromoform	0.0500	0.0422		mg/Kg		84	62 - 119	3	30
trans-1,3-Dichloropropene	0.0486	0.0453		mg/Kg		93	64 - 114	5	30
1,1,1-Trichloroethane	0.0500	0.0530		mg/Kg		106	70 - 125	3	30
1,1,2,2-Tetrachloroethane	0.0500	0.0583		mg/Kg		117	73 - 119	2	30
1,1,2-Trichloroethane	0.0500	0.0593		mg/Kg		119	63 - 136	2	30
Trichloroethene	0.0500	0.0445		mg/Kg		89	75 - 113	2	30
Vinyl chloride	0.0500	0.0567		mg/Kg		113	58 - 136	4	30
1,2-Dichloroethane	0.0500	0.0486		mg/Kg		97	66 - 120	1	30
Xylenes, Total	0.150	0.134		mg/Kg		89	74 - 114	1	30

Surrogate	*LCSD % Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*
Toluene-d8 (Surr)	*101*		*80 - 121*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*
Dibromofluoromethane	*111*		*78 - 119*

Lab Sample ID: MB 500-130034/27
Matrix: Water
Analysis Batch: 130034

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/24/11 16:17	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/24/11 16:17	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/24/11 16:17	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/24/11 16:17	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/24/11 16:17	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/24/11 16:17	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/24/11 16:17	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/24/11 16:17	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/24/11 16:17	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/24/11 16:17	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-130034/27
Matrix: Water
Analysis Batch: 130034

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/24/11 16:17	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/24/11 16:17	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/24/11 16:17	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/24/11 16:17	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/24/11 16:17	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/24/11 16:17	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/24/11 16:17	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/24/11 16:17	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/24/11 16:17	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/24/11 16:17	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/24/11 16:17	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/24/11 16:17	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/24/11 16:17	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/24/11 16:17	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/24/11 16:17	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/24/11 16:17	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/24/11 16:17	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/24/11 16:17	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/24/11 16:17	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/24/11 16:17	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/24/11 16:17	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/24/11 16:17	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/24/11 16:17	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/24/11 16:17	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/24/11 16:17	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/24/11 16:17	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*		*10/24/11 16:17*	*1*
Toluene-d8 (Surr)	*98*		*80 - 121*		*10/24/11 16:17*	*1*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/24/11 16:17*	*1*
Dibromofluoromethane	*93*		*78 - 119*		*10/24/11 16:17*	*1*

Lab Sample ID: LCS 500-130034/5
Matrix: Water
Analysis Batch: 130034

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0518		mg/L		104	43 - 153
Bromomethane	0.0500	0.0581		mg/L		116	46 - 155
Carbon disulfide	0.0500	0.0384		mg/L		77	36 - 110
Chloroethane	0.0500	0.0565		mg/L		113	54 - 149
Chloromethane	0.0500	0.0589		mg/L		118	36 - 148
Methyl Ethyl Ketone	0.0500	0.0612		mg/L		122	42 - 152
Chloroform	0.0500	0.0528		mg/L		106	71 - 116
cis-1,2-Dichloroethene	0.0500	0.0525		mg/L		105	66 - 111
Carbon tetrachloride	0.0500	0.0447		mg/L		89	58 - 132
Benzene	0.0500	0.0468		mg/L		94	74 - 113
1,1-Dichloroethane	0.0500	0.0488		mg/L		98	64 - 117

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-130034/5
Matrix: Water
Analysis Batch: 130034

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
1,1-Dichloroethene	0.0500	0.0450		mg/L		90	60 - 126
Bromodichloromethane	0.0500	0.0520		mg/L		104	73 - 120
1,2-Dichloropropane	0.0500	0.0502		mg/L		100	68 - 123
cis-1,3-Dichloropropene	0.0538	0.0571		mg/L		106	65 - 114
Methylene Chloride	0.0500	0.0525		mg/L		105	65 - 125
methyl isobutyl ketone	0.0500	0.0590		mg/L		118	56 - 138
Methyl tert-butyl ether	0.0500	0.0548		mg/L		110	57 - 119
2-Hexanone	0.0500	0.0568		mg/L		114	55 - 138
Dibromochloromethane	0.0500	0.0437		mg/L		87	73 - 118
Chlorobenzene	0.0500	0.0464		mg/L		93	81 - 111
Ethylbenzene	0.0500	0.0444		mg/L		89	79 - 114
Tetrachloroethene	0.0500	0.0400		mg/L		80	76 - 114
Toluene	0.0500	0.0488		mg/L		98	76 - 121
Styrene	0.0500	0.0474		mg/L		95	76 - 118
trans-1,2-Dichloroethene	0.0500	0.0509		mg/L		102	67 - 120
Bromoform	0.0500	0.0437		mg/L		87	64 - 126
trans-1,3-Dichloropropene	0.0486	0.0475		mg/L		98	60 - 119
1,1,1-Trichloroethane	0.0500	0.0512		mg/L		102	66 - 128
1,1,2,2-Tetrachloroethane	0.0500	0.0574		mg/L		115	66 - 121
1,1,2-Trichloroethane	0.0500	0.0579		mg/L		116	62 - 137
Trichloroethene	0.0500	0.0437		mg/L		87	75 - 116
Vinyl chloride	0.0500	0.0547		mg/L		109	47 - 138
1,2-Dichloroethane	0.0500	0.0480		mg/L		96	69 - 115
Xylenes, Total	0.150	0.132		mg/L		88	74 - 117

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*103*		*77 - 124*
Toluene-d8 (Surr)	*103*		*80 - 121*
4-Bromofluorobenzene (Surr)	*98*		*77 - 112*
Dibromofluoromethane	*108*		*78 - 119*

Lab Sample ID: LCSD 500-130034/32
Matrix: Water
Analysis Batch: 130034

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	0.0500	0.0642	*	mg/L		128	43 - 153	21	20
Bromomethane	0.0500	0.0601		mg/L		120	46 - 155	3	20
Carbon disulfide	0.0500	0.0383		mg/L		77	36 - 110	0	20
Chloroethane	0.0500	0.0631		mg/L		126	54 - 149	11	20
Chloromethane	0.0500	0.0618		mg/L		124	36 - 148	5	20
Methyl Ethyl Ketone	0.0500	0.0544		mg/L		109	42 - 152	12	20
Chloroform	0.0500	0.0559		mg/L		112	71 - 116	6	20
cis-1,2-Dichloroethene	0.0500	0.0551		mg/L		110	66 - 111	5	20
Carbon tetrachloride	0.0500	0.0442		mg/L		88	58 - 132	1	20
Benzene	0.0500	0.0471		mg/L		94	74 - 113	1	20
1,1-Dichloroethane	0.0500	0.0521		mg/L		104	64 - 117	7	20
1,1-Dichloroethene	0.0500	0.0454		mg/L		91	60 - 126	1	20
Bromodichloromethane	0.0500	0.0518		mg/L		104	73 - 120	0	20

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 500-130034/32
Matrix: Water
Analysis Batch: 130034

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
1,2-Dichloropropane	0.0500	0.0505		mg/L		101	68 - 123	1	20
cis-1,3-Dichloropropene	0.0538	0.0550		mg/L		102	65 - 114	4	20
Methylene Chloride	0.0500	0.0556		mg/L		111	65 - 125	6	20
methyl isobutyl ketone	0.0500	0.0586		mg/L		117	56 - 138	1	20
Methyl tert-butyl ether	0.0500	0.0540		mg/L		108	57 - 119	1	20
2-Hexanone	0.0500	0.0582		mg/L		116	55 - 138	2	20
Dibromochloromethane	0.0500	0.0436		mg/L		87	73 - 118	0	20
Chlorobenzene	0.0500	0.0471		mg/L		94	81 - 111	1	20
Ethylbenzene	0.0500	0.0448		mg/L		90	79 - 114	1	20
Tetrachloroethene	0.0500	0.0402		mg/L		80	76 - 114	0	20
Toluene	0.0500	0.0490		mg/L		98	76 - 121	0	20
Styrene	0.0500	0.0476		mg/L		95	76 - 118	0	20
trans-1,2-Dichloroethene	0.0500	0.0536		mg/L		107	67 - 120	5	20
Bromoform	0.0500	0.0422		mg/L		84	64 - 126	3	20
trans-1,3-Dichloropropene	0.0486	0.0453		mg/L		93	60 - 119	5	20
1,1,1-Trichloroethane	0.0500	0.0530		mg/L		106	66 - 128	3	20
1,1,2,2-Tetrachloroethane	0.0500	0.0583		mg/L		117	66 - 121	2	20
1,1,2-Trichloroethane	0.0500	0.0593		mg/L		119	62 - 137	2	20
Trichloroethene	0.0500	0.0445		mg/L		89	75 - 116	2	20
Vinyl chloride	0.0500	0.0567		mg/L		113	47 - 138	4	20
1,2-Dichloroethane	0.0500	0.0486		mg/L		97	69 - 115	1	20
Xylenes, Total	0.150	0.134		mg/L		89	74 - 117	1	20

Surrogate	*LCSD % Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*
Toluene-d8 (Surr)	*101*		*80 - 121*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*
Dibromofluoromethane	*111*		*78 - 119*

Lab Sample ID: MB 500-130095/7
Matrix: Water
Analysis Batch: 130095

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/25/11 04:44	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/25/11 04:44	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/25/11 04:44	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/25/11 04:44	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/25/11 04:44	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/25/11 04:44	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/25/11 04:44	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/25/11 04:44	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/25/11 04:44	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/25/11 04:44	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/25/11 04:44	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/25/11 04:44	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/25/11 04:44	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/25/11 04:44	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/25/11 04:44	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-130095/7
Matrix: Water
Analysis Batch: 130095

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methylene Chloride	0.00677		0.0050	0.00063	mg/L			10/25/11 04:44	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/25/11 04:44	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/25/11 04:44	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/25/11 04:44	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/25/11 04:44	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/25/11 04:44	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/25/11 04:44	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/25/11 04:44	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/25/11 04:44	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/25/11 04:44	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/25/11 04:44	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/25/11 04:44	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/25/11 04:44	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/25/11 04:44	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/25/11 04:44	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/25/11 04:44	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/25/11 04:44	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/25/11 04:44	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/25/11 04:44	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/25/11 04:44	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/25/11 04:44	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*102*		*77 - 124*		*10/25/11 04:44*	*1*
Toluene-d8 (Surr)	*95*		*80 - 121*		*10/25/11 04:44*	*1*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*		*10/25/11 04:44*	*1*
Dibromofluoromethane	*98*		*78 - 119*		*10/25/11 04:44*	*1*

Lab Sample ID: LCS 500-130095/4
Matrix: Water
Analysis Batch: 130095

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0575		mg/L		115	43 - 153
Bromomethane	0.0500	0.0426		mg/L		85	46 - 155
Carbon disulfide	0.0500	0.0316		mg/L		63	36 - 110
Chloroethane	0.0500	0.0502		mg/L		100	54 - 149
Chloromethane	0.0500	0.0434		mg/L		87	36 - 148
Methyl Ethyl Ketone	0.0500	0.0510		mg/L		102	42 - 152
Chloroform	0.0500	0.0453		mg/L		91	71 - 116
cis-1,2-Dichloroethene	0.0500	0.0440		mg/L		88	66 - 111
Carbon tetrachloride	0.0500	0.0540		mg/L		108	58 - 132
Benzene	0.0500	0.0441		mg/L		88	74 - 113
1,1-Dichloroethane	0.0500	0.0419		mg/L		84	64 - 117
1,1-Dichloroethene	0.0500	0.0408		mg/L		82	60 - 126
Bromodichloromethane	0.0500	0.0494		mg/L		99	73 - 120
1,2-Dichloropropane	0.0500	0.0455		mg/L		91	68 - 123
cis-1,3-Dichloropropene	0.0538	0.0497		mg/L		92	65 - 114
Methylene Chloride	0.0500	0.0399		mg/L		80	65 - 125

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-130095/4
Matrix: Water
Analysis Batch: 130095

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
methyl isobutyl ketone	0.0500	0.0536		mg/L		107	56 - 138
Methyl tert-butyl ether	0.0500	0.0484		mg/L		97	57 - 119
2-Hexanone	0.0500	0.0529		mg/L		106	55 - 138
Dibromochloromethane	0.0500	0.0532		mg/L		106	73 - 118
Chlorobenzene	0.0500	0.0468		mg/L		94	81 - 111
Ethylbenzene	0.0500	0.0470		mg/L		94	79 - 114
Tetrachloroethene	0.0500	0.0457		mg/L		91	76 - 114
Toluene	0.0500	0.0468		mg/L		94	76 - 121
Styrene	0.0500	0.0478		mg/L		96	76 - 118
trans-1,2-Dichloroethene	0.0500	0.0466		mg/L		93	67 - 120
Bromoform	0.0500	0.0549		mg/L		110	64 - 126
trans-1,3-Dichloropropene	0.0486	0.0469		mg/L		96	60 - 119
1,1,1-Trichloroethane	0.0500	0.0471		mg/L		94	66 - 128
1,1,2,2-Tetrachloroethane	0.0500	0.0510		mg/L		102	66 - 121
1,1,2-Trichloroethane	0.0500	0.0497		mg/L		99	62 - 137
Trichloroethene	0.0500	0.0449		mg/L		90	75 - 116
Vinyl chloride	0.0500	0.0479		mg/L		96	47 - 138
1,2-Dichloroethane	0.0500	0.0491		mg/L		98	69 - 115
Xylenes, Total	0.150	0.140		mg/L		93	74 - 117

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*
Toluene-d8 (Surr)	*101*		*80 - 121*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*
Dibromofluoromethane	*99*		*78 - 119*

Lab Sample ID: MB 500-130096/7
Matrix: Solid
Analysis Batch: 130096

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			10/25/11 04:44	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			10/25/11 04:44	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			10/25/11 04:44	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			10/25/11 04:44	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			10/25/11 04:44	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			10/25/11 04:44	1
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			10/25/11 04:44	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/25/11 04:44	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			10/25/11 04:44	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			10/25/11 04:44	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			10/25/11 04:44	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			10/25/11 04:44	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			10/25/11 04:44	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			10/25/11 04:44	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			10/25/11 04:44	1
Methylene Chloride	0.00677		0.0050	0.00063	mg/Kg			10/25/11 04:44	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			10/25/11 04:44	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			10/25/11 04:44	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-130096/7
Matrix: Solid
Analysis Batch: 130096

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			10/25/11 04:44	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			10/25/11 04:44	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			10/25/11 04:44	1
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			10/25/11 04:44	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/25/11 04:44	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			10/25/11 04:44	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			10/25/11 04:44	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			10/25/11 04:44	1
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			10/25/11 04:44	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			10/25/11 04:44	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			10/25/11 04:44	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			10/25/11 04:44	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			10/25/11 04:44	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			10/25/11 04:44	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			10/25/11 04:44	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			10/25/11 04:44	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			10/25/11 04:44	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			10/25/11 04:44	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*102*		*77 - 124*		*10/25/11 04:44*	*1*
Toluene-d8 (Surr)	*95*		*80 - 121*		*10/25/11 04:44*	*1*
4-Bromofluorobenzene (Surr)	*93*		*77 - 112*		*10/25/11 04:44*	*1*
Dibromofluoromethane	*98*		*78 - 119*		*10/25/11 04:44*	*1*

Lab Sample ID: LCS 500-130096/4
Matrix: Solid
Analysis Batch: 130096

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0575		mg/Kg		115	46 - 152
Bromomethane	0.0500	0.0426		mg/Kg		85	38 - 157
Carbon disulfide	0.0500	0.0316		mg/Kg		63	38 - 112
Chloroethane	0.0500	0.0502		mg/Kg		100	53 - 156
Chloromethane	0.0500	0.0434		mg/Kg		87	44 - 148
Methyl Ethyl Ketone	0.0500	0.0510		mg/Kg		102	48 - 152
Chloroform	0.0500	0.0453		mg/Kg		91	74 - 115
cis-1,2-Dichloroethene	0.0500	0.0440		mg/Kg		88	68 - 110
Carbon tetrachloride	0.0500	0.0540		mg/Kg		108	63 - 127
Benzene	0.0500	0.0441		mg/Kg		88	74 - 112
1,1-Dichloroethane	0.0500	0.0419		mg/Kg		84	69 - 118
1,1-Dichloroethene	0.0500	0.0408		mg/Kg		82	60 - 123
Bromodichloromethane	0.0500	0.0494		mg/Kg		99	73 - 122
1,2-Dichloropropane	0.0500	0.0455		mg/Kg		91	72 - 124
cis-1,3-Dichloropropene	0.0538	0.0497		mg/Kg		92	65 - 116
Methylene Chloride	0.0500	0.0399		mg/Kg		80	67 - 126
methyl isobutyl ketone	0.0500	0.0536		mg/Kg		107	58 - 135
Methyl tert-butyl ether	0.0500	0.0484		mg/Kg		97	57 - 122
2-Hexanone	0.0500	0.0529		mg/Kg		106	58 - 137

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-130096/4
Matrix: Solid
Analysis Batch: 130096

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Dibromochloromethane	0.0500	0.0532		mg/Kg		106	66 - 123
Chlorobenzene	0.0500	0.0468		mg/Kg		94	80 - 110
Ethylbenzene	0.0500	0.0470		mg/Kg		94	79 - 112
Tetrachloroethene	0.0500	0.0457		mg/Kg		91	76 - 112
Toluene	0.0500	0.0468		mg/Kg		94	78 - 116
Styrene	0.0500	0.0478		mg/Kg		96	77 - 115
trans-1,2-Dichloroethene	0.0500	0.0466		mg/Kg		93	70 - 119
Bromoform	0.0500	0.0549		mg/Kg		110	62 - 119
trans-1,3-Dichloropropene	0.0486	0.0469		mg/Kg		96	64 - 114
1,1,1-Trichloroethane	0.0500	0.0471		mg/Kg		94	70 - 125
1,1,2,2-Tetrachloroethane	0.0500	0.0510		mg/Kg		102	73 - 119
1,1,2-Trichloroethane	0.0500	0.0497		mg/Kg		99	63 - 136
Trichloroethene	0.0500	0.0449		mg/Kg		90	75 - 113
Vinyl chloride	0.0500	0.0479		mg/Kg		96	58 - 136
1,2-Dichloroethane	0.0500	0.0491		mg/Kg		98	66 - 120
Xylenes, Total	0.150	0.140		mg/Kg		93	74 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*
Toluene-d8 (Surr)	*101*		*80 - 121*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*
Dibromofluoromethane	*99*		*78 - 119*

Lab Sample ID: MB 500-130219/6
Matrix: Solid
Analysis Batch: 130219

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			10/25/11 17:30	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			10/25/11 17:30	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			10/25/11 17:30	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			10/25/11 17:30	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			10/25/11 17:30	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			10/25/11 17:30	1
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			10/25/11 17:30	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/25/11 17:30	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			10/25/11 17:30	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			10/25/11 17:30	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			10/25/11 17:30	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			10/25/11 17:30	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			10/25/11 17:30	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			10/25/11 17:30	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			10/25/11 17:30	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/Kg			10/25/11 17:30	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			10/25/11 17:30	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			10/25/11 17:30	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			10/25/11 17:30	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			10/25/11 17:30	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			10/25/11 17:30	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-130219/6
Matrix: Solid
Analysis Batch: 130219

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			10/25/11 17:30	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/25/11 17:30	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			10/25/11 17:30	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			10/25/11 17:30	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			10/25/11 17:30	1
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			10/25/11 17:30	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			10/25/11 17:30	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			10/25/11 17:30	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			10/25/11 17:30	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			10/25/11 17:30	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			10/25/11 17:30	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			10/25/11 17:30	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			10/25/11 17:30	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			10/25/11 17:30	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			10/25/11 17:30	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*99*		*77 - 124*		*10/25/11 17:30*	*1*
Toluene-d8 (Surr)	*94*		*80 - 121*		*10/25/11 17:30*	*1*
4-Bromofluorobenzene (Surr)	*94*		*77 - 112*		*10/25/11 17:30*	*1*
Dibromofluoromethane	*91*		*78 - 119*		*10/25/11 17:30*	*1*

Lab Sample ID: LCS 500-130219/4
Matrix: Solid
Analysis Batch: 130219

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0591		mg/Kg		118	46 - 152
Bromomethane	0.0500	0.0403		mg/Kg		81	38 - 157
Carbon disulfide	0.0500	0.0282		mg/Kg		56	38 - 112
Chloroethane	0.0500	0.0425		mg/Kg		85	53 - 156
Chloromethane	0.0500	0.0356		mg/Kg		71	44 - 148
Methyl Ethyl Ketone	0.0500	0.0510		mg/Kg		102	48 - 152
Chloroform	0.0500	0.0445		mg/Kg		89	74 - 115
cis-1,2-Dichloroethene	0.0500	0.0434		mg/Kg		87	68 - 110
Carbon tetrachloride	0.0500	0.0520		mg/Kg		104	63 - 127
Benzene	0.0500	0.0429		mg/Kg		86	74 - 112
1,1-Dichloroethane	0.0500	0.0404		mg/Kg		81	69 - 118
1,1-Dichloroethene	0.0500	0.0357		mg/Kg		71	60 - 123
Bromodichloromethane	0.0500	0.0479		mg/Kg		96	73 - 122
1,2-Dichloropropane	0.0500	0.0456		mg/Kg		91	72 - 124
cis-1,3-Dichloropropene	0.0538	0.0498		mg/Kg		93	65 - 116
Methylene Chloride	0.0500	0.0418		mg/Kg		84	67 - 126
methyl isobutyl ketone	0.0500	0.0526		mg/Kg		105	58 - 135
Methyl tert-butyl ether	0.0500	0.0464		mg/Kg		93	57 - 122
2-Hexanone	0.0500	0.0532		mg/Kg		106	58 - 137
Dibromochloromethane	0.0500	0.0504		mg/Kg		101	66 - 123
Chlorobenzene	0.0500	0.0459		mg/Kg		92	80 - 110
Ethylbenzene	0.0500	0.0459		mg/Kg		92	79 - 112

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-130219/4
Matrix: Solid
Analysis Batch: 130219

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Tetrachloroethene	0.0500	0.0447		mg/Kg		89	76 - 112
Toluene	0.0500	0.0465		mg/Kg		93	78 - 116
Styrene	0.0500	0.0475		mg/Kg		95	77 - 115
trans-1,2-Dichloroethene	0.0500	0.0440		mg/Kg		88	70 - 119
Bromoform	0.0500	0.0515		mg/Kg		103	62 - 119
trans-1,3-Dichloropropene	0.0486	0.0470		mg/Kg		97	64 - 114
1,1,1-Trichloroethane	0.0500	0.0456		mg/Kg		91	70 - 125
1,1,2,2-Tetrachloroethane	0.0500	0.0463		mg/Kg		93	73 - 119
1,1,2-Trichloroethane	0.0500	0.0475		mg/Kg		95	63 - 136
Trichloroethene	0.0500	0.0442		mg/Kg		88	75 - 113
Vinyl chloride	0.0500	0.0408		mg/Kg		82	58 - 136
1,2-Dichloroethane	0.0500	0.0477		mg/Kg		95	66 - 120
Xylenes, Total	0.150	0.138		mg/Kg		92	74 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*
Toluene-d8 (Surr)	*100*		*80 - 121*
4-Bromofluorobenzene (Surr)	*102*		*77 - 112*
Dibromofluoromethane	*96*		*78 - 119*

Lab Sample ID: LCSD 500-130219/27
Matrix: Solid
Analysis Batch: 130219

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	0.0500	0.0634		mg/Kg		127	46 - 152	7	30
Bromomethane	0.0500	0.0470		mg/Kg		94	38 - 157	15	30
Carbon disulfide	0.0500	0.0324		mg/Kg		65	38 - 112	14	30
Chloroethane	0.0500	0.0466		mg/Kg		93	53 - 156	9	30
Chloromethane	0.0500	0.0441		mg/Kg		88	44 - 148	21	30
Methyl Ethyl Ketone	0.0500	0.0493		mg/Kg		99	48 - 152	3	30
Chloroform	0.0500	0.0475		mg/Kg		95	74 - 115	7	30
cis-1,2-Dichloroethene	0.0500	0.0450		mg/Kg		90	68 - 110	4	30
Carbon tetrachloride	0.0500	0.0532		mg/Kg		106	63 - 127	2	30
Benzene	0.0500	0.0439		mg/Kg		88	74 - 112	2	30
1,1-Dichloroethane	0.0500	0.0435		mg/Kg		87	69 - 118	7	30
1,1-Dichloroethene	0.0500	0.0424		mg/Kg		85	60 - 123	17	30
Bromodichloromethane	0.0500	0.0499		mg/Kg		100	73 - 122	4	30
1,2-Dichloropropane	0.0500	0.0471		mg/Kg		94	72 - 124	3	30
cis-1,3-Dichloropropene	0.0538	0.0496		mg/Kg		92	65 - 116	0	30
Methylene Chloride	0.0500	0.0484		mg/Kg		97	67 - 126	15	30
methyl isobutyl ketone	0.0500	0.0527		mg/Kg		105	58 - 135	0	30
Methyl tert-butyl ether	0.0500	0.0501		mg/Kg		100	57 - 122	8	30
2-Hexanone	0.0500	0.0528		mg/Kg		106	58 - 137	1	30
Dibromochloromethane	0.0500	0.0519		mg/Kg		104	66 - 123	3	30
Chlorobenzene	0.0500	0.0472		mg/Kg		94	80 - 110	3	30
Ethylbenzene	0.0500	0.0465		mg/Kg		93	79 - 112	1	30
Tetrachloroethene	0.0500	0.0444		mg/Kg		89	76 - 112	1	30
Toluene	0.0500	0.0468		mg/Kg		94	78 - 116	1	30

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 500-130219/27
Matrix: Solid
Analysis Batch: 130219

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Styrene			0.0500	0.0484		mg/Kg		97	77 - 115	2	30
trans-1,2-Dichloroethene			0.0500	0.0467		mg/Kg		93	70 - 119	6	30
Bromoform			0.0500	0.0530		mg/Kg		106	62 - 119	3	30
trans-1,3-Dichloropropene			0.0486	0.0468		mg/Kg		96	64 - 114	0	30
1,1,1-Trichloroethane			0.0500	0.0480		mg/Kg		96	70 - 125	5	30
1,1,2,2-Tetrachloroethane			0.0500	0.0488		mg/Kg		98	73 - 119	5	30
1,1,2-Trichloroethane			0.0500	0.0484		mg/Kg		97	63 - 136	2	30
Trichloroethene			0.0500	0.0436		mg/Kg		87	75 - 113	1	30
Vinyl chloride			0.0500	0.0488		mg/Kg		98	58 - 136	18	30
1,2-Dichloroethane			0.0500	0.0486		mg/Kg		97	66 - 120	2	30
Xylenes, Total			0.150	0.140		mg/Kg		93	74 - 114	1	30

Surrogate	*LCSD % Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*
Toluene-d8 (Surr)	*99*		*80 - 121*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*
Dibromofluoromethane	*102*		*78 - 119*

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

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2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40530
Chain of Custody Number:
Page 1 of 2
Temperature °C of Cooler: 23

Client: CH2MHILL
Client Project #: 4235535.02.SI
Project Name: CONWR Plume 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: MMM/JMB
Lab PM: Jim Knapp

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOCs 8260B	VOCs 8260B	VOCs 8260B	VOCs 8260B	Percent Moisture	PCBs 8082				Comments
Preservative							1	Water Cool to 4°	Methanol Cool to 4°	Sodium Bisulfate Cool to 4°	7	7				
Parameter					Total											
1		33-GG135-34	10/11/11	0850	3	W	3									
2		33-GG148-22.5	10/11/11	0945	3	W	3									
3		TB-001-101111	10/11/11	—	2	W	2									
4		33-SB139-11	10/11/11	1020	5	~~W~~ SO MM		2	1	1	1					
5		33-SB139-28	10/11/11	1030	5	~~W~~ SO MM		2	1	1	1					
6		33-SB139-05	10/11/11	1010	1	SO						1				* HOLD *
7		33-SB139-03	10/11/11	1005	1	SO						1				* HOLD *
8		33-FDUP-006	10/11/11	1035	5	SO		2	1	1	1					
9		FB-001-101111	10/11/11	1530	2	W	2									
10		FB-002-101111	10/11/11	1540	2	W	2									

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days X Other
Prelim Final 14d.
Requested Due Date _____

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/11/11	1700	JLA	TA	10/12/11	1030

Lab Courier
Shipped: FX
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SI – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TestAmerica

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2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40530
Chain of Custody Number:
Page 2 of 2
Temperature °C of Cooler:

Client: CH2MHILL
Client Project #: 423535.02.ST
Project Name: CONAR Plume 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: MMM / JMB
Lab PM: Jim Knapp

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers (Total)	Matrix	Preservative: Water Cool to 4°	Methanol Cool to 4°	Sodium Bisulfate Cool to 4°	7	7					Comments
		Parameter					VOCs 8260B	VOCs 8260B	VOCs 8260B	Percent Moisture	PCBs 8082					
11		33-SB145-04	10/11/11	1405	1	SO					1					* HOLD *
12		33-SB145-11	10/11/11	1400	5	SO	2	1	1	1						

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days X Other
Prelim Final 14d
Requested Due Date _____

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/11/11	1700	[signature]	TA	10/12/11	1030
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier:
Shipped: FX
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SF – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-40530-1

Login Number: 40530
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	2.3
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-40530-2
Client Project/Site: Crab Orchard Wildlife Refuge Plume 2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/24/2011 04:28:07 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

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Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Definitions 10
QC Association 11
Surrogate Summary 12
QC Sample Results 13
Certification Summary 14
Chain of Custody 15
Receipt Checklists 17

Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

Job ID: 500-40530-2

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-40530-2

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC Semi VOA
Method(s) 8082: Compound TCX eluted outside the retention time window on the RTX-5 column for the following samples: 33-SB139-03 (500-40530-7), 33-SB139-05 (500-40530-6) and the method blank. This retention time shift was taken into account when reviewing the samples for target compounds.

Method(s) 8082: The grand mean exception, as outlined in EPA Method 8000B, was applied to the continuing calibration verification (CCV) standard associated with batch 129554. This rule states that when one or more compounds in the CCV fail to meet acceptance criteria, the data may be reported if the average %D (the grand mean) of all the compounds in the CCV is less than or equal to 15%D. The following compounds are affected: AR1260.33-SB139-03 (500-40530-7), 33-SB139-05 (500-40530-6), 33-SB145-04 (500-40530-11)

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

Organic Prep
No analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

Client Sample ID: 33-SB139-05 — Lab Sample ID: 500-40530-6

No Detections

Client Sample ID: 33-SB139-03 — Lab Sample ID: 500-40530-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
PCB-1254	0.053		0.020	0.0058	mg/Kg	1	☼	8082	Total/NA
Polychlorinated biphenyls, Total	0.053		0.020	0.0032	mg/Kg	1	☼	8082	Total/NA

Client Sample ID: 33-SB145-04 — Lab Sample ID: 500-40530-11

No Detections

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

Method	Method Description	Protocol	Laboratory
8082	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-40530-6	33-SB139-05	Solid	10/11/11 10:10	10/12/11 10:30
500-40530-7	33-SB139-03	Solid	10/11/11 10:05	10/12/11 10:30
500-40530-11	33-SB145-04	Solid	10/11/11 14:05	10/12/11 10:30

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

Client Sample ID: 33-SB139-05

Date Collected: 10/11/11 10:10
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-6

Matrix: Solid
Percent Solids: 78.6

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.020	U	0.020	0.0073	mg/Kg	☼	10/19/11 19:11	10/20/11 21:45	1
PCB-1221	0.020	U	0.020	0.016	mg/Kg	☼	10/19/11 19:11	10/20/11 21:45	1
PCB-1232	0.020	U	0.020	0.0079	mg/Kg	☼	10/19/11 19:11	10/20/11 21:45	1
PCB-1242	0.020	U	0.020	0.0097	mg/Kg	☼	10/19/11 19:11	10/20/11 21:45	1
PCB-1248	0.020	U	0.020	0.0074	mg/Kg	☼	10/19/11 19:11	10/20/11 21:45	1
PCB-1254	0.020	U	0.020	0.0058	mg/Kg	☼	10/19/11 19:11	10/20/11 21:45	1
PCB-1260	0.020	U	0.020	0.0047	mg/Kg	☼	10/19/11 19:11	10/20/11 21:45	1
Polychlorinated biphenyls, Total	0.020	U	0.020	0.0032	mg/Kg	☼	10/19/11 19:11	10/20/11 21:45	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*90*		*28 - 124*	*10/19/11 19:11*	*10/20/11 21:45*	*1*
DCB Decachlorobiphenyl	*98*		*38 - 130*	*10/19/11 19:11*	*10/20/11 21:45*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

Client Sample ID: 33-SB139-03

Date Collected: 10/11/11 10:05
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-7

Matrix: Solid
Percent Solids: 81.7

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.020	U	0.020	0.0073	mg/Kg	☼	10/19/11 19:11	10/20/11 21:59	1
PCB-1221	0.020	U	0.020	0.016	mg/Kg	☼	10/19/11 19:11	10/20/11 21:59	1
PCB-1232	0.020	U	0.020	0.0079	mg/Kg	☼	10/19/11 19:11	10/20/11 21:59	1
PCB-1242	0.020	U	0.020	0.0097	mg/Kg	☼	10/19/11 19:11	10/20/11 21:59	1
PCB-1248	0.020	U	0.020	0.0074	mg/Kg	☼	10/19/11 19:11	10/20/11 21:59	1
PCB-1254	**0.053**		0.020	0.0058	mg/Kg	☼	10/19/11 19:11	10/20/11 21:59	1
PCB-1260	0.020	U	0.020	0.0048	mg/Kg	☼	10/19/11 19:11	10/20/11 21:59	1
Polychlorinated biphenyls, Total	**0.053**		0.020	0.0032	mg/Kg	☼	10/19/11 19:11	10/20/11 21:59	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*94*		*28 - 124*	*10/19/11 19:11*	*10/20/11 21:59*	*1*
DCB Decachlorobiphenyl	*101*		*38 - 130*	*10/19/11 19:11*	*10/20/11 21:59*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

Client Sample ID: 33-SB145-04
Date Collected: 10/11/11 14:05
Date Received: 10/12/11 10:30

Lab Sample ID: 500-40530-11
Matrix: Solid
Percent Solids: 79.0

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.021	U	0.021	0.0075	mg/Kg	☼	10/19/11 19:11	10/20/11 22:13	1
PCB-1221	0.021	U	0.021	0.017	mg/Kg	☼	10/19/11 19:11	10/20/11 22:13	1
PCB-1232	0.021	U	0.021	0.0081	mg/Kg	☼	10/19/11 19:11	10/20/11 22:13	1
PCB-1242	0.021	U	0.021	0.010	mg/Kg	☼	10/19/11 19:11	10/20/11 22:13	1
PCB-1248	0.021	U	0.021	0.0076	mg/Kg	☼	10/19/11 19:11	10/20/11 22:13	1
PCB-1254	0.021	U	0.021	0.0060	mg/Kg	☼	10/19/11 19:11	10/20/11 22:13	1
PCB-1260	0.021	U	0.021	0.0049	mg/Kg	☼	10/19/11 19:11	10/20/11 22:13	1
Polychlorinated biphenyls, Total	0.021	U	0.021	0.0032	mg/Kg	☼	10/19/11 19:11	10/20/11 22:13	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*85*		*28 - 124*	*10/19/11 19:11*	*10/20/11 22:13*	*1*
DCB Decachlorobiphenyl	*93*		*38 - 130*	*10/19/11 19:11*	*10/20/11 22:13*	*1*

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

Qualifiers

GC Semi VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

GC Semi VOA

Prep Batch: 129554

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-6	33-SB139-05	Total/NA	Solid	3541	
500-40530-7	33-SB139-03	Total/NA	Solid	3541	
500-40530-11	33-SB145-04	Total/NA	Solid	3541	
LCS 500-129554/3-A	Lab Control Sample	Total/NA	Solid	3541	
MB 500-129554/1-A	Method Blank	Total/NA	Solid	3541	

Analysis Batch: 129685

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-6	33-SB139-05	Total/NA	Solid	8082	129554
500-40530-7	33-SB139-03	Total/NA	Solid	8082	129554
500-40530-11	33-SB145-04	Total/NA	Solid	8082	129554
LCS 500-129554/3-A	Lab Control Sample	Total/NA	Solid	8082	129554
MB 500-129554/1-A	Method Blank	Total/NA	Solid	8082	129554

General Chemistry

Analysis Batch: 129193

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40530-6	33-SB139-05	Total/NA	Solid	Moisture	
500-40530-7	33-SB139-03	Total/NA	Solid	Moisture	
500-40530-11	33-SB145-04	Total/NA	Solid	Moisture	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)							
		TCX1	DCB1						
Lab Sample ID	Client Sample ID	(28-124)	(38-130)						
500-40530-6	33-SB139-05	90	98						
500-40530-7	33-SB139-03	94	101						
500-40530-11	33-SB145-04	85	93						
LCS 500-129554/3-A	Lab Control Sample	109	114						
MB 500-129554/1-A	Method Blank	89	99						

Surrogate Legend

TCX = Tetrachloro-m-xylene

DCB = DCB Decachlorobiphenyl

QC Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Lab Sample ID: MB 500-129554/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 129685 — **Prep Batch: 129554**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.017	U	0.017	0.0060	mg/Kg		10/19/11 19:11	10/20/11 21:18	1
PCB-1221	0.017	U	0.017	0.014	mg/Kg		10/19/11 19:11	10/20/11 21:18	1
PCB-1232	0.017	U	0.017	0.0065	mg/Kg		10/19/11 19:11	10/20/11 21:18	1
PCB-1242	0.017	U	0.017	0.0080	mg/Kg		10/19/11 19:11	10/20/11 21:18	1
PCB-1248	0.017	U	0.017	0.0061	mg/Kg		10/19/11 19:11	10/20/11 21:18	1
PCB-1254	0.017	U	0.017	0.0048	mg/Kg		10/19/11 19:11	10/20/11 21:18	1
PCB-1260	0.017	U	0.017	0.0039	mg/Kg		10/19/11 19:11	10/20/11 21:18	1
Polychlorinated biphenyls, Total	0.017	U	0.017	0.0026	mg/Kg		10/19/11 19:11	10/20/11 21:18	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*89*		*28 - 124*	*10/19/11 19:11*	*10/20/11 21:18*	*1*
DCB Decachlorobiphenyl	*99*		*38 - 130*	*10/19/11 19:11*	*10/20/11 21:18*	*1*

Lab Sample ID: LCS 500-129554/3-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 129685 — **Prep Batch: 129554**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits		
PCB-1016			0.167	0.184		mg/Kg		111	47 - 117		
PCB-1260			0.167	0.202		mg/Kg		121	57 - 122		

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
Tetrachloro-m-xylene	*109*		*28 - 124*
DCB Decachlorobiphenyl	*114*		*38 - 130*

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge Plume 2

TestAmerica Job ID: 500-40530-2

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

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2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40530
Chain of Custody Number:
Page 1 of 2
Temperature °C of Cooler: 23

Client: CH2MHILL
Client Project #: 4235535.02.SI
Project Name: CONWR Plume 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: MMM/JMB
Lab PM: Jim Knapp

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	VOCs 8260B (Preservative: 1)	VOCs 8260B (Water Cool to 4°)	VOCs 8260B (Methanol Cool to 4°)	VOCs 8260B (Sodium Bisulfate Cool to 4°)	Percent Moisture (7)	PCBs 8082 (7)				Comments
1		33-GG135-34	10/11/11	0850	3	W	3									
2		33-GG148-22.5	10/11/11	0945	3	W	3									
3		TB-001-101111	10/11/11	—	2	W	2									
4		33-SB139-11	10/11/11	1020	5	~~W~~ SO MM		2	1	1	1					
5		33-SB139-28	10/11/11	1030	5	~~W~~ SO MM		2	1	1	1					
6		33-SB139-05	10/11/11	1010	1	SO						1				* HOLD *
7		33-SB139-03	10/11/11	1005	1	SO						1				* HOLD *
8		33-FDUP-006	10/11/11	1035	5	SO		2	1	1	1					
9		FB-001-101111	10/11/11	1530	2	W	2									
10		FB-002-101111	10/11/11	1540	2	W	2									

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days ___ Other
Prelim X Final 14d.
Requested Due Date _____

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/11/11	1700	JLA	TA	10/12/11	1030

Lab Courier:
Shipped: FX
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SI – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

10/24/2011

TestAmerica

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2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Lab Job #: 500-40530

Chain of Custody Number:

Page 2 of 2

Temperature °C of Cooler:

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Client: CH2MHILL
Client Project #: 423535.02.ST
Project Name: CONAR Plume 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: MMM / JMB
Lab PM: Jim Knapp

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers (Total)	Matrix	Preservative: Water Cool to 4°	Preservative: Methanol Cool to 4°	Preservative: Sodium Bisulfate Cool to 4°	7	7					Comments
		Parameter					VOCs 8260B	VOCs 8260B	VOCs 8260B	Percent Moisture	PCBs 8082					
11		33-SB145-04	10/11/11	1405	1	SO					1					* HOLD *
12		33-SB145-11	10/11/11	1400	5	SO	2	1	1	1						

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days X Other
Prelim Final 14d
Requested Due Date _____

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Monica Martin	CH2MHILL	10/11/11	1700	[signature]	TA	10/12/11	1030

Lab Courier:
Shipped: FX
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SF – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-40530-2

Login Number: 40530
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	2.3
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-40621-1
Client Project/Site: Crab Orchard Wildlife Refuge #2

For:
CH2M Hill, Inc.
135 South 84th Street
Suite 400
Milwaukee, Wisconsin 53214

Attn: Ms. Shannon Olson

Authorized for release by:
10/27/2011 05:25:59 PM

Jim Knapp
Customer Service Manager
jim.knapp@testamericainc.com

LINKS

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Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Detection Summary 4
Method Summary 6
Sample Summary 7
Client Sample Results 8
Definitions 26
QC Association 27
Surrogate Summary 32
QC Sample Results 37
Certification Summary 58
Chain of Custody 59
Receipt Checklists 61

Job ID: 500-40621-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-40621-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC/MS VOA
Method(s) 8260B: The %RPD of the laboratory control sample (LCS) and laboratory control standard duplicate (LCSD) for preparation batch 129797 exceeded control limits for the following analytes: Chloroform, 1,1-Dichloroethene, 2-Butanone and Vinyl Chloride.

Method(s) 8260B: The %RPD of the laboratory control sample (LCS) and laboratory control standard duplicate (LCSD) for preparation batch 129952 exceeded control limits for the following analyte: Acetone.

Method(s) 8260B: The following samples were diluted due to the abundance of target analytes: 33-FDUP-007 (500-40621-6), 33-GG137-29.5 (500-40621-3), 33-GG140-34 (500-40621-2), 33-SB143-15 (500-40621-5), 33-SB147-28 (500-40621-8). Elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

GC/MS Semi VOA
Method(s) 8270C: 500-40621-9 had Phenol-d5 at 18% (20%-11). All other surrogate recoveries were within limits. No further action was required. WS-001-101211 (500-40621-9)

Method(s) 8270C: Internal standard (ISTD 1-6) retention times for the samples, QC and CCV's were outside the ± 0.5 minutes of acceptance from the mid-point of the initial calibration on CMS 20. The samples, QC and CCV's were within + 0.5 minutes from the daily calibration verification. No corrective action was required per TAL Chicago SOP.WA-001-101211 (500-40621-10), WS-001-101211 (500-40621-9)

No other analytical or quality issues were noted.

GC Semi VOA
Method(s) 8081A: The grand mean exception, as outlined in EPA Method 8000B, was applied to the continuing calibration verification (CCV) standard associated with batch 129292. This rule states that when one or more compounds in the CCV fail to meet acceptance criteria, the initial calibration (ICAL) may be used for quantitation if the average %D (the grand mean) of all the compounds in the CCV is less than or equal to 15 %D. The following compounds are affected: Toxaphene, Heptachlor, Methoxychlor, and Endrin.WA-001-101211 (500-40621-10), WS-001-101211 (500-40621-9)

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

General Chemistry
No analytical or quality issues were noted.

Organic Prep
No analytical or quality issues were noted.

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: TB-001-101211 — Lab Sample ID: 500-40621-1

No Detections

Client Sample ID: 33-GG140-34 — Lab Sample ID: 500-40621-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	18		0.50	0.11	mg/L	500		8260B	Total/NA
Vinyl chloride	0.52		0.25	0.065	mg/L	500		8260B	Total/NA
Trichloroethene - DL	170		2.5	0.90	mg/L	5000		8260B	Total/NA

Client Sample ID: 33-GG137-29.5 — Lab Sample ID: 500-40621-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	0.21		0.050	0.019	mg/L	10		8260B	Total/NA
cis-1,2-Dichloroethene	0.88		0.010	0.0022	mg/L	10		8260B	Total/NA
Tetrachloroethene	0.0067	J	0.010	0.0022	mg/L	10		8260B	Total/NA
trans-1,2-Dichloroethene	0.0092	J	0.010	0.0027	mg/L	10		8260B	Total/NA
Vinyl chloride	0.018		0.0050	0.0013	mg/L	10		8260B	Total/NA
Trichloroethene - DL	5.7		0.050	0.018	mg/L	100		8260B	Total/NA

Client Sample ID: FB-001-101211 — Lab Sample ID: 500-40621-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloroform	0.0012		0.0010	0.00025	mg/L	1		8260B	Total/NA

Client Sample ID: 33-SB143-15 — Lab Sample ID: 500-40621-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.53		0.049	0.011	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	17		0.12	0.075	mg/Kg	500	☼	8260B	Total/NA

Client Sample ID: 33-FDUP-007 — Lab Sample ID: 500-40621-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.54		0.050	0.011	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	17		0.12	0.075	mg/Kg	500	☼	8260B	Total/NA

Client Sample ID: 33-SB147-13 — Lab Sample ID: 500-40621-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Vinyl chloride	0.0030	J	0.0049	0.00068	mg/Kg	1	☼	8260B	Total/NA
Acetone	0.0057	*	0.0049	0.0024	mg/Kg	1	☼	8260B	Total/NA
cis-1,2-Dichloroethene	0.091		0.0049	0.00071	mg/Kg	1	☼	8260B	Total/NA
Trichloroethene	0.0047	J	0.0049	0.00079	mg/Kg	1	☼	8260B	Total/NA

Client Sample ID: 33-SB147-28 — Lab Sample ID: 500-40621-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
cis-1,2-Dichloroethene	0.40		0.048	0.011	mg/Kg	50	☼	8260B	Total/NA
Tetrachloroethene	0.039	J	0.048	0.010	mg/Kg	50	☼	8260B	Total/NA
Vinyl chloride	0.039		0.012	0.0060	mg/Kg	50	☼	8260B	Total/NA
Trichloroethene - DL	13		0.048	0.029	mg/Kg	200	☼	8260B	Total/NA

Client Sample ID: WS-001-101211 — Lab Sample ID: 500-40621-9

Detection Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: WS-001-101211 (Continued) — Lab Sample ID: 500-40621-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.33	J	0.50	0.010	mg/L	1		6010B	TCLP
pH	7.87		0.200	0.200	SU	1		9045C	Total/NA
Flashpoint	>200		40	40	Degrees F	1		D92	Total/NA

Client Sample ID: WA-001-101211 — Lab Sample ID: 500-40621-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	1.5		0.50	0.010	mg/L	1		6010B	TCLP
Flashpoint	>176		40.0	40.0	Degrees F	1		1010	Total/NA
pH	7.78	HF	0.200	0.200	SU	1		9040B	Total/NA

Client Sample ID: TB-002-101211 — Lab Sample ID: 500-40621-11

No Detections

Method Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CHI
8270C	Semivolatile Organic Compounds (GC/MS)	SW846	TAL CHI
8081A	Organochlorine Pesticides (GC)	SW846	TAL CHI
8151A	Herbicides (GC)	SW846	TAL CHI
6010B	Metals (ICP)	SW846	TAL CHI
7470A	Mercury (CVAA)	SW846	TAL CHI
1010	Ignitability, Pensky-Martens Closed-Cup Method	SW846	TAL CHI
9040B	pH	SW846	TAL CHI
9045C	pH	SW846	TAL CHI
D92	Flashpoint	ASTM	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-40621-1	TB-001-101211	Water	10/12/11 00:00	10/13/11 10:30
500-40621-2	33-GG140-34	Water	10/12/11 09:05	10/13/11 10:30
500-40621-3	33-GG137-29.5	Water	10/12/11 09:30	10/13/11 10:30
500-40621-4	FB-001-101211	Water	10/12/11 17:00	10/13/11 10:30
500-40621-5	33-SB143-15	Solid	10/12/11 09:45	10/13/11 10:30
500-40621-6	33-FDUP-007	Solid	10/12/11 09:55	10/13/11 10:30
500-40621-7	33-SB147-13	Solid	10/12/11 11:45	10/13/11 10:30
500-40621-8	33-SB147-28	Solid	10/12/11 12:00	10/13/11 10:30
500-40621-9	WS-001-101211	Solid	10/12/11 13:00	10/13/11 10:30
500-40621-10	WA-001-101211	Water	10/12/11 13:15	10/13/11 10:30
500-40621-11	TB-002-101211	Water	10/12/11 00:00	10/13/11 10:30

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: TB-001-101211

Date Collected: 10/12/11 00:00
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-1

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/26/11 09:38	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/26/11 09:38	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/26/11 09:38	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/26/11 09:38	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/26/11 09:38	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/26/11 09:38	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/26/11 09:38	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/26/11 09:38	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/26/11 09:38	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/26/11 09:38	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/26/11 09:38	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/26/11 09:38	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/26/11 09:38	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/26/11 09:38	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/26/11 09:38	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/26/11 09:38	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/26/11 09:38	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/26/11 09:38	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/26/11 09:38	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/26/11 09:38	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/26/11 09:38	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/26/11 09:38	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/26/11 09:38	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/26/11 09:38	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/26/11 09:38	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/26/11 09:38	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/26/11 09:38	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/26/11 09:38	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/26/11 09:38	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/26/11 09:38	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/26/11 09:38	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/26/11 09:38	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/26/11 09:38	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/26/11 09:38	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/26/11 09:38	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/26/11 09:38	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*		*10/26/11 09:38*	*1*
Dibromofluoromethane	*101*		*78 - 119*		*10/26/11 09:38*	*1*
1,2-Dichloroethane-d4 (Surr)	*109*		*77 - 124*		*10/26/11 09:38*	*1*
Toluene-d8 (Surr)	*94*		*80 - 121*		*10/26/11 09:38*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: 33-GG140-34

Date Collected: 10/12/11 09:05
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-2

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	2.5	U	2.5	0.95	mg/L			10/26/11 11:36	500
Benzene	0.25	U	0.25	0.060	mg/L			10/26/11 11:36	500
Bromodichloromethane	0.50	U	0.50	0.12	mg/L			10/26/11 11:36	500
Bromoform	0.50	U	0.50	0.23	mg/L			10/26/11 11:36	500
Bromomethane	0.50	U	0.50	0.25	mg/L			10/26/11 11:36	500
Methyl Ethyl Ketone	2.5	U	2.5	0.50	mg/L			10/26/11 11:36	500
Carbon disulfide	2.5	U	2.5	0.22	mg/L			10/26/11 11:36	500
Carbon tetrachloride	0.50	U	0.50	0.14	mg/L			10/26/11 11:36	500
Chlorobenzene	0.50	U	0.50	0.12	mg/L			10/26/11 11:36	500
Chloroethane	0.50	U	0.50	0.17	mg/L			10/26/11 11:36	500
Chloroform	0.50	U	0.50	0.13	mg/L			10/26/11 11:36	500
Chloromethane	0.50	U	0.50	0.12	mg/L			10/26/11 11:36	500
cis-1,2-Dichloroethene	**18**		0.50	0.11	mg/L			10/26/11 11:36	500
cis-1,3-Dichloropropene	0.50	U	0.50	0.14	mg/L			10/26/11 11:36	500
Dibromochloromethane	0.50	U	0.50	0.13	mg/L			10/26/11 11:36	500
1,1-Dichloroethane	0.50	U	0.50	0.12	mg/L			10/26/11 11:36	500
1,1-Dichloroethene	0.50	U	0.50	0.15	mg/L			10/26/11 11:36	500
1,2-Dichloropropane	0.50	U	0.50	0.18	mg/L			10/26/11 11:36	500
Ethylbenzene	0.25	U	0.25	0.070	mg/L			10/26/11 11:36	500
2-Hexanone	2.5	U	2.5	0.28	mg/L			10/26/11 11:36	500
Methylene Chloride	2.5	U	2.5	0.32	mg/L			10/26/11 11:36	500
methyl isobutyl ketone	2.5	U	2.5	0.40	mg/L			10/26/11 11:36	500
Methyl tert-butyl ether	0.50	U	0.50	0.14	mg/L			10/26/11 11:36	500
Styrene	0.50	U	0.50	0.13	mg/L			10/26/11 11:36	500
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.18	mg/L			10/26/11 11:36	500
Tetrachloroethene	0.50	U	0.50	0.11	mg/L			10/26/11 11:36	500
Toluene	0.25	U	0.25	0.075	mg/L			10/26/11 11:36	500
trans-1,2-Dichloroethene	0.50	U	0.50	0.14	mg/L			10/26/11 11:36	500
trans-1,3-Dichloropropene	0.50	U	0.50	0.18	mg/L			10/26/11 11:36	500
1,1,1-Trichloroethane	0.50	U	0.50	0.13	mg/L			10/26/11 11:36	500
1,1,2-Trichloroethane	0.50	U	0.50	0.15	mg/L			10/26/11 11:36	500
Vinyl chloride	**0.52**		0.25	0.065	mg/L			10/26/11 11:36	500
Xylenes, Total	0.50	U	0.50	0.15	mg/L			10/26/11 11:36	500
1,2-Dichloroethane	0.50	U	0.50	0.14	mg/L			10/26/11 11:36	500
1,3-Dichloropropene, Total	0.50	U	0.50	0.25	mg/L			10/26/11 11:36	500

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*		*10/26/11 11:36*	*500*
Dibromofluoromethane	*101*		*78 - 119*		*10/26/11 11:36*	*500*
1,2-Dichloroethane-d4 (Surr)	*108*		*77 - 124*		*10/26/11 11:36*	*500*
Toluene-d8 (Surr)	*100*		*80 - 121*		*10/26/11 11:36*	*500*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**170**		2.5	0.90	mg/L			10/26/11 12:00	5000

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/26/11 12:00*	*5000*
Dibromofluoromethane	*106*		*78 - 119*		*10/26/11 12:00*	*5000*
1,2-Dichloroethane-d4 (Surr)	*114*		*77 - 124*		*10/26/11 12:00*	*5000*
Toluene-d8 (Surr)	*104*		*80 - 121*		*10/26/11 12:00*	*5000*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: 33-GG137-29.5

Date Collected: 10/12/11 09:30
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-3

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**0.21**		0.050	0.019	mg/L			10/26/11 10:49	10
Benzene	0.0050	U	0.0050	0.0012	mg/L			10/26/11 10:49	10
Bromodichloromethane	0.010	U	0.010	0.0023	mg/L			10/26/11 10:49	10
Bromoform	0.010	U	0.010	0.0045	mg/L			10/26/11 10:49	10
Bromomethane	0.010	U	0.010	0.0049	mg/L			10/26/11 10:49	10
Methyl Ethyl Ketone	0.050	U	0.050	0.010	mg/L			10/26/11 10:49	10
Carbon disulfide	0.050	U	0.050	0.0044	mg/L			10/26/11 10:49	10
Carbon tetrachloride	0.010	U	0.010	0.0028	mg/L			10/26/11 10:49	10
Chlorobenzene	0.010	U	0.010	0.0024	mg/L			10/26/11 10:49	10
Chloroethane	0.010	U	0.010	0.0033	mg/L			10/26/11 10:49	10
Chloroform	0.010	U	0.010	0.0025	mg/L			10/26/11 10:49	10
Chloromethane	0.010	U	0.010	0.0024	mg/L			10/26/11 10:49	10
cis-1,2-Dichloroethene	**0.88**		0.010	0.0022	mg/L			10/26/11 10:49	10
cis-1,3-Dichloropropene	0.010	U	0.010	0.0028	mg/L			10/26/11 10:49	10
Dibromochloromethane	0.010	U	0.010	0.0025	mg/L			10/26/11 10:49	10
1,1-Dichloroethane	0.010	U	0.010	0.0024	mg/L			10/26/11 10:49	10
1,1-Dichloroethene	0.010	U	0.010	0.0029	mg/L			10/26/11 10:49	10
1,2-Dichloropropane	0.010	U	0.010	0.0036	mg/L			10/26/11 10:49	10
Ethylbenzene	0.0050	U	0.0050	0.0014	mg/L			10/26/11 10:49	10
2-Hexanone	0.050	U	0.050	0.0056	mg/L			10/26/11 10:49	10
Methylene Chloride	0.050	U	0.050	0.0063	mg/L			10/26/11 10:49	10
methyl isobutyl ketone	0.050	U	0.050	0.0079	mg/L			10/26/11 10:49	10
Methyl tert-butyl ether	0.010	U	0.010	0.0028	mg/L			10/26/11 10:49	10
Styrene	0.010	U	0.010	0.0026	mg/L			10/26/11 10:49	10
1,1,2,2-Tetrachloroethane	0.010	U	0.010	0.0035	mg/L			10/26/11 10:49	10
Tetrachloroethene	**0.0067**	**J**	0.010	0.0022	mg/L			10/26/11 10:49	10
Toluene	0.0050	U	0.0050	0.0015	mg/L			10/26/11 10:49	10
trans-1,2-Dichloroethene	**0.0092**	**J**	0.010	0.0027	mg/L			10/26/11 10:49	10
trans-1,3-Dichloropropene	0.010	U	0.010	0.0035	mg/L			10/26/11 10:49	10
1,1,1-Trichloroethane	0.010	U	0.010	0.0026	mg/L			10/26/11 10:49	10
1,1,2-Trichloroethane	0.010	U	0.010	0.0030	mg/L			10/26/11 10:49	10
Vinyl chloride	**0.018**		0.0050	0.0013	mg/L			10/26/11 10:49	10
Xylenes, Total	0.010	U	0.010	0.0030	mg/L			10/26/11 10:49	10
1,2-Dichloroethane	0.010	U	0.010	0.0028	mg/L			10/26/11 10:49	10
1,3-Dichloropropene, Total	0.010	U	0.010	0.0050	mg/L			10/26/11 10:49	10

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*77 - 112*		*10/26/11 10:49*	*10*
Dibromofluoromethane	*100*		*78 - 119*		*10/26/11 10:49*	*10*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*		*10/26/11 10:49*	*10*
Toluene-d8 (Surr)	*96*		*80 - 121*		*10/26/11 10:49*	*10*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**5.7**		0.050	0.018	mg/L			10/26/11 11:12	100

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*		*10/26/11 11:12*	*100*
Dibromofluoromethane	*104*		*78 - 119*		*10/26/11 11:12*	*100*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*		*10/26/11 11:12*	*100*
Toluene-d8 (Surr)	*98*		*80 - 121*		*10/26/11 11:12*	*100*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: FB-001-101211

Date Collected: 10/12/11 17:00
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-4

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/26/11 10:25	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/26/11 10:25	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/26/11 10:25	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/26/11 10:25	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/26/11 10:25	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/26/11 10:25	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/26/11 10:25	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/26/11 10:25	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/26/11 10:25	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/26/11 10:25	1
Chloroform	**0.0012**		0.0010	0.00025	mg/L			10/26/11 10:25	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/26/11 10:25	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/26/11 10:25	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/26/11 10:25	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/26/11 10:25	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/26/11 10:25	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/26/11 10:25	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/26/11 10:25	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/26/11 10:25	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/26/11 10:25	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/26/11 10:25	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/26/11 10:25	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/26/11 10:25	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/26/11 10:25	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/26/11 10:25	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/26/11 10:25	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/26/11 10:25	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/26/11 10:25	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/26/11 10:25	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/26/11 10:25	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/26/11 10:25	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/26/11 10:25	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/26/11 10:25	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/26/11 10:25	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/26/11 10:25	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/26/11 10:25	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*102*		*77 - 112*		*10/26/11 10:25*	*1*
Dibromofluoromethane	*105*		*78 - 119*		*10/26/11 10:25*	*1*
1,2-Dichloroethane-d4 (Surr)	*111*		*77 - 124*		*10/26/11 10:25*	*1*
Toluene-d8 (Surr)	*100*		*80 - 121*		*10/26/11 10:25*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: 33-SB143-15
Date Collected: 10/12/11 09:45
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-5
Matrix: Solid
Percent Solids: 83.1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.25	U	0.25	0.095	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Benzene	0.012	U	0.012	0.0040	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Bromodichloromethane	0.099	U	0.099	0.014	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Bromoform	0.099	U	0.099	0.028	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Bromomethane	0.099	U	0.099	0.043	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Methyl Ethyl Ketone	0.25	U	0.25	0.051	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Carbon disulfide	0.25	U	0.25	0.022	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Carbon tetrachloride	0.049	U	0.049	0.014	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Chlorobenzene	0.049	U	0.049	0.012	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Chloroethane	0.099	U	0.099	0.025	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Chloroform	0.049	U	0.049	0.012	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Chloromethane	0.099	U	0.099	0.025	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
cis-1,2-Dichloroethene	**0.53**		0.049	0.011	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
cis-1,3-Dichloropropene	0.049	U	0.049	0.014	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Dibromochloromethane	0.099	U	0.099	0.019	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
1,1-Dichloroethane	0.049	U	0.049	0.012	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
1,2-Dichloroethane	0.049	U	0.049	0.014	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
1,1-Dichloroethene	0.049	U	0.049	0.014	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
1,2-Dichloropropane	0.049	U	0.049	0.018	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Ethylbenzene	0.012	U	0.012	0.0069	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
2-Hexanone	0.25	U	0.25	0.028	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Methylene Chloride	0.25	U	0.25	0.031	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
methyl isobutyl ketone	0.25	U	0.25	0.039	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Methyl tert-butyl ether	0.099	U	0.099	0.024	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Styrene	0.049	U	0.049	0.013	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
1,1,2,2-Tetrachloroethane	0.049	U	0.049	0.017	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Tetrachloroethene	0.049	U	0.049	0.011	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Toluene	0.012	U	0.012	0.0075	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
trans-1,2-Dichloroethene	0.049	U	0.049	0.013	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
trans-1,3-Dichloropropene	0.049	U	0.049	0.017	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
1,1,1-Trichloroethane	0.049	U	0.049	0.013	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
1,1,2-Trichloroethane	0.049	U	0.049	0.015	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Vinyl chloride	0.012	U	0.012	0.0062	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
Xylenes, Total	0.025	U	0.025	0.0064	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50
1,3-Dichloropropene, Total	0.049	U	0.049	0.014	mg/Kg	☼	10/12/11 09:45	10/26/11 12:23	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*77 - 112*	*10/12/11 09:45*	*10/26/11 12:23*	*50*
Dibromofluoromethane	*98*		*78 - 119*	*10/12/11 09:45*	*10/26/11 12:23*	*50*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*	*10/12/11 09:45*	*10/26/11 12:23*	*50*
Toluene-d8 (Surr)	*97*		*80 - 121*	*10/12/11 09:45*	*10/26/11 12:23*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**17**		0.12	0.075	mg/Kg	☼	10/12/11 09:45	10/26/11 12:47	500

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*77 - 112*	*10/12/11 09:45*	*10/26/11 12:47*	*500*
Dibromofluoromethane	*105*		*78 - 119*	*10/12/11 09:45*	*10/26/11 12:47*	*500*
1,2-Dichloroethane-d4 (Surr)	*111*		*77 - 124*	*10/12/11 09:45*	*10/26/11 12:47*	*500*
Toluene-d8 (Surr)	*100*		*80 - 121*	*10/12/11 09:45*	*10/26/11 12:47*	*500*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: 33-FDUP-007
Date Collected: 10/12/11 09:55
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-6
Matrix: Solid
Percent Solids: 83.2

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.25	U	0.25	0.096	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Benzene	0.012	U	0.012	0.0040	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Bromodichloromethane	0.10	U	0.10	0.014	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Bromoform	0.10	U	0.10	0.028	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Bromomethane	0.10	U	0.10	0.043	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Methyl Ethyl Ketone	0.25	U	0.25	0.052	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Carbon disulfide	0.25	U	0.25	0.022	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Carbon tetrachloride	0.050	U	0.050	0.014	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Chlorobenzene	0.050	U	0.050	0.012	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Chloroethane	0.10	U	0.10	0.025	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Chloroform	0.050	U	0.050	0.012	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Chloromethane	0.10	U	0.10	0.025	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
cis-1,2-Dichloroethene	**0.54**		0.050	0.011	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
cis-1,3-Dichloropropene	0.050	U	0.050	0.014	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Dibromochloromethane	0.10	U	0.10	0.019	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
1,1-Dichloroethane	0.050	U	0.050	0.012	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
1,2-Dichloroethane	0.050	U	0.050	0.014	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
1,1-Dichloroethene	0.050	U	0.050	0.014	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
1,2-Dichloropropane	0.050	U	0.050	0.018	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Ethylbenzene	0.012	U	0.012	0.0070	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
2-Hexanone	0.25	U	0.25	0.028	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Methylene Chloride	0.25	U	0.25	0.031	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
methyl isobutyl ketone	0.25	U	0.25	0.039	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Methyl tert-butyl ether	0.10	U	0.10	0.024	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Styrene	0.050	U	0.050	0.013	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
1,1,2,2-Tetrachloroethane	0.050	U	0.050	0.018	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Tetrachloroethene	0.050	U	0.050	0.011	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Toluene	0.012	U	0.012	0.0075	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
trans-1,2-Dichloroethene	0.050	U	0.050	0.014	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
trans-1,3-Dichloropropene	0.050	U	0.050	0.018	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
1,1,1-Trichloroethane	0.050	U	0.050	0.013	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
1,1,2-Trichloroethane	0.050	U	0.050	0.015	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Vinyl chloride	0.012	U	0.012	0.0063	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
Xylenes, Total	0.025	U	0.025	0.0064	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50
1,3-Dichloropropene, Total	0.050	U	0.050	0.014	mg/Kg	☼	10/12/11 09:55	10/26/11 13:11	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*	*10/12/11 09:55*	*10/26/11 13:11*	*50*
Dibromofluoromethane	*104*		*78 - 119*	*10/12/11 09:55*	*10/26/11 13:11*	*50*
1,2-Dichloroethane-d4 (Surr)	*111*		*77 - 124*	*10/12/11 09:55*	*10/26/11 13:11*	*50*
Toluene-d8 (Surr)	*102*		*80 - 121*	*10/12/11 09:55*	*10/26/11 13:11*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**17**		0.12	0.075	mg/Kg	☼	10/12/11 09:55	10/26/11 13:34	500

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*	*10/12/11 09:55*	*10/26/11 13:34*	*500*
Dibromofluoromethane	*107*		*78 - 119*	*10/12/11 09:55*	*10/26/11 13:34*	*500*
1,2-Dichloroethane-d4 (Surr)	*116*		*77 - 124*	*10/12/11 09:55*	*10/26/11 13:34*	*500*
Toluene-d8 (Surr)	*103*		*80 - 121*	*10/12/11 09:55*	*10/26/11 13:34*	*500*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: 33-SB147-13
Date Collected: 10/12/11 11:45
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-7
Matrix: Solid
Percent Solids: 83.1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	0.0049	U	0.0049	0.00080	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Vinyl chloride	**0.0030**	**J**	0.0049	0.00068	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Bromomethane	0.0049	U	0.0049	0.0010	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Chloroethane	0.0049	U	0.0049	0.0010	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
1,1-Dichloroethene	0.0049	U	0.0049	0.00077	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Acetone	**0.0057**	*****	0.0049	0.0024	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Carbon disulfide	0.0049	U	0.0049	0.00069	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Methylene Chloride	0.0049	U	0.0049	0.0014	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
trans-1,2-Dichloroethene	0.0049	U	0.0049	0.00069	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Methyl tert-butyl ether	0.0049	U	0.0049	0.00073	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
1,1-Dichloroethane	0.0049	U	0.0049	0.00077	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
cis-1,2-Dichloroethene	**0.091**		0.0049	0.00071	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Methyl Ethyl Ketone	0.0049	U	0.0049	0.0010	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Chloroform	0.0049	U	0.0049	0.00089	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
1,1,1-Trichloroethane	0.0049	U	0.0049	0.00093	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Carbon tetrachloride	0.0049	U	0.0049	0.0011	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Benzene	0.0049	U	0.0049	0.00052	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
1,2-Dichloroethane	0.0049	U	0.0049	0.00050	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Trichloroethene	**0.0047**	**J**	0.0049	0.00079	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
1,2-Dichloropropane	0.0049	U	0.0049	0.0011	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Bromodichloromethane	0.0049	U	0.0049	0.00074	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
cis-1,3-Dichloropropene	0.0049	U	0.0049	0.00055	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
methyl isobutyl ketone	0.0049	U	0.0049	0.00083	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Toluene	0.0049	U	0.0049	0.00094	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
trans-1,3-Dichloropropene	0.0049	U	0.0049	0.0011	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
1,1,2-Trichloroethane	0.0049	U	0.0049	0.00065	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Tetrachloroethene	0.0049	U	0.0049	0.00092	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
2-Hexanone	0.0049	U	0.0049	0.00069	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Dibromochloromethane	0.0049	U	0.0049	0.00067	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Chlorobenzene	0.0049	U	0.0049	0.00077	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Ethylbenzene	0.0049	U	0.0049	0.00073	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Xylenes, Total	0.0097	U	0.0097	0.00068	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Styrene	0.0049	U	0.0049	0.00061	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
Bromoform	0.0049	U	0.0049	0.00079	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
1,1,2,2-Tetrachloroethane	0.0049	U	0.0049	0.00066	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1
1,3-Dichloropropene, Total	0.0049	U	0.0049	0.00055	mg/Kg	☼	10/12/11 11:45	10/23/11 16:42	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*103*		*69 - 120*	*10/12/11 11:45*	*10/23/11 16:42*	*1*
Toluene-d8 (Surr)	*101*		*69 - 122*	*10/12/11 11:45*	*10/23/11 16:42*	*1*
4-Bromofluorobenzene (Surr)	*101*		*67 - 120*	*10/12/11 11:45*	*10/23/11 16:42*	*1*
Dibromofluoromethane	*96*		*69 - 120*	*10/12/11 11:45*	*10/23/11 16:42*	*1*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: 33-SB147-28
Date Collected: 10/12/11 12:00
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-8
Matrix: Solid
Percent Solids: 85.7

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.24	U	0.24	0.092	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Benzene	0.012	U	0.012	0.0038	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Bromodichloromethane	0.096	U	0.096	0.013	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Bromoform	0.096	U	0.096	0.027	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Bromomethane	0.096	U	0.096	0.041	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Methyl Ethyl Ketone	0.24	U	0.24	0.050	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Carbon disulfide	0.24	U	0.24	0.021	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Carbon tetrachloride	0.048	U	0.048	0.013	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Chlorobenzene	0.048	U	0.048	0.011	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Chloroethane	0.096	U	0.096	0.024	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Chloroform	0.048	U	0.048	0.012	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Chloromethane	0.096	U	0.096	0.024	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
cis-1,2-Dichloroethene	**0.40**		0.048	0.011	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
cis-1,3-Dichloropropene	0.048	U	0.048	0.013	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Dibromochloromethane	0.096	U	0.096	0.018	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
1,1-Dichloroethane	0.048	U	0.048	0.012	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
1,2-Dichloroethane	0.048	U	0.048	0.013	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
1,1-Dichloroethene	0.048	U	0.048	0.014	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
1,2-Dichloropropane	0.048	U	0.048	0.017	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Ethylbenzene	0.012	U	0.012	0.0067	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
2-Hexanone	0.24	U	0.24	0.027	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Methylene Chloride	0.24	U	0.24	0.030	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
methyl isobutyl ketone	0.24	U	0.24	0.038	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Methyl tert-butyl ether	0.096	U	0.096	0.023	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Styrene	0.048	U	0.048	0.013	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
1,1,2,2-Tetrachloroethane	0.048	U	0.048	0.017	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Tetrachloroethene	**0.039**	**J**	0.048	0.010	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Toluene	0.012	U	0.012	0.0072	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
trans-1,2-Dichloroethene	0.048	U	0.048	0.013	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
trans-1,3-Dichloropropene	0.048	U	0.048	0.017	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
1,1,1-Trichloroethane	0.048	U	0.048	0.013	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
1,1,2-Trichloroethane	0.048	U	0.048	0.014	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Vinyl chloride	**0.039**		0.012	0.0060	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
Xylenes, Total	0.024	U	0.024	0.0062	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50
1,3-Dichloropropene, Total	0.048	U	0.048	0.013	mg/Kg	☼	10/12/11 12:00	10/26/11 13:58	50

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*	*10/12/11 12:00*	*10/26/11 13:58*	*50*
Dibromofluoromethane	*103*		*78 - 119*	*10/12/11 12:00*	*10/26/11 13:58*	*50*
1,2-Dichloroethane-d4 (Surr)	*112*		*77 - 124*	*10/12/11 12:00*	*10/26/11 13:58*	*50*
Toluene-d8 (Surr)	*102*		*80 - 121*	*10/12/11 12:00*	*10/26/11 13:58*	*50*

Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Trichloroethene	**13**		0.048	0.029	mg/Kg	☼	10/12/11 12:00	10/26/11 20:03	200

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*	*10/12/11 12:00*	*10/26/11 20:03*	*200*
Dibromofluoromethane	*97*		*78 - 119*	*10/12/11 12:00*	*10/26/11 20:03*	*200*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*	*10/12/11 12:00*	*10/26/11 20:03*	*200*
Toluene-d8 (Surr)	*99*		*80 - 121*	*10/12/11 12:00*	*10/26/11 20:03*	*200*

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: WS-001-101211
Date Collected: 10/12/11 13:00
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-9
Matrix: Solid

Method: 8260B - Volatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.020	U	0.020	0.010	mg/L			10/27/11 00:23	20
Carbon tetrachloride	0.020	U	0.020	0.010	mg/L			10/27/11 00:23	20
Chlorobenzene	0.020	U	0.020	0.010	mg/L			10/27/11 00:23	20
Chloroform	0.020	U	0.020	0.010	mg/L			10/27/11 00:23	20
1,2-Dichloroethane	0.020	U	0.020	0.010	mg/L			10/27/11 00:23	20
1,1-Dichloroethene	0.020	U	0.020	0.010	mg/L			10/27/11 00:23	20
Methyl Ethyl Ketone	0.10	U	0.10	0.050	mg/L			10/27/11 00:23	20
Tetrachloroethene	0.020	U	0.020	0.010	mg/L			10/27/11 00:23	20
Trichloroethene	0.020	U	0.020	0.010	mg/L			10/27/11 00:23	20
Vinyl chloride	0.020	U	0.020	0.010	mg/L			10/27/11 00:23	20

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*108*		*77 - 124*		*10/27/11 00:23*	*20*
Toluene-d8 (Surr)	*101*		*80 - 121*		*10/27/11 00:23*	*20*
4-Bromofluorobenzene (Surr)	*102*		*77 - 112*		*10/27/11 00:23*	*20*
Dibromofluoromethane	*100*		*78 - 119*		*10/27/11 00:23*	*20*

Method: 8270C - Semivolatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methyl-phenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:22	1
1,4-Dichlorobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:22	1
2,4-Dinitrotoluene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:22	1
Hexachlorobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:22	1
Hexachloro-1,3-butadiene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:22	1
Hexachloroethane	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:22	1
Nitrobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:22	1
Pentachlorophenol	0.50	U	0.50	0.25	mg/L		10/19/11 11:55	10/20/11 22:22	1
Pyridine	0.20	U	0.20	0.10	mg/L		10/19/11 11:55	10/20/11 22:22	1
2,4,5-Trichlorophenol	0.50	U	0.50	0.25	mg/L		10/19/11 11:55	10/20/11 22:22	1
2,4,6-Trichlorophenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:22	1
3 & 4 Methylphenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:22	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol	*27*		*20 - 100*	*10/19/11 11:55*	*10/20/11 22:22*	*1*
Phenol-d5	*18*	*X*	*20 - 100*	*10/19/11 11:55*	*10/20/11 22:22*	*1*
Nitrobenzene-d5	*48*		*39 - 110*	*10/19/11 11:55*	*10/20/11 22:22*	*1*
2-Fluorobiphenyl	*53*		*44 - 110*	*10/19/11 11:55*	*10/20/11 22:22*	*1*
2,4,6-Tribromophenol	*63*		*46 - 126*	*10/19/11 11:55*	*10/20/11 22:22*	*1*
Terphenyl-d14	*93*		*52 - 131*	*10/19/11 11:55*	*10/20/11 22:22*	*1*

Method: 8081A - Organochlorine Pesticides (GC) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlordane (technical)	0.010	U	0.010	0.0050	mg/L		10/19/11 10:00	10/19/11 23:35	1
Endrin	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 23:35	1
Heptachlor	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 23:35	1
Heptachlor epoxide	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 23:35	1
gamma-BHC (Lindane)	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 23:35	1
Methoxychlor	0.010	U	0.010	0.0050	mg/L		10/19/11 10:00	10/19/11 23:35	1
Toxaphene	0.050	U	0.050	0.025	mg/L		10/19/11 10:00	10/19/11 23:35	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: WS-001-101211

Date Collected: 10/12/11 13:00
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-9

Matrix: Solid

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*81*		*36 - 126*	*10/19/11 10:00*	*10/19/11 23:35*	*1*
Tetrachloro-m-xylene	*82*		*42 - 120*	*10/19/11 10:00*	*10/19/11 23:35*	*1*

Method: 8151A - Herbicides (GC) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.10	U	0.10	0.050	mg/L		10/19/11 10:35	10/20/11 05:11	1
Silvex (2,4,5-TP)	0.10	U	0.10	0.050	mg/L		10/19/11 10:35	10/20/11 05:11	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCAA	*93*		*30 - 110*	*10/19/11 10:35*	*10/20/11 05:11*	*1*

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.050	U	0.050	0.010	mg/L		10/19/11 10:57	10/19/11 21:14	1
Barium	**0.33**	**J**	0.50	0.010	mg/L		10/19/11 10:57	10/19/11 21:14	1
Cadmium	0.0050	U	0.0050	0.0020	mg/L		10/19/11 10:57	10/19/11 21:14	1
Chromium	0.025	U	0.025	0.010	mg/L		10/19/11 10:57	10/19/11 21:14	1
Lead	0.050	U	0.050	0.0050	mg/L		10/19/11 10:57	10/19/11 21:14	1
Selenium	0.050	U	0.050	0.010	mg/L		10/19/11 10:57	10/19/11 21:14	1
Silver	0.025	U	0.025	0.0050	mg/L		10/19/11 10:57	10/19/11 21:14	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0020	U	0.0020	0.00020	mg/L		10/21/11 12:40	10/22/11 11:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**7.87**		0.200	0.200	SU			10/24/11 18:03	1
Flashpoint	**>200**		40	40	Degrees F			10/22/11 15:24	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: WA-001-101211

Date Collected: 10/12/11 13:15
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-10

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.020	U	0.020	0.010	mg/L			10/26/11 21:14	20
Carbon tetrachloride	0.020	U	0.020	0.010	mg/L			10/26/11 21:14	20
Chlorobenzene	0.020	U	0.020	0.010	mg/L			10/26/11 21:14	20
Chloroform	0.020	U	0.020	0.010	mg/L			10/26/11 21:14	20
1,2-Dichloroethane	0.020	U	0.020	0.010	mg/L			10/26/11 21:14	20
1,1-Dichloroethene	0.020	U	0.020	0.010	mg/L			10/26/11 21:14	20
Methyl Ethyl Ketone	0.10	U	0.10	0.050	mg/L			10/26/11 21:14	20
Tetrachloroethene	0.020	U	0.020	0.010	mg/L			10/26/11 21:14	20
Trichloroethene	0.020	U	0.020	0.010	mg/L			10/26/11 21:14	20
Vinyl chloride	0.020	U	0.020	0.010	mg/L			10/26/11 21:14	20

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*		*10/26/11 21:14*	*20*
Toluene-d8 (Surr)	*98*		*80 - 121*		*10/26/11 21:14*	*20*
4-Bromofluorobenzene (Surr)	*100*		*77 - 112*		*10/26/11 21:14*	*20*
Dibromofluoromethane	*95*		*78 - 119*		*10/26/11 21:14*	*20*

Method: 8270C - Semivolatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methyl-phenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:39	1
1,4-Dichlorobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:39	1
2,4-Dinitrotoluene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:39	1
Hexachlorobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:39	1
Hexachloro-1,3-butadiene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:39	1
Hexachloroethane	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:39	1
Nitrobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:39	1
Pentachlorophenol	0.50	U	0.50	0.25	mg/L		10/19/11 11:55	10/20/11 22:39	1
Pyridine	0.20	U	0.20	0.10	mg/L		10/19/11 11:55	10/20/11 22:39	1
2,4,5-Trichlorophenol	0.50	U	0.50	0.25	mg/L		10/19/11 11:55	10/20/11 22:39	1
2,4,6-Trichlorophenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:39	1
3 & 4 Methylphenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/20/11 22:39	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol	*43*		*20 - 100*	*10/19/11 11:55*	*10/20/11 22:39*	*1*
Phenol-d5	*31*		*20 - 100*	*10/19/11 11:55*	*10/20/11 22:39*	*1*
Nitrobenzene-d5	*79*		*39 - 110*	*10/19/11 11:55*	*10/20/11 22:39*	*1*
2-Fluorobiphenyl	*87*		*44 - 110*	*10/19/11 11:55*	*10/20/11 22:39*	*1*
2,4,6-Tribromophenol	*94*		*46 - 126*	*10/19/11 11:55*	*10/20/11 22:39*	*1*
Terphenyl-d14	*94*		*52 - 131*	*10/19/11 11:55*	*10/20/11 22:39*	*1*

Method: 8081A - Organochlorine Pesticides (GC) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlordane (technical)	0.010	U	0.010	0.0050	mg/L		10/19/11 10:00	10/20/11 00:34	1
Endrin	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/20/11 00:34	1
Heptachlor	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/20/11 00:34	1
Heptachlor epoxide	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/20/11 00:34	1
gamma-BHC (Lindane)	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/20/11 00:34	1
Methoxychlor	0.010	U	0.010	0.0050	mg/L		10/19/11 10:00	10/20/11 00:34	1
Toxaphene	0.050	U	0.050	0.025	mg/L		10/19/11 10:00	10/20/11 00:34	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: WA-001-101211

Date Collected: 10/12/11 13:15
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-10

Matrix: Water

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*85*		*36 - 126*	*10/19/11 10:00*	*10/20/11 00:34*	*1*
Tetrachloro-m-xylene	*88*		*42 - 120*	*10/19/11 10:00*	*10/20/11 00:34*	*1*

Method: 8151A - Herbicides (GC) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.10	U	0.10	0.050	mg/L		10/19/11 10:35	10/20/11 05:33	1
Silvex (2,4,5-TP)	0.10	U	0.10	0.050	mg/L		10/19/11 10:35	10/20/11 05:33	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCAA	*94*		*30 - 110*	*10/19/11 10:35*	*10/20/11 05:33*	*1*

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.050	U	0.050	0.010	mg/L		10/19/11 10:57	10/19/11 21:20	1
Barium	**1.5**		0.50	0.010	mg/L		10/19/11 10:57	10/19/11 21:20	1
Cadmium	0.0050	U	0.0050	0.0020	mg/L		10/19/11 10:57	10/19/11 21:20	1
Chromium	0.025	U	0.025	0.010	mg/L		10/19/11 10:57	10/19/11 21:20	1
Lead	0.050	U	0.050	0.0050	mg/L		10/19/11 10:57	10/19/11 21:20	1
Selenium	0.050	U	0.050	0.010	mg/L		10/19/11 10:57	10/19/11 21:20	1
Silver	0.025	U	0.025	0.0050	mg/L		10/19/11 10:57	10/19/11 21:20	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0020	U	0.0020	0.00020	mg/L		10/21/11 12:40	10/22/11 12:36	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Flashpoint	**>176**		40.0	40.0	Degrees F			10/25/11 16:56	1
pH	**7.78**	**HF**	0.200	0.200	SU			10/25/11 19:20	1

Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Client Sample ID: TB-002-101211

Date Collected: 10/12/11 00:00
Date Received: 10/13/11 10:30

Lab Sample ID: 500-40621-11

Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/26/11 10:02	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/26/11 10:02	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/26/11 10:02	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/26/11 10:02	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/26/11 10:02	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/26/11 10:02	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/26/11 10:02	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/26/11 10:02	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/26/11 10:02	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/26/11 10:02	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/26/11 10:02	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/26/11 10:02	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/26/11 10:02	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/26/11 10:02	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/26/11 10:02	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/26/11 10:02	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/26/11 10:02	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/26/11 10:02	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/26/11 10:02	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/26/11 10:02	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/26/11 10:02	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/26/11 10:02	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/26/11 10:02	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/26/11 10:02	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/26/11 10:02	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/26/11 10:02	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/26/11 10:02	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/26/11 10:02	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/26/11 10:02	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/26/11 10:02	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/26/11 10:02	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/26/11 10:02	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/26/11 10:02	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/26/11 10:02	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/26/11 10:02	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/26/11 10:02	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*		*10/26/11 10:02*	*1*
Dibromofluoromethane	*103*		*78 - 119*		*10/26/11 10:02*	*1*
1,2-Dichloroethane-d4 (Surr)	*111*		*77 - 124*		*10/26/11 10:02*	*1*
Toluene-d8 (Surr)	*102*		*80 - 121*		*10/26/11 10:02*	*1*

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	RPD of the LCS and LCSD exceeds the control limits

GC/MS Semi VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
X	Surrogate is outside control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC Semi VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

GC/MS VOA

Prep Batch: 128833

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-7	33-SB147-13	Total/NA	Solid	5035	

Prep Batch: 128837

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-5	33-SB143-15	Total/NA	Solid	5035	
500-40621-5 - DL	33-SB143-15	Total/NA	Solid	5035	
500-40621-6	33-FDUP-007	Total/NA	Solid	5035	
500-40621-6 - DL	33-FDUP-007	Total/NA	Solid	5035	
500-40621-8	33-SB147-28	Total/NA	Solid	5035	
500-40621-8 - DL	33-SB147-28	Total/NA	Solid	5035	

Leach Batch: 129370

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-10	WA-001-101211	TCLP	Water	1311	
LB3 500-129370/1-A LB3	Method Blank	TCLP	Water	1311	

Leach Batch: 129662

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	1311	
LB 500-129662/1-A LB	Method Blank	TCLP	Solid	1311	

Analysis Batch: 129797

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB3 500-129370/1-A LB3	Method Blank	TCLP	Water	8260B	
LCS 500-129797/5	Lab Control Sample	Total/NA	Water	8260B	
LCSD 500-129797/29	Lab Control Sample Dup	Total/NA	Water	8260B	
MB 500-129797/4	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 129952

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-7	33-SB147-13	Total/NA	Solid	8260B	128833
LCS 500-129952/5	Lab Control Sample	Total/NA	Solid	8260B	
LCSD 500-129952/6	Lab Control Sample Dup	Total/NA	Solid	8260B	
MB 500-129952/4	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 130242

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-5	33-SB143-15	Total/NA	Solid	8260B	128837
500-40621-5 - DL	33-SB143-15	Total/NA	Solid	8260B	128837
500-40621-6	33-FDUP-007	Total/NA	Solid	8260B	128837
500-40621-6 - DL	33-FDUP-007	Total/NA	Solid	8260B	128837
500-40621-8	33-SB147-28	Total/NA	Solid	8260B	128837
LCS 500-130242/4	Lab Control Sample	Total/NA	Solid	8260B	
LCSD 500-130242/31	Lab Control Sample Dup	Total/NA	Solid	8260B	
MB 500-130242/6	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 130243

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-1	TB-001-101211	Total/NA	Water	8260B	
500-40621-2	33-GG140-34	Total/NA	Water	8260B	
500-40621-2 - DL	33-GG140-34	Total/NA	Water	8260B	
500-40621-3	33-GG137-29.5	Total/NA	Water	8260B	

GC/MS VOA (Continued)

Analysis Batch: 130243 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-3 - DL	33-GG137-29.5	Total/NA	Water	8260B	
500-40621-4	FB-001-101211	Total/NA	Water	8260B	
500-40621-11	TB-002-101211	Total/NA	Water	8260B	
LCS 500-130243/4	Lab Control Sample	Total/NA	Water	8260B	
LCSD 500-130243/31	Lab Control Sample Dup	Total/NA	Water	8260B	
MB 500-130243/6	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 130357

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-8 - DL	33-SB147-28	Total/NA	Solid	8260B	128837
LCS 500-130357/5	Lab Control Sample	Total/NA	Solid	8260B	
MB 500-130357/7	Method Blank	Total/NA	Solid	8260B	

Analysis Batch: 130358

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	8260B	
500-40621-10	WA-001-101211	TCLP	Water	8260B	
LB 500-129662/1-A LB	Method Blank	TCLP	Solid	8260B	
LCS 500-130358/5	Lab Control Sample	Total/NA	Water	8260B	
MB 500-130358/7	Method Blank	Total/NA	Water	8260B	

GC/MS Semi VOA

Leach Batch: 129371

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-10	WA-001-101211	TCLP	Water	1311	
LB3 500-129371/1-E LB3	Method Blank	TCLP	Water	1311	

Leach Batch: 129378

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	1311	
LB 500-129378/1-F LB	Method Blank	TCLP	Solid	1311	

Analysis Batch: 129469

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB 500-129378/1-F LB	Method Blank	TCLP	Solid	8270C	129479
LB3 500-129371/1-E LB3	Method Blank	TCLP	Water	8270C	129479
LCS 500-129479/2-A	Lab Control Sample	Total/NA	Solid	8270C	129479
MB 500-129479/1-A	Method Blank	Total/NA	Water	8270C	129479

Prep Batch: 129479

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	3510C	129378
500-40621-10	WA-001-101211	TCLP	Water	3510C	129371
LB 500-129378/1-F LB	Method Blank	TCLP	Solid	3510C	129378
LB3 500-129371/1-E LB3	Method Blank	TCLP	Water	3510C	129371
LCS 500-129479/2-A	Lab Control Sample	Total/NA	Solid	3510C	
MB 500-129479/1-A	Method Blank	Total/NA	Water	3510C	

Analysis Batch: 129617

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	8270C	129479

GC/MS Semi VOA (Continued)

Analysis Batch: 129617 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-10	WA-001-101211	TCLP	Water	8270C	129479

GC Semi VOA

Analysis Batch: 129292

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	8081A	129448
500-40621-9 MS	WS-001-101211	TCLP	Solid	8081A	129448
500-40621-9 MS	WS-001-101211	TCLP	Solid	8081A	129448
500-40621-10	WA-001-101211	TCLP	Water	8081A	129448
LB 500-129378/1-B LB	Method Blank	TCLP	Solid	8081A	129448
LB3 500-129371/1-B LB3	Method Blank	TCLP	Water	8081A	129448
LCS 500-129448/2-A	Lab Control Sample	Total/NA	Solid	8081A	129448
LCS 500-129448/3-A	Lab Control Sample	Total/NA	Water	8081A	129448
MB 500-129448/1-A	Method Blank	Total/NA	Solid	8081A	129448

Leach Batch: 129371

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-10	WA-001-101211	TCLP	Water	1311	
LB3 500-129371/1-B LB3	Method Blank	TCLP	Water	1311	
LB3 500-129371/1-C LB3	Method Blank	TCLP	Water	1311	

Leach Batch: 129378

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	1311	
500-40621-9 MS	WS-001-101211	TCLP	Solid	1311	
LB 500-129378/1-B LB	Method Blank	TCLP	Solid	1311	
LB 500-129378/1-C LB	Method Blank	TCLP	Solid	1311	

Analysis Batch: 129436

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	8151A	129453
500-40621-10	WA-001-101211	TCLP	Water	8151A	129453
LB 500-129378/1-C LB	Method Blank	TCLP	Solid	8151A	129453
LB3 500-129371/1-C LB3	Method Blank	TCLP	Water	8151A	129453
LCS 500-129453/2-A	Lab Control Sample	Total/NA	Solid	8151A	129453
MB 500-129453/1-A	Method Blank	Total/NA	Water	8151A	129453

Prep Batch: 129448

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	3510C	129378
500-40621-9 MS	WS-001-101211	TCLP	Solid	3510C	129378
500-40621-9 MS	WS-001-101211	TCLP	Solid	3510C	129378
500-40621-10	WA-001-101211	TCLP	Water	3510C	129371
LB 500-129378/1-B LB	Method Blank	TCLP	Solid	3510C	129378
LB3 500-129371/1-B LB3	Method Blank	TCLP	Water	3510C	129371
LCS 500-129448/2-A	Lab Control Sample	Total/NA	Solid	3510C	
LCS 500-129448/3-A	Lab Control Sample	Total/NA	Water	3510C	
MB 500-129448/1-A	Method Blank	Total/NA	Solid	3510C	

GC Semi VOA (Continued)

Prep Batch: 129453

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	8151A	129378
500-40621-10	WA-001-101211	TCLP	Water	8151A	129371
LB 500-129378/1-C LB	Method Blank	TCLP	Solid	8151A	129378
LB3 500-129371/1-C LB3	Method Blank	TCLP	Water	8151A	129371
LCS 500-129453/2-A	Lab Control Sample	Total/NA	Solid	8151A	
MB 500-129453/1-A	Method Blank	Total/NA	Water	8151A	

Metals

Leach Batch: 129371

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-10	WA-001-101211	TCLP	Water	1311	
LB3 500-129371/1-D LB3	Method Blank	TCLP	Water	1311	
LB3 500-129371/1-F LB3	Method Blank	TCLP	Water	1311	

Leach Batch: 129378

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	1311	
LB 500-129378/1-D LB	Method Blank	TCLP	Solid	1311	
LB 500-129378/1-H LB	Method Blank	TCLP	Solid	1311	

Prep Batch: 129460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	3010A	129378
500-40621-10	WA-001-101211	TCLP	Water	3010A	129371
LB 500-129378/1-D LB	Method Blank	TCLP	Solid	3010A	129378
LB3 500-129371/1-D LB3	Method Blank	TCLP	Water	3010A	129371
LCS 500-129460/3-A	Lab Control Sample	Total/NA	Solid	3010A	

Analysis Batch: 129575

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	6010B	129460
500-40621-10	WA-001-101211	TCLP	Water	6010B	129460
LB 500-129378/1-D LB	Method Blank	TCLP	Solid	6010B	129460
LB3 500-129371/1-D LB3	Method Blank	TCLP	Water	6010B	129460
LCS 500-129460/3-A	Lab Control Sample	Total/NA	Solid	6010B	129460

Prep Batch: 129818

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	7470A	129378
500-40621-10	WA-001-101211	TCLP	Water	7470A	129371
LB 500-129378/1-H LB	Method Blank	TCLP	Solid	7470A	129378
LB3 500-129371/1-F LB3	Method Blank	TCLP	Water	7470A	129371
LCS 500-129818/8-A	Lab Control Sample	Total/NA	Solid	7470A	
MB 500-129818/7-A	Method Blank	Total/NA	Water	7470A	

Analysis Batch: 129934

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	TCLP	Solid	7470A	129818
500-40621-10	WA-001-101211	TCLP	Water	7470A	129818
LB 500-129378/1-H LB	Method Blank	TCLP	Solid	7470A	129818
LB3 500-129371/1-F LB3	Method Blank	TCLP	Water	7470A	129818

Metals (Continued)

Analysis Batch: 129934 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 500-129818/8-A	Lab Control Sample	Total/NA	Solid	7470A	129818
MB 500-129818/7-A	Method Blank	Total/NA	Water	7470A	129818

General Chemistry

Analysis Batch: 128873

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-5	33-SB143-15	Total/NA	Solid	Moisture	
500-40621-6	33-FDUP-007	Total/NA	Solid	Moisture	
500-40621-7	33-SB147-13	Total/NA	Solid	Moisture	
500-40621-8	33-SB147-28	Total/NA	Solid	Moisture	
500-40621-9	WS-001-101211	Total/NA	Solid	Moisture	

Analysis Batch: 129937

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	Total/NA	Solid	D92	

Analysis Batch: 130110

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-9	WS-001-101211	Total/NA	Solid	9045C	

Analysis Batch: 130193

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-10	WA-001-101211	Total/NA	Water	1010	

Analysis Batch: 130262

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-40621-10	WA-001-101211	Total/NA	Water	9040B	
500-40621-10 DU	WA-001-101211	Total/NA	Water	9040B	

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40621-5	33-SB143-15	94	98	104	97
500-40621-5 - DL	33-SB143-15	96	105	111	100
500-40621-6	33-FDUP-007	100	104	111	102
500-40621-6 - DL	33-FDUP-007	100	107	116	103
500-40621-8	33-SB147-28	99	103	112	102
500-40621-8 - DL	33-SB147-28	100	97	105	99
LCS 500-130242/4	Lab Control Sample	90	96	101	94
LCS 500-130357/5	Lab Control Sample	103	102	107	103
LCSD 500-130242/31	Lab Control Sample Dup	103	111	110	106
MB 500-130242/6	Method Blank	91	93	97	87
MB 500-130357/7	Method Blank	99	96	106	98

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		12DCE	TOL	BFB	DBFM
Lab Sample ID	Client Sample ID	(69-120)	(69-122)	(67-120)	(69-120)
500-40621-7	33-SB147-13	103	101	101	96
LCS 500-129952/5	Lab Control Sample	93	104	100	100
LCSD 500-129952/6	Lab Control Sample Dup	98	103	99	99
MB 500-129952/4	Method Blank	98	108	104	102

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)			
		12DCE	TOL	BFB	DBFM
Lab Sample ID	Client Sample ID	(77-124)	(80-121)	(77-112)	(78-119)
500-40621-9	WS-001-101211	108	101	102	100
LB 500-129662/1-A LB	Method Blank	108	101	99	101

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		BFB	DBFM	12DCE	TOL
Lab Sample ID	Client Sample ID	(77-112)	(78-119)	(77-124)	(80-121)
500-40621-1	TB-001-101211	99	101	109	94
500-40621-2	33-GG140-34	96	101	108	100
500-40621-2 - DL	33-GG140-34	100	106	114	104
500-40621-3	33-GG137-29.5	92	100	105	96
500-40621-3 - DL	33-GG137-29.5	97	104	107	98
500-40621-4	FB-001-101211	102	105	111	100
500-40621-11	TB-002-101211	99	103	111	102
LCS 500-129797/5	Lab Control Sample	103	104	104	102
LCS 500-130243/4	Lab Control Sample	90	96	101	94
LCS 500-130358/5	Lab Control Sample	103	102	107	103
LCSD 500-129797/29	Lab Control Sample Dup	104	92	105	101
LCSD 500-130243/31	Lab Control Sample Dup	103	111	110	106
MB 500-129797/4	Method Blank	97	96	100	99
MB 500-130243/6	Method Blank	91	93	97	87
MB 500-130358/7	Method Blank	99	96	106	98

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane
12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)			
		12DCE	TOL	BFB	DBFM
Lab Sample ID	Client Sample ID	(77-124)	(80-121)	(77-112)	(78-119)
500-40621-10	WA-001-101211	105	98	100	95
LB3 500-129370/1-A LB3	Method Blank	110	105	97	104

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane

Method: 8270C - Semivolatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)					
		2FP	PHL	NBZ	FBP	TBP	TPH
Lab Sample ID	Client Sample ID	(20-100)	(20-100)	(39-110)	(44-110)	(46-126)	(52-131)
LCS 500-129479/2-A	Lab Control Sample	42	26	76	86	102	98

Surrogate Legend

2FP = 2-Fluorophenol
PHL = Phenol-d5
NBZ = Nitrobenzene-d5
FBP = 2-Fluorobiphenyl
TBP = 2,4,6-Tribromophenol
TPH = Terphenyl-d14

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Method: 8270C - Semivolatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)					
		2FP	PHL	NBZ	FBP	TBP	TPH
Lab Sample ID	Client Sample ID	(20-100)	(20-100)	(39-110)	(44-110)	(46-126)	(52-131)
500-40621-9	WS-001-101211	27	18 X	48	53	63	93
LB 500-129378/1-F LB	Method Blank	43	29	70	84	94	97

Surrogate Legend

2FP = 2-Fluorophenol
PHL = Phenol-d5
NBZ = Nitrobenzene-d5
FBP = 2-Fluorobiphenyl
TBP = 2,4,6-Tribromophenol
TPH = Terphenyl-d14

Method: 8270C - Semivolatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)					
		2FP	PHL	NBZ	FBP	TBP	TPH
Lab Sample ID	Client Sample ID	(20-100)	(20-100)	(39-110)	(44-110)	(46-126)	(52-131)
MB 500-129479/1-A	Method Blank	43	28	72	78	90	100

Surrogate Legend

2FP = 2-Fluorophenol
PHL = Phenol-d5
NBZ = Nitrobenzene-d5
FBP = 2-Fluorobiphenyl
TBP = 2,4,6-Tribromophenol
TPH = Terphenyl-d14

Method: 8270C - Semivolatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)					
		2FP	PHL	NBZ	FBP	TBP	TPH
Lab Sample ID	Client Sample ID	(20-100)	(20-100)	(39-110)	(44-110)	(46-126)	(52-131)
500-40621-10	WA-001-101211	43	31	79	87	94	94
LB3 500-129371/1-E LB3	Method Blank	40	26	66	72	83	98

Surrogate Legend

2FP = 2-Fluorophenol
PHL = Phenol-d5
NBZ = Nitrobenzene-d5
FBP = 2-Fluorobiphenyl
TBP = 2,4,6-Tribromophenol
TPH = Terphenyl-d14

Method: 8081A - Organochlorine Pesticides (GC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)	
		DCB2	TCX2
Lab Sample ID	Client Sample ID	(36-126)	(42-120)
LCS 500-129448/2-A	Lab Control Sample	84	83
MB 500-129448/1-A	Method Blank	83	85

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Surrogate Legend

DCB = DCB Decachlorobiphenyl

TCX = Tetrachloro-m-xylene

Method: 8081A - Organochlorine Pesticides (GC)

Matrix: Solid **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)	
		DCB2	TCX2
Lab Sample ID	Client Sample ID	(36-126)	(42-120)
500-40621-9	WS-001-101211	81	82
500-40621-9 MS	WS-001-101211	79	79
500-40621-9 MS	WS-001-101211	88	88
LB 500-129378/1-B LB	Method Blank	80	87

Surrogate Legend

DCB = DCB Decachlorobiphenyl

TCX = Tetrachloro-m-xylene

Method: 8081A - Organochlorine Pesticides (GC)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)	
		DCB2	TCX2
Lab Sample ID	Client Sample ID	(36-126)	(42-120)
LCS 500-129448/3-A	Lab Control Sample	86	85

Surrogate Legend

DCB = DCB Decachlorobiphenyl

TCX = Tetrachloro-m-xylene

Method: 8081A - Organochlorine Pesticides (GC)

Matrix: Water **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)	
		DCB2	TCX2
Lab Sample ID	Client Sample ID	(36-126)	(42-120)
500-40621-10	WA-001-101211	85	88
LB3 500-129371/1-B LB3	Method Blank	80	81

Surrogate Legend

DCB = DCB Decachlorobiphenyl

TCX = Tetrachloro-m-xylene

Method: 8151A - Herbicides (GC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)
		DCPA2
Lab Sample ID	Client Sample ID	(30-110)
LCS 500-129453/2-A	Lab Control Sample	96

Surrogate Legend

DCPA = DCAA

Surrogate Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Method: 8151A - Herbicides (GC)

Matrix: Solid **Prep Type: TCLP**

Lab Sample ID	Client Sample ID	DCPA2 (30-110)
500-40621-9	WS-001-101211	93
LB 500-129378/1-C LB	Method Blank	94

Percent Surrogate Recovery (Acceptance Limits)

Surrogate Legend

DCPA = DCAA

Method: 8151A - Herbicides (GC)

Matrix: Water **Prep Type: Total/NA**

Lab Sample ID	Client Sample ID	DCPA2 (30-110)
MB 500-129453/1-A	Method Blank	93

Percent Surrogate Recovery (Acceptance Limits)

Surrogate Legend

DCPA = DCAA

Method: 8151A - Herbicides (GC)

Matrix: Water **Prep Type: TCLP**

Lab Sample ID	Client Sample ID	DCPA2 (30-110)
500-40621-10	WA-001-101211	94
LB3 500-129371/1-C LB3	Method Blank	93

Percent Surrogate Recovery (Acceptance Limits)

Surrogate Legend

DCPA = DCAA

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-129797/4 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 129797

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0025	mg/L			10/21/11 12:51	1
Chloroform	0.0010	U	0.0010	0.00050	mg/L			10/21/11 12:51	1
Carbon tetrachloride	0.0010	U	0.0010	0.00050	mg/L			10/21/11 12:51	1
Benzene	0.0010	U	0.0010	0.00050	mg/L			10/21/11 12:51	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00050	mg/L			10/21/11 12:51	1
Chlorobenzene	0.0010	U	0.0010	0.00050	mg/L			10/21/11 12:51	1
Tetrachloroethene	0.0010	U	0.0010	0.00050	mg/L			10/21/11 12:51	1
Trichloroethene	0.0010	U	0.0010	0.00050	mg/L			10/21/11 12:51	1
Vinyl chloride	0.0010	U	0.0010	0.00050	mg/L			10/21/11 12:51	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00050	mg/L			10/21/11 12:51	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*100*		*77 - 124*		*10/21/11 12:51*	*1*
Toluene-d8 (Surr)	*99*		*80 - 121*		*10/21/11 12:51*	*1*
4-Bromofluorobenzene (Surr)	*97*		*77 - 112*		*10/21/11 12:51*	*1*
Dibromofluoromethane	*96*		*78 - 119*		*10/21/11 12:51*	*1*

Lab Sample ID: LCS 500-129797/5 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 129797

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Methyl Ethyl Ketone	0.0500	0.0557		mg/L		111	42 - 152
Chloroform	0.0500	0.0521		mg/L		104	71 - 116
Carbon tetrachloride	0.0500	0.0515		mg/L		103	58 - 132
Benzene	0.0500	0.0503		mg/L		101	74 - 113
1,1-Dichloroethene	0.0500	0.0497		mg/L		99	60 - 126
Chlorobenzene	0.0500	0.0493		mg/L		99	81 - 111
Tetrachloroethene	0.0500	0.0460		mg/L		92	76 - 114
Trichloroethene	0.0500	0.0520		mg/L		104	75 - 116
Vinyl chloride	0.0500	0.0555		mg/L		111	47 - 138
1,2-Dichloroethane	0.0500	0.0503		mg/L		101	69 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*104*		*77 - 124*
Toluene-d8 (Surr)	*102*		*80 - 121*
4-Bromofluorobenzene (Surr)	*103*		*77 - 112*
Dibromofluoromethane	*104*		*78 - 119*

Lab Sample ID: LCSD 500-129797/29 — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 129797

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Methyl Ethyl Ketone	0.0500	0.0443	*	mg/L		89	42 - 152	23	20
Chloroform	0.0500	0.0407	*	mg/L		81	71 - 116	25	20
Carbon tetrachloride	0.0500	0.0519		mg/L		104	58 - 132	1	20
Benzene	0.0500	0.0419		mg/L		84	74 - 113	18	20
1,1-Dichloroethene	0.0500	0.0393	*	mg/L		79	60 - 126	23	20

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 500-129797/29
Matrix: Water
Analysis Batch: 129797

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Chlorobenzene	0.0500	0.0454		mg/L		91	81 - 111	8	20
Tetrachloroethene	0.0500	0.0488		mg/L		98	76 - 114	6	20
Trichloroethene	0.0500	0.0483		mg/L		97	75 - 116	7	20
Vinyl chloride	0.0500	0.0419	*	mg/L		84	47 - 138	28	20
1,2-Dichloroethane	0.0500	0.0478		mg/L		96	69 - 115	5	20

Surrogate	*LCSD % Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*105*		*77 - 124*
Toluene-d8 (Surr)	*101*		*80 - 121*
4-Bromofluorobenzene (Surr)	*104*		*77 - 112*
Dibromofluoromethane	*92*		*78 - 119*

Lab Sample ID: MB 500-129952/4
Matrix: Solid
Analysis Batch: 129952

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0025	mg/Kg			10/23/11 10:38	1
Bromomethane	0.0050	U	0.0050	0.0011	mg/Kg			10/23/11 10:38	1
Carbon disulfide	0.0050	U	0.0050	0.00071	mg/Kg			10/23/11 10:38	1
Chloroethane	0.0050	U	0.0050	0.0011	mg/Kg			10/23/11 10:38	1
Chloromethane	0.0050	U	0.0050	0.00082	mg/Kg			10/23/11 10:38	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0011	mg/Kg			10/23/11 10:38	1
Chloroform	0.0050	U	0.0050	0.00092	mg/Kg			10/23/11 10:38	1
cis-1,2-Dichloroethene	0.0050	U	0.0050	0.00073	mg/Kg			10/23/11 10:38	1
Carbon tetrachloride	0.0050	U	0.0050	0.0011	mg/Kg			10/23/11 10:38	1
Benzene	0.0050	U	0.0050	0.00054	mg/Kg			10/23/11 10:38	1
1,1-Dichloroethane	0.0050	U	0.0050	0.00079	mg/Kg			10/23/11 10:38	1
1,1-Dichloroethene	0.0050	U	0.0050	0.00079	mg/Kg			10/23/11 10:38	1
Bromodichloromethane	0.0050	U	0.0050	0.00076	mg/Kg			10/23/11 10:38	1
1,2-Dichloropropane	0.0050	U	0.0050	0.0011	mg/Kg			10/23/11 10:38	1
cis-1,3-Dichloropropene	0.0050	U	0.0050	0.00057	mg/Kg			10/23/11 10:38	1
Methylene Chloride	0.0050	U	0.0050	0.0014	mg/Kg			10/23/11 10:38	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00085	mg/Kg			10/23/11 10:38	1
Methyl tert-butyl ether	0.0050	U	0.0050	0.00075	mg/Kg			10/23/11 10:38	1
2-Hexanone	0.0050	U	0.0050	0.00071	mg/Kg			10/23/11 10:38	1
Dibromochloromethane	0.0050	U	0.0050	0.00069	mg/Kg			10/23/11 10:38	1
Chlorobenzene	0.0050	U	0.0050	0.00079	mg/Kg			10/23/11 10:38	1
Ethylbenzene	0.0050	U	0.0050	0.00075	mg/Kg			10/23/11 10:38	1
Tetrachloroethene	0.0050	U	0.0050	0.00095	mg/Kg			10/23/11 10:38	1
Toluene	0.0050	U	0.0050	0.00097	mg/Kg			10/23/11 10:38	1
Styrene	0.0050	U	0.0050	0.00063	mg/Kg			10/23/11 10:38	1
trans-1,2-Dichloroethene	0.0050	U	0.0050	0.00071	mg/Kg			10/23/11 10:38	1
Bromoform	0.0050	U	0.0050	0.00081	mg/Kg			10/23/11 10:38	1
trans-1,3-Dichloropropene	0.0050	U	0.0050	0.0011	mg/Kg			10/23/11 10:38	1
1,1,1-Trichloroethane	0.0050	U	0.0050	0.00096	mg/Kg			10/23/11 10:38	1
1,1,2,2-Tetrachloroethane	0.0050	U	0.0050	0.00068	mg/Kg			10/23/11 10:38	1
1,1,2-Trichloroethane	0.0050	U	0.0050	0.00067	mg/Kg			10/23/11 10:38	1
Trichloroethene	0.0050	U	0.0050	0.00081	mg/Kg			10/23/11 10:38	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-129952/4
Matrix: Solid
Analysis Batch: 129952

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Vinyl chloride	0.0050	U	0.0050	0.00070	mg/Kg			10/23/11 10:38	1
1,2-Dichloroethane	0.0050	U	0.0050	0.00051	mg/Kg			10/23/11 10:38	1
Xylenes, Total	0.010	U	0.010	0.00070	mg/Kg			10/23/11 10:38	1
1,3-Dichloropropene, Total	0.0050	U	0.0050	0.00057	mg/Kg			10/23/11 10:38	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*98*		*69 - 120*		*10/23/11 10:38*	*1*
Toluene-d8 (Surr)	*108*		*69 - 122*		*10/23/11 10:38*	*1*
4-Bromofluorobenzene (Surr)	*104*		*67 - 120*		*10/23/11 10:38*	*1*
Dibromofluoromethane	*102*		*69 - 120*		*10/23/11 10:38*	*1*

Lab Sample ID: LCS 500-129952/5
Matrix: Solid
Analysis Batch: 129952

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0359		mg/Kg		72	43 - 149
Bromomethane	0.0500	0.0464		mg/Kg		93	36 - 146
Carbon disulfide	0.0500	0.0359		mg/Kg		72	27 - 107
Chloroethane	0.0500	0.0495		mg/Kg		99	34 - 144
Chloromethane	0.0500	0.0385		mg/Kg		77	48 - 136
Methyl Ethyl Ketone	0.0500	0.0395		mg/Kg		79	58 - 140
Chloroform	0.0500	0.0490		mg/Kg		98	70 - 112
cis-1,2-Dichloroethene	0.0500	0.0486		mg/Kg		97	62 - 111
Carbon tetrachloride	0.0500	0.0501		mg/Kg		100	64 - 116
Benzene	0.0500	0.0497		mg/Kg		99	74 - 112
1,1-Dichloroethane	0.0500	0.0462		mg/Kg		92	70 - 113
1,1-Dichloroethene	0.0500	0.0450		mg/Kg		90	60 - 128
Bromodichloromethane	0.0500	0.0473		mg/Kg		95	76 - 108
1,2-Dichloropropane	0.0500	0.0476		mg/Kg		95	77 - 116
cis-1,3-Dichloropropene	0.0538	0.0442		mg/Kg		82	68 - 103
Methylene Chloride	0.0500	0.0467		mg/Kg		93	49 - 125
methyl isobutyl ketone	0.0500	0.0460		mg/Kg		92	65 - 127
Methyl tert-butyl ether	0.0500	0.0493		mg/Kg		99	55 - 116
2-Hexanone	0.0500	0.0429		mg/Kg		86	58 - 138
Dibromochloromethane	0.0500	0.0468		mg/Kg		94	76 - 110
Chlorobenzene	0.0500	0.0474		mg/Kg		95	80 - 110
Ethylbenzene	0.0500	0.0482		mg/Kg		96	78 - 112
Tetrachloroethene	0.0500	0.0463		mg/Kg		93	76 - 114
Toluene	0.0500	0.0469		mg/Kg		94	77 - 113
Styrene	0.0500	0.0495		mg/Kg		99	78 - 109
trans-1,2-Dichloroethene	0.0500	0.0483		mg/Kg		97	62 - 119
Bromoform	0.0500	0.0467		mg/Kg		93	66 - 115
trans-1,3-Dichloropropene	0.0486	0.0398		mg/Kg		82	63 - 107
1,1,1-Trichloroethane	0.0500	0.0493		mg/Kg		99	67 - 115
1,1,2,2-Tetrachloroethane	0.0500	0.0498		mg/Kg		100	73 - 114
1,1,2-Trichloroethane	0.0500	0.0444		mg/Kg		89	69 - 118
Trichloroethene	0.0500	0.0471		mg/Kg		94	76 - 111
Vinyl chloride	0.0500	0.0427		mg/Kg		85	44 - 130

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-129952/5
Matrix: Solid
Analysis Batch: 129952

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
1,2-Dichloroethane	0.0500	0.0486		mg/Kg		97	74 - 114
Xylenes, Total	0.150	0.154		mg/Kg		103	77 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*93*		*69 - 120*
Toluene-d8 (Surr)	*104*		*69 - 122*
4-Bromofluorobenzene (Surr)	*100*		*67 - 120*
Dibromofluoromethane	*100*		*69 - 120*

Lab Sample ID: LCSD 500-129952/6
Matrix: Solid
Analysis Batch: 129952

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	0.0500	0.0491	*	mg/Kg		98	43 - 149	31	30
Bromomethane	0.0500	0.0438		mg/Kg		88	36 - 146	6	30
Carbon disulfide	0.0500	0.0384		mg/Kg		77	27 - 107	7	30
Chloroethane	0.0500	0.0496		mg/Kg		99	34 - 144	0	30
Chloromethane	0.0500	0.0400		mg/Kg		80	48 - 136	4	30
Methyl Ethyl Ketone	0.0500	0.0477		mg/Kg		95	58 - 140	19	30
Chloroform	0.0500	0.0525		mg/Kg		105	70 - 112	7	30
cis-1,2-Dichloroethene	0.0500	0.0534		mg/Kg		107	62 - 111	9	30
Carbon tetrachloride	0.0500	0.0534		mg/Kg		107	64 - 116	6	30
Benzene	0.0500	0.0534		mg/Kg		107	74 - 112	7	30
1,1-Dichloroethane	0.0500	0.0499		mg/Kg		100	70 - 113	8	30
1,1-Dichloroethene	0.0500	0.0490		mg/Kg		98	60 - 128	9	30
Bromodichloromethane	0.0500	0.0509		mg/Kg		102	76 - 108	7	30
1,2-Dichloropropane	0.0500	0.0517		mg/Kg		103	77 - 116	8	30
cis-1,3-Dichloropropene	0.0538	0.0473		mg/Kg		88	68 - 103	7	30
Methylene Chloride	0.0500	0.0501		mg/Kg		100	49 - 125	7	30
methyl isobutyl ketone	0.0500	0.0488		mg/Kg		98	65 - 127	6	30
Methyl tert-butyl ether	0.0500	0.0518		mg/Kg		104	55 - 116	5	30
2-Hexanone	0.0500	0.0482		mg/Kg		96	58 - 138	12	30
Dibromochloromethane	0.0500	0.0489		mg/Kg		98	76 - 110	4	30
Chlorobenzene	0.0500	0.0504		mg/Kg		101	80 - 110	6	30
Ethylbenzene	0.0500	0.0519		mg/Kg		104	78 - 112	7	30
Tetrachloroethene	0.0500	0.0502		mg/Kg		100	76 - 114	8	30
Toluene	0.0500	0.0508		mg/Kg		102	77 - 113	8	30
Styrene	0.0500	0.0518		mg/Kg		104	78 - 109	5	30
trans-1,2-Dichloroethene	0.0500	0.0520		mg/Kg		104	62 - 119	7	30
Bromoform	0.0500	0.0488		mg/Kg		98	66 - 115	4	30
trans-1,3-Dichloropropene	0.0486	0.0423		mg/Kg		87	63 - 107	6	30
1,1,1-Trichloroethane	0.0500	0.0525		mg/Kg		105	67 - 115	6	30
1,1,2,2-Tetrachloroethane	0.0500	0.0521		mg/Kg		104	73 - 114	5	30
1,1,2-Trichloroethane	0.0500	0.0473		mg/Kg		95	69 - 118	6	30
Trichloroethene	0.0500	0.0515		mg/Kg		103	76 - 111	9	30
Vinyl chloride	0.0500	0.0427		mg/Kg		85	44 - 130	0	30
1,2-Dichloroethane	0.0500	0.0514		mg/Kg		103	74 - 114	6	30
Xylenes, Total	0.150	0.161		mg/Kg		107	77 - 114	5	30

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 500-129952/6
Matrix: Solid
Analysis Batch: 129952

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	LCSD % Recovery	LCSD Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	98		69 - 120
Toluene-d8 (Surr)	103		69 - 122
4-Bromofluorobenzene (Surr)	99		67 - 120
Dibromofluoromethane	99		69 - 120

Lab Sample ID: MB 500-130242/6
Matrix: Solid
Analysis Batch: 130242

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			10/26/11 06:30	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			10/26/11 06:30	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			10/26/11 06:30	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			10/26/11 06:30	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			10/26/11 06:30	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			10/26/11 06:30	1
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			10/26/11 06:30	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/26/11 06:30	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			10/26/11 06:30	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			10/26/11 06:30	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			10/26/11 06:30	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			10/26/11 06:30	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			10/26/11 06:30	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			10/26/11 06:30	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			10/26/11 06:30	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/Kg			10/26/11 06:30	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			10/26/11 06:30	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			10/26/11 06:30	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			10/26/11 06:30	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			10/26/11 06:30	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			10/26/11 06:30	1
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			10/26/11 06:30	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/26/11 06:30	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			10/26/11 06:30	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			10/26/11 06:30	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			10/26/11 06:30	1
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			10/26/11 06:30	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			10/26/11 06:30	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			10/26/11 06:30	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			10/26/11 06:30	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			10/26/11 06:30	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			10/26/11 06:30	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			10/26/11 06:30	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			10/26/11 06:30	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			10/26/11 06:30	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			10/26/11 06:30	1

Surrogate	MB % Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	97		77 - 124		10/26/11 06:30	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-130242/6
Matrix: Solid
Analysis Batch: 130242

Client Sample ID: Method Blank
Prep Type: Total/NA

Surrogate	MB % Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	87		80 - 121		10/26/11 06:30	1
4-Bromofluorobenzene (Surr)	91		77 - 112		10/26/11 06:30	1
Dibromofluoromethane	93		78 - 119		10/26/11 06:30	1

Lab Sample ID: LCS 500-130242/4
Matrix: Solid
Analysis Batch: 130242

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0588		mg/Kg		118	46 - 152
Bromomethane	0.0500	0.0420		mg/Kg		84	38 - 157
Carbon disulfide	0.0500	0.0301		mg/Kg		60	38 - 112
Chloroethane	0.0500	0.0441		mg/Kg		88	53 - 156
Chloromethane	0.0500	0.0404		mg/Kg		81	44 - 148
Methyl Ethyl Ketone	0.0500	0.0559		mg/Kg		112	48 - 152
Chloroform	0.0500	0.0466		mg/Kg		93	74 - 115
cis-1,2-Dichloroethene	0.0500	0.0459		mg/Kg		92	68 - 110
Carbon tetrachloride	0.0500	0.0485		mg/Kg		97	63 - 127
Benzene	0.0500	0.0454		mg/Kg		91	74 - 112
1,1-Dichloroethane	0.0500	0.0438		mg/Kg		88	69 - 118
1,1-Dichloroethene	0.0500	0.0400		mg/Kg		80	60 - 123
Bromodichloromethane	0.0500	0.0482		mg/Kg		96	73 - 122
1,2-Dichloropropane	0.0500	0.0477		mg/Kg		95	72 - 124
cis-1,3-Dichloropropene	0.0538	0.0482		mg/Kg		90	65 - 116
Methylene Chloride	0.0500	0.0411		mg/Kg		82	67 - 126
methyl isobutyl ketone	0.0500	0.0570		mg/Kg		114	58 - 135
Methyl tert-butyl ether	0.0500	0.0496		mg/Kg		99	57 - 122
2-Hexanone	0.0500	0.0560		mg/Kg		112	58 - 137
Dibromochloromethane	0.0500	0.0511		mg/Kg		102	66 - 123
Chlorobenzene	0.0500	0.0467		mg/Kg		93	80 - 110
Ethylbenzene	0.0500	0.0474		mg/Kg		95	79 - 112
Tetrachloroethene	0.0500	0.0451		mg/Kg		90	76 - 112
Toluene	0.0500	0.0464		mg/Kg		93	78 - 116
Styrene	0.0500	0.0454		mg/Kg		91	77 - 115
trans-1,2-Dichloroethene	0.0500	0.0472		mg/Kg		94	70 - 119
Bromoform	0.0500	0.0502		mg/Kg		100	62 - 119
trans-1,3-Dichloropropene	0.0486	0.0454		mg/Kg		93	64 - 114
1,1,1-Trichloroethane	0.0500	0.0471		mg/Kg		94	70 - 125
1,1,2,2-Tetrachloroethane	0.0500	0.0492		mg/Kg		98	73 - 119
1,1,2-Trichloroethane	0.0500	0.0473		mg/Kg		95	63 - 136
Trichloroethene	0.0500	0.0437		mg/Kg		87	75 - 113
Vinyl chloride	0.0500	0.0432		mg/Kg		86	58 - 136
1,2-Dichloroethane	0.0500	0.0486		mg/Kg		97	66 - 120
Xylenes, Total	0.150	0.137		mg/Kg		92	74 - 114

Surrogate	LCS % Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	101		77 - 124
Toluene-d8 (Surr)	94		80 - 121
4-Bromofluorobenzene (Surr)	90		77 - 112

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-130242/4
Matrix: Solid
Analysis Batch: 130242

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Surrogate	LCS % Recovery	LCS Qualifier	Limits
Dibromofluoromethane	96		78 - 119

Lab Sample ID: LCSD 500-130242/31
Matrix: Solid
Analysis Batch: 130242

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone			0.0500	0.0665		mg/Kg		133	46 - 152	12	30
Bromomethane			0.0500	0.0454		mg/Kg		91	38 - 157	8	30
Carbon disulfide			0.0500	0.0318		mg/Kg		64	38 - 112	5	30
Chloroethane			0.0500	0.0450		mg/Kg		90	53 - 156	2	30
Chloromethane			0.0500	0.0397		mg/Kg		79	44 - 148	2	30
Methyl Ethyl Ketone			0.0500	0.0521		mg/Kg		104	48 - 152	7	30
Chloroform			0.0500	0.0467		mg/Kg		93	74 - 115	0	30
cis-1,2-Dichloroethene			0.0500	0.0450		mg/Kg		90	68 - 110	2	30
Carbon tetrachloride			0.0500	0.0529		mg/Kg		106	63 - 127	9	30
Benzene			0.0500	0.0424		mg/Kg		85	74 - 112	7	30
1,1-Dichloroethane			0.0500	0.0426		mg/Kg		85	69 - 118	3	30
1,1-Dichloroethene			0.0500	0.0425		mg/Kg		85	60 - 123	6	30
Bromodichloromethane			0.0500	0.0475		mg/Kg		95	73 - 122	1	30
1,2-Dichloropropane			0.0500	0.0445		mg/Kg		89	72 - 124	7	30
cis-1,3-Dichloropropene			0.0538	0.0468		mg/Kg		87	65 - 116	3	30
Methylene Chloride			0.0500	0.0432		mg/Kg		86	67 - 126	5	30
methyl isobutyl ketone			0.0500	0.0529		mg/Kg		106	58 - 135	7	30
Methyl tert-butyl ether			0.0500	0.0518		mg/Kg		104	57 - 122	4	30
2-Hexanone			0.0500	0.0512		mg/Kg		102	58 - 137	9	30
Dibromochloromethane			0.0500	0.0482		mg/Kg		96	66 - 123	6	30
Chlorobenzene			0.0500	0.0455		mg/Kg		91	80 - 110	3	30
Ethylbenzene			0.0500	0.0448		mg/Kg		90	79 - 112	6	30
Tetrachloroethene			0.0500	0.0433		mg/Kg		87	76 - 112	4	30
Toluene			0.0500	0.0461		mg/Kg		92	78 - 116	1	30
Styrene			0.0500	0.0464		mg/Kg		93	77 - 115	2	30
trans-1,2-Dichloroethene			0.0500	0.0456		mg/Kg		91	70 - 119	3	30
Bromoform			0.0500	0.0500		mg/Kg		100	62 - 119	0	30
trans-1,3-Dichloropropene			0.0486	0.0445		mg/Kg		92	64 - 114	2	30
1,1,1-Trichloroethane			0.0500	0.0487		mg/Kg		97	70 - 125	3	30
1,1,2,2-Tetrachloroethane			0.0500	0.0461		mg/Kg		92	73 - 119	7	30
1,1,2-Trichloroethane			0.0500	0.0465		mg/Kg		93	63 - 136	2	30
Trichloroethene			0.0500	0.0437		mg/Kg		87	75 - 113	0	30
Vinyl chloride			0.0500	0.0459		mg/Kg		92	58 - 136	6	30
1,2-Dichloroethane			0.0500	0.0472		mg/Kg		94	66 - 120	3	30
Xylenes, Total			0.150	0.136		mg/Kg		90	74 - 114	1	30

Surrogate	LCSD % Recovery	LCSD Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	110		77 - 124
Toluene-d8 (Surr)	106		80 - 121
4-Bromofluorobenzene (Surr)	103		77 - 112
Dibromofluoromethane	111		78 - 119

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-130243/6
Matrix: Water
Analysis Batch: 130243

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/L			10/26/11 06:30	1
Bromomethane	0.0010	U	0.0010	0.00049	mg/L			10/26/11 06:30	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/L			10/26/11 06:30	1
Chloroethane	0.0010	U	0.0010	0.00033	mg/L			10/26/11 06:30	1
Chloromethane	0.0010	U	0.0010	0.00024	mg/L			10/26/11 06:30	1
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/L			10/26/11 06:30	1
Chloroform	0.0010	U	0.0010	0.00025	mg/L			10/26/11 06:30	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/L			10/26/11 06:30	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/L			10/26/11 06:30	1
Benzene	0.00050	U	0.00050	0.00012	mg/L			10/26/11 06:30	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/L			10/26/11 06:30	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/L			10/26/11 06:30	1
Bromodichloromethane	0.0010	U	0.0010	0.00023	mg/L			10/26/11 06:30	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/L			10/26/11 06:30	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/L			10/26/11 06:30	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/L			10/26/11 06:30	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/L			10/26/11 06:30	1
Methyl tert-butyl ether	0.0010	U	0.0010	0.00028	mg/L			10/26/11 06:30	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/L			10/26/11 06:30	1
Dibromochloromethane	0.0010	U	0.0010	0.00025	mg/L			10/26/11 06:30	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/L			10/26/11 06:30	1
Ethylbenzene	0.00050	U	0.00050	0.00014	mg/L			10/26/11 06:30	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/L			10/26/11 06:30	1
Toluene	0.00050	U	0.00050	0.00015	mg/L			10/26/11 06:30	1
Styrene	0.0010	U	0.0010	0.00026	mg/L			10/26/11 06:30	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/L			10/26/11 06:30	1
Bromoform	0.0010	U	0.0010	0.00045	mg/L			10/26/11 06:30	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/L			10/26/11 06:30	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/L			10/26/11 06:30	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/L			10/26/11 06:30	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/L			10/26/11 06:30	1
Trichloroethene	0.00050	U	0.00050	0.00018	mg/L			10/26/11 06:30	1
Vinyl chloride	0.00050	U	0.00050	0.00013	mg/L			10/26/11 06:30	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/L			10/26/11 06:30	1
Xylenes, Total	0.0010	U	0.0010	0.00030	mg/L			10/26/11 06:30	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00050	mg/L			10/26/11 06:30	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*97*		*77 - 124*		*10/26/11 06:30*	*1*
Toluene-d8 (Surr)	*87*		*80 - 121*		*10/26/11 06:30*	*1*
4-Bromofluorobenzene (Surr)	*91*		*77 - 112*		*10/26/11 06:30*	*1*
Dibromofluoromethane	*93*		*78 - 119*		*10/26/11 06:30*	*1*

Lab Sample ID: LCS 500-130243/4
Matrix: Water
Analysis Batch: 130243

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0588		mg/L		118	43 - 153

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-130243/4
Matrix: Water
Analysis Batch: 130243

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Bromomethane	0.0500	0.0420		mg/L		84	46 - 155
Carbon disulfide	0.0500	0.0301		mg/L		60	36 - 110
Chloroethane	0.0500	0.0441		mg/L		88	54 - 149
Chloromethane	0.0500	0.0404		mg/L		81	36 - 148
Methyl Ethyl Ketone	0.0500	0.0559		mg/L		112	42 - 152
Chloroform	0.0500	0.0466		mg/L		93	71 - 116
cis-1,2-Dichloroethene	0.0500	0.0459		mg/L		92	66 - 111
Carbon tetrachloride	0.0500	0.0485		mg/L		97	58 - 132
Benzene	0.0500	0.0454		mg/L		91	74 - 113
1,1-Dichloroethane	0.0500	0.0438		mg/L		88	64 - 117
1,1-Dichloroethene	0.0500	0.0400		mg/L		80	60 - 126
Bromodichloromethane	0.0500	0.0482		mg/L		96	73 - 120
1,2-Dichloropropane	0.0500	0.0477		mg/L		95	68 - 123
cis-1,3-Dichloropropene	0.0538	0.0482		mg/L		90	65 - 114
Methylene Chloride	0.0500	0.0411		mg/L		82	65 - 125
methyl isobutyl ketone	0.0500	0.0570		mg/L		114	56 - 138
Methyl tert-butyl ether	0.0500	0.0496		mg/L		99	57 - 119
2-Hexanone	0.0500	0.0560		mg/L		112	55 - 138
Dibromochloromethane	0.0500	0.0511		mg/L		102	73 - 118
Chlorobenzene	0.0500	0.0467		mg/L		93	81 - 111
Ethylbenzene	0.0500	0.0474		mg/L		95	79 - 114
Tetrachloroethene	0.0500	0.0451		mg/L		90	76 - 114
Toluene	0.0500	0.0464		mg/L		93	76 - 121
Styrene	0.0500	0.0454		mg/L		91	76 - 118
trans-1,2-Dichloroethene	0.0500	0.0472		mg/L		94	67 - 120
Bromoform	0.0500	0.0502		mg/L		100	64 - 126
trans-1,3-Dichloropropene	0.0486	0.0454		mg/L		93	60 - 119
1,1,1-Trichloroethane	0.0500	0.0471		mg/L		94	66 - 128
1,1,2,2-Tetrachloroethane	0.0500	0.0492		mg/L		98	66 - 121
1,1,2-Trichloroethane	0.0500	0.0473		mg/L		95	62 - 137
Trichloroethene	0.0500	0.0437		mg/L		87	75 - 116
Vinyl chloride	0.0500	0.0432		mg/L		86	47 - 138
1,2-Dichloroethane	0.0500	0.0486		mg/L		97	69 - 115
Xylenes, Total	0.150	0.137		mg/L		92	74 - 117

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*101*		*77 - 124*
Toluene-d8 (Surr)	*94*		*80 - 121*
4-Bromofluorobenzene (Surr)	*90*		*77 - 112*
Dibromofluoromethane	*96*		*78 - 119*

Lab Sample ID: LCSD 500-130243/31
Matrix: Water
Analysis Batch: 130243

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Acetone	0.0500	0.0665		mg/L		133	43 - 153	12	20
Bromomethane	0.0500	0.0454		mg/L		91	46 - 155	8	20
Carbon disulfide	0.0500	0.0318		mg/L		64	36 - 110	5	20

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 500-130243/31
Matrix: Water
Analysis Batch: 130243

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Chloroethane	0.0500	0.0450		mg/L		90	54 - 149	2	20
Chloromethane	0.0500	0.0397		mg/L		79	36 - 148	2	20
Methyl Ethyl Ketone	0.0500	0.0521		mg/L		104	42 - 152	7	20
Chloroform	0.0500	0.0467		mg/L		93	71 - 116	0	20
cis-1,2-Dichloroethene	0.0500	0.0450		mg/L		90	66 - 111	2	20
Carbon tetrachloride	0.0500	0.0529		mg/L		106	58 - 132	9	20
Benzene	0.0500	0.0424		mg/L		85	74 - 113	7	20
1,1-Dichloroethane	0.0500	0.0426		mg/L		85	64 - 117	3	20
1,1-Dichloroethene	0.0500	0.0425		mg/L		85	60 - 126	6	20
Bromodichloromethane	0.0500	0.0475		mg/L		95	73 - 120	1	20
1,2-Dichloropropane	0.0500	0.0445		mg/L		89	68 - 123	7	20
cis-1,3-Dichloropropene	0.0538	0.0468		mg/L		87	65 - 114	3	20
Methylene Chloride	0.0500	0.0432		mg/L		86	65 - 125	5	20
methyl isobutyl ketone	0.0500	0.0529		mg/L		106	56 - 138	7	20
Methyl tert-butyl ether	0.0500	0.0518		mg/L		104	57 - 119	4	20
2-Hexanone	0.0500	0.0512		mg/L		102	55 - 138	9	20
Dibromochloromethane	0.0500	0.0482		mg/L		96	73 - 118	6	20
Chlorobenzene	0.0500	0.0455		mg/L		91	81 - 111	3	20
Ethylbenzene	0.0500	0.0448		mg/L		90	79 - 114	6	20
Tetrachloroethene	0.0500	0.0433		mg/L		87	76 - 114	4	20
Toluene	0.0500	0.0461		mg/L		92	76 - 121	1	20
Styrene	0.0500	0.0464		mg/L		93	76 - 118	2	20
trans-1,2-Dichloroethene	0.0500	0.0456		mg/L		91	67 - 120	3	20
Bromoform	0.0500	0.0500		mg/L		100	64 - 126	0	20
trans-1,3-Dichloropropene	0.0486	0.0445		mg/L		92	60 - 119	2	20
1,1,1-Trichloroethane	0.0500	0.0487		mg/L		97	66 - 128	3	20
1,1,2,2-Tetrachloroethane	0.0500	0.0461		mg/L		92	66 - 121	7	20
1,1,2-Trichloroethane	0.0500	0.0465		mg/L		93	62 - 137	2	20
Trichloroethene	0.0500	0.0437		mg/L		87	75 - 116	0	20
Vinyl chloride	0.0500	0.0459		mg/L		92	47 - 138	6	20
1,2-Dichloroethane	0.0500	0.0472		mg/L		94	69 - 115	3	20
Xylenes, Total	0.150	0.136		mg/L		90	74 - 117	1	20

Surrogate	*LCSD % Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*110*		*77 - 124*
Toluene-d8 (Surr)	*106*		*80 - 121*
4-Bromofluorobenzene (Surr)	*103*		*77 - 112*
Dibromofluoromethane	*111*		*78 - 119*

Lab Sample ID: MB 500-130357/7
Matrix: Solid
Analysis Batch: 130357

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0050	U	0.0050	0.0019	mg/Kg			10/26/11 19:39	1
Bromomethane	0.0020	U	0.0020	0.00086	mg/Kg			10/26/11 19:39	1
Carbon disulfide	0.0050	U	0.0050	0.00044	mg/Kg			10/26/11 19:39	1
Chloroethane	0.0020	U	0.0020	0.00050	mg/Kg			10/26/11 19:39	1
Chloromethane	0.0020	U	0.0020	0.00050	mg/Kg			10/26/11 19:39	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-130357/7
Matrix: Solid
Analysis Batch: 130357

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0010	mg/Kg			10/26/11 19:39	1
Chloroform	0.0010	U	0.0010	0.00025	mg/Kg			10/26/11 19:39	1
cis-1,2-Dichloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/26/11 19:39	1
Carbon tetrachloride	0.0010	U	0.0010	0.00028	mg/Kg			10/26/11 19:39	1
Benzene	0.00025	U	0.00025	0.000080	mg/Kg			10/26/11 19:39	1
1,1-Dichloroethane	0.0010	U	0.0010	0.00024	mg/Kg			10/26/11 19:39	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00029	mg/Kg			10/26/11 19:39	1
Bromodichloromethane	0.0020	U	0.0020	0.00028	mg/Kg			10/26/11 19:39	1
1,2-Dichloropropane	0.0010	U	0.0010	0.00036	mg/Kg			10/26/11 19:39	1
cis-1,3-Dichloropropene	0.0010	U	0.0010	0.00028	mg/Kg			10/26/11 19:39	1
Methylene Chloride	0.0050	U	0.0050	0.00063	mg/Kg			10/26/11 19:39	1
methyl isobutyl ketone	0.0050	U	0.0050	0.00079	mg/Kg			10/26/11 19:39	1
Methyl tert-butyl ether	0.0020	U	0.0020	0.00048	mg/Kg			10/26/11 19:39	1
2-Hexanone	0.0050	U	0.0050	0.00056	mg/Kg			10/26/11 19:39	1
Dibromochloromethane	0.0020	U	0.0020	0.00038	mg/Kg			10/26/11 19:39	1
Chlorobenzene	0.0010	U	0.0010	0.00024	mg/Kg			10/26/11 19:39	1
Ethylbenzene	0.00025	U	0.00025	0.00014	mg/Kg			10/26/11 19:39	1
Tetrachloroethene	0.0010	U	0.0010	0.00022	mg/Kg			10/26/11 19:39	1
Toluene	0.00025	U	0.00025	0.00015	mg/Kg			10/26/11 19:39	1
Styrene	0.0010	U	0.0010	0.00026	mg/Kg			10/26/11 19:39	1
trans-1,2-Dichloroethene	0.0010	U	0.0010	0.00027	mg/Kg			10/26/11 19:39	1
Bromoform	0.0020	U	0.0020	0.00057	mg/Kg			10/26/11 19:39	1
trans-1,3-Dichloropropene	0.0010	U	0.0010	0.00035	mg/Kg			10/26/11 19:39	1
1,1,1-Trichloroethane	0.0010	U	0.0010	0.00026	mg/Kg			10/26/11 19:39	1
1,1,2,2-Tetrachloroethane	0.0010	U	0.0010	0.00035	mg/Kg			10/26/11 19:39	1
1,1,2-Trichloroethane	0.0010	U	0.0010	0.00030	mg/Kg			10/26/11 19:39	1
Trichloroethene	0.00025	U	0.00025	0.00015	mg/Kg			10/26/11 19:39	1
Vinyl chloride	0.00025	U	0.00025	0.00013	mg/Kg			10/26/11 19:39	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00028	mg/Kg			10/26/11 19:39	1
Xylenes, Total	0.00050	U	0.00050	0.00013	mg/Kg			10/26/11 19:39	1
1,3-Dichloropropene, Total	0.0010	U	0.0010	0.00028	mg/Kg			10/26/11 19:39	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*		*10/26/11 19:39*	*1*
Toluene-d8 (Surr)	*98*		*80 - 121*		*10/26/11 19:39*	*1*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*		*10/26/11 19:39*	*1*
Dibromofluoromethane	*96*		*78 - 119*		*10/26/11 19:39*	*1*

Lab Sample ID: LCS 500-130357/5
Matrix: Solid
Analysis Batch: 130357

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Acetone	0.0500	0.0706		mg/Kg		141	46 - 152
Bromomethane	0.0500	0.0579		mg/Kg		116	38 - 157
Carbon disulfide	0.0500	0.0301		mg/Kg		60	38 - 112
Chloroethane	0.0500	0.0550		mg/Kg		110	53 - 156
Chloromethane	0.0500	0.0657		mg/Kg		131	44 - 148
Methyl Ethyl Ketone	0.0500	0.0552		mg/Kg		110	48 - 152

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 500-130357/5
Matrix: Solid
Analysis Batch: 130357

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chloroform	0.0500	0.0455		mg/Kg		91	74 - 115
cis-1,2-Dichloroethene	0.0500	0.0434		mg/Kg		87	68 - 110
Carbon tetrachloride	0.0500	0.0472		mg/Kg		94	63 - 127
Benzene	0.0500	0.0422		mg/Kg		84	74 - 112
1,1-Dichloroethane	0.0500	0.0408		mg/Kg		82	69 - 118
1,1-Dichloroethene	0.0500	0.0381		mg/Kg		76	60 - 123
Bromodichloromethane	0.0500	0.0486		mg/Kg		97	73 - 122
1,2-Dichloropropane	0.0500	0.0465		mg/Kg		93	72 - 124
cis-1,3-Dichloropropene	0.0538	0.0496		mg/Kg		92	65 - 116
Methylene Chloride	0.0500	0.0441		mg/Kg		88	67 - 126
methyl isobutyl ketone	0.0500	0.0585		mg/Kg		117	58 - 135
Methyl tert-butyl ether	0.0500	0.0532		mg/Kg		106	57 - 122
2-Hexanone	0.0500	0.0544		mg/Kg		109	58 - 137
Dibromochloromethane	0.0500	0.0512		mg/Kg		102	66 - 123
Chlorobenzene	0.0500	0.0463		mg/Kg		93	80 - 110
Ethylbenzene	0.0500	0.0459		mg/Kg		92	79 - 112
Tetrachloroethene	0.0500	0.0442		mg/Kg		88	76 - 112
Toluene	0.0500	0.0462		mg/Kg		92	78 - 116
Styrene	0.0500	0.0478		mg/Kg		96	77 - 115
trans-1,2-Dichloroethene	0.0500	0.0483		mg/Kg		97	70 - 119
Bromoform	0.0500	0.0527		mg/Kg		105	62 - 119
trans-1,3-Dichloropropene	0.0486	0.0478		mg/Kg		98	64 - 114
1,1,1-Trichloroethane	0.0500	0.0459		mg/Kg		92	70 - 125
1,1,2,2-Tetrachloroethane	0.0500	0.0469		mg/Kg		94	73 - 119
1,1,2-Trichloroethane	0.0500	0.0489		mg/Kg		98	63 - 136
Trichloroethene	0.0500	0.0435		mg/Kg		87	75 - 113
Vinyl chloride	0.0500	0.0630		mg/Kg		126	58 - 136
1,2-Dichloroethane	0.0500	0.0483		mg/Kg		97	66 - 120
Xylenes, Total	0.150	0.138		mg/Kg		92	74 - 114

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*
Toluene-d8 (Surr)	*103*		*80 - 121*
4-Bromofluorobenzene (Surr)	*103*		*77 - 112*
Dibromofluoromethane	*102*		*78 - 119*

Lab Sample ID: MB 500-130358/7
Matrix: Water
Analysis Batch: 130358

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl Ethyl Ketone	0.0050	U	0.0050	0.0025	mg/L			10/26/11 19:39	1
Chloroform	0.0010	U	0.0010	0.00050	mg/L			10/26/11 19:39	1
Carbon tetrachloride	0.0010	U	0.0010	0.00050	mg/L			10/26/11 19:39	1
Benzene	0.0010	U	0.0010	0.00050	mg/L			10/26/11 19:39	1
1,1-Dichloroethene	0.0010	U	0.0010	0.00050	mg/L			10/26/11 19:39	1
Chlorobenzene	0.0010	U	0.0010	0.00050	mg/L			10/26/11 19:39	1
Tetrachloroethene	0.0010	U	0.0010	0.00050	mg/L			10/26/11 19:39	1
Trichloroethene	0.0010	U	0.0010	0.00050	mg/L			10/26/11 19:39	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-130358/7 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 130358

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Vinyl chloride	0.0010	U	0.0010	0.00050	mg/L			10/26/11 19:39	1
1,2-Dichloroethane	0.0010	U	0.0010	0.00050	mg/L			10/26/11 19:39	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*106*		*77 - 124*		*10/26/11 19:39*	*1*
Toluene-d8 (Surr)	*98*		*80 - 121*		*10/26/11 19:39*	*1*
4-Bromofluorobenzene (Surr)	*99*		*77 - 112*		*10/26/11 19:39*	*1*
Dibromofluoromethane	*96*		*78 - 119*		*10/26/11 19:39*	*1*

Lab Sample ID: LCS 500-130358/5 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 130358

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Methyl Ethyl Ketone	0.0500	0.0552		mg/L		110	42 - 152
Chloroform	0.0500	0.0455		mg/L		91	71 - 116
Carbon tetrachloride	0.0500	0.0472		mg/L		94	58 - 132
Benzene	0.0500	0.0422		mg/L		84	74 - 113
1,1-Dichloroethene	0.0500	0.0381		mg/L		76	60 - 126
Chlorobenzene	0.0500	0.0463		mg/L		93	81 - 111
Tetrachloroethene	0.0500	0.0442		mg/L		88	76 - 114
Trichloroethene	0.0500	0.0435		mg/L		87	75 - 116
Vinyl chloride	0.0500	0.0630		mg/L		126	47 - 138
1,2-Dichloroethane	0.0500	0.0483		mg/L		97	69 - 115

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*107*		*77 - 124*
Toluene-d8 (Surr)	*103*		*80 - 121*
4-Bromofluorobenzene (Surr)	*103*		*77 - 112*
Dibromofluoromethane	*102*		*78 - 119*

Lab Sample ID: LB3 500-129370/1-A LB3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: TCLP**
Analysis Batch: 129797

Analyte	LB3 Result	LB3 Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl Ethyl Ketone	0.10	U	0.10	0.050	mg/L			10/21/11 17:31	20
Chloroform	0.020	U	0.020	0.010	mg/L			10/21/11 17:31	20
Carbon tetrachloride	0.020	U	0.020	0.010	mg/L			10/21/11 17:31	20
Benzene	0.020	U	0.020	0.010	mg/L			10/21/11 17:31	20
1,1-Dichloroethene	0.020	U	0.020	0.010	mg/L			10/21/11 17:31	20
Chlorobenzene	0.020	U	0.020	0.010	mg/L			10/21/11 17:31	20
Tetrachloroethene	0.020	U	0.020	0.010	mg/L			10/21/11 17:31	20
Trichloroethene	0.020	U	0.020	0.010	mg/L			10/21/11 17:31	20
Vinyl chloride	0.020	U	0.020	0.010	mg/L			10/21/11 17:31	20
1,2-Dichloroethane	0.020	U	0.020	0.010	mg/L			10/21/11 17:31	20

Surrogate	*LB3 % Recovery*	*LB3 Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*110*		*77 - 124*		*10/21/11 17:31*	*20*

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LB3 500-129370/1-A LB3
Matrix: Water
Analysis Batch: 129797

Client Sample ID: Method Blank
Prep Type: TCLP

Surrogate	LB3 % Recovery	LB3 Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	105		80 - 121		10/21/11 17:31	20
4-Bromofluorobenzene (Surr)	97		77 - 112		10/21/11 17:31	20
Dibromofluoromethane	104		78 - 119		10/21/11 17:31	20

Lab Sample ID: LB 500-129662/1-A LB
Matrix: Solid
Analysis Batch: 130358

Client Sample ID: Method Blank
Prep Type: TCLP

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl Ethyl Ketone	0.10	U	0.10	0.050	mg/L			10/26/11 23:59	20
Chloroform	0.020	U	0.020	0.010	mg/L			10/26/11 23:59	20
Carbon tetrachloride	0.020	U	0.020	0.010	mg/L			10/26/11 23:59	20
Benzene	0.020	U	0.020	0.010	mg/L			10/26/11 23:59	20
1,1-Dichloroethene	0.020	U	0.020	0.010	mg/L			10/26/11 23:59	20
Chlorobenzene	0.020	U	0.020	0.010	mg/L			10/26/11 23:59	20
Tetrachloroethene	0.020	U	0.020	0.010	mg/L			10/26/11 23:59	20
Trichloroethene	0.020	U	0.020	0.010	mg/L			10/26/11 23:59	20
Vinyl chloride	0.020	U	0.020	0.010	mg/L			10/26/11 23:59	20
1,2-Dichloroethane	0.020	U	0.020	0.010	mg/L			10/26/11 23:59	20

Surrogate	LB % Recovery	LB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	108		77 - 124		10/26/11 23:59	20
Toluene-d8 (Surr)	101		80 - 121		10/26/11 23:59	20
4-Bromofluorobenzene (Surr)	99		77 - 112		10/26/11 23:59	20
Dibromofluoromethane	101		78 - 119		10/26/11 23:59	20

Method: 8270C - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 500-129479/1-A
Matrix: Water
Analysis Batch: 129469

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 129479

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methyl-phenol	0.010	U	0.010	0.0050	mg/L		10/19/11 11:55	10/19/11 20:17	1
1,4-Dichlorobenzene	0.010	U	0.010	0.0050	mg/L		10/19/11 11:55	10/19/11 20:17	1
2,4-Dinitrotoluene	0.010	U	0.010	0.0050	mg/L		10/19/11 11:55	10/19/11 20:17	1
Hexachlorobenzene	0.010	U	0.010	0.0050	mg/L		10/19/11 11:55	10/19/11 20:17	1
Hexachloro-1,3-butadiene	0.010	U	0.010	0.0050	mg/L		10/19/11 11:55	10/19/11 20:17	1
Hexachloroethane	0.010	U	0.010	0.0050	mg/L		10/19/11 11:55	10/19/11 20:17	1
Nitrobenzene	0.010	U	0.010	0.0050	mg/L		10/19/11 11:55	10/19/11 20:17	1
Pentachlorophenol	0.050	U	0.050	0.025	mg/L		10/19/11 11:55	10/19/11 20:17	1
Pyridine	0.020	U	0.020	0.010	mg/L		10/19/11 11:55	10/19/11 20:17	1
2,4,5-Trichlorophenol	0.050	U	0.050	0.025	mg/L		10/19/11 11:55	10/19/11 20:17	1
2,4,6-Trichlorophenol	0.010	U	0.010	0.0050	mg/L		10/19/11 11:55	10/19/11 20:17	1
3 & 4 Methylphenol	0.010	U	0.010	0.0050	mg/L		10/19/11 11:55	10/19/11 20:17	1

Surrogate	MB % Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorophenol	43		20 - 100	10/19/11 11:55	10/19/11 20:17	1

Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 500-129479/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 129469 — **Prep Batch: 129479**

Surrogate	MB % Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Phenol-d5	28		20 - 100	10/19/11 11:55	10/19/11 20:17	1
Nitrobenzene-d5	72		39 - 110	10/19/11 11:55	10/19/11 20:17	1
2-Fluorobiphenyl	78		44 - 110	10/19/11 11:55	10/19/11 20:17	1
2,4,6-Tribromophenol	90		46 - 126	10/19/11 11:55	10/19/11 20:17	1
Terphenyl-d14	100		52 - 131	10/19/11 11:55	10/19/11 20:17	1

Lab Sample ID: LCS 500-129479/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 129469 — **Prep Batch: 129479**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
2-Methyl-phenol	0.0500	0.0323		mg/L		65	48 - 100
1,4-Dichlorobenzene	0.0500	0.0306		mg/L		61	36 - 100
2,4-Dinitrotoluene	0.0500	0.0511		mg/L		102	66 - 118
Hexachlorobenzene	0.0500	0.0579		mg/L		116	66 - 119
Hexachloro-1,3-butadiene	0.0500	0.0333		mg/L		67	33 - 100
Hexachloroethane	0.0500	0.0273		mg/L		55	32 - 100
Nitrobenzene	0.0500	0.0393		mg/L		79	55 - 101
Pentachlorophenol	0.0500	0.0403	J	mg/L		81	47 - 133
Pyridine	0.0500	0.0217		mg/L		43	10 - 100
2,4,5-Trichlorophenol	0.0500	0.0493	J	mg/L		99	68 - 112
2,4,6-Trichlorophenol	0.0500	0.0504		mg/L		101	62 - 106
3 & 4 Methylphenol	0.0500	0.0353		mg/L		71	44 - 100

Surrogate	LCS % Recovery	LCS Qualifier	Limits
2-Fluorophenol	42		20 - 100
Phenol-d5	26		20 - 100
Nitrobenzene-d5	76		39 - 110
2-Fluorobiphenyl	86		44 - 110
2,4,6-Tribromophenol	102		46 - 126
Terphenyl-d14	98		52 - 131

Lab Sample ID: LB 500-129378/1-F LB — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 129469 — **Prep Batch: 129479**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methyl-phenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 20:54	1
1,4-Dichlorobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 20:54	1
2,4-Dinitrotoluene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 20:54	1
Hexachlorobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 20:54	1
Hexachloro-1,3-butadiene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 20:54	1
Hexachloroethane	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 20:54	1
Nitrobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 20:54	1
Pentachlorophenol	0.50	U	0.50	0.25	mg/L		10/19/11 11:55	10/19/11 20:54	1
Pyridine	0.20	U	0.20	0.10	mg/L		10/19/11 11:55	10/19/11 20:54	1
2,4,5-Trichlorophenol	0.50	U	0.50	0.25	mg/L		10/19/11 11:55	10/19/11 20:54	1
2,4,6-Trichlorophenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 20:54	1
3 & 4 Methylphenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 20:54	1

Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LB 500-129378/1-F LB
Matrix: Solid
Analysis Batch: 129469

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 129479

Surrogate	*LB % Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol	*43*		*20 - 100*	*10/19/11 11:55*	*10/19/11 20:54*	*1*
Phenol-d5	*29*		*20 - 100*	*10/19/11 11:55*	*10/19/11 20:54*	*1*
Nitrobenzene-d5	*70*		*39 - 110*	*10/19/11 11:55*	*10/19/11 20:54*	*1*
2-Fluorobiphenyl	*84*		*44 - 110*	*10/19/11 11:55*	*10/19/11 20:54*	*1*
2,4,6-Tribromophenol	*94*		*46 - 126*	*10/19/11 11:55*	*10/19/11 20:54*	*1*
Terphenyl-d14	*97*		*52 - 131*	*10/19/11 11:55*	*10/19/11 20:54*	*1*

Lab Sample ID: LB3 500-129371/1-E LB3
Matrix: Water
Analysis Batch: 129469

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 129479

Analyte	LB3 Result	LB3 Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methyl-phenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 21:30	1
1,4-Dichlorobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 21:30	1
2,4-Dinitrotoluene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 21:30	1
Hexachlorobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 21:30	1
Hexachloro-1,3-butadiene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 21:30	1
Hexachloroethane	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 21:30	1
Nitrobenzene	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 21:30	1
Pentachlorophenol	0.50	U	0.50	0.25	mg/L		10/19/11 11:55	10/19/11 21:30	1
Pyridine	0.20	U	0.20	0.10	mg/L		10/19/11 11:55	10/19/11 21:30	1
2,4,5-Trichlorophenol	0.50	U	0.50	0.25	mg/L		10/19/11 11:55	10/19/11 21:30	1
2,4,6-Trichlorophenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 21:30	1
3 & 4 Methylphenol	0.10	U	0.10	0.050	mg/L		10/19/11 11:55	10/19/11 21:30	1

Surrogate	*LB3 % Recovery*	*LB3 Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorophenol	*40*		*20 - 100*	*10/19/11 11:55*	*10/19/11 21:30*	*1*
Phenol-d5	*26*		*20 - 100*	*10/19/11 11:55*	*10/19/11 21:30*	*1*
Nitrobenzene-d5	*66*		*39 - 110*	*10/19/11 11:55*	*10/19/11 21:30*	*1*
2-Fluorobiphenyl	*72*		*44 - 110*	*10/19/11 11:55*	*10/19/11 21:30*	*1*
2,4,6-Tribromophenol	*83*		*46 - 126*	*10/19/11 11:55*	*10/19/11 21:30*	*1*
Terphenyl-d14	*98*		*52 - 131*	*10/19/11 11:55*	*10/19/11 21:30*	*1*

Method: 8081A - Organochlorine Pesticides (GC)

Lab Sample ID: MB 500-129448/1-A
Matrix: Solid
Analysis Batch: 129292

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 129448

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlordane (technical)	0.00010	U	0.00010	0.000050	mg/L		10/19/11 10:00	10/19/11 21:56	1
Endrin	0.000050	U	0.000050	0.000025	mg/L		10/19/11 10:00	10/19/11 21:56	1
Heptachlor	0.000050	U	0.000050	0.000025	mg/L		10/19/11 10:00	10/19/11 21:56	1
Heptachlor epoxide	0.000050	U	0.000050	0.000025	mg/L		10/19/11 10:00	10/19/11 21:56	1
gamma-BHC (Lindane)	0.000050	U	0.000050	0.000025	mg/L		10/19/11 10:00	10/19/11 21:56	1
Methoxychlor	0.00010	U	0.00010	0.000050	mg/L		10/19/11 10:00	10/19/11 21:56	1
Toxaphene	0.00050	U	0.00050	0.00025	mg/L		10/19/11 10:00	10/19/11 21:56	1

Method: 8081A - Organochlorine Pesticides (GC) (Continued)

Lab Sample ID: MB 500-129448/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 129292 — **Prep Batch: 129448**

Surrogate	MB % Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl	83		36 - 126	10/19/11 10:00	10/19/11 21:56	1
Tetrachloro-m-xylene	85		42 - 120	10/19/11 10:00	10/19/11 21:56	1

Lab Sample ID: LCS 500-129448/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 129292 — **Prep Batch: 129448**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Endrin	0.000100	0.0000973		mg/L		97	66 - 144
Heptachlor	0.000100	0.0000986		mg/L		99	63 - 114
Heptachlor epoxide	0.000100	0.0000937		mg/L		94	75 - 114
gamma-BHC (Lindane)	0.000100	0.0000872		mg/L		87	74 - 118
Methoxychlor	0.00100	0.00112		mg/L		111	64 - 129

Surrogate	LCS % Recovery	LCS Qualifier	Limits
DCB Decachlorobiphenyl	84		36 - 126
Tetrachloro-m-xylene	83		42 - 120

Lab Sample ID: LCS 500-129448/3-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 129292 — **Prep Batch: 129448**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Toxaphene	0.00952	0.00911		mg/L		96	50 - 150

Surrogate	LCS % Recovery	LCS Qualifier	Limits
DCB Decachlorobiphenyl	86		36 - 126
Tetrachloro-m-xylene	85		42 - 120

Lab Sample ID: LB 500-129378/1-B LB — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 129292 — **Prep Batch: 129448**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlordane (technical)	0.010	U	0.010	0.0050	mg/L		10/19/11 10:00	10/19/11 22:55	1
Endrin	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 22:55	1
Heptachlor	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 22:55	1
Heptachlor epoxide	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 22:55	1
gamma-BHC (Lindane)	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 22:55	1
Methoxychlor	0.010	U	0.010	0.0050	mg/L		10/19/11 10:00	10/19/11 22:55	1
Toxaphene	0.050	U	0.050	0.025	mg/L		10/19/11 10:00	10/19/11 22:55	1

Surrogate	LB % Recovery	LB Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl	80		36 - 126	10/19/11 10:00	10/19/11 22:55	1
Tetrachloro-m-xylene	87		42 - 120	10/19/11 10:00	10/19/11 22:55	1

Method: 8081A - Organochlorine Pesticides (GC) (Continued)

Lab Sample ID: LB3 500-129371/1-B LB3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: TCLP**
Analysis Batch: 129292 — **Prep Batch: 129448**

Analyte	LB3 Result	LB3 Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chlordane (technical)	0.010	U	0.010	0.0050	mg/L		10/19/11 10:00	10/19/11 23:15	1
Endrin	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 23:15	1
Heptachlor	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 23:15	1
Heptachlor epoxide	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 23:15	1
gamma-BHC (Lindane)	0.0050	U	0.0050	0.0025	mg/L		10/19/11 10:00	10/19/11 23:15	1
Methoxychlor	0.010	U	0.010	0.0050	mg/L		10/19/11 10:00	10/19/11 23:15	1
Toxaphene	0.050	U	0.050	0.025	mg/L		10/19/11 10:00	10/19/11 23:15	1

Surrogate	*LB3 % Recovery*	*LB3 Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*80*		*36 - 126*	*10/19/11 10:00*	*10/19/11 23:15*	*1*
Tetrachloro-m-xylene	*81*		*42 - 120*	*10/19/11 10:00*	*10/19/11 23:15*	*1*

Lab Sample ID: 500-40621-9 MS — **Client Sample ID: WS-001-101211**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 129292 — **Prep Batch: 129448**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Endrin	0.0050	U	0.0100	0.00951		mg/L		95	66 - 144
Heptachlor	0.0050	U	0.0100	0.00946		mg/L		95	63 - 114
Heptachlor epoxide	0.0050	U	0.0100	0.00900		mg/L		90	75 - 114
gamma-BHC (Lindane)	0.0050	U	0.0100	0.00834		mg/L		83	74 - 118
Methoxychlor	0.010	U	0.100	0.107		mg/L		106	64 - 129

Surrogate	*MS % Recovery*	*MS Qualifier*	*Limits*
DCB Decachlorobiphenyl	*79*		*36 - 126*
Tetrachloro-m-xylene	*79*		*42 - 120*

Lab Sample ID: 500-40621-9 MS — **Client Sample ID: WS-001-101211**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 129292 — **Prep Batch: 129448**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Toxaphene	0.050	U	0.952	0.963		mg/L		101	50 - 150

Surrogate	*MS % Recovery*	*MS Qualifier*	*Limits*
DCB Decachlorobiphenyl	*88*		*36 - 126*
Tetrachloro-m-xylene	*88*		*42 - 120*

Method: 8151A - Herbicides (GC)

Lab Sample ID: MB 500-129453/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 129436 — **Prep Batch: 129453**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.0010	U	0.0010	0.00050	mg/L		10/19/11 10:35	10/20/11 03:22	1
Silvex (2,4,5-TP)	0.0010	U	0.0010	0.00050	mg/L		10/19/11 10:35	10/20/11 03:22	1

Method: 8151A - Herbicides (GC) (Continued)

Lab Sample ID: MB 500-129453/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 129436 — **Prep Batch: 129453**

Surrogate	MB % Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCAA	93		30 - 110	10/19/11 10:35	10/20/11 03:22	1

Lab Sample ID: LCS 500-129453/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 129436 — **Prep Batch: 129453**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
2,4-D	0.00400	0.00237		mg/L		59	20 - 116
Silvex (2,4,5-TP)	0.00400	0.00317		mg/L		79	26 - 126

Surrogate	LCS % Recovery	LCS Qualifier	Limits
DCAA	96		30 - 110

Lab Sample ID: LB 500-129378/1-C LB — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 129436 — **Prep Batch: 129453**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.10	U	0.10	0.050	mg/L		10/19/11 10:35	10/20/11 04:05	1
Silvex (2,4,5-TP)	0.10	U	0.10	0.050	mg/L		10/19/11 10:35	10/20/11 04:05	1

Surrogate	LB % Recovery	LB Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCAA	94		30 - 110	10/19/11 10:35	10/20/11 04:05	1

Lab Sample ID: LB3 500-129371/1-C LB3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: TCLP**
Analysis Batch: 129436 — **Prep Batch: 129453**

Analyte	LB3 Result	LB3 Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.10	U	0.10	0.050	mg/L		10/19/11 10:35	10/20/11 04:27	1
Silvex (2,4,5-TP)	0.10	U	0.10	0.050	mg/L		10/19/11 10:35	10/20/11 04:27	1

Surrogate	LB3 % Recovery	LB3 Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCAA	93		30 - 110	10/19/11 10:35	10/20/11 04:27	1

Method: 6010B - Metals (ICP)

Lab Sample ID: LCS 500-129460/3-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 129575 — **Prep Batch: 129460**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Arsenic	0.100	0.0936		mg/L		94	80 - 120
Barium	2.00	1.92		mg/L		96	80 - 120
Cadmium	0.0500	0.0482		mg/L		96	80 - 120
Chromium	0.200	0.197		mg/L		99	80 - 120
Lead	0.100	0.102		mg/L		102	80 - 120
Selenium	0.100	0.0881		mg/L		88	80 - 120

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: LCS 500-129460/3-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 129575 — **Prep Batch: 129460**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Silver	0.0500	0.0468		mg/L		94	80 - 120

Lab Sample ID: LB 500-129378/1-D LB — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 129575 — **Prep Batch: 129460**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.050	U	0.050	0.010	mg/L		10/19/11 10:57	10/19/11 20:14	1
Barium	0.50	U	0.50	0.010	mg/L		10/19/11 10:57	10/19/11 20:14	1
Cadmium	0.0050	U	0.0050	0.0020	mg/L		10/19/11 10:57	10/19/11 20:14	1
Chromium	0.025	U	0.025	0.010	mg/L		10/19/11 10:57	10/19/11 20:14	1
Lead	0.050	U	0.050	0.0050	mg/L		10/19/11 10:57	10/19/11 20:14	1
Selenium	0.050	U	0.050	0.010	mg/L		10/19/11 10:57	10/19/11 20:14	1
Silver	0.025	U	0.025	0.0050	mg/L		10/19/11 10:57	10/19/11 20:14	1

Lab Sample ID: LB3 500-129371/1-D LB3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: TCLP**
Analysis Batch: 129575 — **Prep Batch: 129460**

Analyte	LB3 Result	LB3 Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.050	U	0.050	0.010	mg/L		10/19/11 10:57	10/19/11 20:20	1
Barium	0.50	U	0.50	0.010	mg/L		10/19/11 10:57	10/19/11 20:20	1
Cadmium	0.0050	U	0.0050	0.0020	mg/L		10/19/11 10:57	10/19/11 20:20	1
Chromium	0.025	U	0.025	0.010	mg/L		10/19/11 10:57	10/19/11 20:20	1
Lead	0.050	U	0.050	0.0050	mg/L		10/19/11 10:57	10/19/11 20:20	1
Selenium	0.050	U	0.050	0.010	mg/L		10/19/11 10:57	10/19/11 20:20	1
Silver	0.025	U	0.025	0.0050	mg/L		10/19/11 10:57	10/19/11 20:20	1

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 500-129818/7-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 129934 — **Prep Batch: 129818**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0020	U	0.0020	0.00020	mg/L		10/21/11 12:40	10/22/11 11:22	1

Lab Sample ID: LCS 500-129818/8-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 129934 — **Prep Batch: 129818**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Mercury	0.0200	0.0194		mg/L		97	80 - 120

Lab Sample ID: LB 500-129378/1-H LB — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 129934 — **Prep Batch: 129818**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0020	U	0.0020	0.00020	mg/L		10/21/11 12:40	10/22/11 11:33	1

Method: 7470A - Mercury (CVAA) (Continued)

Lab Sample ID: LB3 500-129371/1-F LB3
Matrix: Water
Analysis Batch: 129934

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 129818

Analyte	LB3 Result	LB3 Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0020	U	0.0020	0.00020	mg/L		10/21/11 12:40	10/22/11 12:32	1

Method: 9040B - pH

Lab Sample ID: 500-40621-10 DU
Matrix: Water
Analysis Batch: 130262

Client Sample ID: WA-001-101211
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
pH	7.78	HF		7.810		SU				0.4	

Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Crab Orchard Wildlife Refuge #2

TestAmerica Job ID: 500-40621-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)
Report To
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

(optional)
Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40621
Chain of Custody Number:
Page ____ of ____
Temperature °C of Cooler: (22)(24)

Client: CHam HILL
Client Project #: 423535.02.5T
Project Name: CONWR Plume 2
Project Location/State: Marion, IL
Lab Project #: 50006970
Sampler: MMM / JMB
Lab PM: Jim Knapp

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	1 VOCs 8260B	H2O Cool to 4° VOCs 8260B	Methanol Cool to 4° VOCs 8260B		Sodium Bisulfate Cool to 4° VOCs 8260B	7 Percent Moisture				Comments
1		TB-001-101211	10/12/11	—	2	W	2									
2		33-GG140-34	10/12/11	0905	3	W	3									
3		33-GG137-29.5	10/12/11	0930	3	W	3									
4		FB-001-101211	10/12/11	1200	2	W	2									
5		33-SB143-15	10/12/11	0945	5	SO		2	1		1	1				
6		33-FDUP-007	10/12/11	0955	5	SO		2	1		1	1				
7		33-SB147-13	10/12/11	1145	5	SO		2	1		1	1				
8		33-SB147-28	10/12/11	1200	5	SO		2	1		1	1				

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days X Other
Prelim Final 14 days
Requested Due Date _____

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Samson Burkard	CH2M HILL	10/12/11	1900	FEDEX			
					TA	10/13/11	1030

Lab Courier
Shipped: Fx
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TestAmerica

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2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Report To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

Bill To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-40621
Chain of Custody Number:
Page ____ of ____
Temperature °C of Cooler:

Client: CH2M HILL
Client Project #: 423535.02.SI
Project Name: CANWR Plume 2
Project Location/State: Marion, IL
Lab Project #: 50005970
Sampler: MMM
Lab PM: Jim Knapp

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Preservative: 1	Ice	Ice	Ice	Ice	8	1			Comments
		Parameter					TCLP VOCs	TCLP Pest.	TCLP Herb	TCLP SVOCs	TCLP Metals (lit, flashpoint)	Solid Waste characterization	VOCs			
9		WS-001-101211	10/12/11	1300	2	SO						2				
10		WA-001-101211	10/12/11	1315	9	W	5	1	1	1	1					
11		TB-002-101211	10/12/11	—	2	W							2			

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days ✓ 10 Days ___ 15 Days _____ Other
Requested Due Date _____

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Jayson Burkard	CH2M HILL		1900	FEDEX			
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
				[signature]	TA	10/12/11	1030
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier
Shipped: FX
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 500-40621-1

Login Number: 40621
List Number: 1
Creator: Lunt, Jeff T

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	2.2,2.4
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	

Laboratory reports are located on the CD on the inside cover of this report.

Appendix B
Plume 2 Numerical Groundwater Modeling Technical Memorandum

Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

Introduction

This technical memorandum documents the application of numerical groundwater flow and solute transport models that simulate groundwater conditions beneath an industrial area located within the Crab Orchard National Wildlife Refuge (CONWR). The industrial area is located approximately 4 miles southwest of Marion, Illinois (Figure B-1), south of Crab Orchard Lake. Numerical models were developed previously to support the development of feasibility studies focused on the Plumes 1 and 3 subarea of the industrial area (RMT 2000; 2003; 2004 and ENVIRON 2010). CH2M HILL updated the models to support the development of the *Focused Feasibility Study (FFS) Revision 4 for Plume 2 at PCB OU Site 33* (Revision 4 of the FFS). The locations of the plume subareas are illustrated in Figure B-2. The simulations documented in this technical memorandum focus on potential remedial alternatives associated with the Plume 2 subarea. Trichloroethene (TCE) is the contaminant of concern included in the numerical transport model discussed herein, because it is the most common contaminant of concern at the site, is present at the highest concentrations, and is the primary driver for environmental management of the site.

The primary modeling objective is to forecast a remediation timeframe (RTF) for each of the five remedial alternatives presented in Revision 4 of the FFS, so the potential relative benefits of implementing the alternatives can be evaluated. The RTF is defined as the time required after Calendar Year 2011 for TCE concentrations in groundwater to decrease to below the maximum contaminant limit of 5 micrograms per liter, which is the cleanup objective for groundwater at the site. The following remedial alternatives being evaluated as part of Revision 4 of the FFS are as follows:

- Alternative 1—No Action
- Alternative 2—Excavation and Long-Term Management
- Alternative 3—Soil Mixing with Zero Valent Iron and Long-Term Management
- Alternative 4—Thermal Conductive Heating and Long-Term Management
- Alternative 5—Long-Term Management

The groundwater model considered the following four treatment zone scenarios to help define a range of potential treatment areas for the remedial alternatives evaluated as part of Revision 4 of the FFS:

(1) No active treatment of the groundwater plume. This scenario represents the time to cleanup of the plume without implementing active remediation.

(2) Treatment of the source area indicative of nonaqueous phase liquid (NAPL) around SB-144 near Building I-1-2 (estimated as roughly 400 square feet).

(3) Treatment of the source area near Buildings I-1-2 and I-1-3 (less than 0.5 acres in size). The target treatment zone for this scenario included areas and depth intervals with soil concentrations of at least 10 mg/kg of TCE, to be consistent with the target treatment zone for excavation presented in the FFS Revision 3.

(4) Treatment of the entire 73-acre plume. This hypothetical case, which represents a remediation scenario that would not be possible to implement, was evaluated to determine the extreme end of range of calculable treatment times.

Scenario 1 was carried forward in the detailed evaluation of remedial alternatives for the purpose of addressing the no action and long-term management alternatives (Alternatives 1 and 5). The model forecasts essentially no difference in remediation timeframes between Scenarios 2 and 3. The results for Scenario 4, which represent a hypothetical and extreme remediation scenario, indicate that such an approach for the plume would not reduce the time to achieve cleanup standards below 100 years even for the lower range of biodegradation half-lives

considered. This was the basis for selecting Scenario 2 as the target treatment zone for active remedial alternatives (Alternatives 2, 3, and 4). The modeling results for these scenarios are presented below.

Model Construction

The simulations were conducted using updated versions of the numerical models previously developed by RMT (2000) (RMT Model) and subsequently modified by ENVIRON (2010) (ENVIRON Model). The most recent documentation for the models developed by RMT is found in Appendix B of the *Focused Feasibility Study, Revision 3, Crab Orchard National Wildlife Refuge, PCB Operable Unit – Sites 32/33* (RMT 2004), and the most recent documentation for the modifications ENVIRON made to RMT's models are found in Appendix R of the *Final (100%) Design Report for Groundwater Plumes 1 and 3, Crab Orchard National Wildlife Refuge PCB Areas Operable Unit* (ENVIRON 2010). The numerical models used for the simulations presented herein maintain the grid orientation and lateral distribution of active and inactive model cells as used in the ENVIRON Model. While the numerical models used for the simulations during this study were based primarily on the aforementioned versions developed previously for the site, some modifications were made as part of the analysis. The modifications were made based on additional data collected from the Plume 2 subarea as well as the need to provide finer discretization in the Plume 2 subarea. The groundwater flow model was modified during this analysis as follows:

- The grid cell spacing was reduced in the Plume 2 subarea to provide greater spatial resolution than the previous versions of the models.
- Model layer thicknesses were adjusted to improve consistency with lithologic information in available soil borings logs.
- A new layer was added to the bottom of the model to simulate the upper sedimentary bedrock.
- The distribution of hydraulic parameter values was adjusted in the Plume 2 subarea during calibration of the flow model.
- Boundary conditions from the ENVIRON Model were left largely unchanged, except for the removal of drain and river boundaries in layers below Model Layer 1. The boundary conditions were removed from lower model layers because it is physically more realistic to have them active in only the surficial model layer in the absence of physical subsurface drains.
- A variable land surface elevation was added to the top of Model Layer 1, and drain boundary elevations were adjusted accordingly.

In addition to changes made to the flow model, the solute transport model was reformulated as described later in this technical memorandum.

Code Selection

The groundwater flow model (GFM) was developed with the MODFLOW-2000 (MF2K) code (Harbaugh et al. 2000) to solve the groundwater flow equations and establish a set of steady-state groundwater elevations and associated fluxes. The MF2K code simulates single-density, three-dimensional (3D) groundwater flow through porous media using the finite-difference method (McDonald and Harbaugh 1988). The code expands upon the modularization approach that was originally included in MODFLOW (McDonald and Harbaugh 1988). As with previous versions of MODFLOW, the MF2K code requires consistent length and time units. The GFM was developed with input data expressed in length and time units of feet and days, respectively. The coordinate system and vertical datum used in the development of the GFM are Illinois State Plane East, 1983 North American Datum, and North American Vertical Datum of 1988, respectively.

The solute transport model (STM) was developed with the MT3DMS code (Zheng and Wang 1999), which was used in conjunction with MF2K to simulate the transport of TCE beneath the site. The modeling process includes running MF2K to establish a 3D representation of a groundwater flow system, followed by running MT3DMS to retrieve the necessary hydraulic results from MF2K and solving the governing solute transport equations necessary to simulate TCE transport processes. Thus, both MF2K and MT3DMS are required to simulate solute transport.

The MF2K and MT3DMS codes were selected for the following reasons:

- MF2K and MT3DMS have been benchmarked and verified, meaning that the numerical solutions generated by the codes have been compared with one or more analytical solutions, subject to scientific review, and are in wide use. Verification of the codes ensures that MF2K and MT3DMS can accurately solve the governing equations that constitute the mathematical models.
- Both codes are products of decades of development and are industry standards.
- CH2M HILL has experience using both codes for numerous project sites worldwide.

More complete descriptions of the modeling codes are available in their respective user's guides. The GFM and STM were developed with the aid of the pre- and postprocessing software, Groundwater Vistas, Version 6.0 (Environmental Simulations, Inc. 2011).

Groundwater Flow Model Development

Model Domain

The GFM grid mathematically represents an area of approximately 4 square miles, including and surrounding the industrial area. The grid is areally discretized into 154 columns and 145 rows. Model grid cells range in length from 7 to 330 feet. The GFM grid consists of 17,963 active cells per model layer, for a total of 125,741 total active cells.

The GFM is vertically stacked into 7 layers to provide a 3D representation of the subsurface system. The physical representation of each model layer differs, depending on location. Table B-1 lists the model layer designations along with their general characteristics.

TABLE B-1
Model Layer Definitions
Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

		Thickness (feet)	
Model Layer	**Description**	**Whole Domain**	**Plume 2 Vicinity[a]**
1	Upper Clay with Lenses of Sandy Silt and Clayey Sand	8 to 42	8 to 26
2	Upper Clay with Lenses of Sandy Silt and Clayey Sand	< 1 to 16	4 to 15
3	Upper Sand Grades Laterally into Upper Clay	< 1 to 17	< 1 to 14
4	Lower Clay with Lenses of Sandy Silt and Clayey Sand	< 1 to 16	1 to 12
5	Lower Clay with Lenses of Sandy Silt and Clayey Sand	< 1 to 45	<1 to 17
6	Lower Sand Grades Laterally into Lower Clay	< 1 to 41	<1 to 40
7	Upper Sedimentary Bedrock	10	10

[a] Refer to Figure B-2 for location of Plume 2 vicinity.

Topography

The previously developed numerical models did not account for changes in the land surface elevation (the top elevation of Model Layer 1 was a constant value of 435 feet). The updated GFM used a combination of Digital Elevation Model data obtained from the National Elevation Dataset[1], site-specific survey data, and site-specific Light Detection and Ranging data for the basis of land surface elevations. The data were contoured using the Surfer, Version 10, and assigned to the top of Model Layer 1. Land surface elevations range from approximately 405 to 450 feet above the North American Vertical Datum of 1988 (NAVD88).

[1] http://ned.usgs.gov/ (Accessed December 12, 2011.)

Subsurface Hydraulic Parameters

Subsurface hydraulic properties required by MF2K for a steady state solution include the horizontal and vertical hydraulic conductivity (K_h and K_v, respectively). The initial hydraulic parameters used in the GFM were based on the values used in the ENVIRON Model. Initial K_h values from the ENVIRON Model ranged from 0.003 to 40 feet per day (ft/day) across Crab Orchard National Wildlife Refuge.

To improve the fit between observed and simulated groundwater elevations in the Plume 2 subarea, field data and information from previous site characterization efforts were used as a basis to adjust parameter values. Data resulting from slug tests and aquifer tests in the Plume 2 area indicate K_h ranging from 0.004 to 25 ft/day (RMT 2004).

The K_v values were initially assigned according to an assumption of isotropy ($K_v = K_h$) for each model layer. The initial K_v values were also modified during the calibration process.

Boundary Conditions

Boundary conditions are mathematical statements (rules) that specify a water level or flux at particular locations within the model domain. The following four types of boundary conditions are used in the GFM:

1. **Specified-head:** Groundwater elevation is specified.
2. **Specified-flux:** Groundwater flux is specified.
3. **Head-dependent Flux:** A groundwater elevation is specified and groundwater flux is internally computed across the boundary using an appropriate flow equation.
4. **No-flow:** Groundwater can flow parallel to the boundary but not across it.

Figure B-3 and Table B-2 summarize the boundary conditions selected for the GFM.

TABLE B-2
Summary of Boundary Conditions
Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

Hydrologic Process	Specified-flux Boundary	Head-dependent Flux Boundary
Areal Groundwater Recharge from Precipitation	X	
Groundwater Interaction with Streams and Lakes		X
Evapotranspiration of Shallow Groundwater		X
Groundwater Pumping	X	
Groundwater Discharge to Land Surface		X

Figure B-3 depicts the assignment of boundary conditions in the GFM.

Specified-flux Boundary Conditions

The areal groundwater recharge from precipitation term applied to the top of Model Layer 1 represents the portion of infiltrated precipitation that collects on the water table. A value of 6 inches per year (in/yr) was used in the ENVIRON Model and served as the initial value used at the beginning of model calibration for Revision 4 of the FFS. The value was adjusted during model calibration.

A small amount of groundwater pumping is ongoing related to remedial activities in the Plumes 1 and 3 subarea. Pumping rates assigned in the ENVIRON Model were maintained for the simulations described herein.

Head-dependent Flux Boundary Conditions

A maximum rate of shallow groundwater evapotranspiration (ET) of 37 in/yr was assigned in the GFM, based on ET data reported in Winstanley et al. (2006). Rooting depths of 0, 1, and 5 feet below ground surface were assigned to areas beneath buildings, nonwooded areas, and wooded areas, respectively. Maximum ET of shallow groundwater occurs when the simulated water table in Model Layer 1 is at the land surface elevation. The rate of shallow

groundwater of ET decreases with a decreasing water table in Model Layer 1 within the rooting depth. Thus, the rooting depth represents the depth interval over which groundwater can be extracted by phreatophytes.

Wolf Creek, west of the site, was simulated using the river package of MF2K (ENVIRON 2010). The river stage and streambed hydraulic conductivity, which limits the water exchange between the river and groundwater in Model Layer 1, are input parameters. The river stage and streambed hydraulic conductivity values were taken directly from the ENVIRON Model.

The drain package of MF2K was applied to ephemeral surface water drainages and depressions in the land surface (ENVIRON 2010) in Model Layer 1. The drain package of MF2K removes excess water that would otherwise flood a cell and simulates the process of groundwater discharge to the land surface. The drain elevation and drain hydraulic conductivity, which limits the groundwater discharge rate to the land surface, are input parameters. The drain elevation and drain hydraulic conductivity values were initially taken directly from the ENVIRON Model.

No-flow Boundaries

The no-flow boundaries present in the ENVIRON Model were maintained for the current GFM, except at the bottom of the model. Because an additional model layer (Model Layer 7) was added to the bottom of the model, the location of the lower no-flow boundary was lowered by 10 feet from the bottom of Model Layer 6 to the bottom of Model Layer 7. Given the lack of available bedrock information, 10 feet was considered a sufficient upper thickness of sedimentary bedrock to include.

Solute Transport Model Development

TCE Transport Formulation

The STM uses a dual-domain (that is, dual-porosity) transport formulation, as opposed to a more traditional single-domain transport formulation. With single domain transport models, the porous medium is conceptualized as one transport domain with a user-defined distribution of effective (that is, mobile) porosity (θ_m). The θ_m represents the interconnected pore space in the subsurface where the dominant transport process is advection, as opposed to diffusion. For the purposes of this technical memorandum, dead-end pore spaces and low-permeability zones, where only very slow advection and diffusion are the dominant transport processes, are contained within the immobile porosity (θ_{im}). With single-domain transport models, it is assumed that all of the void space represented by the θ_m value is available for fluid flow and transport; however, the θ_{im} of the porous medium is ignored. Ignoring effects of the θ_{im} can be problematic for multi-decade old solute plumes, because the processes of very slow advection and diffusion have ample time to transmit some of the available solute mass into the less-mobile portions of the subsurface. Thus, the dual-domain transport formulation provides a mechanism for older plumes to persist for extended periods and more accurately reflects the physical system that most likely exists at the site.

The dual-domain transport formulation conceptualizes the porous medium with both a θ_m and θ_{im}, the sum of which equals the total porosity ($\theta_m+\theta_{im}=\theta_t$). When conceptualized in this manner, θ_m is essentially equivalent to the effective porosity. The dual-domain transport formulation was implemented to more accurately account for the entire θ_t with the goal of improving the predictive capabilities over what could have been achieved with a single-domain transport formulation, with respect to TCE persistence and mobility.

Because TCE concentrations have been detected at soil boring SB-144 in the Plume 2 vicinity near the bedrock-aquifer interface at concentrations near the TCE solubility limit, this area was identified as the source area indicative of NAPL (see Figure B-2 for the location of the source area indicative of NAPL). Dissolution of the source area indicative of NAPL provides a continuing source of TCE in the subsurface that could sustain the dissolved-phase TCE plume over a long period. To simulate the continuing TCE source, a slow biodegradation half-life value of 200 years was assigned to a single model cell representing the area and depth interval around SB-144 with the highest TCE detections in Model Layers 5 and 6, which was done so the highest TCE concentrations within the approximate source area indicative of NAPL in the STM would decay at a much slower rate than those in the dissolved-phase TCE plume area, thereby providing a long-lasting source of TCE around SB-144. Although the actual rate of dissolution in the source area indicative of NAPL is unknown, the approach provides a means of

sustaining a dissolved-phase TCE plume over a long period. Based on the existing chemical data, it is the only source area indicative of NAPL simulated in the STM. However, it is possible other source areas indicative of NAPL exist that have not been discovered that could prolong RTFs beyond those discussed herein if left untreated.

Soil-specific Transport Parameters

Soil-specific transport parameters include θ_t, bulk density (ρ_b), and fraction of organic carbon (f_{oc}). A ρ_b value of 1.70 grams per cubic centimeter (g/cm^3) was used in the model and taken from the ENVIRON Model. A θ_t term of 0.36 was computed from the ρ_b value and an assumed grain density (ρ_s) value of 2.65 g/cm^3, according to Equation B-1 as follows (Freeze and Cherry 1979):

$$\theta_t = 1 - \left(\rho_b / \rho_s \right) \qquad \text{(B-1)}$$

The θ_m term was assumed to equal 0.15 and the θ_{im} term was computed as the difference between θ_t and θ_m, or 0.21.

Data resulting from f_{oc} analyses of soil samples collected during drilling at the site indicate values between 0.26 and 0.84 percent. The f_{oc} value used to compute a solute distribution coefficient (K_d) in the model was the average value of 0.56 percent, as is discussed in the following subsection. Table B-3 lists the solute transport parameters.

TCE-specific Transport Parameters

TCE-specific transport parameters include the dispersivity, soil organic carbon-water partitioning coefficient (K_{oc}), single rate mass transfer (SRMT) coefficient, and first-order decay due to biodegradation. A longitudinal dispersivity value of 30 feet was assigned in the STM, based on Xu and Eckstein (1995), as modified by Al-Suwaiyan (1996) for a plume length (L) of approximately 1,600 feet, according to Equation B-2 as follows:

$$\text{Longitudinal Dispersivity} = 2.69 \left[log\left({}^{L}/_{3.28} \right)^{2.446} \right] \qquad \text{(B-2)}$$

Equation B-2 assumes length units of feet. Transverse and vertical dispersivity values of one-tenth (3 feet) and one-hundredth (0.3 foot) of the longitudinal dispersivity value, respectively, were assumed in the STM. The K_d is the product of the f_{oc} and K_{oc} and is used by the STM to compute TCE sorption to the porous medium that is in equilibrium with dissolved-phase TCE. A K_{oc} of 137 milliliters per gram (mL/g) (Jeng et al. 1992) yields a K_d value of 0.77 mL/g (0.0056 × 137 = 0.77).

TABLE B-3
Summary of Solute Transport Parameters
Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

Parameter	Modeled Value
Bulk Density, ρ_b (g/cm^3)	1.70 (ENVIRON 2010)
Mobile Porosity, θ_m	0.15 (assumed)
Immobile Porosity, θ_{im}	0.21 (calculated as θ_t - θ_m)
Total Porosity, θ_t	0.36 (calculated using Equation B-1)
Longitudinal Dispersivity (feet)	30 (calculated using Equation B-2)
Transverse Dispersivity (feet)	3 (assumed to be ten times less than longitudinal)
Vertical Dispersivity (feet)	0.3 (assumed to be one hundred times less than longitudinal)
Fraction of Organic Carbon, f_{oc} (percent)	0.56 (site data)
Soil Organic Carbon-Water Partitioning Coefficient, K_{oc} (mL/g)	137 (Jeng et al. 1992)
Solute Distribution Coefficient, K_d (mL/g)	0.77 (calculated as product of f_{oc} and K_{oc})
SRMT Coefficient, α (day^{-1})[a]	5×10^{-5} (55 years) (calculated)
Decay Half-life Within Source Area Indicative of NAPL (years)[b]	200 (assumed)
Biodegradation Half-life Beyond Source Area Indicative of NAPL (years)[c]	10 / 20 (assumed)

[a] Value in parentheses is the equivalent SRMT timescale, computed as [1÷SRMT Coefficient] and converted to years.
[b] Refer to Figure B-2 for the location of the source area indicative of NAPL.
[c] Values provided for two different assumed biodegradation half-lives of 10 and 20 years.

When an advecting solute undergoes first-order mass transfer between the mobile and immobile porosity domains, the reciprocal of the SRMT coefficient provides an approximation of the mean residence time of the solute in the immobile storage zone. Based on site histories presented in previous versions of the FFS (RMT 2000; 2003, 2004 and ENVIRON 2010), it was assumed that the TCE plume was emplaced beginning in the mid-1950s, approximately 55 years or 20,075 days ago. An estimate for the SRMT coefficient of 5×10^{-5} $days^{-1}$ ($1 \div 20{,}075$) was used in the transport simulations.

Time-series TCE data are not available in sufficient quantity to estimate biodegradation half-lives. Thus, biodegradation half-life values of 10 and 20 years were assumed in the simulations to assess their affect on the forecast TCE trends. The range was considered reasonable because it results in forecasts of future TCE trends that are generally consistent with historical trends. Continued groundwater monitoring would eventually provide valuable data to assess whether these biodegradation half-lives are reasonable. Table B-3 lists the solute transport parameters.

Initial TCE Conditions

The 3D, 2011 TCE distribution served as initial solute conditions in the STM. TCE concentrations were distributed according to screened interval and sample depth (model layer) in the mobile porosity domain. The same TCE concentrations were also assigned to the immobile porosity domain. Thus, at time-zero of the forecast simulations, the TCE concentrations were assumed to be in equilibrium between not only the dissolved and sorbed phases of the mobile porosity domain, but also between these phases of the immobile porosity domain. The STM was then run forward-in-time to forecast the potential fate and transport of TCE. Details of specific simulations are provided below.

Model Calibration

A stepwise calibration approach was implemented that included a combination of both manual and autocalibration techniques, as described in the following subsections.

Selection of Calibration Targets

Calibration targets are defined as the selected field-measured values that quantify hydrologic and chemical conditions of interest with consideration of data quality and reliability. Both qualitative and quantitative calibration targets were selected to evaluate the progress of calibration during development of the GFM and STM. Following is a discussion related to how the averaging period for the calibration target data was selected for the steady-state flow calibration, followed by a discussion related to the specific quantitative and qualitative calibration targets selected for this effort.

The quantity of groundwater elevation (head) data in the Plume 2 subarea is limited. No more than 10 groundwater-level measurements were available for any of the monitoring wells in this subarea. The period of record for most monitoring wells ranged from the late 1990s to 2011. The steady-state calibration head targets were calculated as the average of available groundwater-level data at each Plume 2 monitoring well.

Calibration summary statistics were computed to provide a quantitative measure of the ability of the GFM to replicate calibration-target heads. Head calibration was evaluated using a variety of summary statistics, including the following:

- Residual error, computed as the simulated head value minus the calibration-target head value
- Mean error (ME), computed as the sum of all residual errors divided by the number of observations (n)
- Coefficient of determination (R^2), computed as the square of the correlation coefficient
- Root mean squared error (RMSE), computed as the square root of the mean of all residual squared errors
- RMSE divided by the range of calibration-target head values (RMSE/Range)

Rather than setting arbitrary goals for individual summary statistics as part of quantitative calibration, the following general calibration goals were defined:

- To minimize spatial bias in residual errors
- To minimize residual error, ME, RMSE, and RMSE/Range values
- To have R^2 values as close to 1.00 as possible

Figure B-4 depicts the 16 locations of the quantitative calibration target-heads used to help calibrate the GFM.

Qualitative calibration targets refer to general observations of the field problem that were compared with model output. The qualitative targets include the following:

- Simulated vertical head-differences as compared with calibration target vertical head-differences at three locations.
- Simulated groundwater flow directions as compared to the observed Plume 2 shape
- Model forecast TCE trends after 2011 as compared with historical TCE trends at calibration target monitoring wells

Vertical head-difference well pairs were selected if the wells were spaced within 25 feet of each other, but screened in different depth intervals represented by different model layers. Calibration summary statistics were not used to quantify the ability of the model to replicate qualitative calibration targets values or observations.

Calibration Procedure

The general calibration procedure consisted of three phases. The first phase was initial manual calibration, which focused on defining locations with field-derived property values and establishing approximate hydraulic values that resulted in a reasonably close match to both quantitative and qualitative targets. The second phase implemented autocalibration techniques, which employed numerical optimization software to obtain the best fit to the quantitative calibration targets. The third phase involved interpreting the autocalibration results with respect to the quantitative and qualitative calibration targets and modifying parameter values to provide a better match to the conceptual site model.

Parameter values of the K_h, and K_v were adjusted during the calibration of the GFM and STM. Boundary condition values associated with the rate of areal groundwater recharge from precipitation was also adjusted during calibration.

Initial Manual Calibration Phase

During the first calibration phase, property zones were spatially defined and assigned values using a manual interactive technique, which involved manually running the simulations, comparing model results with qualitative and quantitative calibration targets to assess the progress of calibration, and making manual changes to parameter values and boundary conditions in areas where important calibration mismatches were noted for the next round of simulations. The procedure was repeated until only minor improvements in calibration were achieved with each round of simulations.

Autocalibration Phase

Parameter values and boundary conditions estimated during the first calibration phase were then adjusted with the aid of PEST (Doherty 2004 and 2010) autocalibration software. PEST uses a process of parameter modification and calibration target-matching that is similar to the manual interactive technique used by a groundwater modeler, but PEST has the advantage of being able to perform and analyze thousands of model simulations over a brief period, depending on model runtimes. Although PEST cannot exercise professional judgment, it can be guided by a professional who is familiar with the site and software.

Final Calibration Phase

Model output from PEST represents the best fit to the quantitative calibration targets. However, it is often necessary to modify the parameter values resulting from the autocalibration process in a way that takes advantage of the progress made by PEST, but better honors the conceptual site model. The product resulting from

this calibration procedure is a GFM and STM that takes advantage of numerical parameter estimation, professional judgment, and experience of engineers and scientists familiar with the site.

Calibration Results and Discussion

Locations of the calibration-target wells selected for this evaluation are depicted on Figure B-4. The target and simulated heads, along with their residual errors, are listed in Table B-4. Figure B-5 shows a scatterplot of simulated versus target head values. The purpose of computing summary statistics is to quantify the goodness-of-fit between simulated and target head data. Goodness-of-fit statistics that accompany model calibration are not necessarily good indicators of the predictive capabilities of a model. Summary statistics are highly sensitive to the number of observations, quality of measured data, and outlier data. Nevertheless, the summary statistics for data presented on Figure B-5 are as follows:

- ME = 0.74 feet
- RMSE = 2.23 feet
- Range in calibration target head values = 15.43 feet
- RMSE/Range = 14.4 percent
- R^2 = 0.83
- n = 16

The ME value of 0.74 foot indicates the GFM slightly overpredicts heads throughout the Plume 2 subarea, as shown by the slightly positive value. However, considering that the calibration target heads vary by more than 15 feet in the Plume 2 subarea, the ME, RMSE, and RMSE/Range are reasonably small. A well calibrated model should have mostly low residual errors, with some simulated heads occurring above and below their calibration target heads. Figure B-5 shows that points fall both above and below the 1:1 correlation line. However, there tends to be more values that fall above the 1:1 correlation line, illustrating the slight bias toward overpredicting heads.

TABLE B-4
Comparison of Simulated and Target Heads
Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

Location	Model Layer	Target Head[a] (ft NAVD 88)	Simulated Head (ft NAVD 88)	Residual Error[b] (ft)
33-341	2	414.57	414.50	-0.07
33-342	2	414.10	414.72	0.62
33MWC-01	1	414.47	415.47	1.00
33MWC-02	1	412.12	414.06	1.94
33MWC-03	1	415.74	415.76	0.02
33MWC-10	1	412.32	412.53	0.21
33MWC-11	1	412.62	412.30	-0.32
33MWC-12	1	412.13	412.28	0.15
33MWC-13	1	418.98	419.84	0.86
33MWC-14	2	418.82	417.24	-1.58
33MWC-24	6	418.85	417.20	-1.65
33MWC-33	3	412.14	411.00	-1.14
33MWC-35	6	408.99	409.29	0.30
33MWC-36	6	414.24	414.21	-0.03
33MWC-44	1	403.63	409.28	5.65
33MWC-45	3	403.55	409.46	5.91

[a]Calibration target head values = average groundwater elevation.
[b]Residual error computed as simulated head value minus the calibration-target head value.

The calibration summary statistics are heavily impacted by two calibration target head values at 33MWC-44 and 33MWC-45. The wells are collocated and screened in different depth intervals (Figure B-4). The GFM overpredicts heads by over 5 feet at each of these monitoring wells. The model struggles to match calibration target heads at these monitoring wells because they are lower than the elevation of Crab Orchard Lake. Thus, in the absence of groundwater pumping or a complex arrangement of hydraulic conductivity near these wells, the GFM does not match the calibration target heads at this location. Calibration summary statistics with the two outlier wells not included are as follows:

- ME = 0.02 feet
- RMSE = 0.95 feet
- Range in calibration target head values = 9.99 feet
- RMSE/Range = 9.5 percent
- R^2 = 0.89
- n = 14

The target and simulated vertical head-difference values, along with their residual errors, are listed in Table B-5. The GFM struggles to match vertical head-differences. Calibration to vertical head-difference would be better constrained if data were available from multi-depth aquifer tests; however, such data are not currently available.

TABLE B-5
Comparison of Simulated and Target Vertical Head-differences
Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

Upper/Lower Monitoring Well	Upper/Lower Layer	Target Vertical Head-difference[a] (feet)	Simulated Vertical Head-difference (feet)	Residual Error[b] (feet)
33MWC-13/33MWC-24	1/6	0.13	2.64	2.51
33MWC-33/33MWC-35	3/6	3.15	1.69	-1.46
33MWC-44/33MWC-45	1/3	0.08	-0.20	-0.28

[a]Calibration target head differences based on average groundwater elevations.
[b]Residual error computed as the simulated vertical head-difference minus the target vertical head-difference.

Figure B-6 shows the simulated potentiometric surface contours by model layer. The contours are in general agreement with the conceptual site model of groundwater flow. Groundwater generally flows semiradially outward from the Plume 2 groundwater recharge area toward Crab Orchard Lake. The contours are also consistent with the overall Plume 2 shape, with a significant westerly component to the groundwater flow direction, which corresponds to the longer limb of the plume to the west.

TABLE B-6
Calibrated Hydraulic Conductivity Values
Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

Model Layer	Description	K_h (ft/day)[a]	K_h:K_v Ratio[a]
1	Upper Clay with Lenses of Sandy Silt and Clayey Sand	0.05 to 20	1 to 8
2	Upper Clay with Lenses of Sandy Silt and Clayey Sand	0.05 to 10	1 to 42
3	Upper Sand Grades Laterally into Upper Clay	0.9 to 50	1
4	Lower Clay with Lenses of Sandy Silt and Clayey Sand	0.05	10 to 100
5	Lower Clay with Lenses of Sandy Silt and Clayey Sand	0.05	10 to 100
6	Lower Sand Grades Laterally into Lower Clay	0.002 to 40	1
7	Upper Sedimentary Bedrock	0.001	1

[a]Values represent the range in Plume 2 vicinity only (Figure B-2).
ft/day = feet per day

Table B-6 shows the calibrated K_h and K_h:K_v ratios used in the GFM. These values are in general agreement with estimates derived from field tests. The K_h and K_v values are also generally within the range of literature values for the materials present at the site. Calibration of hydraulic parameters would be better constrained if additional multi-depth aquifer testing was available. The calibrated areal groundwater recharge from precipitation is 3 in/yr.

Table B-7 summarizes the steady-state groundwater balance, which was created using output from the GFM. Given that the model is a steady-state model, the inflow and outflow rates are equal, at approximately 20 gallons per minute for the Plume 2 vicinity. Groundwater recharge from precipitation represents the largest inflow component to the overall groundwater budget, whereas subsurface outflow represents the largest outflow component for the Plume 2 vicinity. As a whole, the groundwater balance components and magnitudes appear reasonable for the area represented by the GFM.

Figure B-7 shows model forecast versus detected TCE concentrations at wells in the Plume 2 subarea. This figure shows two forecasts of TCE trends; one with a TCE biodegradation half-life of 20 years outside of the source area indicative of NAPL around SB-144 and the other with a TCE biodegradation half-life of 10 years in the same area. A TCE biodegradation half-life of 200 years was assigned in the source area indicative of NAPL with both sets of calibration simulations (Figure B-2). Because data were insufficient to calculate a site-specific biodegradation half-life, and recognizing that concentration forecasts are sensitive to this parameter, two values representing a range of plausible values are presented. The simulated TCE concentrations are generally consistent with the limited observed data. However, simulated TCE concentrations at several wells show a sharp increase from recently detected concentrations. This is because these wells are located downgradient of higher concentration areas of the TCE plume. This potential plume migration forecast by the GFM and STM could be confirmed with long-term groundwater monitoring.

TABLE B-7
Modeled Steady State Groundwater Balance
Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

Groundwater Inflow Rate (gpm)			Groundwater Outflow Rate (gpm)		
Inflow Component	**Whole Domain**	**Plume 2 Vicinity[a]**	**Outflow Component**	**Whole Domain**	**Plume 2 Vicinity[a]**
Groundwater Recharge from Precipitation	351	16	Groundwater Discharge to the Land Surface	4	0
Groundwater Recharge from Streams	46	0	Groundwater Discharge to Streams	25	0
Subsurface Inflow	0	4	Groundwater Pumping	5	0
Groundwater Recharge from Lake	53	0	ET of Shallow Groundwater	382	6
			Subsurface Outflow	0	14
			Groundwater Discharge to Lake	34	0
Total Groundwater Inflows	*450*	20	*Total Groundwater Outflows*	*450*	20

[a] Refer to Figure B-2 for location of Plume 2 vicinity.
Values presented are rounded to the nearest whole number.
gpm = gallons per minute

The process of calibrating the GFM and STM has resulted in models that are suitable for their intended application. The following are the primary attributes that make these models appropriate for their intended near-term uses:

- GFM is capable of simulating average heads to within an acceptable degree of accuracy to achieve its objective.
- GFM is capable of simulating groundwater flow directions with depth that are reasonable and consistent with field observations, where available.

- STM is capable of forecasting TCE trends that are similar to historical TCE trends.
- Numerical solutions are constrained by 16 target monitoring well locations that are spatially distributed throughout the Plume 2 area.

However, mathematical models can only approximate processes of physical systems. Models are inherently inexact because the mathematical description of the physical system is imperfect and the understanding of interrelated physical processes is incomplete. Nevertheless, the GFM and STM are useful tools that, when used carefully, can provide insight into processes of the physical system.

Time Discretization

The GFM was set up to simulate steady-state flow conditions, reflecting average groundwater elevations. As such, the hydraulics associated with the modeled groundwater flow system do not change with time, and groundwater inflows equal groundwater outflows to and from the model domain. A steady-state simulation was considered appropriate for this level of analysis given the primary model objective, and considering the limited availability of groundwater elevation data. The Preconditioned Conjugate Gradient 2 solver was used for the groundwater flow computations.

Durations of transport time steps of 5 to 91.25 days were selected for the STM along with an output time interval of 5 years. The Generalized Conjugate Gradient solver was used for the solute transport computations.

Model Application

The GFM was calibrated to simulate 3D, steady-state groundwater flow based on average groundwater elevation data. The steady-state head field provides a numerical framework for the simulation of solute transport. Although it is impossible to predict future hydrology and TCE conditions with certainty, the calibrated versions of the GFM and STM were used to forecast potential TCE plume conditions from current 3D distributions of TCE concentrations. The TCE concentration data in both soil and dissolved phases from the 2011 sampling events were distributed in the STM in the appropriate layers, and the model was run forward-in-time. The approach of starting with recent TCE conditions and looking forward-in-time is sufficient for achieving the primary model objective.

Model Setup for Predictive Simulations

Two different target treatment zones were assumed for the remedial alternatives to facilitate evaluating the potential benefit of implementing various in situ remedial alternatives. One target treatment zone included areas and depth intervals with soil concentrations of at least 10 milligrams per kilogram (mg/kg) of TCE, whereas the other target treatment area only included the source area indicative of NAPL around SB-144. Although five remedial alternatives are being evaluated in Revision 4 of the FFS, it was not necessary to run simulations for all five alternatives. The simulations focused on the size of the target treatment zone and the assumed biodegradation half-life of 10 versus 20 years. As such, a total of six simulations were sufficient to capture the variability in the remedial alternatives, whereby a treatment effectiveness of 99 percent was assumed for Alternatives 2 through 4 (Table B-8). The simulated source area indicative of NAPL, with an assumed biodegradation half-life of 200-years, was only applied to the 1 percent of the TCE assumed to remain in the mobile porosity of the target treatment zone for these alternatives.

TABLE B-8
Remedial Alternatives and Associated Model Simulations
Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

	Alternative				
	1 – No Action	**2 – Excavation**	**3 – Soil Mixing**	**4 – Thermal**	**5 – Management**
No Target Treatment Zone (Scenario 1)					
10-Year BHL	Simulation 1	---	---	---	Simulation 1
20-Year BHL	Simulation 2	---	---	---	Simulation 2
Source Area Indicative of NAPL Target Treatment Zone (Scenario 2)					
10-Year BHL	---	Simulation 5	Simulation 5	Simulation 5	---
20-Year BHL	---	Simulation 6	Simulation 6	Simulation 6	---
10 mg/kg Target Treatment Zone Target Treatment Zone (Scenario 3)					
10-Year BHL	---	Simulation 3	Simulation 3	Simulation 3	---
20-Year BHL	---	Simulation 4	Simulation 4	Simulation 4	---

BHL = biodegradation half-life

Model Application Results and Discussion

Figure B-8 shows the forecast TCE plume area as a function of time after 2011 for all simulations. As indicated by the simulated TCE chemographs (Figure B-7), a significant difference exists in the duration of the TCE plume depending on the assumed biodegradation half-life. Not only is the duration of the TCE plume significantly different between the 10- and 20-year biodegradation half-life simulations, but the simulation using the 20-year biodegradation half-life forecasts an expansion of the TCE plume area, whereas the 10-year biodegradation half-life simulation does not. This is because TCE mass destruction would be sufficient to cease expansion of the TCE plume with a quicker biodegradation half-life of 10 versus 20 years, according to the STM.

The results of Simulations 1 and 2 (Alternatives 1 and 5) show the impact of the continuing TCE source from the source area indicative of NAPL, most notably around 160 years and later for the 20 year biodegradation half-life, and around 110 years and later for the 10 year biodegradation half-life (Figure B-8). Modeling results indicate that a portion of the TCE plume could persist beyond 500 years after 2011 for both simulations if the source area indicative of NAPL is left untreated. Figure B-8 also shows that a significant portion of the RTF may be required to remediate the remaining 5 percent of the current TCE plume area, which illustrates how the slow process of matrix-diffusion of TCE from the immobile porosity can sustain plumes for long periods. Figure B-9 shows the forecast generalized TCE plume extents at selected times for each simulation. For each simulation, the TCE mass persists longest near the source area indicative of NAPL shown on Figure B-2.

Table B-9 summarizes the forecast RTFs for all six simulations. The model forecasts essentially no difference in RTFs between the source area indicative of NAPL target treatment zone and the 10 mg/kg TCE target treatment zone. The lack of difference in the RTFs results primarily from the relatively small size of the target treatment zones compared to the overall size of the groundwater TCE plume. A significant difference was forecast between the active treatment alternatives (Alternatives 2, 3, and 4) and the passive treatment alternatives (Alternatives 1 and 5) because a continuing TCE source was not assumed for Alternatives 2, 3, and 4 (Simulations 3 through 6). A continuing TCE source was not simulated for Alternatives 2, 3, and 4 because it was assumed that residual source area indicative of NAPL would be removed during implementation of each of these remedial alternatives.

TABLE B-9
Summary of Forecast Remediation Timeframes
Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

	Alternative				
	1 – No Action	**2 – Excavation**	**3 – Soil Mixing**	**4 – Thermal**	**5 – Management**
No Target Treatment Zone (Scenario 1)					
10-Year BHL	> 500	---	---	---	> 500
20-Year BHL	> 500	---	---	---	> 500
Source Area Indicative of NAPL Target Treatment Zone (Scenario 2)					
10-Year BHL	---	145	145	145	---
20-Year BHL	---	280	280	280	---
10 mg/kg Target Treatment Zone (Scenario 3)					
10-Year BHL	---	145	145	145	---
20-Year BHL	---	275	275	275	---

BHL = biodegradation half-life

An additional simulation was performed to estimate the RTF under an extreme hypothetical remediation scenario (Scenario 4) for illustrative purposes. Under this scenario, initial TCE concentrations within the mobile porosity were zeroed across the entire model domain, whereas initial TCE concentrations within the immobile porosity were reduced across the model domain by one order of magnitude. The concept of this simulation is to illustrate how the mass transfer process, with TCE back-diffusing from the immobile porosity to the mobile porosity, can sustain the mobile-phase TCE plume for several decades. Figure B-10 illustrates that even under the extreme reductions in initial TCE concentrations in this scenario, such an approach for the plume would not reduce the time to achieve cleanup standards below 100 years even for the lower range of biodegradation half-lives considered (10 years). According to the model, back-diffusion of TCE would regenerate a mobile-phase TCE plume over a period of approximately 10 years. After approximately 10 years, the mobile-phase TCE plume would stabilize for a few years and then retract over several decades.

Model Limitations

Predictive versions of the GFM and STM were used to simulate processes of the physical aquifer system at and surrounding the Plume 2 subarea. Models are imperfect in that they do not accurately describe all aspects of interrelated physical and chemical processes beneath a site. The sparse available hydraulic and chemical data limits the degree to which the model assumptions and results can be constrained. Thus, the modeling solutions discussed herein should be considered nonunique, meaning that different combinations of model parameter values could produce equally good fits to the calibration targets, but result in predictive results that are quite different. Groundwater flow directions in the future could also vary in response to future changes in hydrology, land use, and water use. Thus, groundwater flow and TCE migration pathways in the future will not necessarily follow those indicated with the STM. However, the forecasts described in this technical memorandum are considered plausible and reasonable, given the available data and sufficient for achieving the primary modeling objective.

Additional information related to the aquifer's physical and chemical parameters and their spatial distributions would help constrain the model. As more hydraulic and chemical data become available, hydraulic and chemical parameter values should be periodically evaluated and compared with those assigned in the GFM and STM. Obtaining the information would provide the opportunity to improve the conceptual site model and predictive capabilities of the GFM and STM. The modeling results should be scrutinized and used in conjunction with observational site data and professional judgment.

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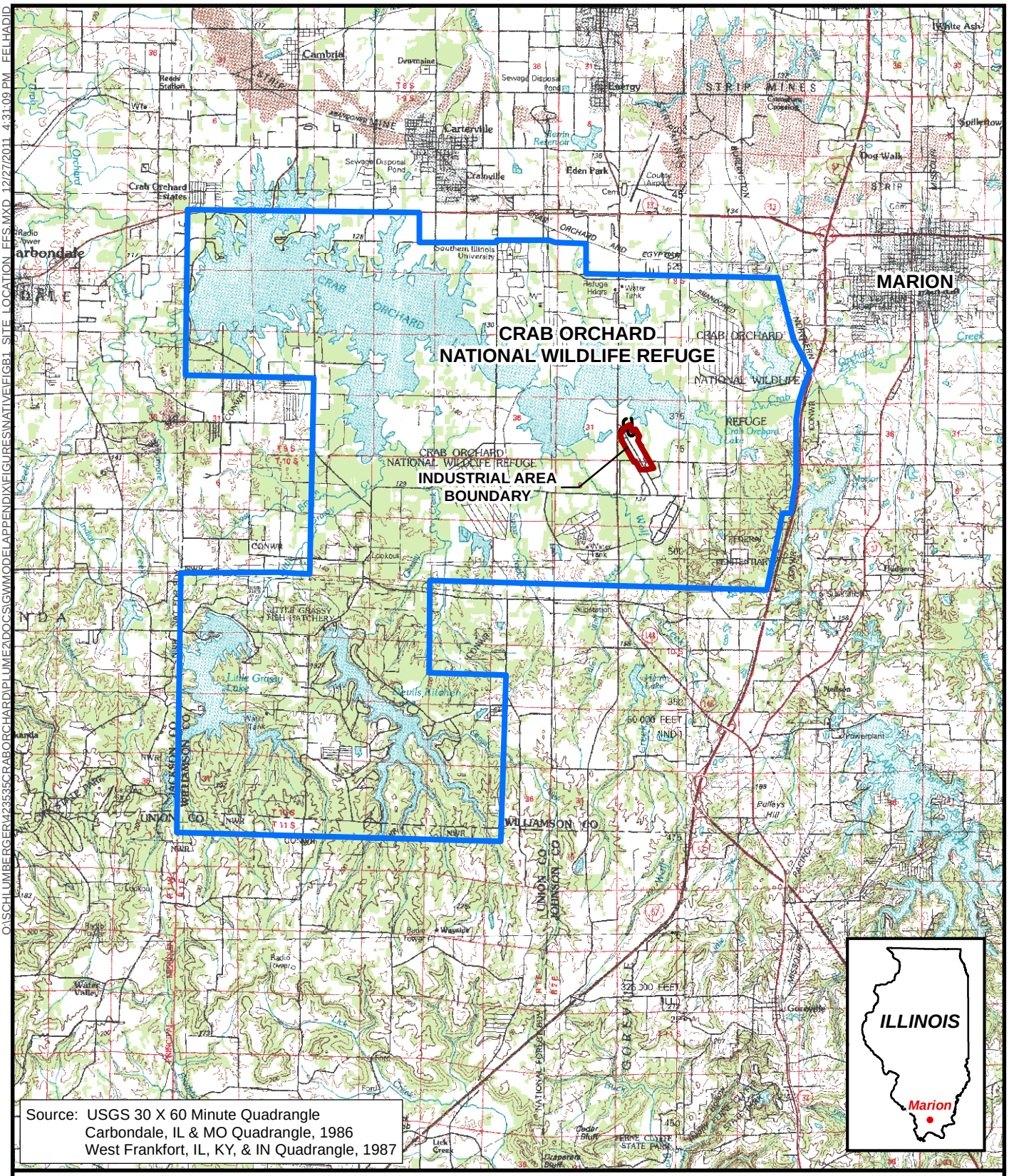

LEGEND

- Industrial Area Boundary
- Crab Orchard National Wildlife Refuge Boundary

0 12,000 24,000 Feet

N

FIGURE B-1
Site Location Map
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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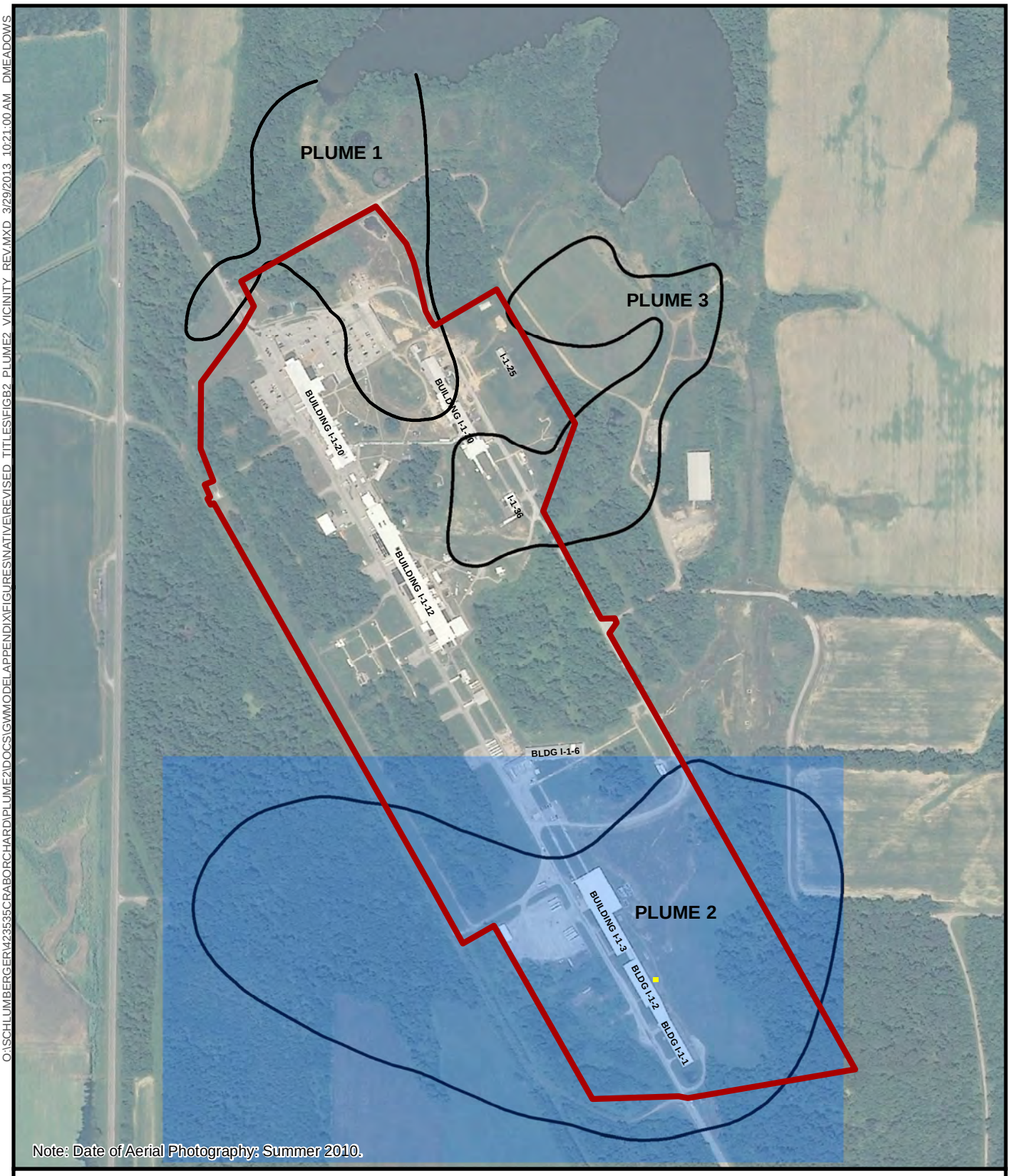

LEGEND

- Industrial Area Boundary
- TCE Concentration Contour (5 µg/L)
- Source Area Indicative of NAPL
- Plume 2 Vicinity

0 600 1,200 Feet

N

Note:

The Plume 2 5 µg/L contour is based on results from September 2011 groundwater sampling.

FIGURE B-2
TCE Plume Areas and Source Area Indicative of NAPL
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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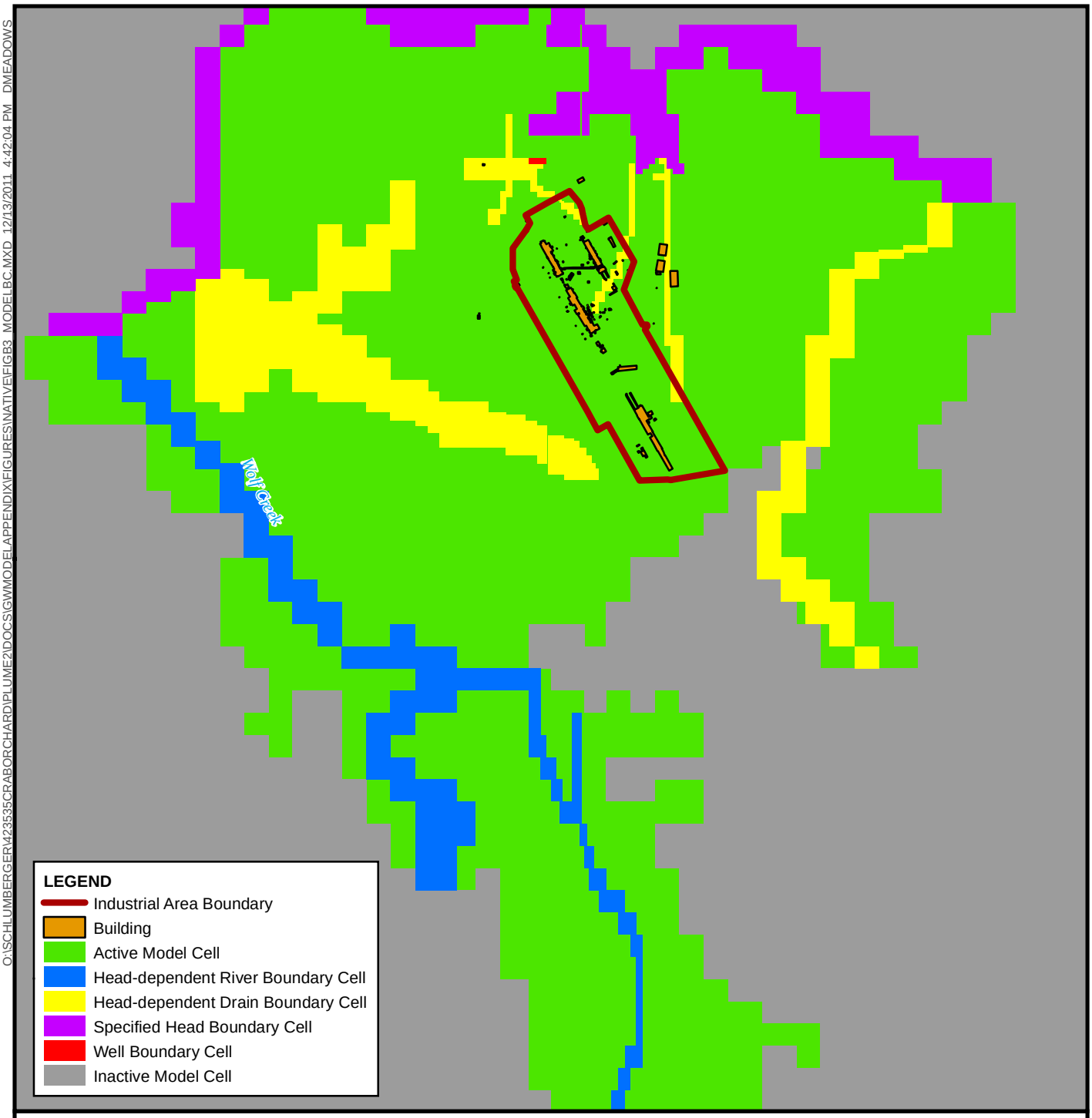

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Notes:

No flow boundaries are located along the margins in Model Layers 1 through 7 and at the bottom of Model Layer 1.

Areal groundwater recharge from precipitation (specified flux) and evapotranspiration of shallow groundwater (head-dependent flux) are assigned to all active model cells except for model cells associated with buildings.

0 2,000 4,000 Feet

N

FIGURE B-3
Model Boundary Conditions
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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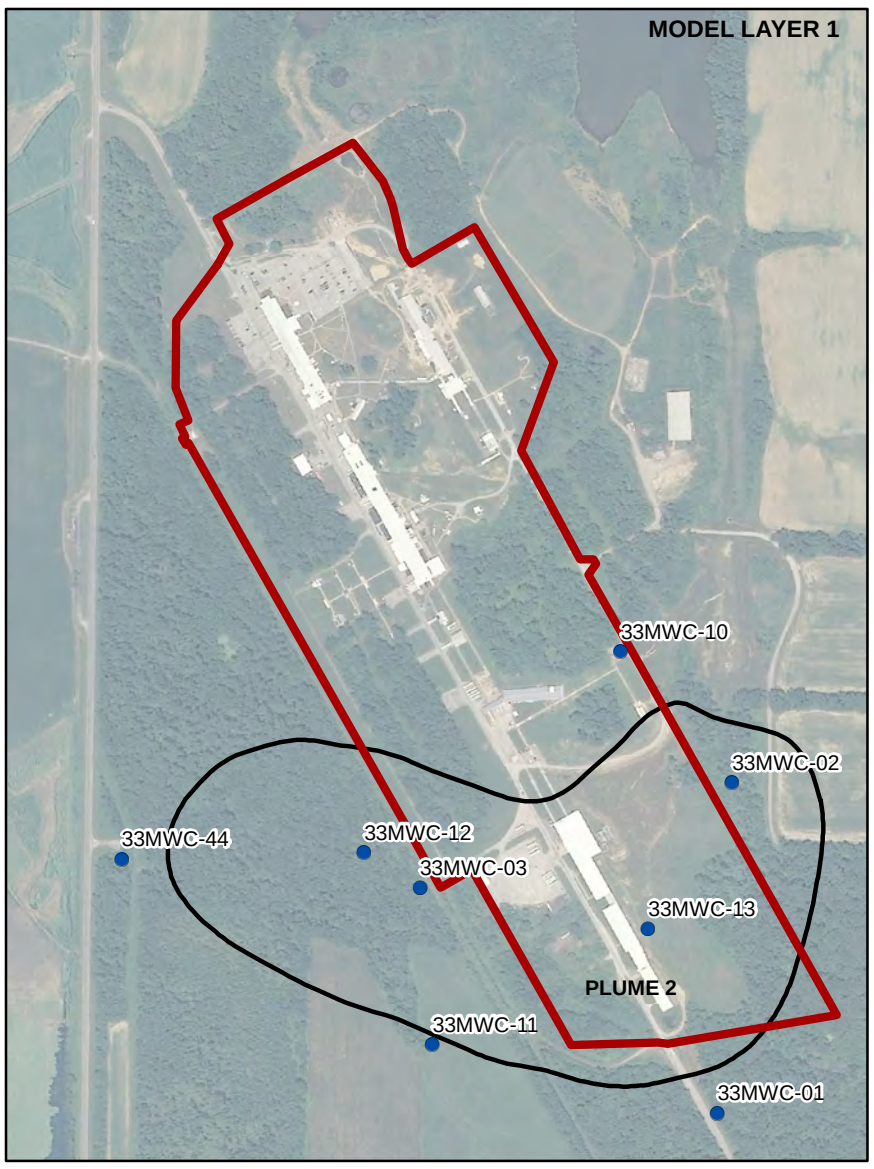

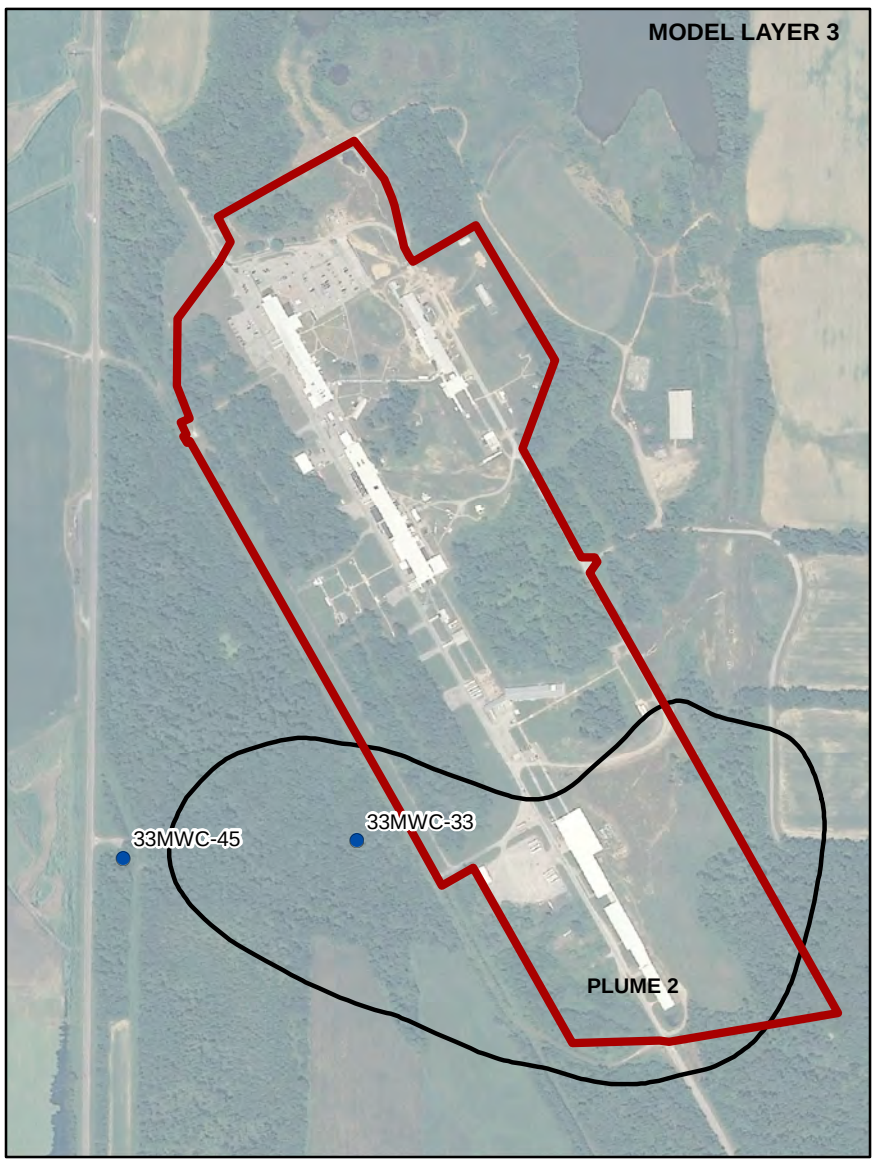

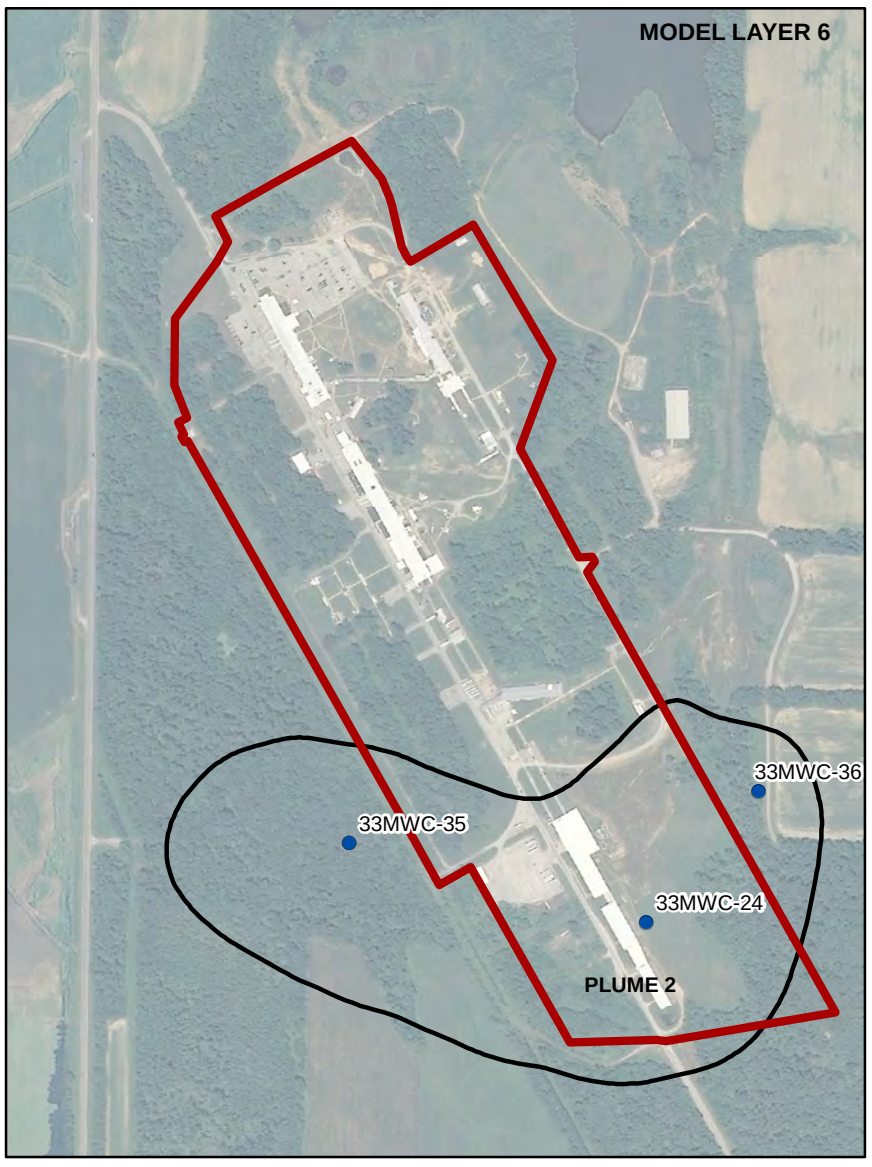

LEGEND

- Head Calibration Well Location
- TCE Concentration Contour (5 µg/L)
- Industrial Area Boundary

0 1,000 2,000 Feet

N

Notes:

See Table B-1 for description of model layers.

Head calibration well locations were assigned to model layers according to the midpoint of the screened interval.

No head calibration wells were assigned to Model Layers 4, 5, and 7.

Date of Aerial Photography: Summer 2010.

FIGURE B-4
Model Calibration Target Locations
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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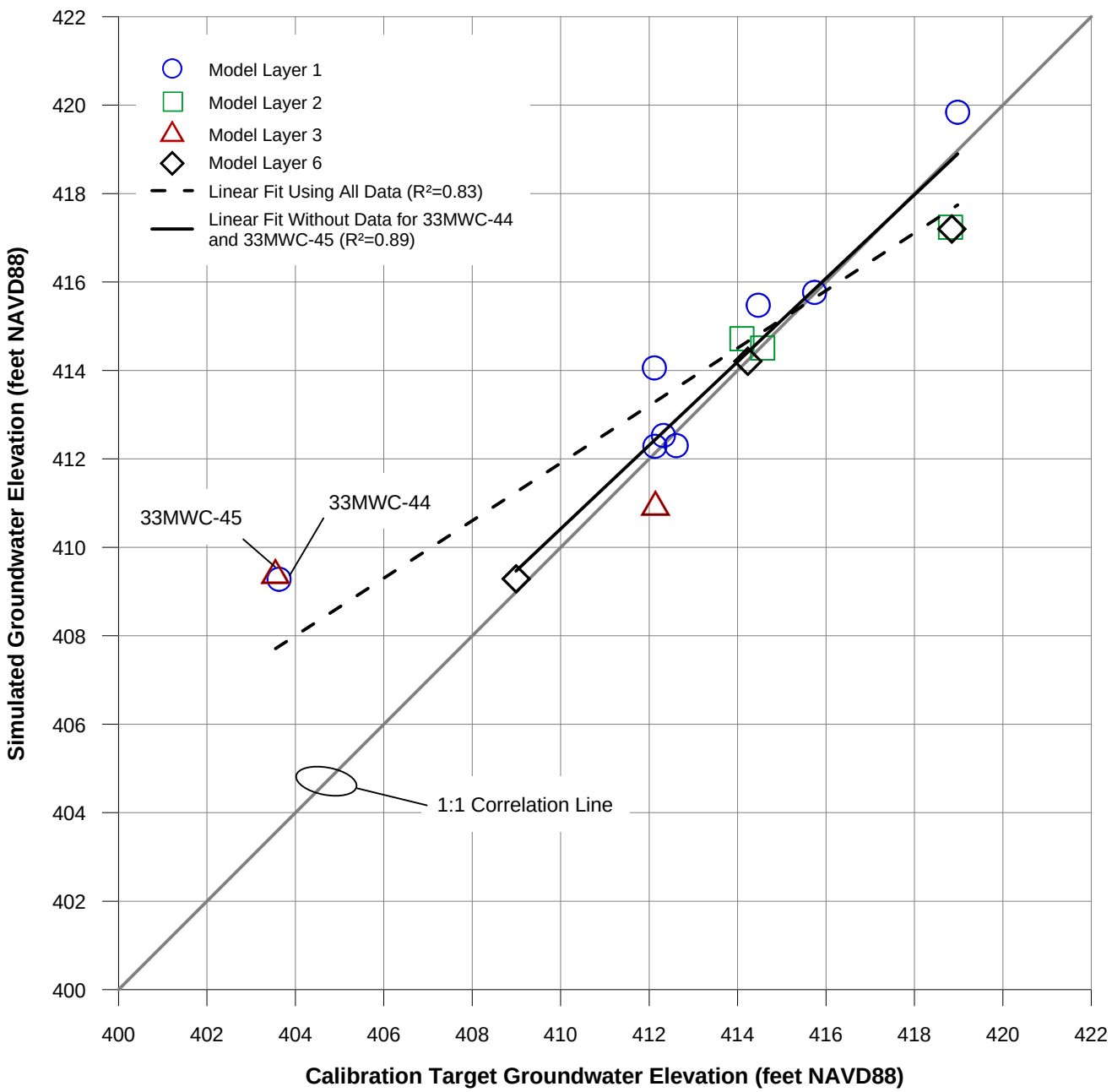

Summary Statistic	Using All Target Heads	Excluding 33MWC-44 and 33MWC-45
ME (feet)	0.74	0.02
RMSE (feet)	2.23	0.95
Range (feet)	15.43	9.99
RMSE/Range (percent)	14.4	9.5
R^2	0.83	0.89
n	16	14

FIGURE B-5
Simulated Versus Calibration Target Groundwater Elevations
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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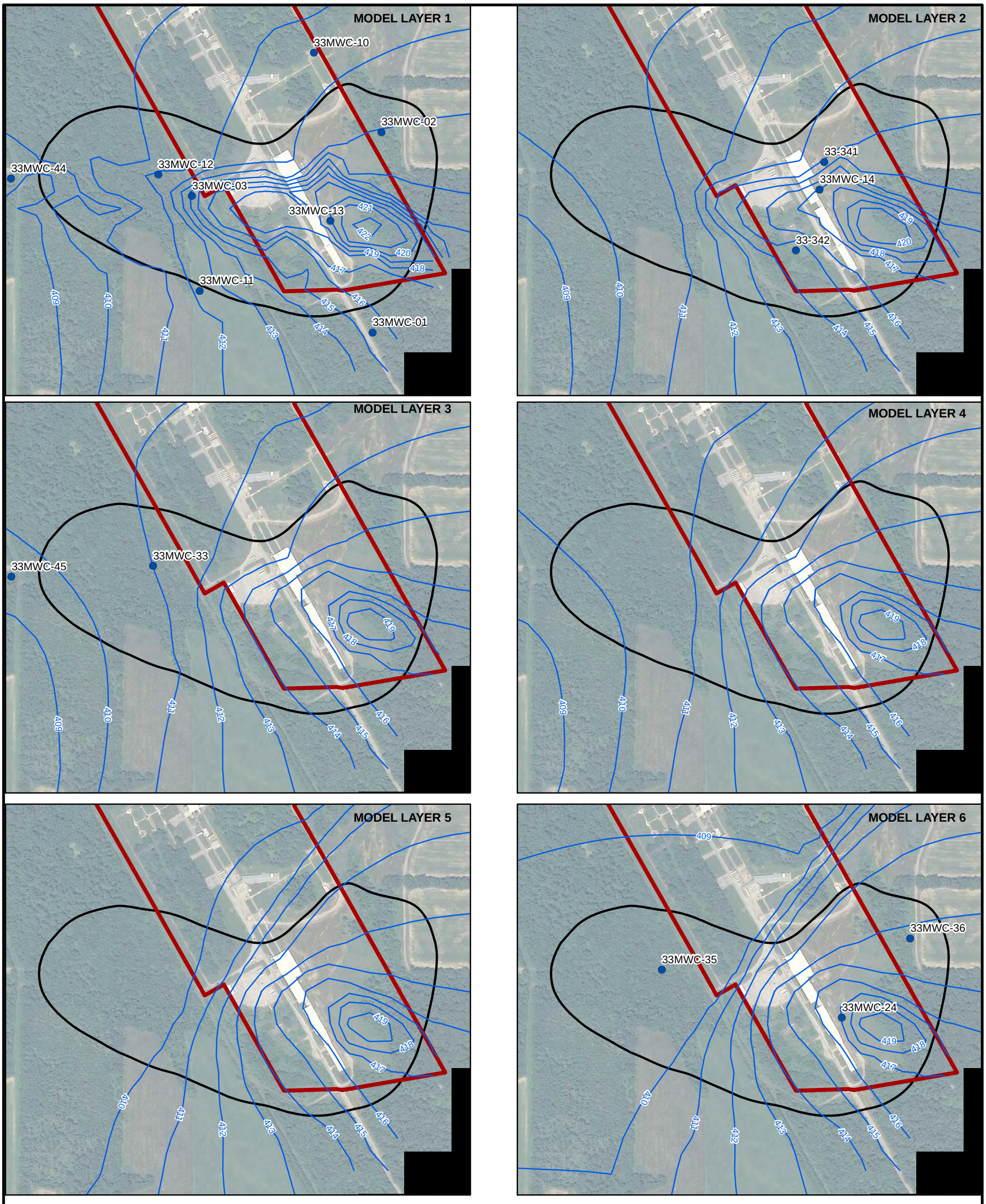

LEGEND

- Head Calibration Well Location
- Industrial Area Boundary
- Simulated Groundwater Elevation (ft NAVD 88)
- TCE Concentration Contour – Plume 2 (5 µg/L)
- Inactive Model Cell

Notes:

See Table B-1 for description of model layers.

Contour interval = 1 foot.

Date of Aerial Photography: Summer 2010.

0 700 1,400 Feet

N

FIGURE B-6
Simulated Potentiometric Surfaces
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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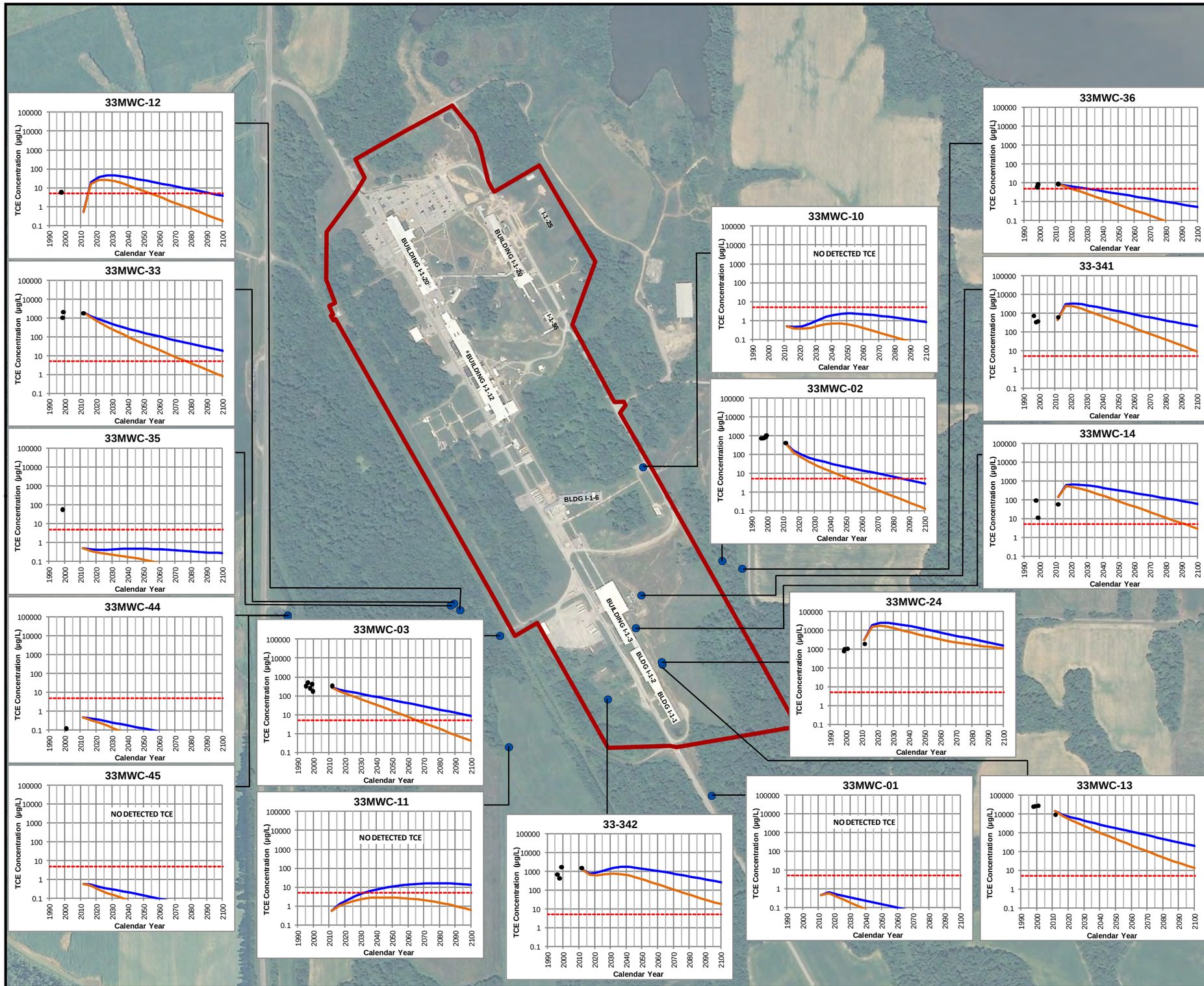

MAP LEGEND

- Calibration Target Well Location
- Industrial Area Boundary

GRAPH LEGEND

- Detected TCE Concentration (µg/L)
- Model Forecast TCE Concentration (µg/L) (Assuming a 20-year BHL)
- Model Forecast TCE Concentration (µg/L) (Assuming a 10-year BHL)
- TCE MCL (5 µg/L)

Notes:

A 200-year biodegradation half-life (BHL) was assigned inside the source area indicative of NAPL to account for NAPL dissolution. The 20- and 10-year BHLs indicated on the graphs were assigned outside the source area indicative of NAPL.

Date of Aerial Photography: Summer 2010.

0 600 1,200 Feet

N

FIGURE B-7
Detected and Model Forecast TCE Concentrations
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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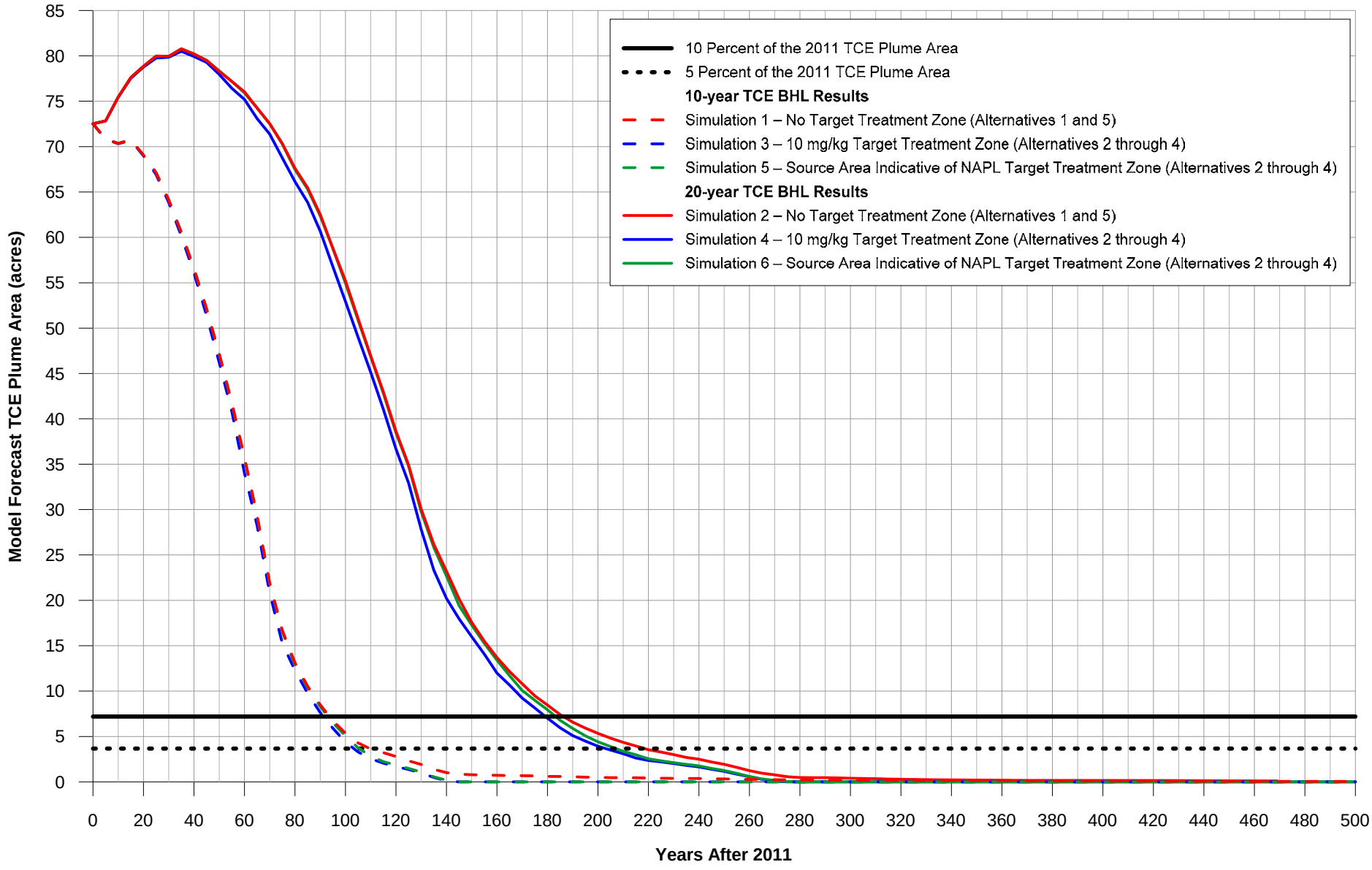

Notes:
1. BHL = Biodegradation Half-life.
2. TCE plume defined by a concentration of 5 µg/L.

FIGURE B-8
Model Forecast TCE Plume Area
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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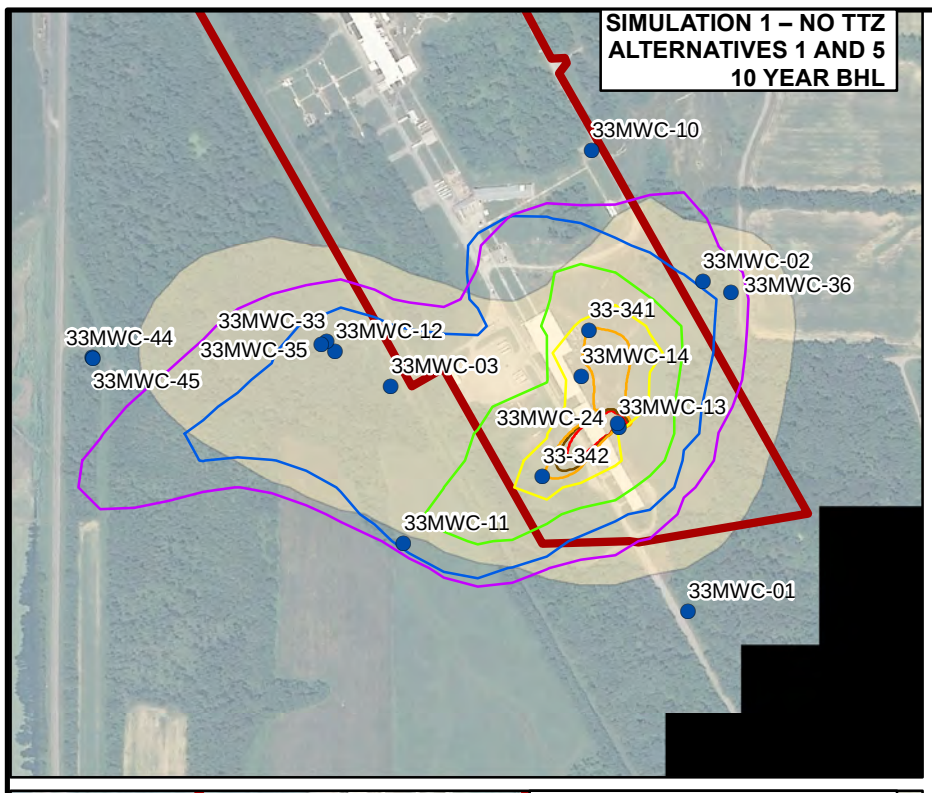

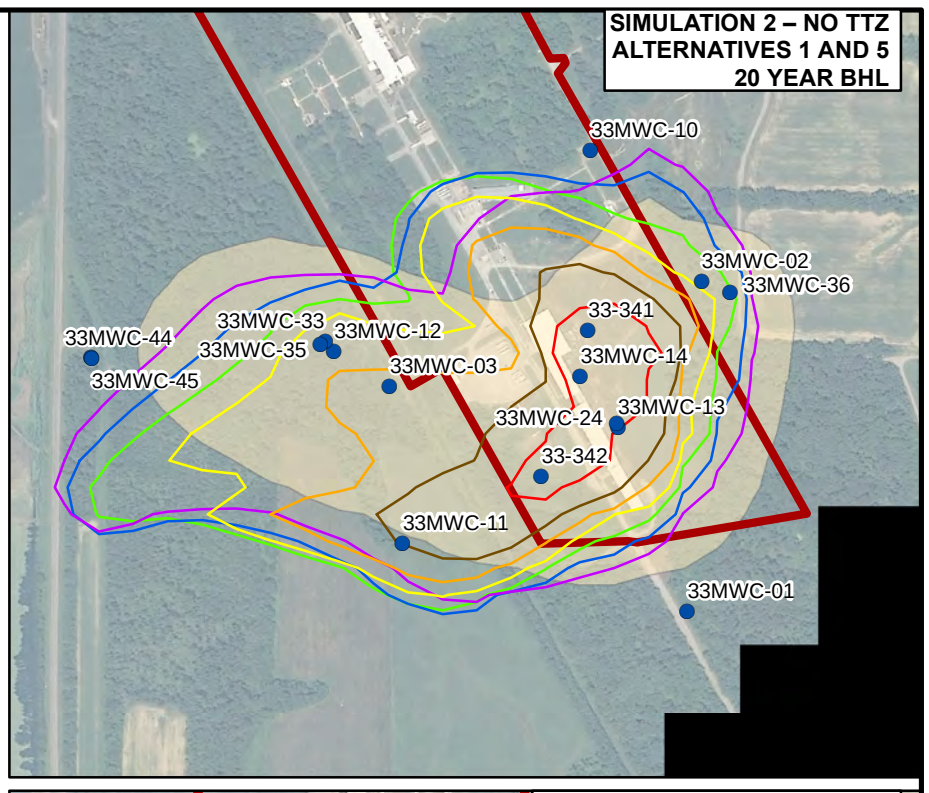

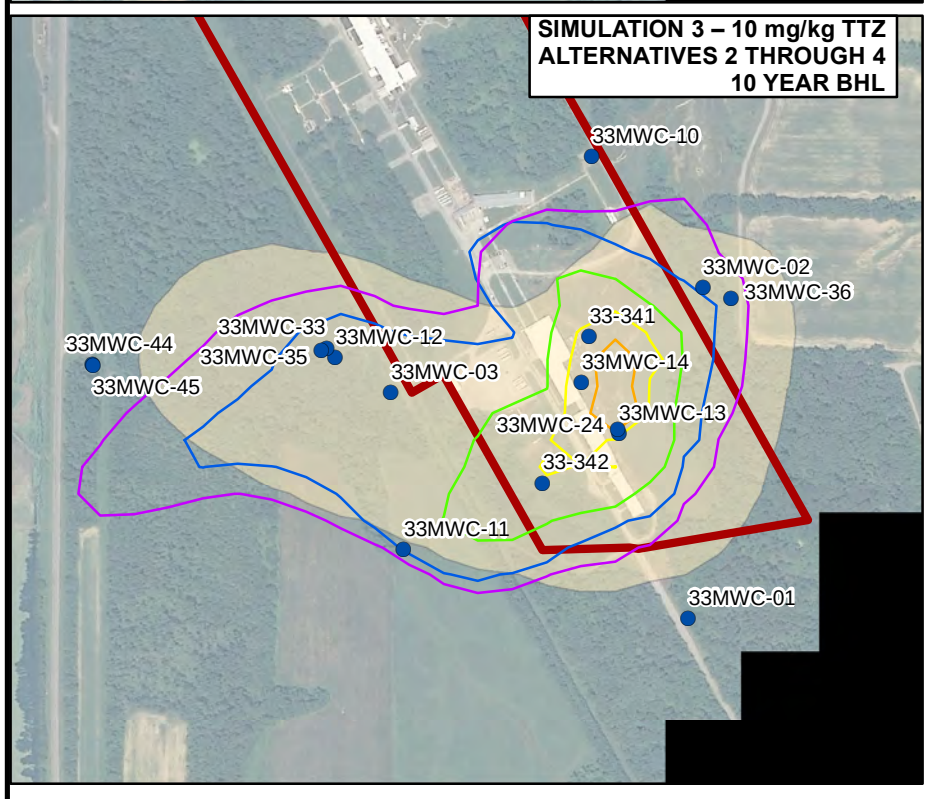

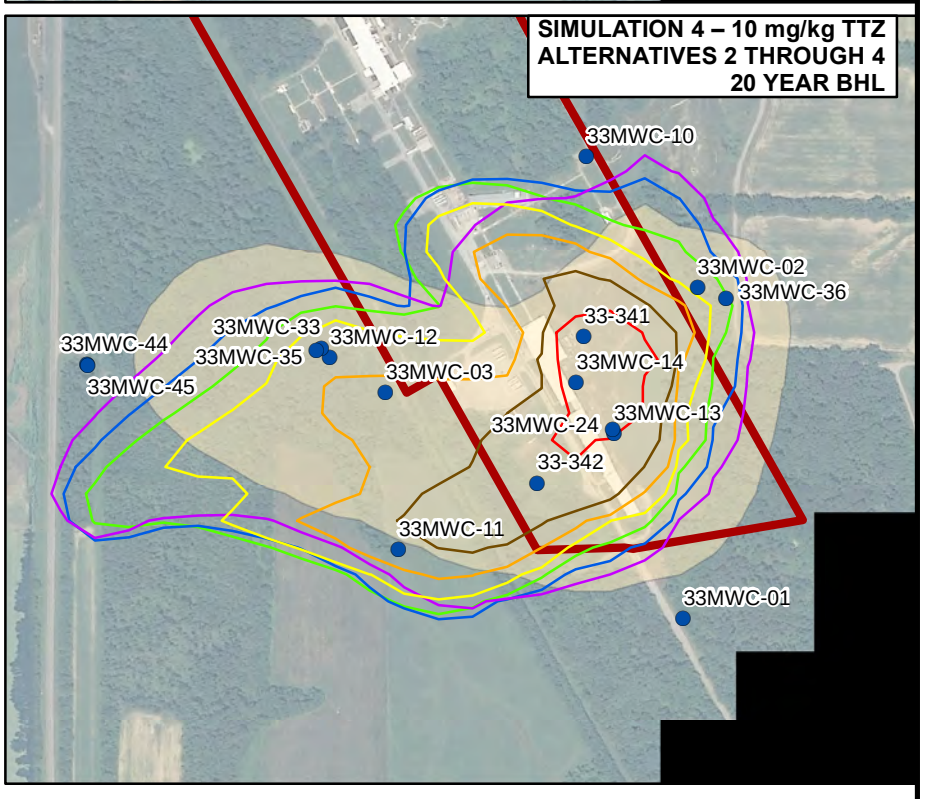

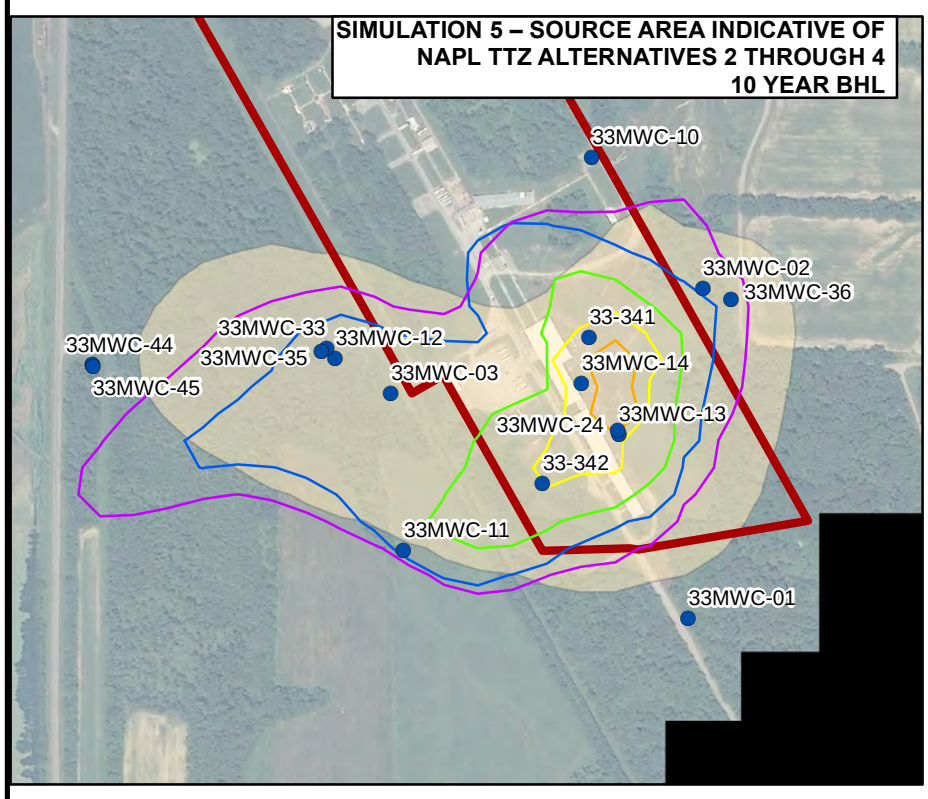

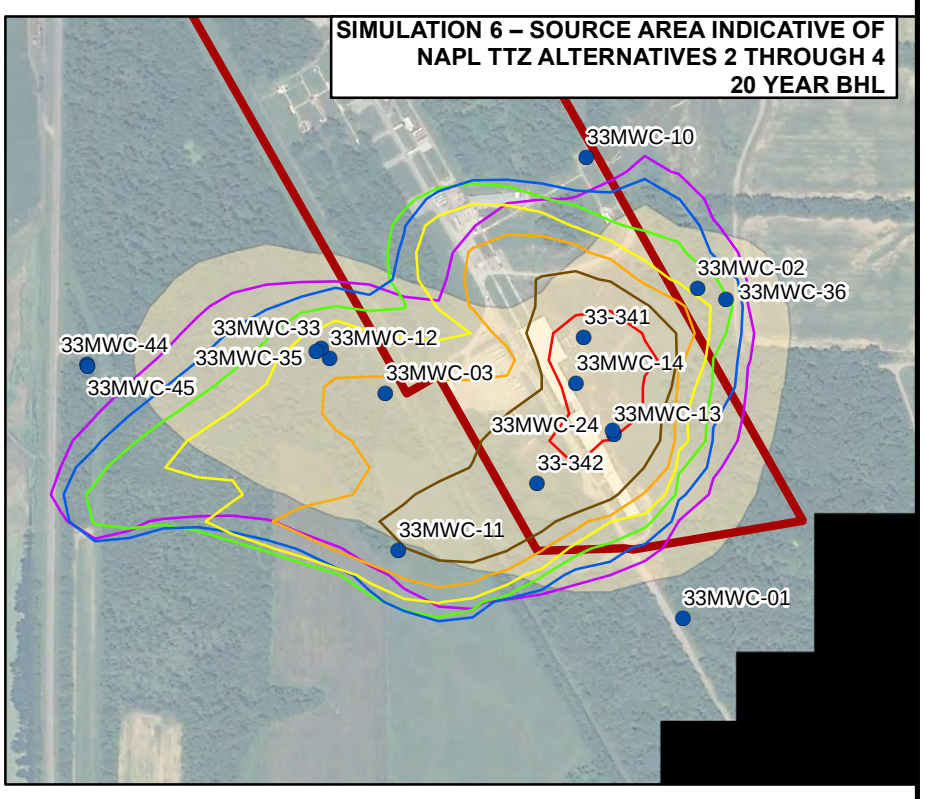

LEGEND

- Industrial Area Boundary
- Inactive Model Cell
- TCE Plume Extent at 0 Years (2011)
- TCE Plume Extent at 25 Years (2036)
- TCE Plume Extent at 50 Years (2061)
- TCE Plume Extent at 75 Years (2086)
- TCE Plume Extent at 100 Years (2111)
- TCE Plume Extent at 125 Years (2136)
- TCE Plume Extent at 150 Years (2161)
- TCE Plume Extent at 200 Years (2211)

0 700 1,400 Feet

N

Notes:

Forecast TCE plume areas represent the generalized maximum TCE plume extent in all model layers projected up to the land surface.

Date of Aerial Photography: Summer 2010.

mg/kg = milligrams per kilogram

TTZ = Target Treatment Zone

BHL = Biodegradation Half-Life

FIGURE B-9
Forecast TCE Plume Extent in Alluvium
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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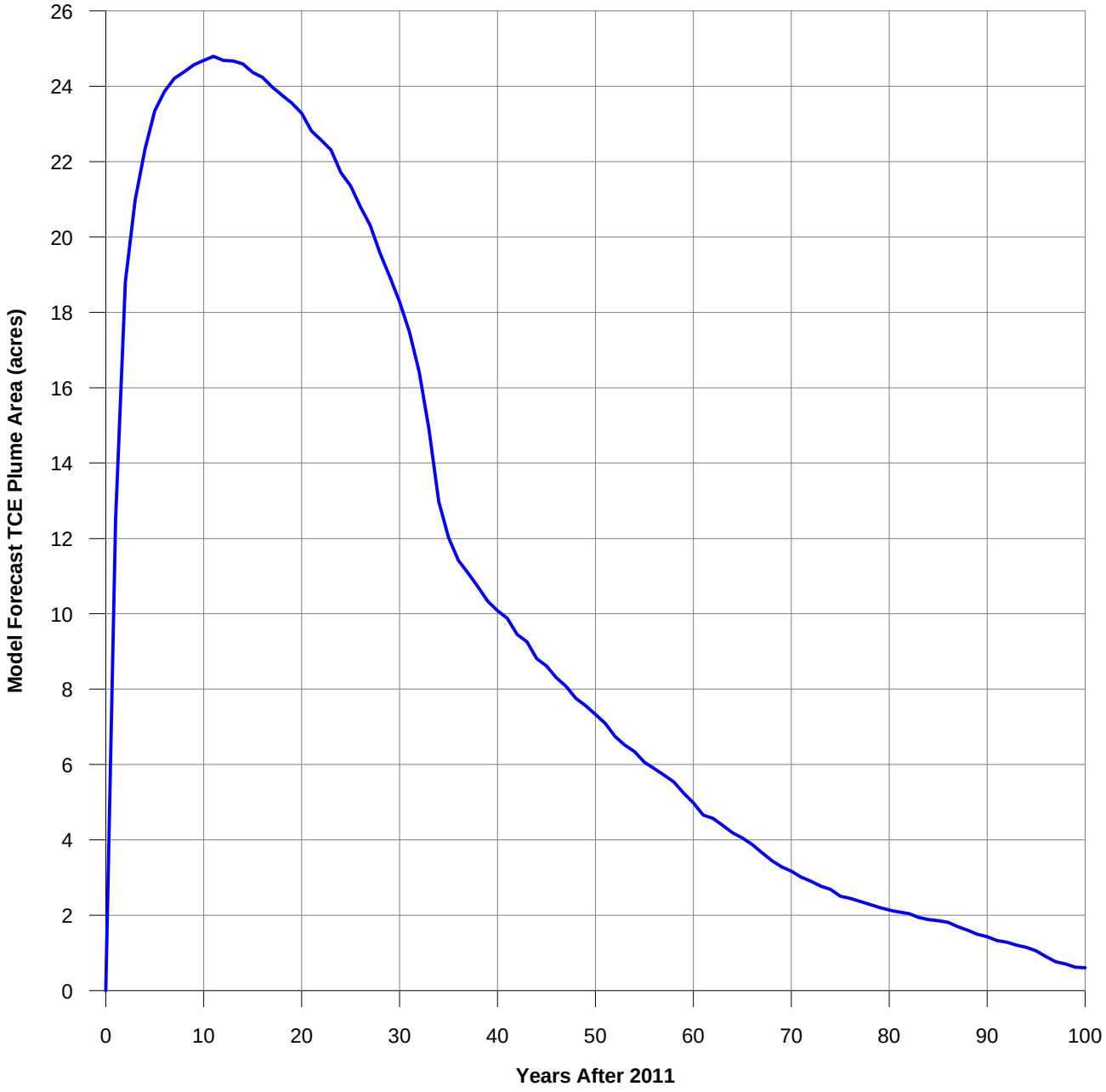

Notes:
1. Biodegradation half-life = 10 years.
2. TCE plume defined by a concentration of 5 µg/L.
3. Initial TCE concentrations within the mobile porosity were zeroed across the entire model domain, whereas initial TCE concentrations within the immobile porosity were reduced across the model domain by one order of magnitude.

FIGURE B-10
Model Forecast TCE Plume Area for Extreme Hypothetical Remediation Scenario

Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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Attachment 1

Appendix B, Attachment 1: Supplement to Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

Introduction

Appendix B of the *Focused Feasibility Study (FFS) Revision 4 for Plume 2 at PCB OU Site 33* (Revision 4 of the FFS) documents the application of numerical groundwater flow and solute transport models that simulate groundwater conditions beneath an industrial area located within the Crab Orchard National Wildlife Refuge (CONWR). The predictive solute transport simulations described in Appendix B were used to forecast a remediation timeframe (RTF) for each of the five remedial alternatives presented in Revision 4 of the FFS. The RTF is defined as the time required after Calendar Year 2011 for trichloroethene (TCE) concentrations in groundwater to decrease to below the maximum contaminant limit of 5 micrograms per liter, which is the cleanup standard for TCE in groundwater at the site. The following are the remedial alternatives being evaluated as part of Revision 4 of the FFS:

- Alternative 1—No Action
- Alternative 2—Excavation and Long-Term Management
- Alternative 3—Soil Mixing with Zero Valent Iron and Long-Term Management
- Alternative 4—Thermal Conductive Heating and Long-Term Management
- Alternative 5—Long-Term Management

The alternatives are described in detail in Revision 4 of the FFS.

Appendix B presents the development and calibration of the groundwater flow model and development of the solute transport model in detail. The results presented in Appendix B show that the RTF is sensitive to the assumed biodegradation half-life (BHL). Given the uncertainty in this parameter, Appendix B presents results from simulations using two different BHLs: 10 and 20 years. The results of the model forecast were illustrated in graphs on Figure B-7 for site monitoring wells. The simulated TCE concentrations are generally consistent with the observed data, indicating that the selection of the BHLs was reasonable for the model.

The model results are sensitive to the BHLs. While 10- and 20-year BHL simulations would be more consistent with the historical data of Plume 2, the U.S. Environmental Protection Agency (USEPA) suggested that a broader range of 5 to 20 years appeared justified based on published data and requested that the model to be rerun using a 5-year BHL simulation (see attached correspondence in Exhibit 1). While the 5-year BHL does not fit the historical data available for Plume 2 or the 10- and 20-year BHLs, additional simulations were performed in response to USEPA's request to investigate the effect of simulating a 5-year BHL.

This attachment to Appendix B presents the Scenarios 1 through 3 that the groundwater model considered in Appendix B for the 5-, 10-, and 20-year BHL. The extreme hypothetical remediation scenario (Scenario 4) evaluated in Appendix B was not rerun for the 5-year BHL.

Model Application

As described in Appendix B, the groundwater flow model (GFM) is calibrated to simulate three-dimensional (3D), steady-state groundwater flow based on average groundwater elevation data. The steady-state head field provides a numerical framework for the simulation of solute transport. Although it is impossible to predict future hydrology and TCE conditions with certainty, the calibrated versions of the GFM and solute transport model (STM) were used to forecast potential TCE plume conditions from current 3D distributions of TCE concentrations. The TCE concentration data in both soil and dissolved phases from the 2011 sampling events were distributed in the STM in the appropriate layers, and the model was run forward-in-time. The approach of starting with recent TCE conditions and looking forward-in-time is sufficient for achieving the primary model objective of forecasting RTFs.

Model Setup for Predictive Simulations

As described in Appendix B, Alternatives 1 and 5 consist of no active treatment of the TCE plume. Because TCE concentrations have been detected at soil boring SB-144 in the Plume 2 vicinity near the bedrock-aquifer interface at concentrations near the TCE solubility limit, the area was identified as the source area indicative of nonaqueous phase liquid (NAPL) (see Figure B1-1 for the location of the source area indicative of NAPL). Dissolution of the source area indicative of NAPL provides a continuing source of TCE in the subsurface that could sustain the dissolved-phase TCE plume over a long period. To simulate the continuing TCE source in Alternatives 1 and 5, a slow biodegradation half-life value of 200 years was assigned to a single model cell representing the area and depth interval around SB-144 with the highest TCE detections in Model Layers 5 and 6. This was done so the highest TCE concentrations within the approximate source area indicative of NAPL in the STM would decay at a much slower rate than those in the dissolved-phase TCE plume area, thereby providing a long-lasting source of TCE around SB-144. Although the actual rate of the dissolution of the source area indicative of NAPL is unknown, the approach provides a means of sustaining a dissolved-phase TCE plume over a long period in the STM.

Two different target treatment zones were assumed for the remedial alternatives (Alternatives 2 through 4) to facilitate evaluating the potential benefit of implementing various in situ remedial alternatives. One target treatment zone included areas and depth intervals with soil concentrations of at least 10 milligrams per kilogram (mg/kg) of TCE, whereas the other target treatment zone only included the source area indicative of NAPL around SB-144. Although five remedial alternatives are being evaluated in Revision 4 of the FFS, it was not necessary to run simulations for all five alternatives. The simulations focused on the size of the target treatment zone and the assumed BHLs of 5, 10, and 20 years. As such, nine simulations were sufficient to capture the variability in the remedial alternatives, whereby a treatment effectiveness of 99 percent was assumed for Alternatives 2 through 4 (Table B1-1). The simulated source area hot spot, with an assumed biodegradation half-life of 200-years, was only applied to the TCE assumed to remain in the mobile porosity of the target treatment zone for these alternatives.

TABLE B1-1
Remedial Alternatives and Associated Model Simulations
Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

	Alternative				
	1 – No Action	**2 – Excavation**	**3 – Soil Mixing**	**4 – Thermal**	**5 – Management**
No Target Treatment Zone (Scenario 1)					
5-Year BHL	Simulation 7	---	---	---	Simulation 7
10-Year BHL	Simulation 1	---	---	---	Simulation 1
20-Year BHL	Simulation 2	---	---	---	Simulation 2
Source Area Indicative of NAPL Target Treatment Zone (Scenario 2)					
5-Year BHL	---	Simulation 9	Simulation 9	Simulation 9	---
10-Year BHL	---	Simulation 5	Simulation 5	Simulation 5	---
20-Year BHL	---	Simulation 6	Simulation 6	Simulation 6	---
10 mg/kg Target Treatment Zone (Scenario 3)					
5-Year BHL	---	Simulation 8	Simulation 8	Simulation 8	---
10-Year BHL	---	Simulation 3	Simulation 3	Simulation 3	---
20-Year BHL	---	Simulation 4	Simulation 4	Simulation 4	---

Model Application Results and Discussion

Figure B1-2 shows model forecast versus detected TCE concentrations at wells in the Plume 2 subarea. The figure shows three forecasts of TCE trends using TCE BHLs of 5, 10, and 20 years outside of the source area indicative of NAPL around SB-144. As indicated by the simulated TCE chemographs (Figure B1-2), a significant difference exists in the duration of the TCE plume depending on the assumed BHL.

The results of Simulations 1, 2, and 7 (Alternatives 1 and 5) show the impact of the continuing TCE source from the source area indicative of NAPL (Figure B1-3). Modeling results indicate that a portion of the TCE plume could persist beyond 500 years after 2011 if the source area indicative of NAPL is left untreated, regardless of the BHL assumed in the model domain beyond the source area indicative of NAPL model cells.

Table B1-2 summarizes the forecast RTFs for all nine simulations. The model forecasts essentially no difference in RTFs between the 10 mg/kg TCE target treatment zone and the source area indicative of NAPL target treatment zone. The similarity in the RTFs results primarily from the relatively small size of the target treatment zones compared to the overall size of the groundwater TCE plume.

A significant difference was forecast between the active treatment alternatives (Alternatives 2, 3, and 4) and the passive treatment alternatives (Alternatives 1 and 5) because a continuing TCE source was not assumed for Alternatives 2, 3, and 4 (Simulations 3 through 6, 8, and 9). A continuing TCE source was not simulated for Alternatives 2, 3, and 4 because it was assumed that the residual source area indicative of NAPL would be removed during implementation of each of the remedial alternatives.

Accordingly, source-area hot spot treatment would provide a significant benefit to remedy performance as compared to passive treatment alternatives. However, no additional benefit to remedy performance would arise from selection of the larger target treatment zone.

TABLE B1-2
Summary of Forecast Remediation Timeframes
Plume 2 Numerical Groundwater Modeling: Crab Orchard National Wildlife Refuge, Marion, Illinois

	Alternative				
	1 – No Action	**2 – Excavation**	**3 – Soil Mixing**	**4 – Thermal**	**5 – Management**
No Target Treatment Zone (Scenario 1)					
5-Year BHL	> 500	---	---	---	> 500
10-Year BHL	> 500	---	---	---	> 500
20-Year BHL	> 500	---	---	---	> 500
Source Area Indicative of NAPL Target Treatment Zone (Scenario 2)					
5-Year BHL	---	75	75	75	---
10-Year BHL	---	145	145	145	---
20-Year BHL	---	280	280	280	---
10 mg/kg Target Treatment Zone (Scenario 3)					
5-Year BHL	---	75	75	75	---
10-Year BHL	---	145	145	145	---
20-Year BHL	---	275	275	275	---

Table B1-2 shows a significant difference in RTF depending on the assumed BHL outside of the source area indicative of NAPL for the remedial alternative simulations. For the remedial alternative simulations, RTFs range from 75 years (assuming a 5-year BHL) to 280 years (assuming a 20-year BHL). However, the comparison between

forecast and detected TCE concentrations at wells in the Plume 2 subarea (Figure B1-2) indicates that the 5-year BHL is likely overly optimistic. The graphs for each monitoring well shown within Figure B1-2 provide a forecast of the concentration of TCE at that location over time for the three BHLs modeled. While the amount of actual data is limited, the forecast concentrations for the 10- and 20-year BHLs align more closely with the historical data.

The model results presented in Table B1-2 also indicate that the RTFs estimated for treatment Alternatives 2, 3 and 4 do not vary between either remediating the Source Area Indicative of NAPL Target Treatment Zone (Scenario 2) or the much larger area of the 10mg/kg Target Treatment Zone (Scenario 3), with the exception of the 20-year BHL simulation showing a marginal reduction of RTF of 5 years between Scenario 2 and 3.

Figures

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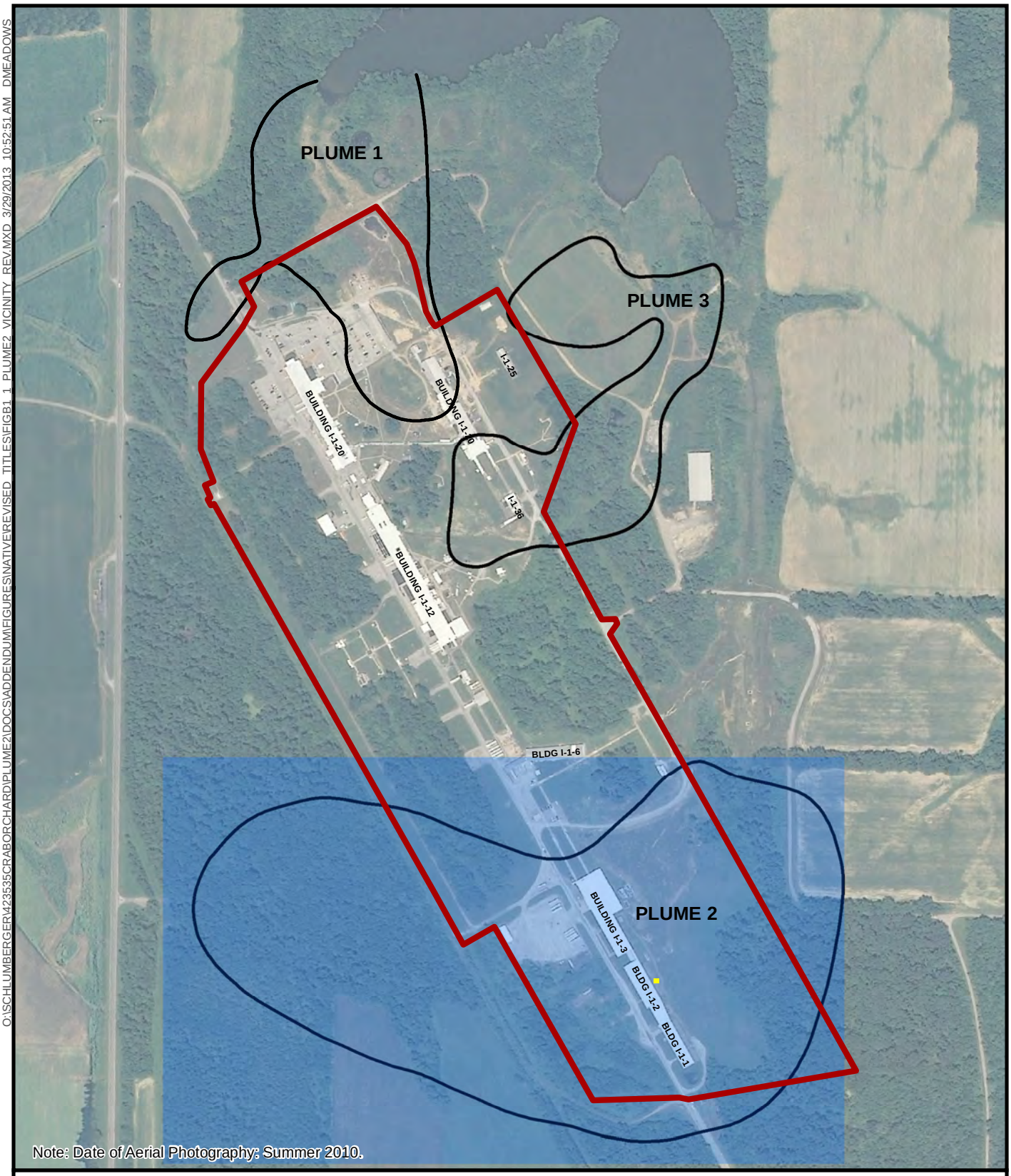

LEGEND

- Industrial Area Boundary
- TCE Concentration Contour (5 µg/L)
- Source Area Indicative of NAPL
- Plume 2 Vicinity

0 600 1,200 Feet

N

Note:

The Plume 2 5 µg/L contour is based on results from September 2011 groundwater sampling.

FIGURE B1-1
TCE Plume Areas and Source Area Indicative of NAPL
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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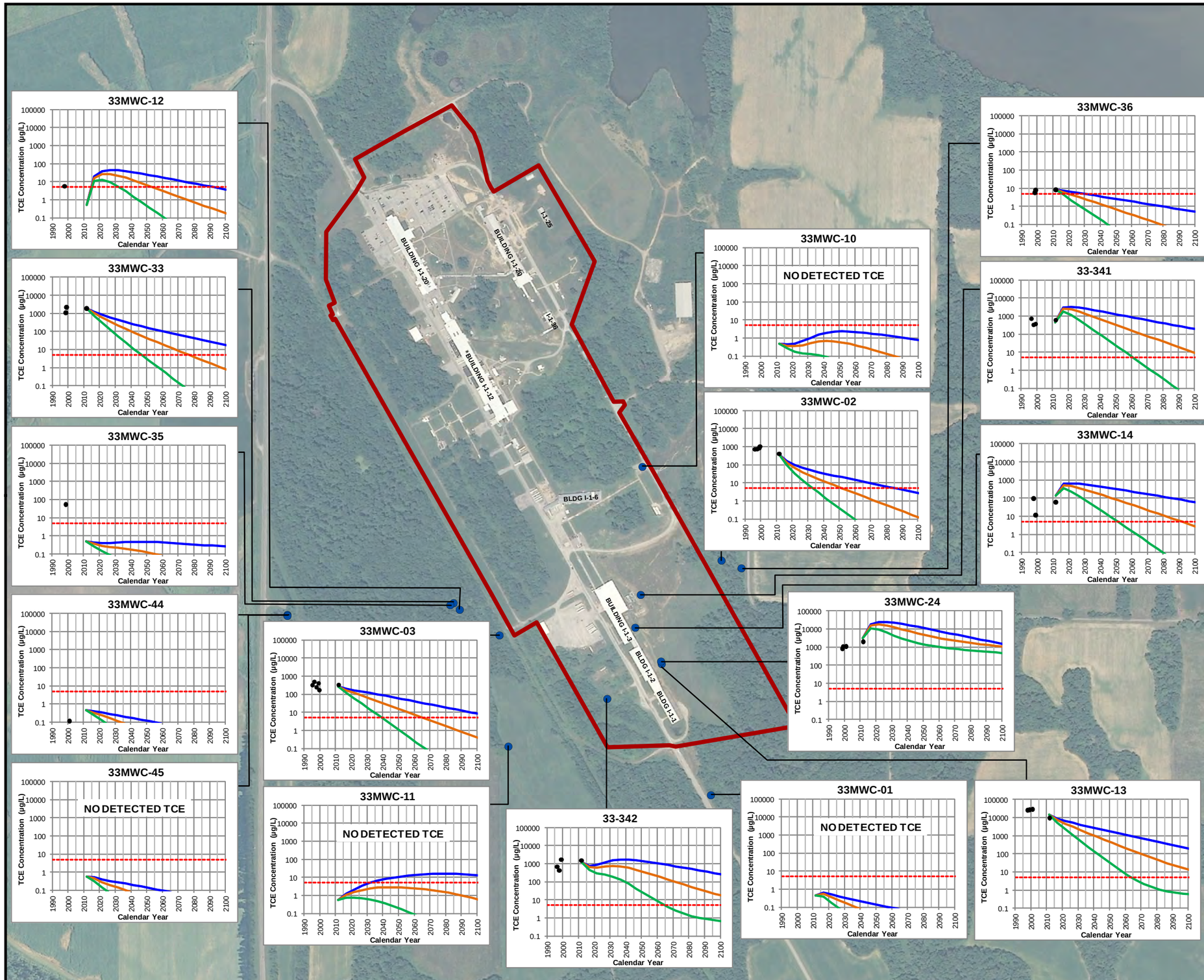

MAP LEGEND

- Calibration Target Well Location
- Industrial Area Boundary

GRAPH LEGEND

- Detected TCE Concentration (µg/L)
- Model Forecast TCE Concentration (µg/L) (Assuming a 20-year BHL)
- Model Forecast TCE Concentration (µg/L) (Assuming a 10-year BHL)
- Model Forecast TCE Concentration (µg/L) (Assuming a 5-year BHL)
- TCE MCL (5 µg/L)

Notes:

A 200-year biodegradation half-life (BHL) was assigned inside the source area indicative of NAPL to account for NAPL dissolution. The 20-,10-, and 5-year BHLs indicated on the graphs were assigned outside the source area indicative of NAPL.

Date of Aerial Photography: Summer 2010.

FIGURE B1-2
Detected and Model Forecast TCE Concentrations
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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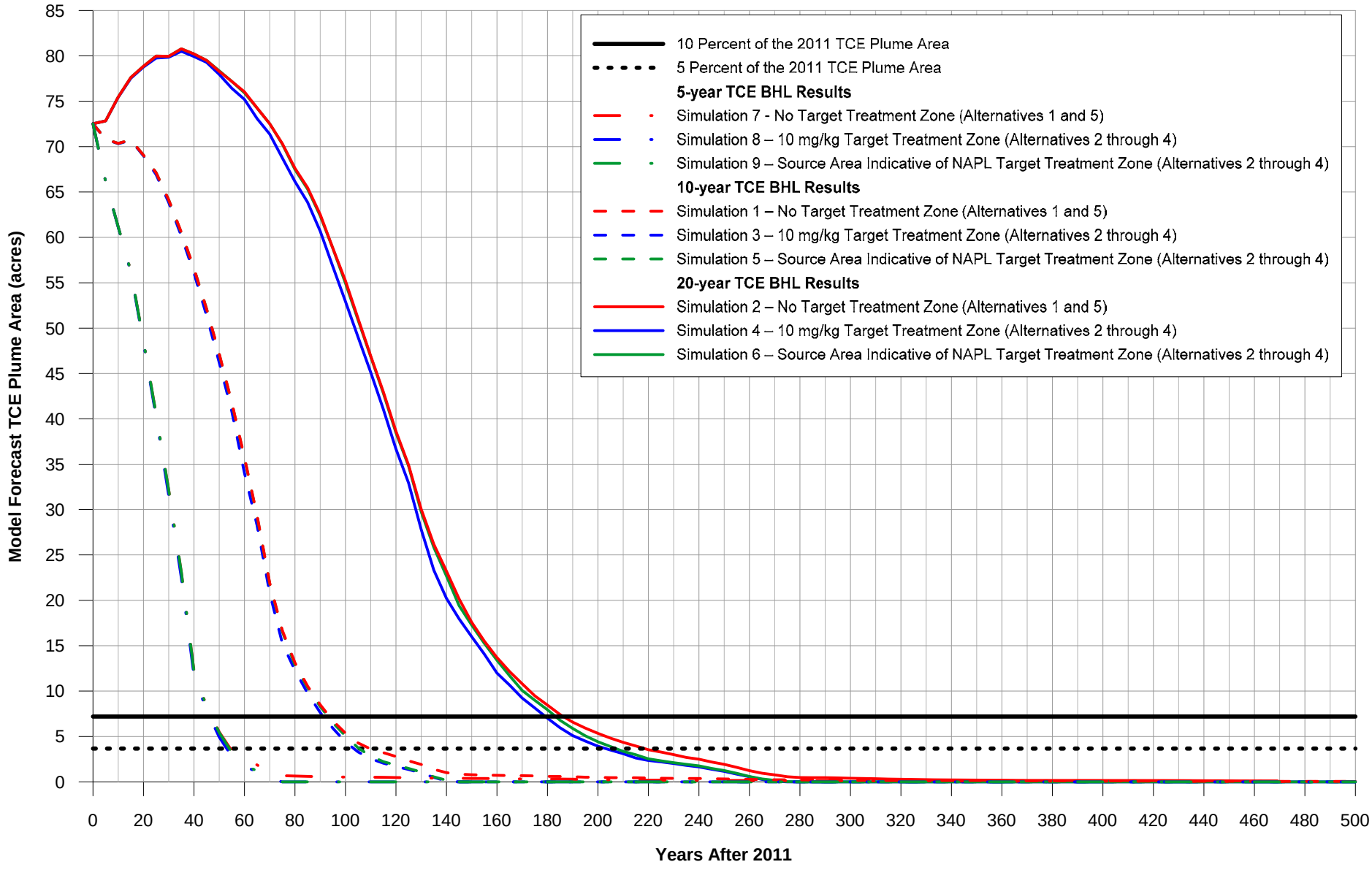

Notes:
1. BHL = Biodegradation Half-life.
2. TCE plume defined by a concentration of 5 µg/L.

FIGURE B1-3
Model Forecast TCE Plume Area
Focused Feasibility Study
for Plume 2 at PCB OU Site 33
Crab Orchard National Wildlife Refuge
Marion, Illinois

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Exhibit 1
U.S. Environmental Protection Agency Correspondence

Martin, Monica/STL

From: Martin, Monica/STL
Sent: Monday, August 06, 2012 5:14 PM
To: Martin, Monica/STL
Subject: FW: Crab Orchard Plume 2 - 5-yr TCE half-life model run request

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From: Virgilio Cocianni
Sent: Tuesday, July 10, 2012 3:52 PM
To: 'NANJUNDA GOWDA'
Cc: Alan Morton; dennis_pinigis@fws.gov; Paul.Lake@Illinois.gov; MPowers@TechLawInc.com
Subject: RE: Crab Orchard Plume 2 - 5-yr TCE half-life model run request

Good afternoon, Nan.
Thank you for this information. I will instruct CH2M Hill to run their model with a 5 year TCE half-life and to submit the results of this model as an addendum to the Final Focused Feasibility Study, Revision 4 for Plume 2 that we recently submitted to you. I hope this will be acceptable to you and the team and will allow you to make the appropriate decisions in the selection of the remedy.
Have a wonderful vacation.
Best regards,
Vic.

Vic Cocianni
Schlumberger Remediation Manager
Phone: +1-281-285-4747

" Courage doesn't always roar. Sometimes courage is the little voice at the end of the day that says I'll try again tomorrow." Mary Ann Radmacher.
(Please continue to be patient with me, She is still making me).

From: NANJUNDA GOWDA [mailto:Gowda.Nanjunda@epamail.epa.gov]
Sent: Tuesday, July 10, 2012 3:44 PM
To: Virgilio Cocianni
Cc: Alan Morton; dennis_pinigis@fws.gov; Paul.Lake@Illinois.gov; MPowers@TechLawInc.com
Subject: Crab Orchard Plume 2 - 5-yr TCE half-life model run request

Hi Vic,

This message is to request additional information regarding the half-lives of TCE in the groundwater at Plume 2.

Given the limited availability of data suitable to calculate trichloroethene (TCE) degradation in the Plume 2 area, a range of TCE half-lives must be evaluated to inform the decision-making process. For the purposes of estimating clean-up timeframes for TCE in groundwater, a literature search was performed. Based on this research, a reasonable range of TCE half-lives in groundwater of 5 to 20 years appears justified.

One of the most commonly referenced sources for TCE half-lives, the Handbook of Environmental Degradation Rates (Howard, P.H., R.S. Boethling, W.F. Jarvis, W.M. Meylan, and E.M. Michalenko, 1991), identifies a TCE half-life range of 10.7 months to 4.5 years. This reference is listed on the following EPA website as a source of half-lives to be used as model inputs:

http://www.epa.gov/oppt/exposure/pubs/fqa.htm

As described on the website:

"The Handbook of Environmental Degradation Rates, authors PH Howard, RS Boethling, WF Jarvis, WM Meylan, EM Michalenko (Lewis: Boca Raton, FL) (1991) is a data source containing abbreviated records for several hundred (mostly US Toxics Release Inventory) chemicals. The records have measured values from the literature and/or estimates of half-lives for the various environmental fate processes (biodegradation, photolysis, etc) as well as for key environmental compartments (soil, water, air). This enables the user to identify a half-life for the dominant fate process or processes for a given chemical, which may be needed for input to models."

Table 15 of USGS' Description, Properties, and Degradation of Selected Volatile Organic Compounds Detected in Ground Water —A Review of Selected Literature (Stephen J. Lawrence, 2006) presents a mean TCE half-life range of 277 to 1,210 days (approximately 1 to 3.5 years) based on 30 field/in-situ and 78 total studies. Other references, such as the University of California's Final Draft Report, Intermedia Transfer Factors for Contaminants Found at Hazardous Waste Sites, Trichloroethylene (TCE), 1994, includes a half-life range of 128 to 2,888 days (approximately <1 year to 8 years).

Based on the above-referenced sources and the lack of adequate site-specific data, it is reasonable to evaluate remediation timeframes using a TCE half-life range of 5 to 20 years. Since remedial timeframes have already been modeled using 10- and 20-year half-lives, we recommend that a model run be performed using a 5-year half-life to provide a reasonable range of potential remedial timeframes to inform the decision-making process.

If you have any questions, please do not hesitate to contact me. Thanks.

Nan Gowda

Appendix C
Cost Estimates

COMPARISON OF TOTAL COST OF REMEDIAL ALTERNATIVES

Crab Orchard Plume 2

Client:	Schlumberger			
Site:	Plume 2 at PCB OU Site 33	**Base Year:**	2011	
Location:	Crab Orchard National Wildlife Refuge, Marion, IL	**Date Updated:**	11/13/2012	
Phase:	Focused Feasibility Study (FFS) Revision 4			

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
	No Action	**Excavation and Long-Term Management**	**Soil Mixing and Long-Term Management**	**Thermal Conductive Heating and Long-Term Management**	**Long-Term Management**
Total Project Duration (Years)	0	30	30	30	30
Total Capital Cost	$0	$ 9,708,258	$ 1,026,010	$ 3,710,716	$ 97,323
Annual O&M Cost (Years 1 through 4)	$0	$ 26,436	$ 26,436	$ 26,436	$ 26,436
5-Year O&M Cost (Years 5 through 30)	$0	$ 40,836	$ 40,836	$ 40,836	$ 40,836
Total Present Value of Alternative	**$ -**	**$ 9,955,000**	**$ 1,273,000**	**$ 3,957,000**	**$ 344,000**

Disclaimer: The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternatives. Changes in the cost estimates are likely to occur as a result of new information and data collected during the engineering design of the remedial alternatives. This is an order-of-magnitude cost estimate that is expected to be within -30 to +50 percent of the actual project costs.

Alternative 1
No Action

COST ESTIMATE SUMMARY

Site: Plume 2 at PCB OU Site 33
Location: Crab Orchard National Wildlife Refuge, Marion, IL
Phase: Focused Feasibility Study (FFS) Revision 4
Base Year: 2011
Date: 11/13/2012

CAPITAL COSTS

	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
		0	LS		$0	
SUBTOTAL					$0	
	Undefined Scope and Market Allowance	20%			$0	
	SUBTOTAL				$0	
	TOTAL CAPITAL COST				**$0**	

OPERATIONS AND MAINTENANCE COST

Years of Operation **30**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
TOTAL ANNUAL O&M COST				**$0**	

PERIODIC COSTS

DESCRIPTION	YEAR	QTY	UNIT	UNIT COST	TOTAL	NOTES
					$0	

PRESENT VALUE ANALYSIS

Discount Rate = 3.1%

END YEAR	COST TYPE	TOTAL ANNUAL COST	DISCOUNT FACTOR	PRESENT VALUE	NOTES
0	CAPITAL COST	$ -	1.000	$ -	
1	ANNUAL O&M COST	$ -	0.970	$ -	
2	ANNUAL O&M COST	$ -	0.941	$ -	
3	ANNUAL O&M COST	$ -	0.912	$ -	
4	ANNUAL O&M COST	$ -	0.885	$ -	
5	ANNUAL O&M COST	$ -	0.858	$ -	
6	ANNUAL O&M COST	$ -	0.833	$ -	
7	ANNUAL O&M COST	$ -	0.808	$ -	
8	ANNUAL O&M COST	$ -	0.783	$ -	
9	ANNUAL O&M COST	$ -	0.760	$ -	
10	ANNUAL O&M COST	$ -	0.737	$ -	
11	ANNUAL O&M COST	$ -	0.715	$ -	
12	ANNUAL O&M COST	$ -	0.693	$ -	
13	ANNUAL O&M COST	$ -	0.672	$ -	
14	ANNUAL O&M COST	$ -	0.652	$ -	
15	ANNUAL O&M COST	$ -	0.633	$ -	
16	ANNUAL O&M COST	$ -	0.614	$ -	
17	ANNUAL O&M COST	$ -	0.595	$ -	
18	ANNUAL O&M COST	$ -	0.577	$ -	
19	ANNUAL O&M COST	$ -	0.560	$ -	
20	ANNUAL O&M COST	$ -	0.543	$ -	
21	ANNUAL O&M COST	$ -	0.527	$ -	
22	ANNUAL O&M COST	$ -	0.511	$ -	
23	ANNUAL O&M COST	$ -	0.496	$ -	
24	ANNUAL O&M COST	$ -	0.481	$ -	
25	ANNUAL O&M COST	$ -	0.466	$ -	
26	ANNUAL O&M COST	$ -	0.452	$ -	
27	ANNUAL O&M COST	$ -	0.439	$ -	
28	ANNUAL O&M COST	$ -	0.425	$ -	
29	ANNUAL O&M COST	$ -	0.413	$ -	
30	ANNUAL O&M COST	$ -	0.400	$ -	
	TOTAL PRESENT VALUE OF ALTERNATIVE			**$ -**	

Alternative 2
Excavation and Long-Term Management

COST ESTIMATE SUMMARY

Site: Plume 2 at PCB OU Site 33
Location: Crab Orchard National Wildlife Refuge, Marion, IL
Phase: Focused Feasibility Study (FFS) Revision 4
Base Year: 2011
Date: 12/30/2011
Revision: 11/13/2012

CAPITAL COSTS (YEAR 0)

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
EXCAVATION AND T&D CONTRACTOR SERVICES					
Submittals and P&P Bond (Subcontractor)	1	LS	$ 51,400	$ 51,400	Recent Quote (Envirocon)
Mobilization, Site Setup, & Daily H&S, Project and Site Management	1	EA	$ 870,000	$ 870,000	Recent Quote (Envirocon)
Pre-Survey of Site to Mark Out Excavation Areas	3	Day	$ 2,850	$ 8,550	Recent Quote (Envirocon)
Utility Locating Service	1	LS	$ 3,150	$ 3,150	Recent Quote (Envirocon)
Site Preparation - Install Erosion Control measures	1,500	LF	$ 26.00	$ 39,000	Recent Quote (Envirocon)
Monitoring Well Abandonment	2	EA	$ 500.00	$ 1,000	Engineer's Estimate
Demolition - Building	1	LS	$ 5,000.00	$ 5,000	Engineer's Estimate
Demolition - Concrete Slab	1	LS	$ 2,400.00	$ 2,400	Engineer's Estimate
Soil Excavation	24,486	CY	$ 9.95	$ 243,636	Recent Quote (Envirocon)
Excavation Shoring	468	LF	$ 2,550	$ 1,193,400	Recent Quote (Envirocon)
Waste Characterization Sampling	49	EA	$ 860	$ 42,140	Collect 1 characterization sample per 500 cubic yards soil excavated. Assume full TCLP analysis.
Confirmation Sampling	9	EA	$ 90	$ 810	Recent Quote (TestAmerica)
Supply and Placement of Gravel/Mulch Backfill into Excavation area	195	CY	$ 102.00	$ 19,890	Recent Quote (Envirocon)
Supply and Placement of soil backfill into Excavation area	27,936	CY	$ 30.50	$ 852,042	Recent Quote (Envirocon)
Transportation and Disposal of Non-Hazardous Waste	32,059	TON	$ 28.50	$ 913,690	Recent Quote - Subtitle D Landfill
Transportation and Disposal of Hazardous Waste	9,322	TON	$ 161.50	$ 1,505,509	Recent Quote - Subtitle C Landfill
Site Restoration (i.e. Hydroseeding, etc)	3	Acre	$ 4,000	$ 12,000	Recent Quote (Envirocon)
Post- Survey of Site	2	Day	$ 2,850	$ 5,700	Recent Quote (Envirocon)
Demobilization	1	LS	$ 11,350	$ 11,350	Recent Quote (Envirocon)
Subtotal - Excavation and T&D Contractor Services				**$ 5,780,667**	
DEWATERING CONTRACTOR SERVICES					
Submittals and P&P Bond (Subcontractor)	1	LS	$ 8,776	$ 8,776	Historical experience.
Mobilization and Site Setup	1	EA	$ 19,560	$ 19,560	R.S.M. Crew #B-10i and Crew #B-10k plus equipment
Dewatering of excavation	250,000	GAL	$ 0.22	$ 54,500	R.S.M. #31-23-19.40
On-site Water Storage and Treatment System	4	Month	$ 100,000	$ 400,000	Previous Experience on projects similar in nature.
Effluent Sampling	16	EA	$ 90	$ 1,440	Assume weekly VOC analysis.
Demobilization	1	LS	$ 9,560	$ 9,560	R.S.M. Crew #B-10i and Crew #B-10k plus equipment
Subtotal - Dewatering Contractor Services				**$ 493,836**	
MONITORING WELL INSTALLATION					
Submittals	1	LS	$ 1,500	$ 1,500	Historical Experience
Mobilization and Site Setup	1	EA	$ 2,869	$ 2,869	ECHOS #33-23-1180
Utility Locating Service	1	LS	$ 2,100	$ 2,100	One Vision Locating
Drill and Install Monitoring Wells	420	LF	$ 70	$ 29,400	Assume 3 wells @ 20 feet, 2 wells at 25 feet, 2 wells at 35 feet, and 6 well at 40 feet. Assume wells are 2-inch dia. stainless steel with 10-foot well screen (0.01-inch slot).
Develop Monitoring Wells	39	HR	$ 210	$ 8,190	13 new monitoring wells; 3 hours per well; Boart Longyear
Equipment Decontamination	4	HR	$ 275	$ 1,100	Boart Longyear
IDW Disposal	1	LS	$ 1,128	$ 1,128	Assume 1/2 drum per well.
Demobilization	1	LS	$ 2,869	$ 2,869	ECHOS #33-23-1180
Survey New Monitoring Wells	2	Day	$ 1,500	$ 3,000	Allowance.
Subtotal - Monitoring Well Installation				**$ 52,156**	
SUBTOTAL - CAPITAL COSTS				**$ 6,326,659**	
Undefined Scope and Market Allowance	10%	of	$ 6,326,659	$ 632,666	R.S. Means #01-21-16.50
SUBTOTAL - CAPITAL COSTS				**$ 6,959,325**	
IMPLEMENTATION COST ALLOWANCES					
Bid / Performance Bonds	0%	of	$ 6,959,325	$ -	R.S. Means #01-31-13.90
Engineering Design	1.5%	of	$ 6,959,325	$ 104,390	R.S. Means #01-11-31.30
Permitting	1%	of	$ 6,959,325	$ 69,593	R.S. Means #01-41-26.50
Health and Safety	1%	of	$ 6,959,325	$ 69,593	R.S. Means #01-21-53.50
Legal and Insurance Costs	1%	of	$ 6,959,325	$ 69,593	R.S. Means #01-31-13.30
Project Management	5%	of	$ 6,959,325	$ 347,966	R.S. Means #01-11-31.20
Construction Field Support	15%	of	$ 6,959,325	$ 1,043,899	R.S. Means #01-31-13.20
Overhead and Profit	15%	of	$ 6,959,325	$ 1,043,899	R.S. Means #01-31-13.70
Subtotal - Implementation Cost Allowances				**$ 2,748,933**	
TOTAL CAPITAL COSTS				**$ 9,708,258**	

Alternative 2
Excavation and Long-Term Management

COST ESTIMATE SUMMARY

OPERATIONS AND MAINTENANCE COST (YEARS 1 THROUGH 30)

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
GROUNDWATER LTM (Sampling of 14 wells on annual basis Years 1 through 5 and every 5 years thereafter)					
Groundwater Samples (includes QA/QC)	22	Sample	$ 90	$ 1,980	VOC analysis only; engineers est
Sampling Labor	100	Hr	$ 95	$ 9,500	2 persons for 4 days per event; Engineer's Estimate
Consumables	1	LS	$ 150	$ 150	Engineer's Estimate
Equipment Rental	1	LS	$ 750	$ 750	Engineer's Estimate
Travel	1	LS	$ 1,500	$ 1,500	Engineer's Estimate
Data Management and Validation	10	Hr	$ 95	$ 950	Engineer's Estimate
Annual Reporting	60	Hr	$ 120	$ 7,200	Engineer's Estimate
SUBTOTAL				**$ 22,030**	
Undefined Scope and Market Allowance	20%	of	$ 22,030	$ 4,406	
LTM TOTAL (Per Year)				**$ 26,436**	
FIVE YEAR REVIEW REPORTING (YEARS 1 THROUGH 30)					
Reporting	100	Hr	$ 120	$ 12,000	Engineer's Estimate
SUBTOTAL				**$ 12,000**	
Undefined Scope and Market Allowance	20%	of	$ 12,000	$ 2,400	
5-Year Periodic Review Reporting TOTAL (Per Year)				**$ 14,400**	

PRESENT VALUE ANALYSIS

Discount Rate = 3.1%

END YEAR	COST TYPE	TOTAL ANNUAL COST	DISCOUNT FACTOR	PRESENT VALUE	NOTES
0	CAPITAL COST	$ 9,708,258	1.000	$ 9,708,258	
1	ANNUAL O&M COST	$ 26,436	0.970	$ 25,641	
2	ANNUAL O&M COST	$ 26,436	0.941	$ 24,870	
3	ANNUAL O&M COST	$ 26,436	0.912	$ 24,122	
4	ANNUAL O&M COST	$ 26,436	0.885	$ 23,397	
5	ANNUAL O&M COST	$ 40,836	0.858	$ 35,055	
6	ANNUAL O&M COST	$ -	0.833	$ -	
7	ANNUAL O&M COST	$ -	0.808	$ -	
8	ANNUAL O&M COST	$ -	0.783	$ -	
9	ANNUAL O&M COST	$ -	0.760	$ -	
10	ANNUAL O&M COST	$ 40,836	0.737	$ 30,092	
11	ANNUAL O&M COST	$ -	0.715	$ -	
12	ANNUAL O&M COST	$ -	0.693	$ -	
13	ANNUAL O&M COST	$ -	0.672	$ -	
14	ANNUAL O&M COST	$ -	0.652	$ -	
15	ANNUAL O&M COST	$ 40,836	0.633	$ 25,832	
16	ANNUAL O&M COST	$ -	0.614	$ -	
17	ANNUAL O&M COST	$ -	0.595	$ -	
18	ANNUAL O&M COST	$ -	0.577	$ -	
19	ANNUAL O&M COST	$ -	0.560	$ -	
20	ANNUAL O&M COST	$ 40,836	0.543	$ 22,175	
21	ANNUAL O&M COST	$ -	0.527	$ -	
22	ANNUAL O&M COST	$ -	0.511	$ -	
23	ANNUAL O&M COST	$ -	0.496	$ -	
24	ANNUAL O&M COST	$ -	0.481	$ -	
25	ANNUAL O&M COST	$ 40,836	0.466	$ 19,036	
26	ANNUAL O&M COST	$ -	0.452	$ -	
27	ANNUAL O&M COST	$ -	0.439	$ -	
28	ANNUAL O&M COST	$ -	0.425	$ -	
29	ANNUAL O&M COST	$ -	0.413	$ -	
30	ANNUAL O&M COST	$ 40,836	0.400	$ 16,341	
	TOTAL PRESENT VALUE OF ALTERNATIVE			**$ 9,955,000**	

Alternative 3
Soil Mixing and Long-Term Management

COST ESTIMATE SUMMARY

Site: Plume 2 at PCB OU Site 33
Location: Crab Orchard National Wildlife Refuge, Marion, IL
Phase: Focused Feasibility Study (FFS) Revision 4
Base Year: 2011
Date: 11/13/2012

CAPITAL COSTS (YEAR 0)

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
SOIL MIXING					
Submittals and P&P Bond (Subcontractor)	1	LS	$ 26,000.00	$ 26,000	Recent Quote (Envirocon)
Mobilization, Site Setup, H&S, and Project/Site Management	1	LS	$ 225,000.00	$ 225,000	Recent Quote (Envirocon)
Site Preparation - Install Erosion Control	450	LF	$ 26.00	$ 11,700	Recent Quote (Envirocon)
Utility Locating Service	1	LS	$ 3,150.00	$ 3,150	One Vision Locating
Pre-Survey of Site	2	Day	$ 2,850.00	$ 5,700	R.S.M. #01-71-23.13
Excavate and Berm Shallow Soil - (top 3 feet)	100	CY	$9.95	$ 995	Recent Quote (Envirocon) (10 ft. x 20 ft. x 3 ft. / 27 = 22.25 cy x 2 areas) + (20 ft. x 25 ft. x 3 ft. / 27 = 55.5 cy)
Soil Mixing Treated Volume	1,222	CY	$90.00	$ 109,980	Recent Quote (Envirocon) (20 ft. x 10 ft. x 45 ft. x 2 areas) + (20 ft. x 25 ft. x 30 ft.) / 27 = 1,222 cy
ZVI Purchase and Delivery (2.5%)	46	Ton	$1,250.00	$ 57,500	Recent Quote (Envirocon)
ZVI Royalty Cost	1,222	CY	$25.00	$ 30,550	Recent Quote (Colorado State University)
Bentonite Purchase and Delivery (1%)	18	Ton	$260.00	$ 4,680	Recent Quote (Envirocon)
Level B PPE Premium	7	Day	$1,000.00	$ 7,000	Recent Quote (Envirocon)
Soil Vapor Treatment	1	LS	$20,000.00	$ 20,000	Recent Quote (Envirocon)
Conduct on-site QC tests on reagents and treated soil	1	LS	$20,000.00	$ 20,000	Recent Quote (Envirocon)
Place Staged Fill Material Back into Shallow Excavation Area	100	CY	$9.95	$ 995	Recent Quote (Envirocon)
Site Restoration (i.e. grading, hydroseeding, etc)	2	Acre	$4,000.00	$ 8,000	Recent Quote (Envirocon)
Install Chain Link Fence Around Soil Mixing Areas	400	LF	$12.00	$ 4,800	Recent Quote (Envirocon)
Post- Survey of Site	1	Day	$2,850.00	$ 2,850	R.S.M. #01-71-23.13
Demobilization	1	LS	$ 50,000.00	$ 50,000	Recent Quote (Envirocon)
Subtotal - Soil Mixing				**$ 588,900**	
MONITORING WELL INSTALLATION					
Submittals	1	LS	$ 1,500	$ 1,500	Historical Experience
Mobilization and Site Setup	1	EA	$ 2,869	$ 2,869	ECHOS #33-23-1180
Utility Locating Service	1	LS	$ 2,100	$ 2,100	One Vision Locating
Drill and Install Monitoring Wells	420	LF	$ 70	$ 29,400	Assume 3 wells @ 20 feet, 2 wells at 25 feet, 2 wells at 35 feet, and 6 well at 40 feet. Assume wells are 2-inch dia. stainless steel with 10-foot well screen (0.01-inch slot).
Develop Monitoring Wells	39	HR	$ 210	$ 8,190	13 monitoring wells; 3 hours per well; Recent Boart Longyear quote
Equipment Decontamination	4	HR	$ 275	$ 1,100	Recent Boart Longyear quote
IDW Disposal	1	LS	$ 1,128	$ 1,128	Assume 1/2 drum per well.
Demobilization	1	LS	$ 2,869	$ 2,869	ECHOS #33-23-1180
Survey New Monitoring Wells	2	Day	$ 1,500	$ 3,000	Recent Boart Longyear quote
Subtotal - Monitoring Well Installation				**$ 52,156**	
SUBTOTAL - CAPITAL COSTS				**$ 641,056**	
Undefined Scope and Market Allowance	10%	of	$ 641,056	$ 64,106	R.S. Means #01-21-16.50
SUBTOTAL - CAPITAL COSTS				**$ 705,162**	
IMPLEMENTATION COST ALLOWANCES					
Bid / Performance Bonds	0%	of	$ 705,162	$ -	R.S. Means #01-31-13.90
Engineering Design	7.5%	of	$ 705,162	$ 52,887	R.S. Means #01-11-31.30
Permitting	1%	of	$ 705,162	$ 7,052	R.S. Means #01-41-26.50
Health and Safety	1%	of	$ 705,162	$ 7,052	R.S. Means #01-21-53.50
Legal Costs	1%	of	$ 705,162	$ 7,052	R.S. Means #01-31-13.30
Project Management	5%	of	$ 705,162	$ 35,258	R.S. Means #01-11-31.20
Construction Field Support	15%	of	$ 705,162	$ 105,774	R.S. Means #01-31-13.20
Overhead and Profit	15%	of	$ 705,162	$ 105,774	R.S. Means #01-31-13.70
Subtotal - Implementation Cost Allowances				**$ 320,849**	
TOTAL CAPITAL COSTS				**$ 1,026,010**	

OPERATIONS AND MAINTENANCE COST (YEARS 1 THROUGH 30)

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
GROUNDWATER LTM (Sampling of 14 wells on annual basis Years 1 through 5 and every 5 years thereafter)					
Groundwater Samples (includes QA/QC)	22	Sample	$ 90	$ 1,980	VOC analysis only; engineers est
Sampling Labor	100	Hr	$ 95	$ 9,500	2 persons for 4 days per event; Engineer's Estimate
Consumables	1	LS	$ 150	$ 150	Engineer's Estimate
Equipment Rental	1	LS	$ 750	$ 750	Engineer's Estimate
Travel	1	LS	$ 1,500	$ 1,500	Engineer's Estimate
Data Management and Validation	10	Hr	$ 95	$ 950	Engineer's Estimate
Annual Reporting	60	Hr	$ 120	$ 7,200	Engineer's Estimate
SUBTOTAL				**$ 22,030**	
Undefined Scope and Market Allowance	20%	of	$ 22,030	$ 4,406	
LTM TOTAL (Per Year)				**$ 26,436**	
FIVE YEAR REVIEW REPORTING (YEARS 1 THROUGH 30)					
Reporting	100	Hr	$ 120	$ 12,000	Engineer's Estimate
SUBTOTAL				**$ 12,000**	
Undefined Scope and Market Allowance	20%	of	$ 12,000	$ 2,400	
5-Year Periodic Review Reporting TOTAL (Per Year)				**$ 14,400**	

Alternative 3
Soil Mixing and Long-Term Management

COST ESTIMATE SUMMARY

PRESENT VALUE ANALYSIS

Discount Rate = 3.1%

END YEAR	COST TYPE	TOTAL ANNUAL COST	DISCOUNT FACTOR	PRESENT VALUE	NOTES
0	CAPITAL COST	$ 1,026,010	1.000	$ 1,026,010	
1	ANNUAL O&M COST	$ 26,436	0.970	$ 25,641	
2	ANNUAL O&M COST	$ 26,436	0.941	$ 24,870	
3	ANNUAL O&M COST	$ 26,436	0.912	$ 24,122	
4	ANNUAL O&M COST	$ 26,436	0.885	$ 23,397	
5	ANNUAL O&M COST	$ 40,836	0.858	$ 35,055	
6	ANNUAL O&M COST	$ -	0.833	$ -	
7	ANNUAL O&M COST	$ -	0.808	$ -	
8	ANNUAL O&M COST	$ -	0.783	$ -	
9	ANNUAL O&M COST	$ -	0.760	$ -	
10	ANNUAL O&M COST	$ 40,836	0.737	$ 30,092	
11	ANNUAL O&M COST	$ -	0.715	$ -	
12	ANNUAL O&M COST	$ -	0.693	$ -	
13	ANNUAL O&M COST	$ -	0.672	$ -	
14	ANNUAL O&M COST	$ -	0.652	$ -	
15	ANNUAL O&M COST	$ 40,836	0.633	$ 25,832	
16	ANNUAL O&M COST	$ -	0.614	$ -	
17	ANNUAL O&M COST	$ -	0.595	$ -	
18	ANNUAL O&M COST	$ -	0.577	$ -	
19	ANNUAL O&M COST	$ -	0.560	$ -	
20	ANNUAL O&M COST	$ 40,836	0.543	$ 22,175	
21	ANNUAL O&M COST	$ -	0.527	$ -	
22	ANNUAL O&M COST	$ -	0.511	$ -	
23	ANNUAL O&M COST	$ -	0.496	$ -	
24	ANNUAL O&M COST	$ -	0.481	$ -	
25	ANNUAL O&M COST	$ 40,836	0.466	$ 19,036	
26	ANNUAL O&M COST	$ -	0.452	$ -	
27	ANNUAL O&M COST	$ -	0.439	$ -	
28	ANNUAL O&M COST	$ -	0.425	$ -	
29	ANNUAL O&M COST	$ -	0.413	$ -	
30	ANNUAL O&M COST	$ 40,836	0.400	$ 16,341	
	TOTAL PRESENT VALUE OF ALTERNATIVE			**$ 1,273,000**	

Alternative 4
Thermal Conductive Heating and Long-Term Management

COST ESTIMATE SUMMARY

Site: Plume 2 at PCB OU Site 33
Location: Crab Orchard National Wildlife Refuge, Marion, IL
Phase: Crab Orchard National Wildlife Refuge, Marion, IL
Base Year: 2011
Date: 11/13/2012

CAPITAL COSTS (YEAR 0)

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
THERMAL SYSTEM DESIGN, CONSTRUCTION, AND OPERATION					
Design and Procurement	1	EA	$ 285,000	$ 285,000	TerraTherm Estimate
System Construction and Operation	1	EA	$ 1,721,000	$ 1,721,000	TerraTherm Estimate
Install Electric Utility Service	1	LS	$ 100,000	$ 100,000	Engineer's Estimate
Install Treatment Water Discharge Line to East Swale.	800	FT	$ 58	$ 46,400	4-inch diameter CPVC excavated to minimum 3 feet bgs. (R.S. Means #22-11-13.74)
Abandon Infrastructure After Completion of Remedial Activities	1	LS	$ 74,000	$ 74,000	Engineer's Estimate
Estimated Utility Usage	1	EA	$ 131,000	$ 131,000	TerraTherm Estimate.
Subtotal - Thermal System				**$ 2,357,400**	
MONITORING WELL INSTALLATION					
Submittals	1	LS	$ 1,500	$ 1,500	Historical Experience
Mobilization and Site Setup	1	EA	$ 2,869	$ 2,869	ECHOS #33-23-1180
Utility Locating Service	1	LS	$ 2,100	$ 2,100	One Vision Locating
Drill and Install Monitoring Wells	420	LF	$ 70	$ 29,400	Assume 3 wells @ 20 feet, 2 wells at 25 feet, 2 wells at 35 feet, and 6 well at 40 feet. Assume wells are 2-inch dia. stainless steel with 10-foot well screen (0.01-inch slot).
Develop Monitoring Wells	39	HR	$ 210	$ 8,190	13 monitoring wells; 3 hours per well: Recent Boart Longyear quote
Equipment Decontamination	4	HR	$ 275	$ 1,100	Recent Boart Longyear quote
IDW Disposal	1	LS	$ 1,128	$ 1,128	Assume 1/2 drum per well.
Demobilization	1	LS	$ 2,869	$ 2,869	ECHOS #33-23-1180
Survey New Monitoring Wells	2	Day	$ 1,500	$ 3,000	Allowance
Subtotal - Monitoring Well Installation				**$ 52,156**	
SUBTOTAL - CAPITAL COSTS				**$ 2,409,556**	
Undefined Scope and Market Allowance	10%	of	$ 2,409,556	$ 240,956	R.S. Means #01-21-16.50
SUBTOTAL - CAPITAL COSTS				**$ 2,650,512**	
IMPLEMENTATION COST ALLOWANCES					
Bid / Performance Bonds	0%	of	$ 2,650,512	$ -	R.S. Means #01-31-13.90
Engineering Design	2.0%	of	$ 2,650,512	$ 53,010	R.S. Means #01-11-31.30
Permitting	1%	of	$ 2,650,512	$ 26,505	R.S. Means #01-41-26.50
Health and Safety	1%	of	$ 2,650,512	$ 26,505	R.S. Means #01-21-53.50
Legal Costs	1%	of	$ 2,650,512	$ 26,505	R.S. Means #01-31-13.30
Project Management	5%	of	$ 2,650,512	$ 132,526	R.S. Means #01-11-31.20
Construction Field Support	15%	of	$ 2,650,512	$ 397,577	R.S. Means #01-31-13.20
Overhead and Profit	15%	of	$ 2,650,512	$ 397,577	R.S. Means #01-31-13.70
Subtotal - Implementation Cost Allowances				**$ 1,060,205**	
TOTAL CAPITAL COSTS				**$ 3,710,716**	

OPERATIONS AND MAINTENANCE COST (YEARS 1 THROUGH 30)

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
GROUNDWATER LTM (Sampling of 14 wells on annual basis Years 1 through 5 and every 5 years thereafter)					
Groundwater Samples (includes QA/QC)	22	Sample	$ 90	$ 1,980	VOC analysis only; engineers est
Sampling Labor	100	Hr	$ 95	$ 9,500	2 persons for 4 days per event; Engineer's Estimate
Consumables	1	LS	$ 150	$ 150	Engineer's Estimate
Equipment Rental	1	LS	$ 750	$ 750	Engineer's Estimate
Travel	1	LS	$ 1,500	$ 1,500	Engineer's Estimate
Data Management and Validation	10	Hr	$ 95	$ 950	Engineer's Estimate
Annual Reporting	60	Hr	$ 120	$ 7,200	Engineer's Estimate
SUBTOTAL				**$ 22,030**	
Undefined Scope and Market Allowance	20%	of	$ 22,030	$ 4,406	
LTM TOTAL (Per Year)				**$ 26,436**	
FIVE YEAR REVIEW REPORTING (YEARS 1 THROUGH 30)					
Reporting	100	Hr	$ 120	$ 12,000	Engineer's Estimate
SUBTOTAL				**$ 12,000**	
Undefined Scope and Market Allowance	20%	of	$ 12,000	$ 2,400	
5-Year Periodic Review Reporting TOTAL (Per Year)				**$ 14,400**	

Alternative 4
Thermal Conductive Heating and Long-Term Management

COST ESTIMATE SUMMARY

PRESENT VALUE ANALYSIS

Discount Rate = 3.1%

END YEAR	COST TYPE	TOTAL ANNUAL COST	DISCOUNT FACTOR	PRESENT VALUE	NOTES
0	CAPITAL COST	$ 3,710,716	1.000	$ 3,710,716	
1	ANNUAL O&M COST	$ 26,436	0.970	$ 25,641	
2	ANNUAL O&M COST	$ 26,436	0.941	$ 24,870	
3	ANNUAL O&M COST	$ 26,436	0.912	$ 24,122	
4	ANNUAL O&M COST	$ 26,436	0.885	$ 23,397	
5	ANNUAL O&M COST	$ 40,836	0.858	$ 35,055	
6	ANNUAL O&M COST	$ -	0.833	$ -	
7	ANNUAL O&M COST	$ -	0.808	$ -	
8	ANNUAL O&M COST	$ -	0.783	$ -	
9	ANNUAL O&M COST	$ -	0.760	$ -	
10	ANNUAL O&M COST	$ 40,836	0.737	$ 30,092	
11	ANNUAL O&M COST	$ -	0.715	$ -	
12	ANNUAL O&M COST	$ -	0.693	$ -	
13	ANNUAL O&M COST	$ -	0.672	$ -	
14	ANNUAL O&M COST	$ -	0.652	$ -	
15	ANNUAL O&M COST	$ 40,836	0.633	$ 25,832	
16	ANNUAL O&M COST	$ -	0.614	$ -	
17	ANNUAL O&M COST	$ -	0.595	$ -	
18	ANNUAL O&M COST	$ -	0.577	$ -	
19	ANNUAL O&M COST	$ -	0.560	$ -	
20	ANNUAL O&M COST	$ 40,836	0.543	$ 22,175	
21	ANNUAL O&M COST	$ -	0.527	$ -	
22	ANNUAL O&M COST	$ -	0.511	$ -	
23	ANNUAL O&M COST	$ -	0.496	$ -	
24	ANNUAL O&M COST	$ -	0.481	$ -	
25	ANNUAL O&M COST	$ 40,836	0.466	$ 19,036	
26	ANNUAL O&M COST	$ -	0.452	$ -	
27	ANNUAL O&M COST	$ -	0.439	$ -	
28	ANNUAL O&M COST	$ -	0.425	$ -	
29	ANNUAL O&M COST	$ -	0.413	$ -	
30	ANNUAL O&M COST	$ 40,836	0.400	$ 16,341	
	TOTAL PRESENT VALUE OF ALTERNATIVE			**$ 3,957,000**	

Alternative 5
Long-Term Management

COST ESTIMATE SUMMARY

Site: Plume 2 at PCB OU Site 33
Location: Crab Orchard National Wildlife Refuge, Marion, IL
Phase: Focused Feasibility Study (FFS) Revision 4
Base Year: 2011
Date: 11/13/2012

CAPITAL COSTS (YEAR 0)

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
MONITORING WELL INSTALLATION					
Submittals	1	LS	$ 1,500	$ 1,500	Historical Experience
Mobilization and Site Setup	1	EA	$ 2,869	$ 2,869	ECHOS #33-23-1180
Utility Locating Service	1	LS	$ 2,100	$ 2,100	One Vision Locating
Drill and Install Monitoring Wells	420	LF	$ 70	$ 29,400	Assume 3 wells @ 20 feet, 2 wells at 25 feet, 2 wells at 35 feet, and 6 well at 40 feet. Assume wells are 2-inch dia. stainless steel with 10-foot well screen (0.01-inch slot).
Develop Monitoring Wells	39	HR	$ 210	$ 8,190	13 monitoring wells; 3 hours per well: Recent Boart Longyear quote
Equipment Decontamination	4	HR	$ 275	$ 1,100	Recent Boart Longyear quote
IDW Disposal	1	LS	$ 1,128	$ 1,128	Assume 1/2 drum per well.
Demobilization	1	LS	$ 2,869	$ 2,869	ECHOS #33-23-1180
Survey New Monitoring Wells	2	Day	$ 1,500	$ 3,000	Allowance
Subtotal - Monitoring Well Installation				**$ 52,156**	
Undefined Scope and Market Allowance	20%	of	$ 52,156	$ 10,431	
SUBTOTAL - CAPITAL COSTS				**$ 62,587**	
IMPLEMENTATION COST ALLOWANCES					
Bid / Performance Bonds	0%	of	$ 62,587	$ -	R.S. Means #01-31-13.90
Engineering Design	7.5%	of	$ 62,587	$ 4,694	R.S. Means #01-11-31.30
Permitting	1%	of	$ 62,587	$ 626	R.S. Means #01-41-26.50
Health and Safety	1%	of	$ 62,587	$ 626	R.S. Means #01-21-53.50
Legal Costs	1%	of	$ 62,587	$ 626	R.S. Means #01-31-13.30
Project Management	5%	of	$ 62,587	$ 3,129	R.S. Means #01-11-31.20
Construction Field Support	15%	of	$ 62,587	$ 9,388	R.S. Means #01-31-13.20
Undefined Scope and Market Allowance	10%	of	$ 62,587	$ 6,259	R.S. Means #01-21-16.50
Overhead and Profit	15%	of	$ 62,587	$ 9,388	R.S. Means #01-31-13.70
Subtotal - Implementation Cost Allowances				**$ 34,736**	
TOTAL CAPITAL COSTS				**$ 97,323**	

OPERATIONS AND MAINTENANCE COST (YEARS 1 THROUGH 30)

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
GROUNDWATER LTM (Sampling of 14 wells on annual basis Years 1 through 5 and every 5 years thereafter)					
Groundwater Samples (includes QA/QC)	22	Sample	$ 90	$ 1,980	VOC analysis only; engineers est
Sampling Labor	100	Hr	$ 95	$ 9,500	2 persons for 4 days per event; Engineer's Estimate
Consumables	1	LS	$ 150	$ 150	Engineer's Estimate
Equipment Rental	1	LS	$ 750	$ 750	Engineer's Estimate
Travel	1	LS	$ 1,500	$ 1,500	Engineer's Estimate
Data Management and Validation	10	Hr	$ 95	$ 950	Engineer's Estimate
Annual Reporting	60	Hr	$ 120	$ 7,200	Engineer's Estimate
SUBTOTAL				**$ 22,030**	
Undefined Scope and Market Allowance	20%	of	$ 22,030	$ 4,406	
LTM TOTAL (Per Year)				**$ 26,436**	
FIVE YEAR REVIEW REPORTING (YEARS 1 THROUGH 30)					
Reporting	100	Hr	$ 120	$ 12,000	Engineer's Estimate
SUBTOTAL				**$ 12,000**	
Undefined Scope and Market Allowance	20%	of	$ 12,000	$ 2,400	
5-Year Periodic Review Reporting TOTAL (Per Year)				**$ 14,400**	

Alternative 5
Long-Term Management

COST ESTIMATE SUMMARY

PRESENT VALUE ANALYSIS

Discount Rate = 3.1%

END YEAR	COST TYPE	TOTAL ANNUAL COST	DISCOUNT FACTOR	PRESENT VALUE	NOTES
0	CAPITAL COST	$ 97,323	1.000	$ 97,323	
1	ANNUAL O&M COST	$ 26,436	0.970	$ 25,641	
2	ANNUAL O&M COST	$ 26,436	0.941	$ 24,870	
3	ANNUAL O&M COST	$ 26,436	0.912	$ 24,122	
4	ANNUAL O&M COST	$ 26,436	0.885	$ 23,397	
5	ANNUAL O&M COST	$ 40,836	0.858	$ 35,055	
6	ANNUAL O&M COST	$ -	0.833	$ -	
7	ANNUAL O&M COST	$ -	0.808	$ -	
8	ANNUAL O&M COST	$ -	0.783	$ -	
9	ANNUAL O&M COST	$ -	0.760	$ -	
10	ANNUAL O&M COST	$ 40,836	0.737	$ 30,092	
11	ANNUAL O&M COST	$ -	0.715	$ -	
12	ANNUAL O&M COST	$ -	0.693	$ -	
13	ANNUAL O&M COST	$ -	0.672	$ -	
14	ANNUAL O&M COST	$ -	0.652	$ -	
15	ANNUAL O&M COST	$ 40,836	0.633	$ 25,832	
16	ANNUAL O&M COST	$ -	0.614	$ -	
17	ANNUAL O&M COST	$ -	0.595	$ -	
18	ANNUAL O&M COST	$ -	0.577	$ -	
19	ANNUAL O&M COST	$ -	0.560	$ -	
20	ANNUAL O&M COST	$ 40,836	0.543	$ 22,175	
21	ANNUAL O&M COST	$ -	0.527	$ -	
22	ANNUAL O&M COST	$ -	0.511	$ -	
23	ANNUAL O&M COST	$ -	0.496	$ -	
24	ANNUAL O&M COST	$ -	0.481	$ -	
25	ANNUAL O&M COST	$ 40,836	0.466	$ 19,036	
26	ANNUAL O&M COST	$ -	0.452	$ -	
27	ANNUAL O&M COST	$ -	0.439	$ -	
28	ANNUAL O&M COST	$ -	0.425	$ -	
29	ANNUAL O&M COST	$ -	0.413	$ -	
30	ANNUAL O&M COST	$ 40,836	0.400	$ 16,341	
	TOTAL PRESENT VALUE OF ALTERNATIVE			**$ 344,000**	

Responses to Stakeholder Comments (Dated April 5, 2012) Regarding the Draft Final Focused Feasibility Study Revision 4 – Plume 2 at PCB OU Site 33, Crab Orchard National Wildlife Refuge Superfund Site, Marion, Illinois

General Comments

According to the modeling results, the larger plume beyond the source area is predicted to persist at levels exceeding cleanup goals for extended periods, whether or not source area treatment occurs. The FFS did not address a larger scale plume treatment scenario to reduce the cleanup timeframe to less than 100 years. As discussed in the specific comments, FWS recommends including a scenario where cleanup goals could be accomplished in less than 100 years.

Response:

The FFS focused on addressing the most highly contaminated area of the plume as a cost effective and sustainable approach for reducing the contaminant mass and the cleanup timeframe. The development of the remedial alternatives presented in the FFS for Plume 2 was based on the following factors:

- ***There is currently no unacceptable risk associated with the groundwater plume; land use controls (LUCs) have been implemented that prevent exposure to contaminated groundwater***
- ***A reliable alternative water source is available***
- ***Modeling indicates that the plume will not expand beyond the LUC protected area and will not discharge into Crab Orchard Lake***
- ***VOC concentrations in soil are below the regional screening level for cancer and noncancer health effects for potential receptors***

The area of the groundwater plume is estimated to be about 73-acres. The plume extends a significant distance away from the source area. Contamination found in the distal plume is not limited to the sand layers, but is present within multiple subsurface layers of varying hydraulic characteristics.

Without active remediation, the Plume 2 groundwater model estimates the plume will contain levels of TCE above the MCLs for more than 500 years. The Plume 2 groundwater model presented in the FFS evaluated the time to cleanup assuming a remedy effectiveness of 99% for two target treatment zone scenarios. Using a 10-year half life for discussion purposes, which is at the low end of the anticipated range, the following remediation timeframes were estimated to achieve MCLs:

1. ***Treatment zone focusing on the area of highest concentration of TCE in soil and groundwater (625 square feet) – 145 years***
2. ***Treatment zone encompassing the area where soil concentrations were observed above 10 mg/kg (20,500 square feet (less than ½-acre)) – 145 years***

The target treatment zone in the second scenario is more than 30 times larger than in the first scenario, however, the remediation timeframe is estimated to be the same. This is primarily because the entire plume is 73-acres and the majority of the plume area (99.3%) would not be impacted by either treatment scenario. The highest concentration target treatment zone was selected for further evaluation since the remediation timeframe for both scenarios is estimated to be the same.

In order to reduce the remediation timeframe below the 100 year target, a significant portion of the plume outside the source area would need to be remediated. In response to this comment, the Plume 2 groundwater model was re-run to investigate the size of the target treatment zone that would be required to achieve a remediation timeframe within 100 years.

In contrast to single-domain models, the dual-domain formulation used in the Plume 2 groundwater model provides a reservoir of TCE mass within the immobile porosity that diffuses back into the mobile porosity. In order to understand the extreme case, the model was re-evaluated assuming that initial (2011) TCE concentrations within the entire mobile porosity are zeroed out and initial TCE concentrations within the immobile porosity are reduced by a factor of 10. This would represent active remediation performed across the entire 73-acre plume. In this situation, the model estimates that TCE concentrations greater than 5 µg/L will remain after 100 years. These results illustrate that the process of back-diffusion from the immobile porosity can sustain the TCE plume for a prolonged timeframe (>100 years), even when the mobile and immobile contamination is actively remediated.

In order to achieve cleanup goals in less than 100 years, initial TCE concentrations in the mobile porosity must be completely zeroed out and those in the immobile porosity must be reduced by a factor of 100, which represents a 99% remedy effectiveness across the entire 73-acre plume. Given that portions of the plume are not accessible (such as the areas under active buildings), the large area of treatment required, and limitations to treatment alternatives, we do not believe there are any practical remedy alternatives that would achieve these results.

Long-term monitoring of the site without implementing an active remedy would effectively manage risk at the site and would not trigger the environmental impacts inherent to active remediation such as greenhouse gas emissions. Active remediation of the highest concentration area will address the goal of reduction of toxicity, mobility, and volume of contamination at the site and may reduce the cleanup timeframe from more than 500 years to 145 years (based on a 10-year TCE biodegradation half life).

In order to provide this clarity to the FFS, the following changes will be made:

- ***Section 1.3.5 Groundwater Modeling will be expanded to explain why the model shows that achieving remediation timeframe of 100 years or less is not realistically attainable based on TCE concentrations and site-specific conditions.***
- ***Section 2.3 Practicality of Cleanup Standards will be expanded to note the additional groundwater model results which further support that achievement of MCLs are impractical.***
- ***The section Basis for Selected Target Treatment Zone will be moved from Section 4 into Section 3 and will provide additional clarification on the basis for selection of the treatment zone incorporated into the detailed alternative evaluation. This section will reference the additional groundwater modeling results and present a discussion on the impracticality of reducing the remediation timeframe to 100 years or less as presented above.***

Since the basis for the selection of the target treatment zone is provided prior to the development of the detailed alternatives, the discussion on alternative evaluation will not be modified.

Specific Comments

Main Body of Report

Section 1.3.2 – Land Use Control Implementation, Section 2.3 – Practicality of Cleanup Standards, and Section 4.2.1 – Institutional Controls

The USFWS has cautioned that the current land and water use restrictions discussed in these sections are USFWS policies and are not incorporated in any formal CERCLA remedy decision document for the site. As such, they should not be relied upon in their current form to prevent inappropriate groundwater use into the future. While the Crab Orchard Refuge generally consults with the CERCLA office on plans that may involve environmental issues, there is no formalized requirement for such coordination, and no assurance that a future Refuge manager would not choose to use groundwater in an area potentially affected by the site. The USFWS has concluded that any groundwater use restrictions agreed upon must be formalized in the Plume 2 remedy decision document to assure that restrictions will be enforced into the future.

Response: Comment noted.

Section 2.2 – Remedial Action Objectives

The remedial action objectives (RAOs) cited in this section are from the 2007 ROD Amendment, and formally pertain only to Plumes 1 and 3. While CH2M HILL may reasonably conclude the same RAOs would apply to the forthcoming Plume 2 ROD Amendment, it should be clarified in this section that this is a presumption and not a matter of decision record for Plume 2.

Response:

Development of RAOs is part of the alternatives development process in the feasibility study stage of the CERCLA process (Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA; USEPA, October 1988) and is the basis for screening and evaluating remedial alternatives. We acknowledge that RAOs do not become a matter of decision record until the ROD stage of the CERCLA process. However, it is not necessary to state this in the FFS.

Section 4 – Development of Remedial Alternatives

The three active remedial alternatives considered in this FFS involve "*approaches that remove, treat, or destruct the mass of groundwater COCs within a targeted treatment area where NAPL was encountered during the supplemental site characterization investigation. Natural attenuation will reduce sorbed and dissolved TCE mass in soil and groundwater, respectively, outside the NAPL zone*." What is apparent from the modeling assessment presented in Appendix B is that, whether or not source area treatment is conducted, reduction of TCE concentrations to MCLs in the distal parts of the plume will probably require in excess of 100 years. In order to achieve cleanup of the majority of the plume area in 50 to 100 years, as is often considered a "reasonable timeframe" for remediation, it appears that a broader treatment of the plume would be necessary. Preliminary calculations offered by CH2M HILL at the March 5, 2012 meeting suggested that treatment over most of the plume area would be necessary to reduce the cleanup timeframe to 50 to 100 years. Such an informal analysis, while useful for discussion during the meeting, is not sufficient for determining that plume-wide treatment to reduce timeframes to 50 to 100 years is impractical. In order to evaluate the practicality of cleaning up the aquifer to MCLs in a timeframe of 50-100 years, the USFWS requests the inclusion and analysis of a remedial alternative designed to achieve cleanup within 50 to 100 years. Modeling analysis should support this scenario assessment.

Response: See response to General Comment.

Section 4.1 – Basis for Selected Target Treatment Zone

The conclusions of the supplemental site investigation regarding the extent of the NAPL zone are questionable. NAPL may be present over a larger area or in other locations than postulated by CH2M HILL. In particular, given the proximity of the NAPL zone to the I-1-2 building, it seems possible that the NAPL may extend beneath the building. Thus the magnitude of the NAPL source that could continue to degrade groundwater may be underestimated, and the source treatment remedial designs included in the FFS analysis could be inadequate to achieve cleanup in the estimated timeframes.

Response:

We agree that the full extent of the NAPL may not be precisely defined by the currently available data. The objective of the NAPL source area treatment zone was to focus the treatment on the area with the highest level of contamination to have a nominal impact on the time to achieve cleanup. The goal of this alternative is not to treat any potential NAPL area at the site. The exact location and extent of NAPL does not change the risk associated with the groundwater plume. The target treatment zone currently referred to as the NAPL source area will be re-titled the as the Source Area Hot Spot to avoid confusion or set unrealistic expectations.

Section 4.2.2 – Long-Term Management

The long-term management (LTM) program should include wells within the source areas of the plume, as well as on its fringes, to monitor conditions within the source areas as they evolve over time. The LTM wells should also monitor all hydrostratigraphic units that are present at a given location, including the Lower Clay and Lower Sand, if present. The USFWS understands from discussions during the March 5, 2012 meeting that most of the contaminant mass remained in Layers 5 and 6 (i.e., the Lower Clay and Lower Sand) in the later stages of the simulations. Currently, the recommendation in the FFS is to monitor only the Upper Clay and Upper Sand.

Response:

The section that presents the long-term management component of each alternative (with the exception of the no action alternative) will be revised to propose monitoring of existing and new wells installed in the Lower Clay and Lower Sand units and within the source area.

Section 4.4 – Alternative 2 – Excavation and Long-Term Management

All water removed from the excavation should be tested for PCBs prior to discharge to the East Swale or anywhere else on site.

Response: Concur.

Section 4.6 - Alternative 4—Source Area Thermal Conductive Heating and Long-Term Management

Monitoring of ambient air and building air quality would be necessary during implementation.

Response: Concur.

Appendix B

TCE Transport Formulation

The USFWS understands from discussions during the March 5, 2012 meeting that the 200-year half-life assumption for the presence of NAPL was applied only for the no-treatment scenarios. This should be clarified in the text.

Response:

The text in first paragraph of the Model Setup for Predictive Simulations section (Appendix B of the FFS) will be revised to clarify that a treatment effectiveness of 99 percent assumed for Alternatives 2 through 4 means that the 200-year half-life assumption for the presence of NAPL was only applied to the 1 percent assumed to not be treated within the target treatment zone for these alternatives.

TCE-Specific Transport Parameters

The document should provide discussion of the factors that drive the timeframe estimates; for example, the relative influences of the TCE half-life assumption versus the single rate mass transfer (SRMT) coefficient, which considers mass transfer between the mobile and immobile pore space (i.e., dual-domain model). The USFWS understands from the March 5, 2012 meeting that the model results are most sensitive to the TCE half-life assumptions. During the meeting, the USFWS understood CH2M HILL to say that the dual-domain aspect of the model, although less of a timeframe driver, significantly affected the results (i.e., the results would have been significantly different if the dual-domain model had not been used), but also that varying the transfer coefficient had little impact on the results. Further clarification of this is warranted.

Response:

The SRMT coefficient is only one variable of the dual-domain transport formulation to consider. A very important variable is the amount of TCE mass stored in the immobile porosity at the start of the predictive simulation (i.e., 2011). Having additional storage of TCE mass in the immobile porosity makes a significant difference in the forecast remediation timeframe. In this example, inclusion of an immobile porosity storage zone more than doubles the simulated total TCE mass at the start of the predictive simulation. That stored TCE mass diffuses out of the immobile porosity through time at a rate scaled by the SRMT coefficient. This diffusion from the immobile porosity prolongs the remediation timeframe.

To investigate the impact of the dual-domain transport formulation, the forecast remediation timeframes were compared to those from a single-domain predictive simulation. Single-domain predictive simulations for the site forecast remediation timeframes closer to 100 years (significantly shorter than predictive simulations from the dual-domain model). The remediation timeframe estimates from the dual-domain model are highly sensitive to both the TCE biodegradation half-life assumptions and the initial TCE concentrations assigned to the immobile porosity. The forecast remediation timeframes are less sensitive (but not insensitive) to the SRMT coefficient.

Initial TCE Conditions

The document should better discuss the vertical distribution of TCE and changes that occur during the simulations, providing more insight on which layers are driving the timeframe estimates. The USFWS understands from discussions during the March 5, 2012 meeting that most of the contaminant mass remained in Layers 5 and 6 in the later stages of the simulations. However, Section 4.2.2 – Long-Term Management recommends long-term monitoring only in the Upper Clay and Upper Sand

Response:

The section that presents the long-term management component of each alternative (with the exception of the no action alternative) will be revised to propose monitoring of existing and new wells installed in the Lower Clay and Lower Sand units.

Model Limitations

Given the model's sensitivity to the TCE-half-life parameter, the document should discuss what would be needed to improve the site-specific estimate of this critical parameter. The USFWS understood from discussions during the March 5, 2012 meeting that at least five years of TCE concentration data collection would be needed to begin understanding the site-specific TCE degradation rate. The USFWS recommends that this recommendation be made in the FFS and that the data collection be initiated as early as possible.

Response:

The existing monitoring well network would be improved by installing and sampling new monitoring wells along the inferred TCE plume centerlines between the source areas and distal portions of the plume. Shallow/deep monitoring well pairs along the inferred TCE plume centerlines would provide the opportunity to evaluate TCE concentrations at two depth intervals along the inferred plume centerlines. Annual monitoring of TCE concentrations from these and other existing monitoring wells would provide data that could be used to better estimate site-specific biodegradation half-lives.

Before Schlumberger would be willing to proceed with collection of additional data prior to implementation of a remedy, there needs to be a clear understanding of the objective of the sampling and how it fits into the overall site management strategy. Additional sampling may provide us with a better understanding of how quickly site contamination will degrade. Schlumberger would be agreeable to continuing to collect site data for a period of 5 years if remedy selection was delayed during that period and if there was agreement that LTM would be the selected remedy if the current understanding of the site was confirmed.