Final

In-Situ Remediation Pilot Study Report
Area of Concern I (AOC I)

Atlantic Fleet Weapons Training Area – Vieques
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

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Acronyms and Abbreviations

µg/L	micrograms per liter
AOC	area of concern
AST	aboveground storage tank
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-term Environmental Action–Navy
COC	constituent of concern
DO	dissolved oxygen
DOI	Department of Interior
EBS	Environmental Baseline Study
EISB	enhanced in-situ Bioremediation
ELCR	excess lifetime cancer risk
EQB	Environmental Quality Board
ERA	Ecological Risk Assessment
ERP	Environmental Restoration Program
FFA	Federal Facilities Agreement
ft/day	feet per day
ft/ft	feet per foot
gpm	gallons per minute
HHRA	Human Health Risk Assessment
HI	hazard index
IR	Installation Restoration
ISCO	in-situ chemical oxidation
mg/L	milligram per liter
MOV	Municipality of Vieques
mV	millivolt
NASD	Naval Ammunition Support Detachment
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
ORC	oxygen releasing compound
ORP	oxygen reduction potential
PA	Preliminary Assessment
PRG	preliminary remediation goal
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SI	Site Inspection
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound

SECTION 1

Introduction

This Pilot Study Report summarizes the activities performed and data obtained during the In-situ Chemical Oxidation (ISCO) and Enhanced In-situ Bioremediation (EISB) Pilot Study conducted at Area of Concern (AOC) I, located at the Former Naval Ammunition Support Detachment (NASD), Vieques, Puerto Rico (**Figures 1, 2,** and **3**). AOC I is approximately 1 acre in size and was a former asphalt plant that operated from the 1960s through 1988. The Municipality of Vieques (MOV) owns the land within which AOC I is located.

This report is prepared under the United States Department of the Navy (Navy), Naval Facilities Engineering Command, Atlantic Division, Comprehensive Long-term Environmental Action–Navy (CLEAN) Contract N62470-08-D-1000, Contract Task Order 083, for submittal to the Naval Facilities Engineering Command (NAVFAC) Atlantic Division, United States Environmental Protection Agency (USEPA) Region 2, and the Commonwealth of Puerto Rico Environmental Quality Board (EQB). The Navy, USEPA, and EQB, together with the United States Fish and Wildlife Service (USFWS) for land owned by the Department of Interior (DOI), work jointly as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Environmental Restoration Program (ERP) Technical Subcommittee.

A Remedial Investigation (RI) conducted at AOC I identified six constituents of concern (COCs) within groundwater: benzene, bis(2-ethylhexyl)phthalate, 1,2-dichloroethane, 1,2-dichloropropane, 2-methyl-napthalene, and naphthalene (CH2M HILL, 2008a). No COCs were identified in soil. Prior to the In-situ Remediation Pilot Study, COC concentrations in groundwater were limited to a relatively small area, demonstrated a declining trend over multiple years, and were relatively low. Evaluation of the RI and post-RI groundwater data indicated that although already low, certain COC concentrations could require more than a decade to decrease to acceptable levels. Therefore, a Pilot Study was implemented to determine if accelerated achievement of acceptable COC concentrations was possible.

The Pilot Study was implemented in a two-step systematic approach (ISCO directly followed by EISB) to initially oxidize organics and then increase the intrinsic biodegradation rate to reduce the attenuation time needed to achieve acceptable COC concentrations in groundwater. The baseline monitoring and ISCO injection were initiated in March 2010, followed by a post-injection monitoring event, application of EISB, and then three additional post-injection performance monitoring events, with the last monitoring event completed in November 2012.

The pertinent planning documents that set the framework for the implementation of the Pilot Study comprise the *Final In-Situ Remediation Pilot Studies (AOC E and AOC I Sites) Sampling and Analysis Plan, Former Naval Ammunition Support Detachment, Vieques, Puerto Rico* (CH2M HILL, 2010a), hereafter referred to as the Pilot Study Sampling and Analysis Plan (SAP), and the Technical Memorandum entitled *Proposed Pilot Study of In-Situ Remediation at Vieques AOC I* (CH2M HILL, 2008b). Results from the baseline monitoring, ISCO injection event, and the first performance monitoring event were documented in the report entitled: *Status Report, Area of Concern I, In-Situ Remediation Pilot Study* (CH2M HILL, 2011). Pertinent information from the Status Report is included in this Pilot Study Report.

1.1 Pilot Study Objectives and Goals

The objectives of the Pilot Study were to:

- Determine if the groundwater Pilot Study technologies could reduce the groundwater COC concentrations to acceptable levels.
- Determine if the Pilot Study technologies could reduce the groundwater cleanup timeframe (relative to that predicted by natural attenuation alone).

The Pilot Study approach consisted of an ISCO injection of sodium persulfate (sodium hydroxide alkaline activated Klozur) into four existing 2-inch-diameter monitoring wells (MW-02, MW-03, MW-04, and MW-07, as shown in **Figure 4**), followed by EISB by placing oxygen releasing compound (ORC) "socks" into the same monitoring wells and into one additional downgradient monitoring well (MW-05). Periodic groundwater monitoring (COC, geochemical, and microbial, as applicable) during March 2010 (pre-injection [a.k.a., baseline]), November 2010, and November 2011 were planned to evaluate the effectiveness of the Pilot Study technologies. Although the data collected during the planned Pilot Study performance monitoring period indicated COC concentrations had decreased to acceptable levels, the ERP Technical Subcommittee concurred during the February 2012 meeting to collect two additional rounds of samples to ensure rebound did not occur and that no further action is warranted (CH2M HILL, 2012). These two sampling events occurred in May and November 2012.

The following Pilot Study Preliminary Remediation Goals (PRGs) were developed based upon the USEPA Maximum Contaminant Levels (MCLs), or other standards for constituents without MCLs.

COCs	Pilot Study PRGs	Source of PRGs
Benzene	5 µg/L	MCL
Bis (2-ethylhexyl) phthalate	6 µg/L	MCL
1,2-Dichloroethane	3.8 µg/L	PRWQS for Groundwater-SG, lower than MCL of 5 µg/L
1,2-Dichloropropane	5 µg/L	MCL
2-Methylnaphthalene	27 µg/L	HI of 1: not a potential carcinogen, based on the December 2012 EPA Regional Screening Level
Naphthalene	6.1 µg/L*	HI based, (using December 2012 RSL for tap water for non-carcinogenic endpoints).

µg/L = micrograms per liter; HI = hazard index; MCL = maximum contaminant level; PRWQS = Puerto Rico Water Quality Standards
* A Pilot Study PRG of 1.4 µg/L was originally selected solely to represent a conservative screening value to evaluate the technical implementability and effectiveness of the proposed Pilot Study technology. The value of 6.1 µg/L is hazard index based, using the December 2012 RSL for tap water for non-carcinogenic endpoints, and is more appropriate to use as a PRG.

The 2011 Edition of the Drinking Water Standards and Health Advisories (issued by the USEPA Office of Water) indicates that the cancer classification of naphthalene is "I – inadequate information to assess carcinogenic potential." The Lifetime Health Advisory (HA) Level of 100 µg/L for naphthalene is defined as the concentration of naphthalene in drinking water that is not expected to cause any adverse noncarcinogenic effects for a lifetime of exposure. In the updated 2012 Edition of the Drinking Water Standards and Health Advisories, the HA Level of 100 µg/L for naphthalene is unchanged.

The Record of Decision (ROD) entries contained in the USEPA CERCLIS Public Access Database were searched for naphthalene cleanup goals in EPA Region 2. For the nine Superfund Sites where quantitative cleanup goals were available for naphthalene, goals ranged from 10 to 300 µg/L. A PRG of 10 µg/L was selected for three sites in New York, as stipulated in the NYSDEC Groundwater Standards, based on a non-carcinogenic endpoint HI of 1 with an uncertainty factor (UF) of 10 for "Group C" carcinogens to provide sufficient protection from possible carcinogenic effects. Additionally, naphthalene does not have a groundwater standard (SG) in the Puerto Rico Water Quality Standards (PRWQS).

The May 2013 USEPA Regional Screening Level (RSL) Table provides carcinogenic inhalation toxicity values for naphthalene, with a tap water RSL of 0.14 µg/L corresponding to a 1x10-6 excess lifetime cancer risk (ELCR) (or 14 µg/L corresponding to 1x10-4 ELCR). USEPA's target range for ELCR is 1x10-4 to 1x10-6. The 2013 RSL table also identifies a tap water RSL of 6.1 µg/L for non-carcinogenic endpoints, based on an HI of 1 (for cumulative exposures via ingestion/dermal/inhalation).

Based on the above information, the HI-based PRG of 6.1 µg/L, especially considering it is within the USEPA's acceptable ELCR range, is used as the PRG for naphthalene.

1.2 Site Background

Vieques is located in the Caribbean Sea approximately 7 miles southeast of the eastern tip of the island of Puerto Rico (**Figure 1**). Vieques is the largest offshore island of the Commonwealth of Puerto Rico. It is approximately 20 miles long and 4.5 miles wide, and has an area of approximately 33,088 acres (51 square miles).

The Navy purchased large portions of Vieques in the early 1940s to conduct activities related to military training. Site operations within the Former NASD consisted mainly of ammunition loading and storage, vehicle and facility maintenance, and some training. The Navy ceased facility-wide operations on the Former NASD on April 30, 2001, in accordance with Presidential Directive to the Secretary of Defense of January 30, 2000, when the land was transferred to the DOI, MOV, and the Puerto Rico Conservation Trust. The property that contains AOC I was transferred to the MOV.

On February 11, 2005, the Atlantic Fleet Weapons Training Area – Vieques was placed on the National Priorities List (NPL), which required all subsequent environmental restoration activities for Navy Installation Restoration (IR) sites on Vieques to be conducted under CERCLA. On September 7, 2007, the Navy, DOI, USEPA, and PREQB executed a Federal Facility Agreement (FFA) that establishes the procedural framework and schedule for implementing the CERCLA response actions for Vieques.

AOC I is a former asphalt plant, located approximately 900 feet south of Mosquito Pier, adjacent to an active rock quarry within the former NASD and current MOV property. The asphalt plant was in operation from the 1960s through 1988. The former asphalt plant comprised a large concrete pad, asphalt mixing drum, earthen ramp, two concrete-paved containment areas, and an area where two diesel fuel aboveground storage tanks (ASTs) were located (**Figure 3**).

The AOC I area occupies approximately 1 acre, but the asphalt plant itself occupied a considerably smaller area. The topography of the site is relatively flat; stormwater at and in the immediate vicinity of the former asphalt plant was observed to pond at the site during a rain event rather than run off. At the northern, eastern, and southern margins of the site, the topography slopes downward to Route 200 (to the north), the quarry (to the south), and a drainage ditch for the quarry (to the east). Currently there is no continuous human presence or use of the site other than potentially as a passageway for trucks to/from the rock quarry from Route 200. The area that includes the site is fenced to discourage trespassing. Ecological habitat at the former asphalt plant is minimal, consisting primarily of scrub grass, brush, and small trees growing in and around the former asphalt plant structures and through the gravel-covered terrain. No federally-protected species or preferred habitats were observed at AOC I, nor are any cultural resources present at the site.

1.3 Previous Investigations

Previous environmental investigations conducted at AOC I prior to the implementation of the Pilot Study comprise:

- An Environmental Baseline Survey (EBS) was conducted in 2000 to disclose relevant information regarding the environmental condition of the site prior to property transfer of the former NASD (ERM, 2000). A reconnaissance of AOC I was conducted that identified two concrete-bermed containment areas with sumps. Three surface soil samples were collected. The EBS concluded that AOC I should be further investigated under the IR Program.
- An Expanded Preliminary Assessment (PA)/Site Inspection (SI) was conducted at AOC I in 2000 that consisted of an ecological survey and soil sampling from 26 co-located surface soil and subsurface soil samples to determine whether a release had occurred. The Expanded PA/SI recommended the site be investigated further in an RI to delineate the extent of surface soil impacts at the site and conduct a risk assessment (CH2M HILL, 2002).

- RI activities were conducted in 2004, 2005, and 2006 that included surface soil sampling at 18 locations, subsurface soil sampling at 7 locations, and installing and sampling 9 monitoring wells (CH2M HILL, 2005; 2008a). The baseline Human Health Risk Assessment (HHRA) identified six COCs in groundwater. No human health COCs were identified in soil because the potential risks associated with the chemical constituents detected in soil were within acceptable limits (CH2M HILL, 2008a). Additionally, the soil concentrations of the six groundwater COCs were also lower than the concentrations that would likely need to be present to pose a leaching-to-groundwater concern. The Ecological Risk Assessment (ERA) concluded there were no unacceptable risk for ecological receptors at AOC I (CH2M HILL, 2008a).
- To help determine the appropriate path forward for the site, a post-RI round of groundwater samples was collected in July 2008 since 2 years had elapsed since the last RI sampling event.

1.4 Conceptual Site Model

The surficial material at the site comprises gravel fill interspersed with silty clay and sand. Beneath the thin veneer of fill, the soil zone at the site is relatively thin (generally 2 to 9 feet thick) and consists of well-graded gravel with sand of the Qa geologic unit (Quaternary or Holocene alluvium). Andesite bedrock lies below the soil, generally weathered at its surface. **Figure 5** shows a geologic cross section through the site.

The upper portion of the bedrock is unsaturated. Depth to groundwater typically ranges from 14 to 22 feet below ground surface (bgs), with seasonal fluctuation up to approximately 9 feet. The directions and rates of groundwater movement in the andesite bedrock are confined by the size, frequency, and orientation of fractures and by the hydraulic gradient and, therefore, can be quite variable on the small-scale. However, the general direction of groundwater flow at AOC I for all eight rounds of water level measurements is northwest toward the Vieques Passage.

The hydraulic conductivity measured in 2004 and 2006 ranged from 0.1 foot per day (ft/day) to 8.6 ft/day (CH2M HILL, 2008b). The northern area of the site (represented by well MW-06) has the lowest hydraulic conductivity of 0.1 ft/day, while average hydraulic conductivity in southern and central portion of the site (represented by wells MW01 through MW-05) is 4.1 ft/day. The horizontal hydraulic gradient in the southern and central portion of AOC I ranges from approximately flat (November 2012) to approximately 0.005 feet per foot (ft/ft) (November 2011), but increases to a range of approximately 0.015 ft/ft (November 2012) to 0.032 ft/ft (November 2011) in the northern portion of AOC I. Based on the above information, a relatively low groundwater velocity ranging from 3 to 16 feet per year is suggested, with higher seepage velocity observed in the southern and central portion of the AOC I (CH2M HILL, 2010a).

The conceptual site model of AOC I is presented in **Figure 6**, which shows the historical features and potential contaminant migration routes. Based on the historical activities and extent of contamination identified during the RI and related investigations, releases occurred during past asphalt plant operations, likely in the form of minor drips and spills. The primary route of contaminant migration was likely vertical leaching through soil and bedrock to groundwater and subsequent transport with groundwater flow through fractures in the bedrock. However, the data show the extent of contamination was generally limited to the immediate vicinity of the former asphalt plant. Further, the pre-Pilot Study contaminant levels present in environmental media were relatively low with respect to human health-based and ecological-based screening values. No unacceptable human health or ecological risks were identified in soil at the site. However, COCs were identified in groundwater; COC concentrations in groundwater prior to the ISCO/EISB Pilot Study (i.e., from 2004 through 2008) are presented in **Figure 7**. Concentrations exceeding PRGs were limited to the area of MW-04, MW-05, and MW-07, which is the area immediately underlying the main operational activities of the former asphalt plant. However, data from the last sampling event prior to the start of the pilot study show the area of exceedance was limited to MW-07.

SECTION 2

Pilot Study Field Activities

A summary of the Pilot Study field activities completed to date at AOC I is provided in **Table 1**. Site monitoring/injection wells are shown in **Figure 4**. The basis for the pilot study field activities can be found in the Pilot Study SAP (CH2M HILL, 2010a). The Vieques Technical Subcommittee, comprising representatives of the Navy, USEPA, and EQB, concurred on the wells to include in the Pilot Study based on historical data and Pilot Study objectives. Wells MW-01, MW-06, MW-08, and MW-09 were excluded from contaminant analysis during the Pilot Study because they were either upgradient of (MW-01) or far downgradient from (MW-06, MW-08, and MW-09) the area of contamination. These wells had been installed during the RI for the purposes of nature and extent determination but were not relevant to the Pilot Study. Due to the small size of the groundwater plume and slow groundwater velocity rates (3 to 16 ft/yr), MW-02, MW-03, MW-04, MW-05, and MW-07 were determined by the Technical Subcommittee as the appropriate wells to be used for monitoring contaminant concentrations during the Pilot Study.

2.1 Baseline Monitoring

Groundwater elevations were measured from nine AOC I monitoring wells on March 15, 2010 (**Table 2**). Groundwater samples were collected from five monitoring wells (MW-02, MW-03, MW-04, MW-05, and MW-07) between March 18 and 22, 2010. Low-flow sampling techniques were used to purge and collect groundwater samples. Field readings (including turbidity) conducted during sampling were recorded on well purging forms, which are provided in **Appendix A**. Stabilized field parameters are listed in **Table 3**. Persulfate concentrations measured with a field test kit at time of sampling are provided in **Table 4.** Persulfate concentrations were measured to provide a pre-injection baseline. All sampling activities were conducted in accordance with the Pilot Study SAP.

2.2 In-Situ Chemical Oxidation Injection

During the Pilot Study design, the oxidant (persulfate) demand was estimated based on: a) the historical groundwater geochemical data and water quality parameters (showing the anaerobic nature of the subsurface and likelihood of reduced iron and manganese exerting a demand on persulfate), b) the stoichiometric demand based on the historical COC concentrations, and c) professional judgment from numerous persulfate applications. Due to the very low COC concentrations and lack of NAPL at AOC I, the stoichiometric demand, as is common, was negligible.

ISCO injection activities were conducted from March 27 to 31, 2010 by ORIN Remediation Technologies, Inc. of McFarland, Wisconsin in accordance with the Pilot Study SAP. Approximately 835 pounds of sodium persulfate and 800 pounds of sodium hydroxide as an activator were mixed into a 5 percent by weight solution, and injected into MW-02, MW-03, MW-04, and MW-07 (for a total of approximately 2,033 gallons). A summary of the amount of solution injected into each monitoring well and field parameters recorded from the various monitoring wells are provided in **Appendix B**.

Approximately 500 gallons of mixed persulfate/NaOH solution (approximately 209 pounds persulfate and 19 gallons 25 percent NaOH solution with water to make 500 gallons mixture) were injected into each well (MW-02, MW-03, MW-04, and MW-07). These quantities are approximate as a few injections were done simultaneously and in one instance the flow rate was estimated because it was too low for flow meters to measure accurately (less than 1 gallons per minute [gpm]). The injection pressures ranged from 0 to 30 pounds per square inch (psi), only once briefly reaching the maximum of 30 psi. When the pressure reached 30 psi, the injection rate was lowered to decrease the pressure, which was maintained below 30 psi. The flow rates ranged from approximately 0.8 to 3.9 gpm.

No mounding was observed in the surrounding monitoring wells, nor was persulfate detected in wells that were not used as injection wells. This indicates that the injections influenced the local vicinity around each well as designed, and the oxidant solution did not migrate outside the COC-impacted area. Although

fractures in the bedrock at AOC I may have provided preferential pathways for contaminant migration, the ISCO injections would have followed those same pathways since the injections were intentionally performed at very low pressures to avoid creating additional preferential flow pathways. Monitoring during injection was performed and showed no mounding in surrounding wells.

2.3 Persulfate Monitoring

The AOC I monitoring wells to be sampled during the first post-injection performance monitoring event were tested for residual persulfate approximately 2 months before sampling. The purpose was to confirm the persulfate had been consumed sufficiently so that it would not potentially react with the COCs between the time the samples were collected and the time they were analyzed at the laboratory. The residual sodium persulfate concentrations in AOC I monitoring wells measured on August 24-27, 2010, as shown in **Table 4**, ranged from non-detect to 105 milligram per liter (mg/L) (MW-07). In a September 20, 2010 Technical Memorandum (CH2M HILL, 2010b), included in **Appendix C**, the Navy suggested groundwater containing less than 500 mg/L persulfate be sampled using the procedure set forth in the SAP. This proposal was based on a Technical Memorandum by FMC supporting such a limit (FMC, 2010), also included in **Appendix C**. Per an e-mail from USEPA's Scott Huling, also included in **Appendix C**, USEPA preferred to have the samples preserved with ascorbic acid (USEPA, 2010). The Vieques Technical Subcommittee agreed on the sampling approach in an October 4, 2010 conference call (CH2M HILL, 2010c). The procedure agreed upon was that for AOC I groundwater samples containing residual persulfate, the residual persulfate would be neutralized using ascorbic acid (instead of hydrochloric acid) before placing these on ice for shipment to the laboratory for analysis. Persulfate monitoring was conducted in accordance with the SAP (CH2M HILL, 2010a).

2.4 First Post-injection Performance Monitoring Event

The first post-injection performance monitoring event was conducted from November 1 to 4, 2010. Groundwater elevations measured from each monitoring well are summarized in **Table 2** and presented in **Figure 8**. Groundwater flow was discussed in Section 1.4 and is further discussed in Section 3. Low-flow sampling techniques were used to purge and collect groundwater samples. Field readings (including turbidity) conducted during sampling were recorded on well purging forms, which are provided in **Appendix A**. Stabilized field parameters are listed in **Table 3**. Persulfate concentrations measured in groundwater using field test kits are presented in **Table 4**. The persulfate was measured after field parameters stabilized, immediately prior to collecting samples.

For informational purposes, groundwater collected from the five monitoring wells was processed with three different approaches in the field. One set of samples was collected in ascorbic acid-preserved vials, as concurred upon by the Technical Subcommittee (CH2M HILL, 2010c); a second set was collected in unpreserved vials; and a third set was collected in hydrochloric acid-preserved vials (i.e., in accordance with the SAP). **Table 4** shows the persulfate concentrations measured in wells at the time of sample collection. **Table 5** shows the results of the three analyses (with identification of the preservative method for each) for each well. Of note is that the volatile organic compounds (VOCs) concentrations for each well were essentially the same among the samples preserved with hydrochloric acid, ascorbic acid, and unpreserved. For example, benzene concentrations in samples from well MW-07, which had a measured persulfate concentration between 14 and 21 mg/L, were 9.5 μg/L (unpreserved), 9.5 μg/L (ascorbic acid), and 9.4 μg/L (HCl). Therefore, at the concentrations observed at this site and given the water geochemistry, it does not appear to make a difference for VOC groundwater results how or if the samples were preserved.

2.5 Enhanced In-Situ Bioremediation

Following the post-injection groundwater sampling event in November 2010, ten 2-inch diameter ORC socks (strung together) were placed down each of monitoring wells MW-02, MW-03, MW-04, MW-05 and MW-07 in accordance with the Pilot Study SAP. The ORC sock suspension lines were attached to a fitting on the underside of each well cap, allowing the ORC socks to remain suspended and submerged in groundwater

within the screen zone when the well cap was in place. The ORC socks were removed in July 2011 according to the schedule in the Pilot Study SAP.

2.6 Second Post-injection Performance Monitoring Event

The second post-injection performance monitoring event was conducted from November 9 to 10, 2011. Groundwater elevations measured from each monitoring well are summarized in **Table 2** and presented in **Figure 9**. Low-flow sampling techniques were used to purge and collect groundwater samples. Field readings (including turbidity) conducted during sampling were recorded on well purging forms, which are provided in **Appendix A**. Stabilized field parameters are listed in **Table 3**. Persulfate concentrations measured in groundwater using field test kits are presented in **Table 4**. Persulfate was measured after field parameters stabilized, immediately prior to collecting samples.

The results of the analyses for each well are presented in **Table 5** and are discussed in Section 3.

2.7 Third Post-injection Performance Monitoring Event

After the first two post-injection sampling events scheduled in the SAP were conducted, the data were presented to the Vieques Environmental Technical Subcommittee with a recommendation to prepare a no further action proposed plan and record of decision. However, to ensure contaminant rebound was not observed, the Technical Subcommittee agreed to perform two additional sampling events for a subset of the AOC I monitoring wells (i.e., MW-04, MW-05, and MW-07). This agreement was reached in the February 22, 2012 Technical Subcommittee meeting. The third post-injection performance monitoring event was conducted from May 22 to 23, 2012. Groundwater elevations measured from each monitoring well are summarized in **Table 2** and presented in **Figure 10**. Low-flow sampling techniques were used to purge and collect groundwater samples. Field readings (including turbidity) conducted during sampling were recorded on well purging forms, which are provided in **Appendix A**. Stabilized field parameters are listed in **Table 3**. Persulfate concentrations measured in groundwater using field test kits are presented in **Table 4**. Persulfate was measured immediately prior to collecting samples.

2.8 Fourth Post-injection Performance Monitoring Event

The fourth post-injection performance monitoring event was conducted from November 28 to 29, 2012. Groundwater elevations measured from each monitoring well are summarized in **Table 2** and presented in **Figure 11**. Low-flow sampling techniques were used to purge and collect groundwater samples. Field readings (including turbidity) conducted during sampling were recorded on well purging forms provided in **Appendix A**. Stabilized field parameters are listed in **Table 3**. Persulfate concentrations measured in groundwater using field test kits are presented in **Table 4**. Persulfate was measured immediately prior to collecting samples.

SECTION 3

Groundwater Monitoring Results

This section summarizes the results of the groundwater monitoring activities during the baseline and post-injection performance monitoring events. The groundwater elevations measured at each of the monitoring wells prior to each sampling event are tabulated in **Table 2** and are shown in **Figures 8** through **11**. While the groundwater elevation fluctuated by as much as 9 feet, the groundwater flow direction stayed consistently to the northwest. The south and central portion of the site, where area of contamination was localized, has a relatively flat gradient. As discussed in section 3.2, there is no correlation between groundwater elevation and COC concentrations in groundwater. Field parameters and detected analytical concentrations are provided in **Tables 3** and **5**, respectively. The groundwater data were validated in accordance with the Pilot Study SAP. Concentration trends of benzene and naphthalene are shown in **Figures 12** through **15,** and are discussed below. Concentrations of the other COCs had already decreased to below PRGs prior to the start of the pilot test, as shown in **Table 5**. Analytical data and data validation reports for all Pilot Study sampling efforts are provided in **Appendix D**.

3.1 Geochemical Parameters

Groundwater temperature remained consistent during the four sampling events (between 28 and 30 degrees Celcius), which is conducive for both ISCO and EISB (**Table 3**). The pH remained relatively neutral; however, one monitoring well (MW-07) exhibited elevated pH values from November 2011 to November 2012, potentially due to low residual sodium hydroxide base used to activate the sodium persulfate during ISCO. The pH showed a decreasing trend over the time period from November 2011 to 2012. While elevated pH is not ideal for EISB, the pH range in the other four wells supplied with ORC socks is optimal for EISB.

The specific conductivity increased between the first and second monitoring events at four monitoring wells (MW-02, MW-03, MW-04, and MW-07) before decreasing through the third and fourth events. This trend is likely a result of the residual sodium from the sodium persulfate oxidant and sodium hydroxide catalyst injected into these monitoring wells (sodium persulfate was not injected into well MW-05). The overall low dissolved oxygen (DO) concentrations suggest reducing conditions occur naturally in the aquifer. However, the DO readings of 6.59 mg/L in MW-02 in November 2010 and readings of 11.15 mg/L and 5.44 mg/L in 2011 and 2012, respectively, in MW-07 in 2012 may be the result of localized oxidizing conditions induced during ISCO or residual oxygen released during EISB. Oxygen reduction potential (ORP) concentrations ranged from -70.6 to 113 millivolts (mV) during the baseline sampling in March 2010, showed increasing trends in each individual well over the next few sampling events, and were between -232.8 and 25.4 mV (lower than initial values) in November 2012. The initial increases in ORP are indicative of the oxidant's effect on groundwater.

Dissolved iron and manganese were analyzed to confirm the presence of an oxidative environment post-injection, which would tend to decrease dissolved iron and manganese. As shown in **Table 5**, this is what was observed; iron and manganese concentrations declined at the injection wells (MW-02, MW-03, MW-04, and MW-07) following the ISCO injection, indicative of the desired oxidative conditions. Several wells also showed increases of these metals toward the end of the study, indicating a return to normal geochemical conditions.

3.2 COC Concentration Trends

Based on the baseline groundwater monitoring event, benzene and naphthalene were identified as the key COCs (**Figure 7**). 1,2-dichloroethane, 1,2-dichloropropane, bis(2-ethyhexyl)phthalate, and 2-methylnapthalene were either not detected or were detected at concentrations below the Pilot Study PRGs during baseline sampling and all subsequent monitoring events.

Benzene was detected above the Pilot Study PRG (**Figures 7, 12,** and **13**) at only one monitoring well (MW-07) following the injection. Although the concentration demonstrate a decrease from 14 micrograms per

liter (μg/L) during baseline sampling to 0.82 μg/L during November 2012 sampling, the change in concentration may be due to natural degradation as well as ISCO influence. Benzene concentrations have decreased steadily since the baseline sampling event, with no evidence of rebound in the 2012 sampling events.

Like benzene, naphthalene (**Figures 7, 14, and 15**) was detected above the Pilot Study PRG in only one monitoring well (MW-07) following the injection. Also like benzene, naphthalene concentrations in MW-07 decreased to be below the Pilot Study PRG and showed no evidence of rebound.

As stated in Section 1.1, the objectives of the Pilot Study implemented at AOC I were to: (1) determine if the groundwater Pilot Study technologies could reduce COC concentrations to acceptable levels and (2) determine if the Pilot Study technologies could reduce the groundwater cleanup timeframe (relative to that predicted by natural attenuation alone). The associated project quality objective (PQO), as documented in Worksheet 11 of the Pilot Study SAP (CH2M HILL, 2010a), was to collect data sufficient for determining whether unacceptable risk associated with potential potable groundwater use at the site was mitigated (i.e., all COC concentrations below Pilot Study PRGs) and, therefore, no further action was warranted.

As noted previously, the concentrations of all groundwater COCs in all wells (except benzene and naphthalene in well MW07) had declined to below Pilot Study PRGs before the Pilot Study baseline sampling (i.e., between 2004 and 2010). For MW07, **Table 6** summarizes the percent reduction of benzene and naphthalene in monitoring well MW-07 prior to and during the Pilot Study implementation. The table also includes 2-methylnaphthalene because it helps demonstrate the potential affect on COC concentration decline by natural processes and the Pilot Study technologies. As shown in the table, the concentrations of these three COCs declined between 74 percent and 79 percent over the 5 ½ years prior to the Pilot Study (i.e., under the influence of natural attenuation processes alone). During the 2 ½-year Pilot Study, the same COCs declined by about 95 percent.

In addition to the above, natural attenuation modeling (see Attachment C of the Pilot Study SAP [CH2M HILL, 2010a]) indicated it would take approximately 7 years for benzene and 14 years for naphthalene to decline from levels measured at AOC I in 2008 to the Pilot Study PRGs under the influence of natural attenuation processes alone. As shown in **Figures 12 and 14**, the Pilot Study PRGs for both of these two COCs were achieved in about 4 years (i.e., 2008 to 2012).

The information above indicates the decreases in COC concentrations were attributable to both natural processes and Pilot Study technologies, with the Pilot Study technologies likely accelerating the decline to below the PRGs. Regardless of the relative contribution of natural processes and Pilot Study technologies, the monitoring conducted before and during the Pilot Study indicated all COCs at the site declined to below the PRGs without rebound.

3.3 Residual Human Health Risk

Although the COC concentrations decreased to below Pilot Study PRGs (in most cases before the pilot study was initiated), human health risk calculations were performed using the most recent COC concentrations (i.e., from May and November 2012) to ensure residual COC concentrations do not pose an unacceptable risk under an unrestricted use scenario. As shown in **Table 5**, only three of the six COCs were detected in 2012. Based on maximum detected concentrations in 2012 and comparison to the USEPA Regional Screening Levels for tap water (November 2012), the total excess lifetime cancer risk (ELCR) is $3x10^{-5}$ and the maximum target organ-specific hazard index (HI) is 0.5 (**Table 7**). Both the ELCR and HI are within USEPA-acceptable risk levels.

SECTION 4

Conclusions and Path Forward

In summary, the conclusions for the In-situ Pilot Study are as follows:

- The groundwater Pilot Study technologies (potentially coupled with natural processes) achieved the Pilot Study goals by reducing the groundwater COC concentrations to acceptable levels within 26-months (from March 2010 to May 2012), a rate faster than predicted by natural attenuation alone.
- The Pilot Study results are applicable to the site as a whole since the area of contamination was small enough to apply the Pilot Study site-wide.
- Only monitoring well MW-07 showed COC exceedances at the start of the Pilot Study, and only for two COCs: benzene and naphthalene.
  - Benzene concentrations decreased from 59.3 μg/L in September 2004 to 0.82 μg/L in November 2012 (from 14 μg/L to 0.82 μg/L during the Pilot Study). Benzene concentrations declined naturally by 76 percent prior to the Pilot Study and by 94 percent following the ISCO injection and EISB application; overall concentrations declined by 99 percent. Benzene fell below its PRG of 5 μg/L between November 2011 and May 2012 and no rebound was observed.
  - Naphthalene concentrations decreased from 96 μg/L in January 2006 to being undetected in November 2012(from 21 μg/L to non-detect during the Pilot Study). Naphthalene concentrations declined naturally by 74 percent prior to the Pilot Study and by 95 percent following the ISCO injection and EISB application; overall concentrations declined by 99 percent. Naphthalene fell below its PRG of 6.1 μg/L between November 2011 and May 2012 and no rebound was observed.
- 1,2-Dichloroethane concentrations decreased from 1.6 μg/L (January 2006) to below detection (July 2008). 1,2-Dichloroethane has not been detected since 2006.
- 1,2-Dichloropropane concentrations decreased from 0.33μg/L (September 2004) to below detection (January 2006). 1,2-Dichloropropane has not been detected since 2004.
- 2-Methylnaphthalene concentrations decreased from 110 μg/L (January 2006) to 1.1 μg/L (November 2012). 2-Methylnaphthalene concentrations fell below the PRG of 27 μg/L between January 2006 and July 2008, prior to the start of the pilot test.
- Bis(2-Ethylhexyl)phthalate concentrations decreased from 9.6 μg/L (September 2004) to below detection (May 2012). Bis(2-Ethylhexyl)phthalate concentrations fell below the PRG of 6 μg/L between September 2004 and July 2008, prior to the start of the pilot test.

Before implementing the Pilot Study, groundwater COC concentrations were trending down due to natural attenuation and a likely overall decrease in residual adsorbed COC mass in the fine-grained matrix. Implementing ISCO and EISB likely accelerated the rate of mass dissolved concentration decreases, and no rebound has been observed. In addition, residual risk under a potable use scenario is acceptable because the ELCR and HI based on the current concentrations of all COCs are within USEPA-acceptable risk levels.

Because there are no soil COCs, because the Pilot Study PRGs were achieved site-wide and no rebound was observed, and because residual risks are within acceptable levels under a potable use scenario, no further action is warranted for AOC I. A no further action proposed plan and record of decision will be prepared for AOC I based on information presented in the RI and this Pilot Study report.

SECTION 5

References

CH2M HILL. 2000. *Expanded Preliminary Assessment/Site Inspection, U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico.* October.

CH2M HILL. 2002. *Expanded Preliminary Assessment/Site Inspection Phase II Seven Sites, Former U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico.* November 18.

CH2M HILL. 2005. *Interim Remedial Investigation Report for Area of Concern (AOC) I at the Former U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico.* January.

CH2M HILL. 2008a. *Final Remedial Investigation Report, Area of Concern (AOC) I, Former Naval Ammunition Support Detachment, Vieques, Puerto Rico.* June.

CH2M HILL. 2008b. *Technical Memorandum – Proposed Pilot Study of In Situ Remediation at Vieques AOC I.* November 20.

CH2M HILL. 2010a. *Final In-Situ Remediation Pilot Studies (AOC E and AOC I Sites) Sampling and Analysis Plan, Vieques, Puerto Rico.* February.

CH2M HILL. 2010b. *Technical Justification for Conducting First Post-Injection Sampling at AOC I despite Low Residual Persulfate Concentrations.* September.

CH2M HILL. 2010c. Telephone conversation record-Ascorbic Acid Additive to Post-Injection samples collected at AOC I. October.

CH2M HILL. 2011. *Status Report, Area of Concern I, In-Situ Remediation Pilot Study.* March.

CH2M HILL. 2012. *Final Meeting Minutes, ERP/MRP Subcommittee Meeting, Vieques Superfund Site.* February 22-24.

Environmental Resources Management (ERM). 2000. *Environmental Baseline Survey, Naval Ammunition Support Detachment Vieques, Vieques Island, Puerto Rico*. October.

FMC. 2010. Technical *Memorandum Reactivity of Dilute Concentrations of Klozur Persulfate*. September.

United States Environmental Protection Agency (USEPA). 2010. Email. Ascorbic acid addition to AOC I samples. September 30.

USEPA. 2012. *2012 Edition of the Drinking Water Standards and Health Advisories.* EPA 822-R-06-013 Office of Water, U.S. Environmental Protection Agency, Washington, DC. December 2012.

Tables

TABLE 1
Pilot Study Approach
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

Date	Specific Activity	Comments
March 18-22, 2010	Baseline Groundwater Sampling Event	Purged and sampled 5 monitoring wells (MW-02, MW-03, MW-04, MW-05, and MW-07).
March 27-31, 2010	ISCO Injection Event	Injected 835 pounds of sodium persulfate with 800 lbs of sodium hydroxide (total of approximately 2,033 gallons) across four existing monitoring wells (MW-02, MW-03, MW-04, and MW-07).
August 24-27, 2010	Measured persulfate concentrations in wells	Performed in preparation for sampling in accordance with SAP. Residual sodium persulfate was detected in some wells; worked with EPA/EQB between September and October 2010 to modify the sampling approach to account for residual persulfate (use of ascorbic acid as preservative).
November 1-4, 2010	First Performance Groundwater Sampling Event	Collected site-wide water-level measurements. Purged and sampled 5 monitoring wells (MW-02, MW-03, MW-04, MW-05, and MW-07).
November 4, 2010	EISB (ORC sock placement)	Installed 2-inch diameter ORC socks in the screen zone of monitoring wells MW-02, MW-03, MW-04, MW-05, and MW-07.
July 27, 2011	ORC sock removal	ORC sock removal from monitoring wells MW-02, MW-03, MW-04, MW-05 and MW-07.
November 9-10, 2011	Second Performance Groundwater Sampling Event	Collected site-wide water-level measurements. Purged and sampled 5 monitoring wells (MW-02, MW-03, MW-04, MW-05, and MW-07).
May 22-23, 2012	Third Performance Groundwater Sampling Event	Collected site-wide water-level measurements. Purged and sampled 3 monitoring wells (MW-04, MW-05, and MW-07).
November 27-28, 2012	Fourth Performance Groundwater Sampling Event	Collected site-wide water-level measurements. Purged and sampled 3 monitoring wells (MW-04, MW-05, and MW-07).

TABLE 2
Groundwater Elevations
AOC I In-Situ remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

Monitoring Well ID	Top of Casing Elevation (ft amsl)	Screen Interval Depth (ft amsl)	September 22, 2004		January 10, 2006		March 17, 2006		March 15, 2010		November 1, 2010		November 9, 2011		May 22, 2012		November 27, 2012	
			Depth to Water (ft BTOC)	Groundwater Elev. (ft amsl)	Depth to Water (ft BTOC)	Groundwater Elev. (ft amsl)	Depth to Water (ft BTOC)	Groundwater Elev. (ft amsl)	Depth to Water (ft BTOC)	Groundwater Elev. (ft amsl)	Depth to Water (ft BTOC)	Groundwater Elev. (ft amsl)	Depth to Water (ft BTOC)	Groundwater Elev. (ft amsl)	Depth to Water (ft BTOC)	Groundwater Elev. (ft amsl)	Depth to Water (ft BTOC)	Groundwater Elev. (ft amsl)
MW-01	35.27	0.45 to -9.55	17.68	17.59	17.57	17.70	22.18	13.09	24.93	10.34	20.82	14.45	16.46	18.81	18.32	16.95	25.50	9.77
MW-02	34.54	-0.36 to -10.36	17.28	17.26	16.97	17.57	21.44	13.10	24.20	10.34	20.08	14.46	15.80	18.74	17.65	16.89	24.78	9.76
MW-03	34.77	5.58 to -4.42	17.54	17.23	17.23	17.54	21.75	13.02	24.35	10.42	20.45	14.32	16.10	18.67	17.90	16.87	25.02	9.75
MW-04	34.96	2.81 to -7.19	17.95	17.01	17.53	17.43	22.14	12.82	24.62	10.34	20.60	14.36	16.35	18.61	18.14	16.82	25.19	9.77
MW-05	34.82	0.22 to -9.78	18.26	16.56	17.84	16.98	22.26	12.56	24.21	10.61	20.65	14.17	16.57	18.25	18.09	16.73	24.96	9.86
MW-06	34.75	-0.25 to -10.25	25.04	9.71	20.65	14.10	25.04	9.71	24.65	10.10	22.14	12.61	19.33	15.42	19.96	14.79	26.25	8.50
MW-07	35.16	-0.27 to -10.27	18.14	17.02	17.73	17.43	22.14	13.02	24.85	10.31	20.85	14.31	16.64	18.52	18.28	16.88	25.33	9.83
MW-08	33.81	0.81 to -9.19	NI	NI	19.69	14.12	24.01	9.80	23.55	10.26	21.24	12.57	18.36	15.45	19.00	14.81	25.26	8.55
MW-09	35.1	0.10 to -9.90	NI	NI	18.55	16.55	23.39	11.71	23.61	11.49	21.31	13.79	17.53	17.57	18.68	16.42	25.11	9.99

Notes:
ft BTOC = feet below top of casing
ft amsl = feet above mean sea level
NI- Not yet installed
MWs-02, 03, 04, and 07 had ISCO applied in them March 27-31, 2010. The previously mentioned wells and MW-05 received EISB treatment November 4, 2010 to July 27, 2011.

TABLE 3
Stablized Field Parameters
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

	Monitoring Well	MW-02			MW-03			MW-04					MW-05						MW-07				
Field Parameter	**Date**	3/18/2010	11/3/2010	11/10/2011	3/19/2010	11/4/2010	11/9/2011	3/19/2010	11/2/2010	11/10/2011	5/23/2012	11/28/2012	3/18/2010	11/2/2010	11/8/2011	11/9/2011	5/22/2012	11/28/2012	3/22/2010	11/4/2010	11/9/2011	5/23/2012	11/29/2012
Temperature (ºC)		29.72	29.34	28.50	29.68	29.35	28.40	29.82	29.44	29.20	29.04	29.00	29.56	29.24	28.90	27.60	29.87	28.60	28.93	29.80	28.00	29.40	29.10
Specific Conductance (mS/cm)		1.099	1.620	1.084	1.275	1.779	1.161	1.289	1.843	1.393	1.489	1.420	1.431	1.358	1.348	1.258	1.311	1.040	1.374	9.861	8.230	4.796	3.700
Dissolved Oxygen (mg/L)		0.13	6.59	2.20	0.26	0.37	0.31	0.17	0.28	1.08	2.30	0.27	0.28	0.21	1.05	0.55	0.23	0.44	0.51	0.35	11.15	5.44	2.01
Oxidation-Reduction Potential (mV)		113.0	172.1	25.4	-49.4	-8.7	-163.7	30.8	106.9	-85.1	-116.3	-232.8	-7.0	12.5	52.9	-4.0	45.6	-100.1	-70.6	89.9	48.6	-41.7	-42.4
pH		6.69	6.60	6.96	6.76	7.28	6.90	6.77	6.86	7.07	6.96	6.54	6.74	6.73	6.69	6.71	7.01	6.36	6.72	7.38	12.26	11.12	10.00
Turbidity (NTU)		2.02	1.11	6.31	10.2	7.87	10.08	6.09	11.9	11.5	1.37	2.0	3.49	4.16	23.8	19.2	4.43	3.0	10.9	4.32	22.7	19.6	11.1

Notes:

ºC - degrees centigrade

mS/cm - millisiemens per centimeter

mg/L - milligrams per liter

mV - millivolts

NTU - Nephelometric Turbidity Unit

NM - not measured

MWs-02, 03, 04, and 07 had ISCO applied in them March 27-31, 2010. These wells and MW-05 received EISB treatment November 4, 2010 to July 27, 2011.

TABLE 4

Persulfate Concentration

AOC I In-Situ Remediation Pilot Study Report

Former Naval Ammunition Support Detachment

Vieques, Puerto Rico

Persulfate Concentration (PPM)						
Monitoring Well ID	**March 18-22, 2010**	**August 24-27, 2010**	**November 1-4, 2010**	**Novmeber 9-10, 2011**	**May 22-23, 2012**	**November 28-29, 2012**
MW-01	nm	0	nm	nm	nm	nm
MW-02	0	14	14	0.7	nm	nm
MW-03	0	2.1	0-0.7	0	nm	nm
MW-04	0	1.4	0-0.7	0.7	0	0
MW-05	0	0	0	0	0	0
MW-07	0	105	14-21	1.4	1.4	0
MW-08	nm	0	nm	nm	nm	nm
MW-09	nm	0	nm	nm	nm	nm
nm- Not measured						

Notes:

MWs-02, 03, 04, and 07 had ISCO applied in them March 27-31, 2010. These wells and MW-05 received EISB treatment November 4, 2010 to July 27, 2011.

Persulfate monitoring was conducted in accordance with the SAP (CH2M HILL, 2010a).

TABLE 5

Analytical Results for COCs, Dissolved Iron and Manganese, and Select Wet Chemistry Parameters for AOC I

AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

Station ID	**GW PRGs**	MW01				MW02							
Sample ID		NDAIGW01-R01	WAI-GW01-06A	WAI-GW01P-06A	VWAI-MW01-08C	NDAIFD01P-R01	NDAIGW02-R01	VWAI-MW02-08C	VWAI-MW02-0310	VWAI-MW02-1110	VWAI-MW02-1110A	VWAI-MW02-1110H	VWAI-MW02-1111
Sample Date		09/23/04	01/10/06	01/10/06	07/23/08	09/21/04	09/21/04	07/24/08	03/18/10	11/03/10	11/03/10	11/03/10	11/10/11
Preservative Method		HCl	HCl	HCl	HCl	HCl	HCl	HCl	HCl	Unpreserved	Ascorbic Acid	HCl	HCl
Chemical Name													
Volatile Organic Compounds (UG/L)													
1,2-Dichloroethane	3.8	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	1 U	1 U	1 U	1 U
Benzene	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U
Semivolatile Organic Compounds (UG/L)													
2-Methylnaphthalene	27	5 UJ	5 U	5 U	0.093 U	5.2 U	5.2 U	0.1 U	1 U	1 U	NA	NA	2 U
bis(2-Ethylhexyl)phthalate	6	10 UJ	5 U	5 U	4.7 U	10.4 U	10.4 U	5 U	5 U	5 U	NA	NA	2 U
Naphthalene	6.1	5 UJ	5 U	5 U	0.093 U	5.2 U	5.2 U	0.1 U	1 U	1 U	NA	NA	2 U
Dissolved Metals (UG/L)													
Iron, Dissolved	--	**83.3 J**	100 U	100 U	100 U	**33.4 J**	**32.5 J**	100 U	200 U	100 U	NA	NA	50 U
Manganese, Dissolved	--	**37.9**	**10.9 J**	**11.5 J**	4 R	**865**	**859**	1,050 R	**1,500**	**70.7 J**	NA	NA	**155 J**
Wet Chemistry (MG/L)													
Nitrate	--	NA	**0.66**	**0.615**	NA	NA	NA	NA	**0.74 B**	**11 B**	NA	NA	**3.9**
Persulfate (field test kit)	--	NA	NA	NA	NA	NA	NA	NA	0	**14**	**14**	**14**	**0.7**
Sulfate	--	NA	**22.2**	**22.4**	NA	NA	NA	NA	**8.2 B**	**90**	NA	NA	**59**
Total organic carbon (TOC)	--	NA	**2.74 J**	**8.58**	NA	NA	NA	NA	**3.6 J**	**4.4 J**	NA	NA	**5.4 J**

Notes:

Bold indicates detections

Bolded shading indicates detected exceedance.

[1]0-0.7 indicates an estimated value of persulfate that was less than 0.7 mg/L .

NA - Not analyzed

B - Analyte also detected in an associated method blank (unvalidated data).

J - Estimated (validated data).

J - Below reporting limit (unvalidated data).

R - Unreliable Result

U – Nondetect or not detected at significantly greater than that in an associated blank.

UJ - Nondetect. Estimated reporting limit.

MG/L - Milligrams per liter

UG/L - Micrograms per liter

TABLE 5
Analytical Results for COCs, Dissolved Iron and Manganese, and Select Wet Chemistry Parameters for AOC I
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

Station ID	MW03							
Sample ID	NDAIGW03-R01	VWAI-MW03-08C	VWAI-MW03-0310	VWAI-MW03P-0310	VWAI-MW03-1110	VWAI-MW03-1110A	VWAI-MW03-1110H	VWAI-MW03-1111
Sample Date	09/21/04	07/24/08	03/19/10	03/19/10	11/04/10	11/04/10	11/04/10	11/09/11
Preservative Method	HCl	HCl	HCl	HCl	Unpreserved	Ascorbic Acid	HCl	HCl
Chemical Name								
Volatile Organic Compounds (UG/L)								
1,2-Dichloroethane	0.5 U	0.5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	5 U	5 U	1 U	1 U	1 U	1 U
Benzene	**0.62**	**0.14 J**	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U
Semivolatile Organic Compounds (UG/L)								
2-Methylnaphthalene	5 U	**1.3**	1 U	1 U	1 U	NA	NA	2 U
bis(2-Ethylhexyl)phthalate	10 U	5 U	5 U	5 U	5 U	NA	NA	2 U
Naphthalene	5 U	**0.71 J**	1 U	1 U	1 U	NA	NA	2 U
Dissolved Metals (UG/L)								
Iron, Dissolved	**99.8 J**	**321**	**578**	NA	100 U	NA	NA	**113 J**
Manganese, Dissolved	**1,290**	1,450 R	**1,850**	NA	**589 J**	NA	NA	**1,350 J**
Wet Chemistry (MG/L)								
Nitrate	NA	NA	**0.023 BJ**	NA	0.042 U	NA	NA	0.042 U
Persulfate (field test kit)	NA	NA	0	0	**0-0.7**[1]	**0-0.7**[1]	**0-0.7**[1]	0
Sulfate	NA	NA	**5.9 B**	NA	**200**	NA	NA	**42**
Total organic carbon (TOC)	NA	NA	**4.5 J**	NA	**6.6 J**	NA	NA	**6 J**

Notes:
Bold indicates detections
Bolded shading indicates detected exceedance.
[1]0-0.7 indicates an estimated value of persulfate that was less than 0.7 mg/L .
NA - Not analyzed
B - Analyte also detected in an associated method blank (unvalidated data).
J - Estimated (validated data).
J - Below reporting limit (unvalidated data).
R - Unreliable Result
U – Nondetect or not detected at significantly greater than that in an associated blank.
UJ - Nondetect. Estimated reporting limit.
MG/L - Milligrams per liter
UG/L - Micrograms per liter

TABLE 5
Analytical Results for COCs, Dissolved Iron and Manganese, and Select Wet Chemistry Parameters for AOC I
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

Station ID	MW04									
Sample ID	NDAIGW04-R01	WAI-GW04-06A	VWAI-MW04-08C	VWAI-MW04-0310	VWAI-MW04-1110	VWAI-MW04-1110A	VWAI-MW04-1110H	VWAI-MW04-1111	VWAI-MW04-0512	VWAI-MW04-1112
Sample Date	09/23/04	01/10/06	07/23/08	03/19/10	11/02/10	11/02/10	11/02/10	11/10/11	05/23/12	11/28/12
Preservative Method	HCl	HCl	HCl	HCl	Unpreserved	Ascorbic Acid	HCl	HCl	Ascorbic Acid	Ascorbic Acid
Chemical Name										
Volatile Organic Compounds (UG/L)										
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzene	**33.7**	**4.6**	**5**	5 U	**4.3 J**	**4 J**	**4.6 J**	**1.1 J**	**2.6 J**	**2.2 J**
Semivolatile Organic Compounds (UG/L)										
2-Methylnaphthalene	**41.4**	**3.8 J**	**0.47**	1 U	1 U	NA	NA	2 U	2 U	2 U
bis(2-Ethylhexyl)phthalate	10 U	5 U	5 U	5 U	**1.4 J**	NA	NA	2 U	2 U	2 U
Naphthalene	**46.2**	**5.5**	**1.1**	1 U	**1.4**	NA	NA	**1.2**	**2.2**	**1.6 J**
Dissolved Metals (UG/L)										
Iron, Dissolved	**17 J**	**117**	100 U	**65.5 J**	100 U	NA	NA	50 U	50 UJ	**34.3 J**
Manganese, Dissolved	**1,920**	**1,960**	1,670 R	**2,130**	**1,340 J**	NA	NA	**789 J**	**712 J**	**1,140 J**
Wet Chemistry (MG/L)										
Nitrate	NA	0.05 U	0.05 U	**0.078 BJ**	0.042 U	NA	NA	**0.32**	**0.022 J**	0.042 U
Persulfate (field test kit)	NA	NA	NA	0	**0-0.7**[1]	**0-0.7**[1]	**0-0.7**[1]	**0.7**	0	0
Sulfate	NA	**10.2**	**10.8**	**14 B**	**110**	NA	NA	**100**	**71**	**75**
Total organic carbon (TOC)	NA	**3.79 J**	**2.31 B**	10 U	**7.1 J**	NA	NA	**7.5 J**	**5.6 J**	**4.9 J**

Notes:
Bold indicates detections
Bolded shading indicates detected exceedance.
[1]0-0.7 indicates an estimated value of persulfate that was less than 0.7 mg/L .
NA - Not analyzed
B - Analyte also detected in an associated method blank (unvalidated data).
J - Estimated (validated data).
J - Below reporting limit (unvalidated data).
R - Unreliable Result
U – Nondetect or not detected at significantly greater than that in an associated blank.
UJ - Nondetect. Estimated reporting limit.
MG/L - Milligrams per liter
UG/L - Micrograms per liter

TABLE 5
Analytical Results for COCs, Dissolved Iron and Manganese, and Select Wet Chemistry Parameters for AOC I
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Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

Station ID	MW05													MW06		
Sample ID	NDAIGW05-R01	VWAI-MW05-08C	VWAI-MW05P-08C	VWAI-MW05-0310	VWAI-MW05-1110	VWAI-MW05-1110A	VWAI-MW05-1110H	VWAI-MW05-1111	VWAI-MW05P-1111	VWAI-MW05B-1111	VWAI-MW05BP-1111	VWAI-MW05-0512	VWAI-MW05-1112	NDAIGW06-R01	WAI-GW06-06A	VWAI-MW06-08C
Sample Date	09/22/04	07/21/08	07/21/08	03/18/10	11/02/10	11/02/10	11/02/10	11/08/11	11/08/11	11/09/11	11/09/11	05/22/12	11/28/12	09/22/04	01/10/06	07/27/08
Preservative Method	HCl	HCl	HCl	HCl	Unpreserved	Ascorbic Acid	HCl	HCl	HCl	HCl	HCl	Ascorbic Acid	Ascorbic Acid	HCl	HCl	HCl
Chemical Name																
Volatile Organic Compounds (UG/L)																
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	5 U	1 U	1 U	1 U	NA	NA	1 U	1 U	1 U	1 U	0.5 U	0.5 UJ	0.5 U
Benzene	**0.66**	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Semivolatile Organic Compounds (UG/L)																
2-Methylnaphthalene	**9.5**	**7.5**	**5.4**	**3**	**20**	NA	NA	**11**	**11**	NA	NA	**11**	**11**	5 U	5.4 U	0.1 U
bis(2-Ethylhexyl)phthalate	**9.6 J**	5 U	5 U	**1.4 J**	5 U	NA	NA	2 U	2 U	NA	NA	2 UJ	2 U	10 U	5.4 U	5.1 U
Naphthalene	5 U	**0.33 J**	**0.26 J**	1 U	**1.7**	NA	NA	2 U	2 U	NA	NA	**1.3 J**	2 U	5 U	5.4 U	0.1 U
Dissolved Metals (UG/L)																
Iron, Dissolved	**77.3 J**	100 U	100 U	**318**	**311 J**	NA	NA	**54.2 J**	NA	NA	NA	**107 J**	**248 J**	**68.9 J**	100 U	100 U
Manganese, Dissolved	**1,090**	1,050 R	1,310 R	**1,300**	**1,300 J**	NA	NA	**1,280 J**	NA	NA	NA	**1,230 J**	**1,450 J**	**44.9**	**12.1 J**	7.6 R
Wet Chemistry (MG/L)																
Nitrate	NA	0.05 U	0.05 U	**0.012 BJ**	0.042 U	NA	NA	**0.017 J**	NA	NA	NA	**0.0094 J**	0.042 U	NA	**1.86**	NA
Persulfate (field test kit)	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	NA	NA	NA
Sulfate	NA	5 U	5 U	**0.18 BJ**	**0.19 J**	NA	NA	**0.62 J**	NA	NA	NA	**0.34 J**	1.7 U	NA	**52**	NA
Total organic carbon (TOC)	NA	**6.27**	**6.19**	**8.5 J**	**7.3 J**	NA	NA	**7.6 J**	NA	NA	NA	**7 J**	**7.6 J**	NA	**9.87**	NA

Notes:
Bold indicates detections
Bolded shading indicates detected exceedance.
[1]0-0.7 indicates an estimated value of persulfate that was less than 0.7 mg/L .
NA - Not analyzed
B - Analyte also detected in an associated method blank (unvalidated data).
J - Estimated (validated data).
J - Below reporting limit (unvalidated data).
R - Unreliable Result
U – Nondetect or not detected at significantly greater than that in an associated blank.
UJ - Nondetect. Estimated reporting limit.
MG/L - Milligrams per liter
UG/L - Micrograms per liter

TABLE 5
Analytical Results for COCs, Dissolved Iron and Manganese, and Select Wet Chemistry Parameters for AOC I
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

Station ID	MW07													
Sample ID	NDAIGW07-R01	WAI-GW07-06A	VWAI-MW07-08C	VWAI-MW07-0310	VWAI-MW07-1110	VWAI-MW07-1110A	VWAI-MW07-1110H	VWAI-MW07P-1110	VWAI-MW07P-1110A	VWAI-MW07-1111	VWAI-MW07-0512	VWAI-MW07P-0512	VWAI-MW07-1112	VWAI-MW07P-1112
Sample Date	09/24/04	01/10/06	07/22/08	03/22/10	11/04/10	11/04/10	11/04/10	11/04/10	11/04/10	11/09/11	05/23/12	05/23/12	11/29/12	11/29/12
Preservative Method	HCl	HCl	HCl	HCl	Unpreserved	Ascorbic Acid	HCl	Unpreserved	Ascorbic Acid	HCl	Ascorbic Acid	AscorbicAcid	AscorbicAcid	Ascorbic Acid
Chemical Name														
Volatile Organic Compounds (UG/L)														
1,2-Dichloroethane	0.5 U	**1.6**	2.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	**0.33 J**	0.5 U	2.5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzene	**59.3**	**28**	**24**	**14**	**9.5**	**9.5**	**9.4**	**10**	**9.5**	**5.3**	**2.9 J**	**2.8 J**	**0.82 J**	0.5 UJ
Semivolatile Organic Compounds (UG/L)														
2-Methylnaphthalene	**82.1**	**110**	**22 J**	**17**	**7.7**	NA	NA	**9.9**	NA	**7**	**3.4**	**3.3**	2 UJ	**1.1 J**
bis(2-Ethylhexyl)phthalate	10 U	5 U	**4.2 J**	5 U	5 U	NA	NA	5 U	NA	**1.3 J**	2 U	2 U	2 U	2 U
Naphthalene	**81.4**	**96**	**34 J**	**21**	**7.9**	NA	NA	**10**	NA	**12**	**3.3**	**3.2**	2 U	2 U
Dissolved Metals (UG/L)														
Iron, Dissolved	**188 J**	**1,470**	**1,030**	**1,510**	**51.1 J**	NA	NA	NA	NA	50 U	50 UJ	NA	50 UJ	NA
Manganese, Dissolved	**1,240**	**1,760**	1,680 R	**1,700**	**222 J**	NA	NA	NA	NA	15 UJ	**15 J**	NA	15 UJ	NA
Wet Chemistry (MG/L)														
Nitrate	NA	0.05 U	0.05 U	**0.02 BJ**	0.042 U	NA	NA	NA	NA	**0.014 J**	0.042 U	NA	**0.074 J**	NA
Persulfate (field test kit)	NA	NA	NA	0	**14-21**	**14-21**	**14-21**	**14-21**	**14-21**	**1.4**	**1.4**	**1.4**	0	0
Sulfate	NA	**2.37 J**	5 U	**0.56 BJ**	**4,500**	NA	NA	NA	NA	**1,600**	**1,600**	NA	**1,400 J**	NA
Total organic carbon (TOC)	NA	**7.28**	**4.49 B**	**6 J**	**21**	NA	NA	NA	NA	**77**	**21**	NA	**22**	NA

Notes:
Bold indicates detections
Bolded shading indicates detected exceedance.
[1]0-0.7 indicates an estimated value of persulfate that was less than 0.7 mg/L .
NA - Not analyzed
B - Analyte also detected in an associated method blank (unvalidated data).
J - Estimated (validated data).
J - Below reporting limit (unvalidated data).
R - Unreliable Result
U – Nondetect or not detected at significantly greater than that in an associated blank.
UJ - Nondetect. Estimated reporting limit.
MG/L - Milligrams per liter
UG/L - Micrograms per liter

TABLE 5
Analytical Results for COCs, Dissolved Iron and Manganese, and Select Wet Chemistry Parameters for AOC I
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

Station ID	MW08		MW09	
Sample ID	WAI-GW08-06A	VWAI-MW08-08C	WAI-GW09-06A	VWAI-MW09-08C
Sample Date	01/10/06	07/20/08	01/11/06	07/22/08
Preservative Method	HCl	HCl	HCl	HCl
Chemical Name				
Volatile Organic Compounds (UG/L)				
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	0.5 U	0.5 U	0.5 U	0.5 U
Semivolatile Organic Compounds (UG/L)				
2-Methylnaphthalene	5 U	0.1 UJ	5 U	0.095 U
bis(2-Ethylhexyl)phthalate	5 UJ	5 U	5 U	4.8 U
Naphthalene	5 U	0.1 UJ	5 U	0.095 U
Dissolved Metals (UG/L)				
Iron, Dissolved	**241**	100 U	100 U	100 U
Manganese, Dissolved	**126**	148 R	**279**	220 R
Wet Chemistry (MG/L)				
Nitrate	**0.77**	NA	0.05 U	NA
Persulfate (field test kit)	NA	NA	NA	NA
Sulfate	**17.8**	NA	**1.85 J**	NA
Total organic carbon (TOC)	**7.14**	NA	**8.1**	NA

Notes:
Bold indicates detections
Bolded shading indicates detected exceedance.
[1]0-0.7 indicates an estimated value of persulfate that was less than 0.7 mg/L .
NA - Not analyzed
B - Analyte also detected in an associated method blank (unvalidated data).
J - Estimated (validated data).
J - Below reporting limit (unvalidated data).
R - Unreliable Result
U – Nondetect or not detected at significantly greater than that in an associated blank.
UJ - Nondetect. Estimated reporting limit.
MG/L - Milligrams per liter
UG/L - Micrograms per liter

TABLE 6

Pilot Study Data Evaluation at MW-07

AOC I In-Situ Remediation Pilot Study Report

Former Naval Ammunition Support Detachment

Vieques, Puerto Rico

COCs	Pilot Study PRG	Prior to Pilot Study			During Pilot Study			Overall		
		September 2004 (ug/L)	March 2010 (ug/L)	Percent COC Reduction	March 2010 (ug/L)	November 2012 (ug/L)	Percent COC Reduction[a]	September 2004 (ug/L)	November 2012 (ug/L)	Percent COC Reduction[a]
Benzene	5	59.3	14	76%	14	0.8	94%	59.3	0.8	99%
2-Methylnaphthalene	27	82.1	17.0	79%	17.0	1.1	94%	82.1	1.1	99%
Naphthalene	6.1	81.4	21	74%	21	2U	95%	81.4	2U	99%

Notes:

[a] for non-detects, half the reporting limit was used in the percent COC reduction calculation

TABLE 7

Human Health Risk Calculations, 2012 Sampling Events

AOC I In-Situ Remediation Pilot Test Report

Former Naval Ammunition Support Detachment

Vieques, Puerto Rico

CAS Number	Chemical	Maximum Concentration	Qual	Units	Location of Maximum	Data	EPC	Statistic	ELCR	HQ	Target Organs
71-43-2	Benzene	2.9		ug/L	VWAI-MW07	5/23/2012	2.9	Max	7.40E-06	1.00E-01	Blood, Immune
91-57-6	2-Methylnaphthalene	11		ug/L	VWAI-MW05	11/28/2012	11	Max		4.00E-01	Lungs
91-20-3	Naphthalene	3.3		ug/L	VWAI-MW07	5/23/2012	3.3	Max	2.40E-05	5.00E-01	Decreased Body Weight

Total = 3.00E-05

Total Blood HI Across All Media =	1.00E-01
Total Immune System HI Across All Media =	1.00E-01
Total Lungs HI Across All Media =	4.00E-01
Total Body Weight HI Across All Media =	5.00E-01

Figures

FIGURE 1
Regional Location Map
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment,
Vieques, Puerto Rico

CH2MHILL

FIGURE 2
AOC I Site Location Map
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

CH2MHILL

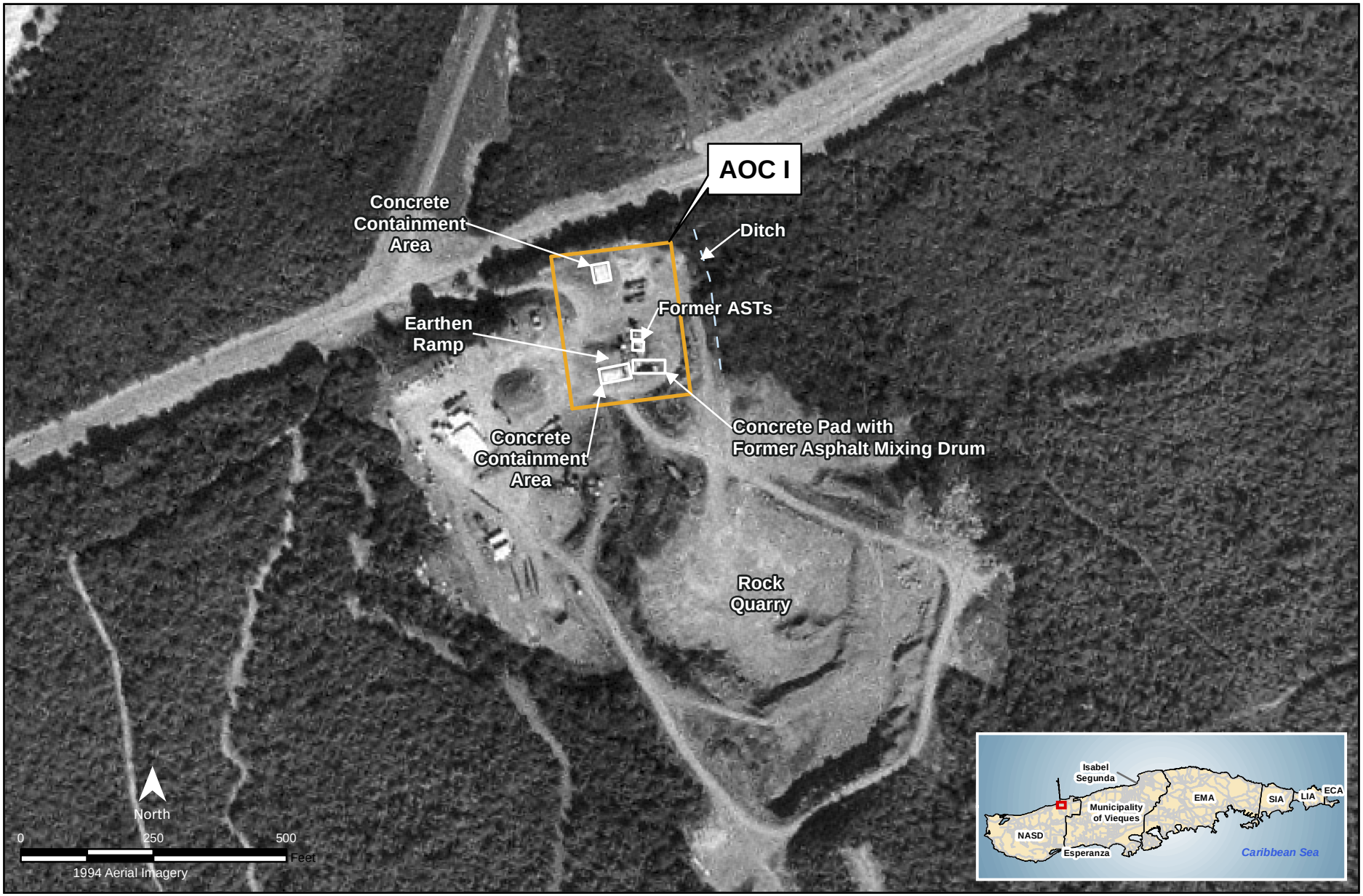


FIGURE 3
1994 Aerial Photograph of AOC I
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment,
Vieques, Puerto Rico

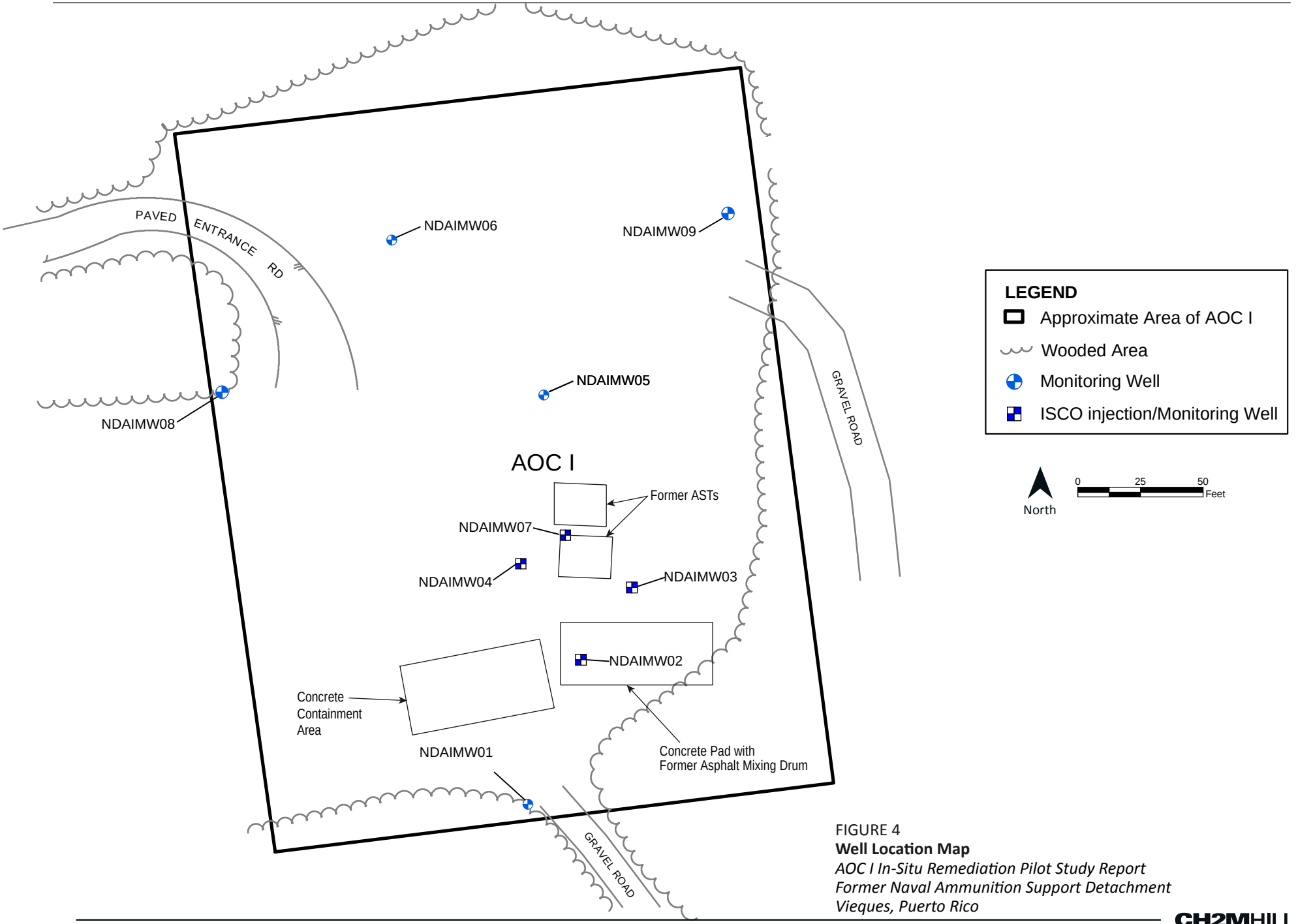


FIGURE 4
Well Location Map
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

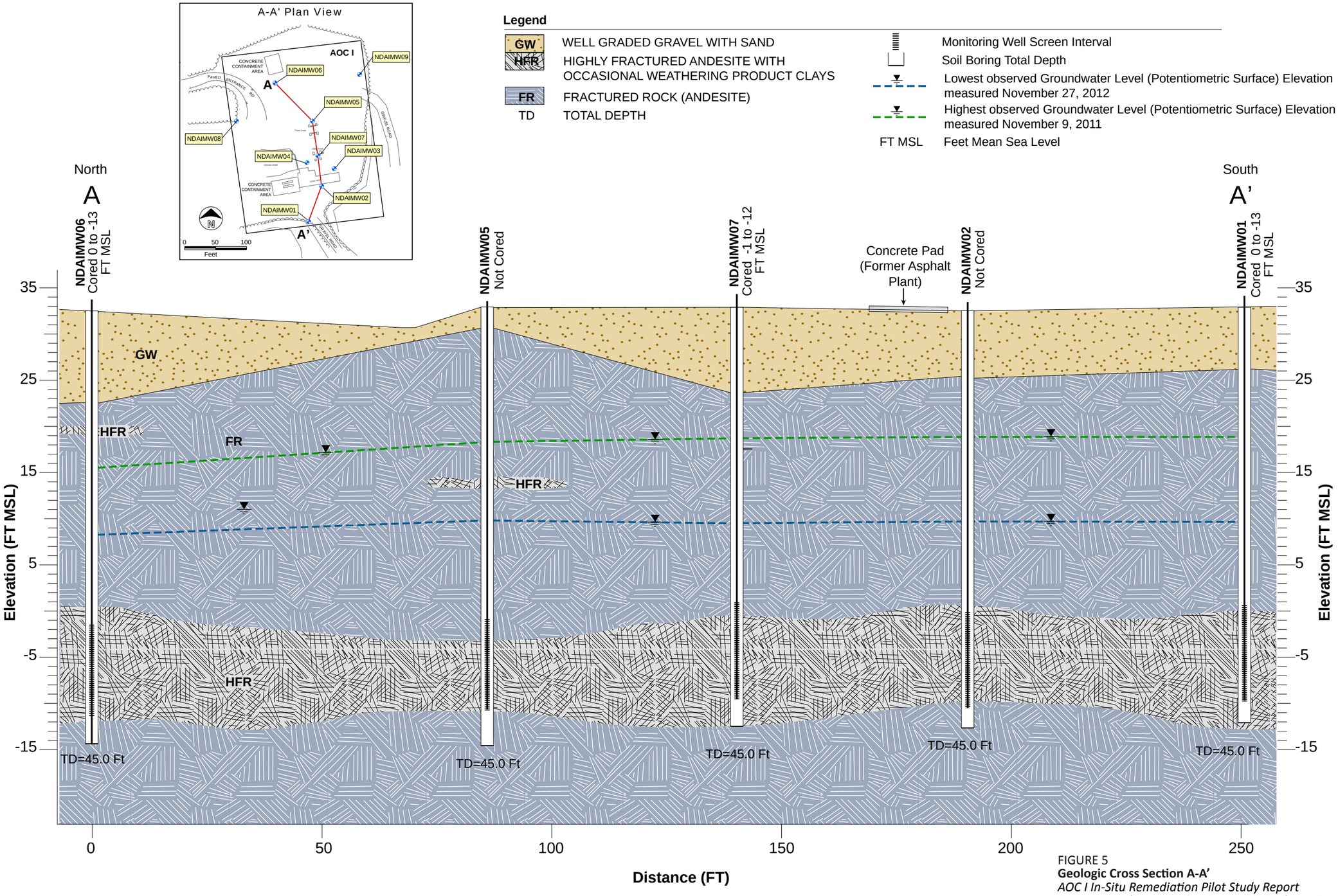


FIGURE 5
Geologic Cross Section A-A'
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment, Vieques, Puerto Rico

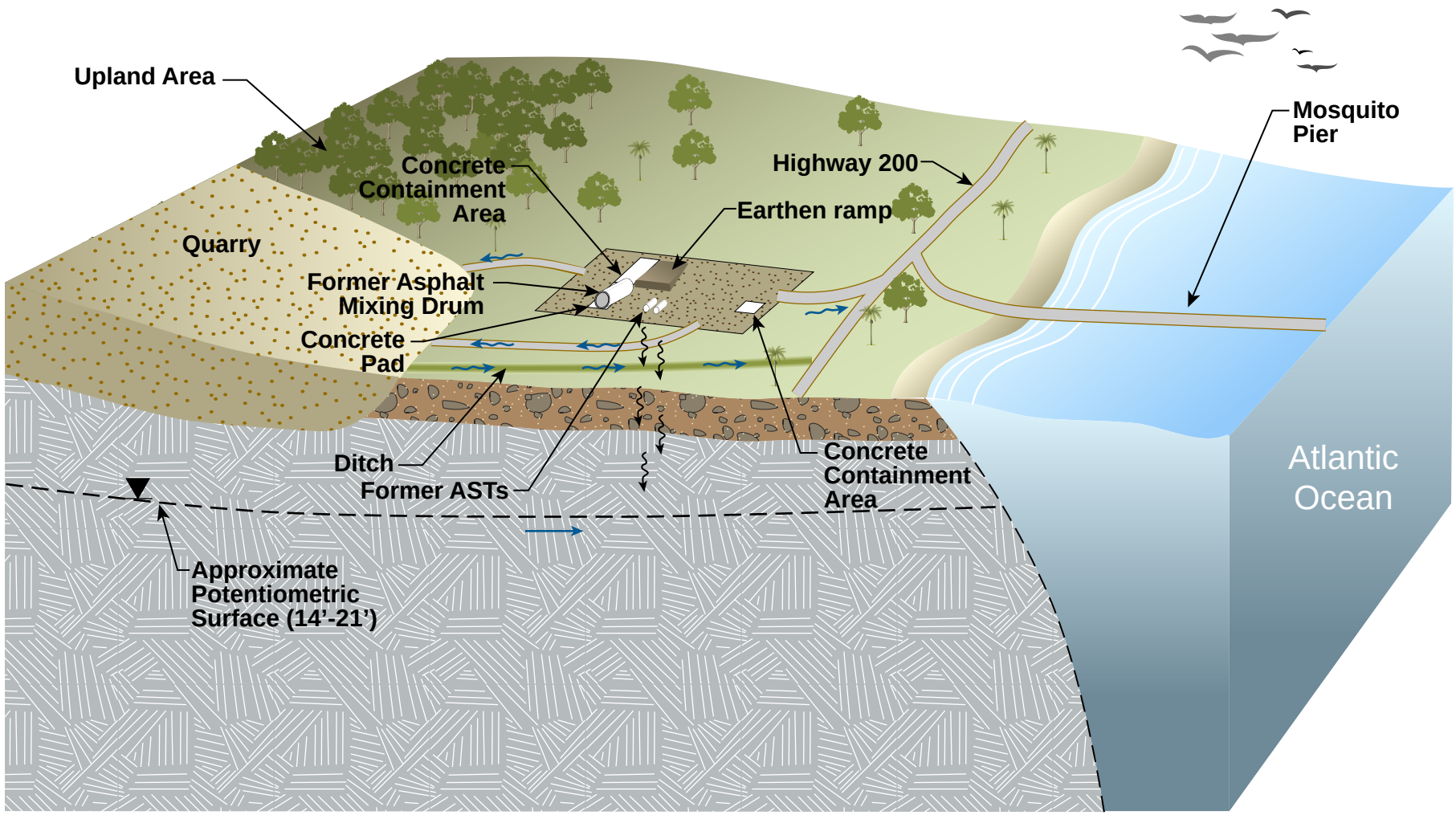


FIGURE 6
AOC I Conceptual Site Model
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

MW06	PRG	9/22/2004	1/10/2006	7/27/2008
Benzene	5	0.5U	0.5U	0.5U
Naphthalene	6.1	5U	5.4U	0.1U
1,2-Dichloroethane	3.8	0.5U	0.5U	0.5U
1,2-Dichloropropane	5	0.5U	0.5UJ	0.5U
2-Methylnaphthalene	27	5U	5.4U	0.1U
bis(2-Ethylhexyl)phthalate	6	10U	5.4U	5.1U

MW09	PRG	1/11/2006	7/22/2008
Benzene	5	0.5U	0.5U
Naphthalene	6.1	5U	0.095U
1,2-Dichloroethane	3.8	0.5U	0.5U
1,2-Dichloropropane	5	0.5U	0.5U
2-Methylnaphthalene	27	5U	0.095U
bis(2-Ethylhexyl)phthalate	6	5U	4.8U

MW05	PRG	9/22/2004	7/21/2008
Benzene	5	**0.66**	0.5U
Naphthalene	6.1	5U	**0.33J**
1,2-Dichloroethane	3.8	0.5U	0.5U
1,2-Dichloropropane	5	0.5U	0.5U
2-Methylnaphthalene	27	**9.5**	**7.5**
bis(2-Ethylhexyl)phthalate	6	**9.6J**	5U

MW08	PRG	1/10/2006	7/20/2008
Benzene	5	0.5U	0.5U
Naphthalene	6.1	5U	0.1UJ
1,2-Dichloroethane	3.8	0.5U	0.5U
1,2-Dichloropropane	5	0.5U	0.5U
2-Methylnaphthalene	27	5U	0.1UJ
bis(2-Ethylhexyl)phthalate	6	5UJ	5U

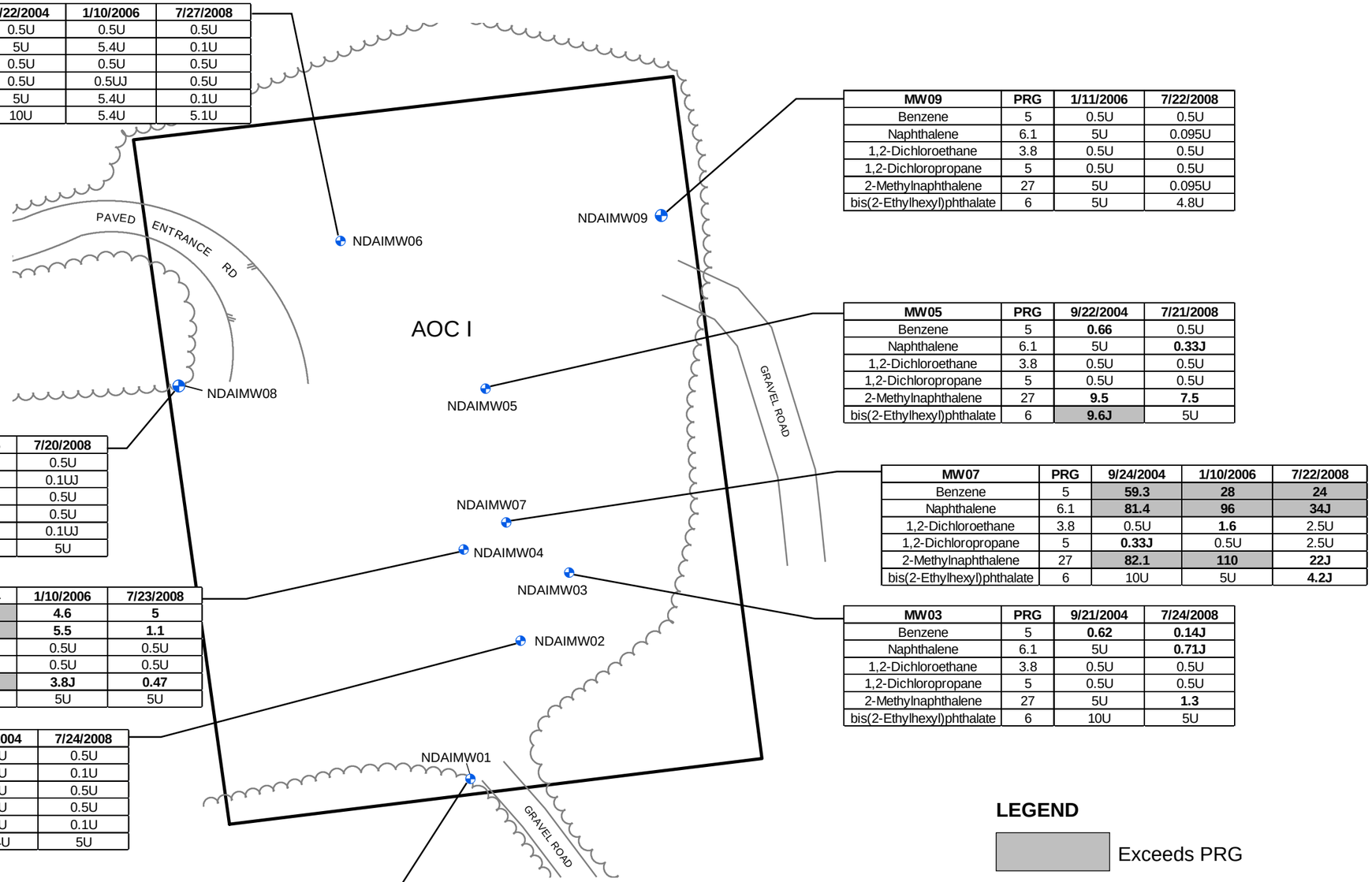
MW07	PRG	9/24/2004	1/10/2006	7/22/2008
Benzene	5	**59.3**	**28**	**24**
Naphthalene	6.1	**81.4**	**96**	**34J**
1,2-Dichloroethane	3.8	0.5U	**1.6**	2.5U
1,2-Dichloropropane	5	**0.33J**	0.5U	2.5U
2-Methylnaphthalene	27	**82.1**	**110**	**22J**
bis(2-Ethylhexyl)phthalate	6	10U	5U	**4.2J**

MW04	PRG	9/23/2004	1/10/2006	7/23/2008
Benzene	5	**33.7**	**4.6**	**5**
Naphthalene	6.1	**46.2**	**5.5**	**1.1**
1,2-Dichloroethane	3.8	0.5U	0.5U	0.5U
1,2-Dichloropropane	5	0.5U	0.5U	0.5U
2-Methylnaphthalene	27	**41.4**	**3.8J**	**0.47**
bis(2-Ethylhexyl)phthalate	6	10U	5U	5U

MW03	PRG	9/21/2004	7/24/2008
Benzene	5	**0.62**	**0.14J**
Naphthalene	6.1	5U	**0.71J**
1,2-Dichloroethane	3.8	0.5U	0.5U
1,2-Dichloropropane	5	0.5U	0.5U
2-Methylnaphthalene	27	5U	**1.3**
bis(2-Ethylhexyl)phthalate	6	10U	5U

MW02	PRG	9/21/2004	7/24/2008
Benzene	5	0.5U	0.5U
Naphthalene	6.1	5.2U	0.1U
1,2-Dichloroethane	3.8	0.5U	0.5U
1,2-Dichloropropane	5	0.5U	0.5U
2-Methylnaphthalene	27	5.2U	0.1U
bis(2-Ethylhexyl)phthalate	6	10.4U	5U

MW01	PRG	9/23/2004	1/10/2006	7/23/2008
Benzene	5	0.5U	0.5U	0.5U
Naphthalene	6.1	5UJ	5U	5U
1,2-Dichloroethane	3.8	0.5U	0.5U	0.5U
1,2-Dichloropropane	5	0.5U	0.5U	0.5U
2-Methylnaphthalene	27	5UJ	5U	0.093U
bis(2-Ethylhexyl)phthalate	6	10UJ	5U	4.7U

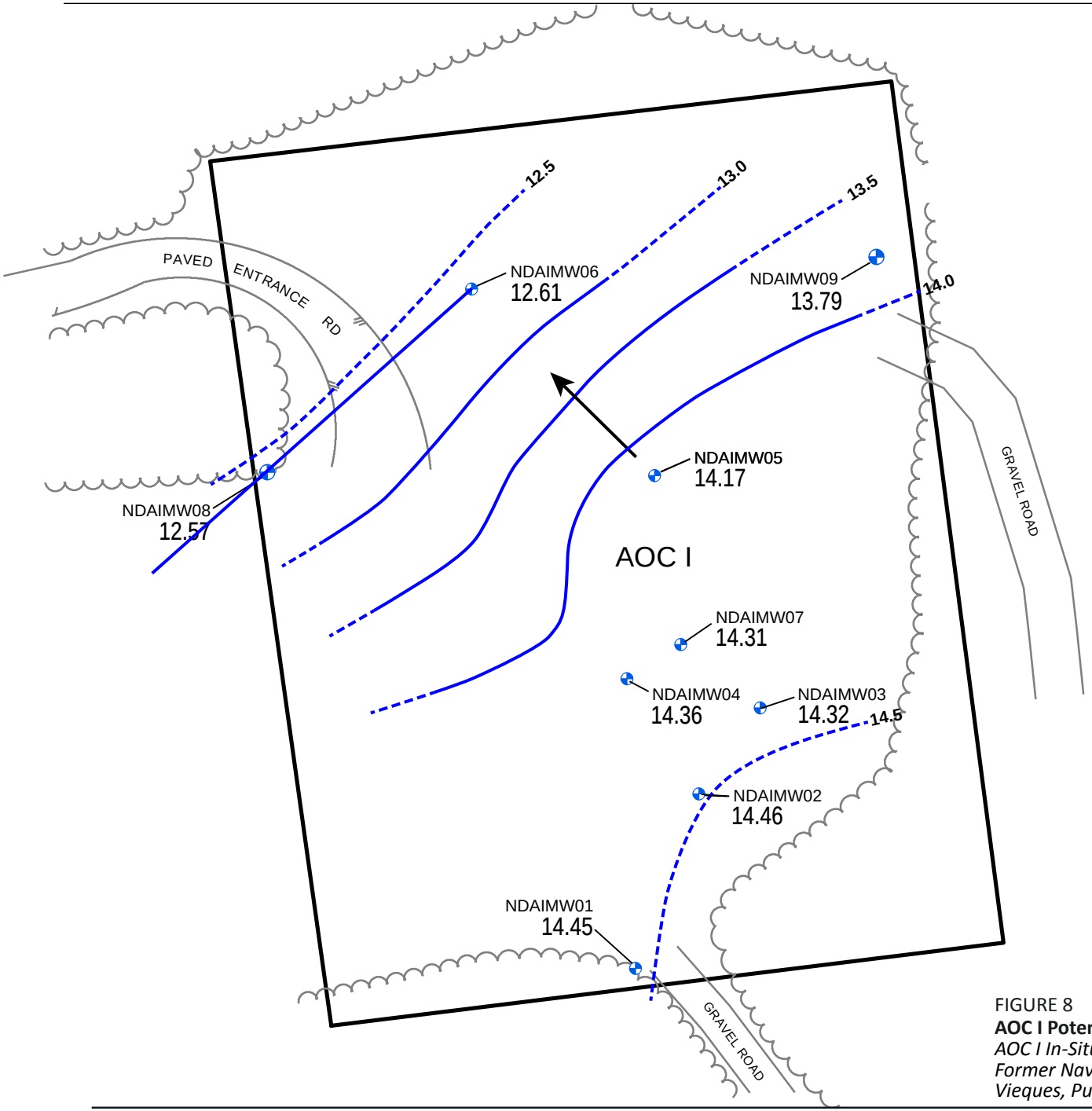


LEGEND

Exceeds PRG

FIGURE 7
AOC I Pre-Pilot Study Groundwater Analytical Results for COCs
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

CH2MHILL



LEGEND

- Approximate Area of AOC I
- Wooded Area
- Monitoring Well
- 14.45 Groundwater Elevation ft msl on November 1, 2010
- Groundwater Flow Direction
- Groundwater Elevation Contour, 0.5 ft Interval

North

0 25 50 Feet

FIGURE 8

AOC I Potentiometric Map, November 1, 2010

AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

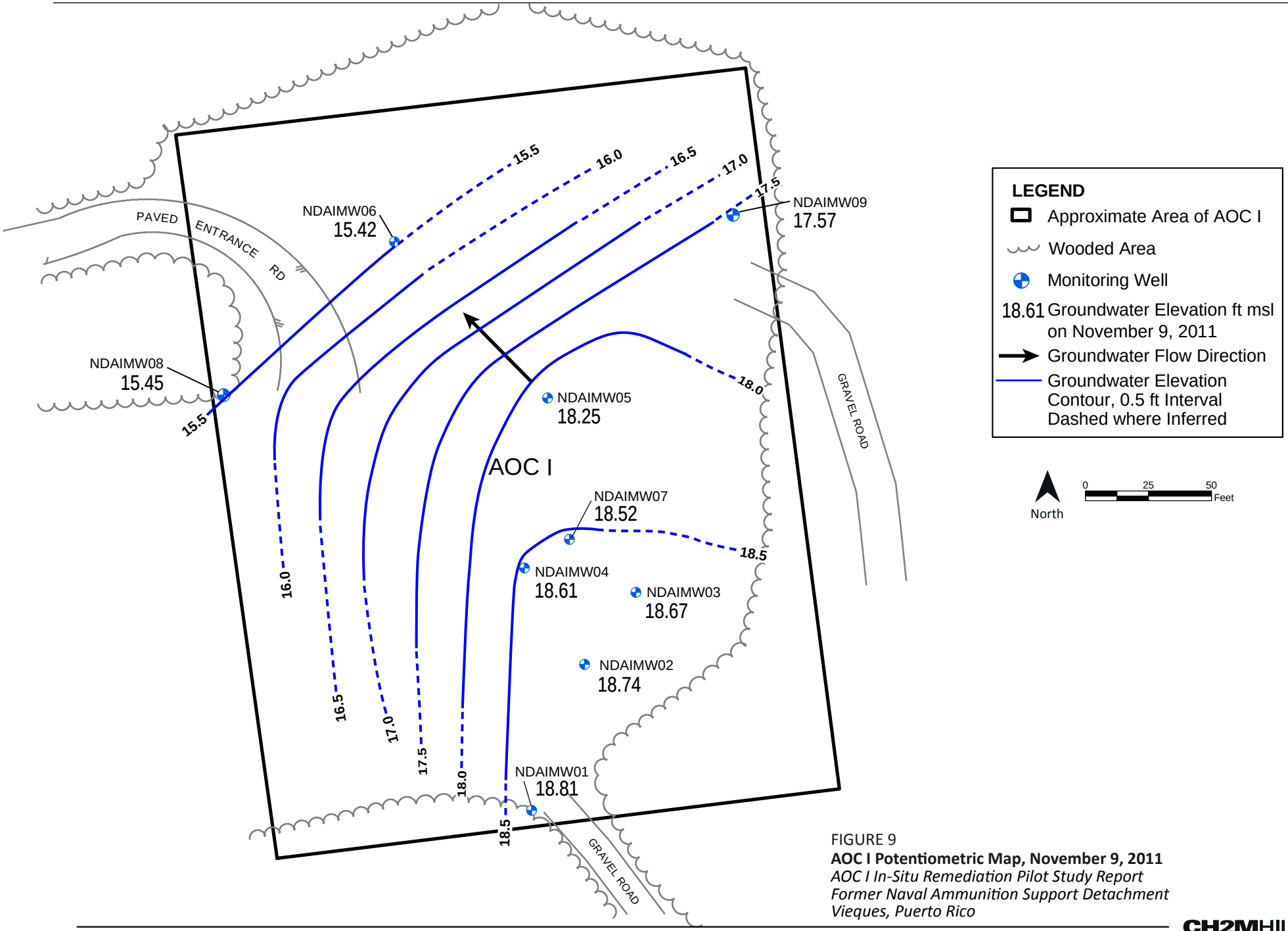
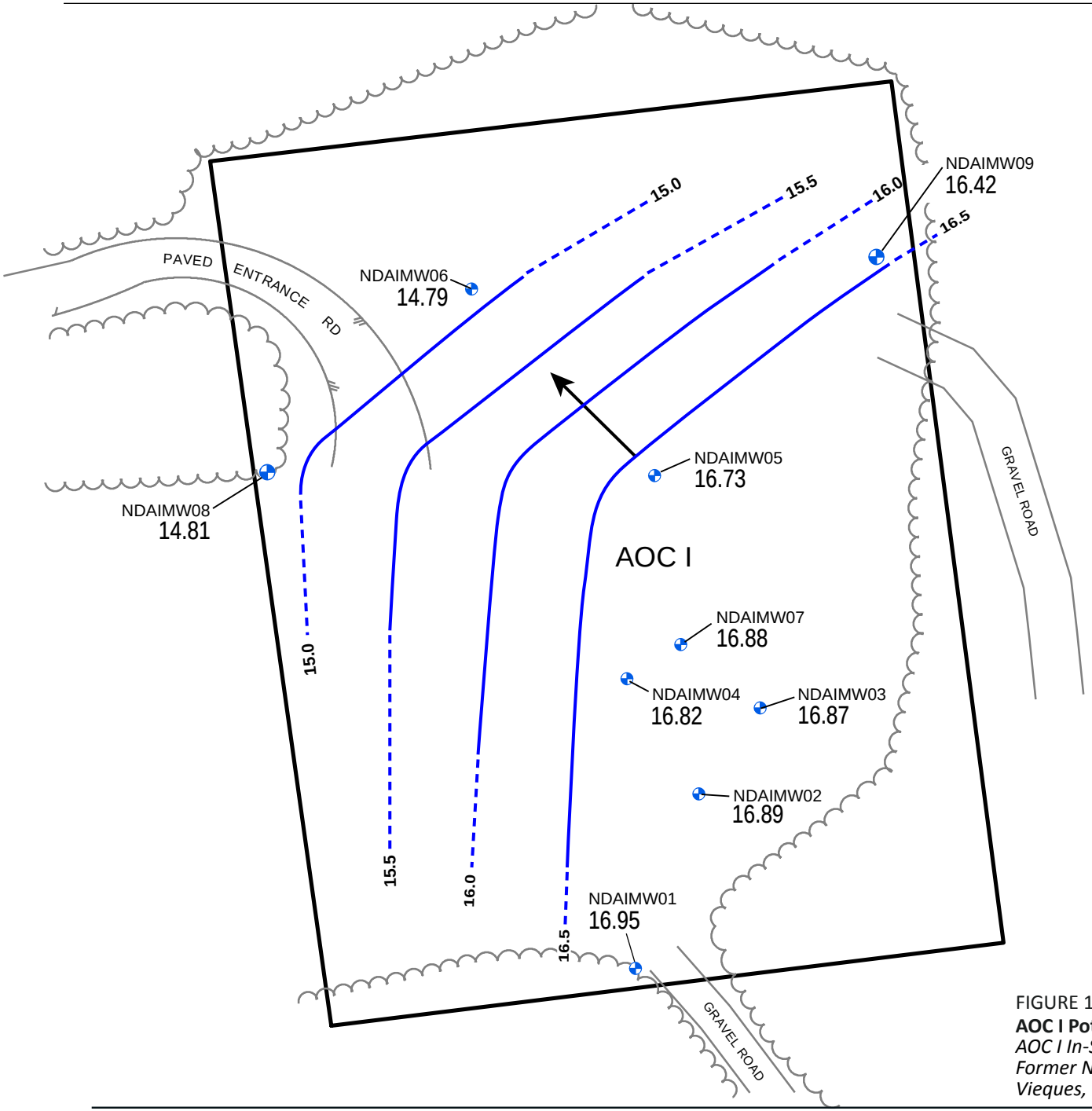


FIGURE 9
AOC I Potentiometric Map, November 9, 2011
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico



LEGEND

- Approximate Area of AOC I
- Wooded Area
- Monitoring Well
- 16.95 Groundwater Elevation ft msl on May 22, 2012
- Groundwater Flow Direction
- Groundwater Elevation Contour, 0.5 ft Interval Dashed where Inferred

North

0 25 50 Feet

FIGURE 10

AOC I Potentiometric Map, May 22, 2012

AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

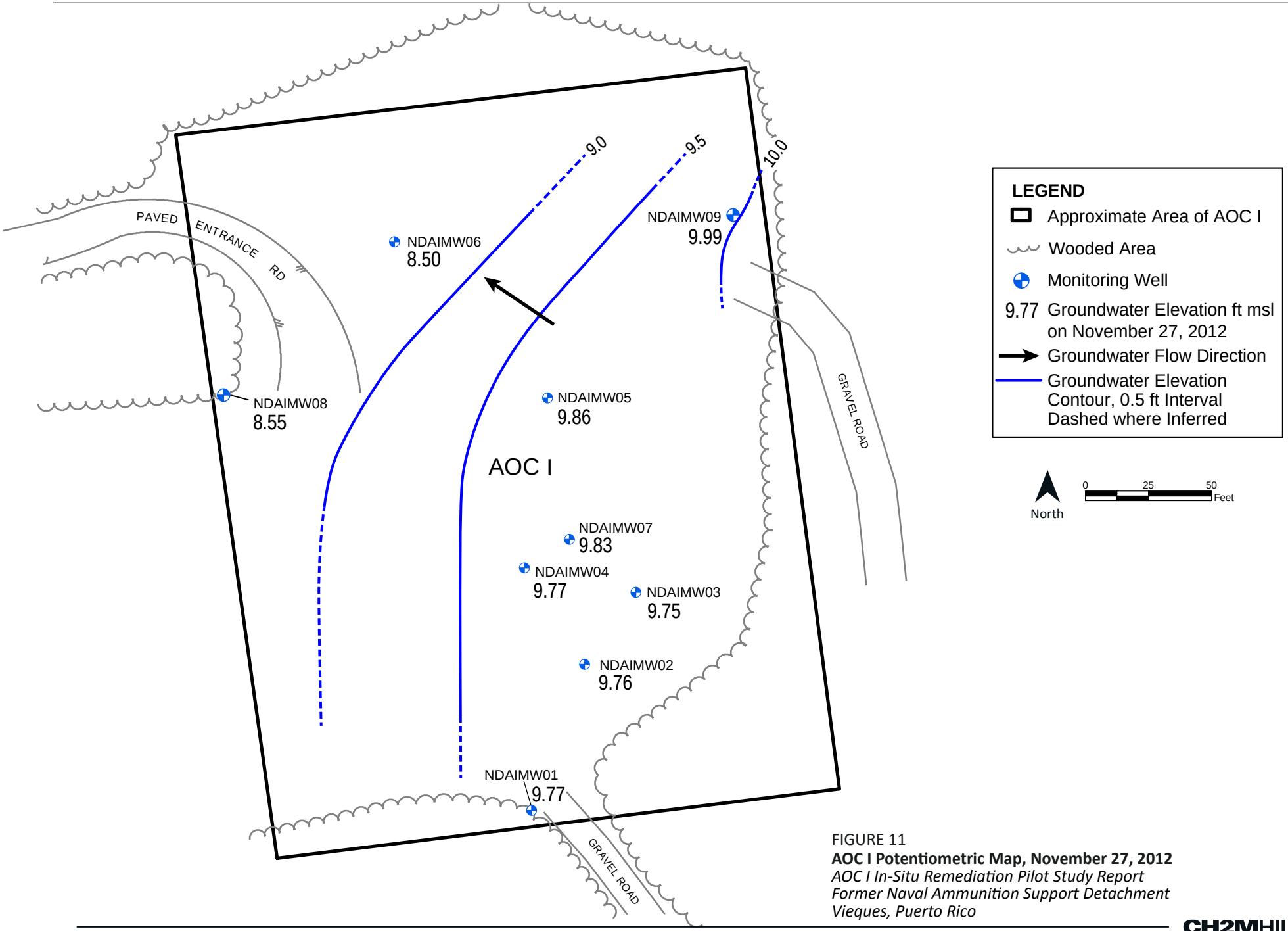


FIGURE 11
AOC I Potentiometric Map, November 27, 2012
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

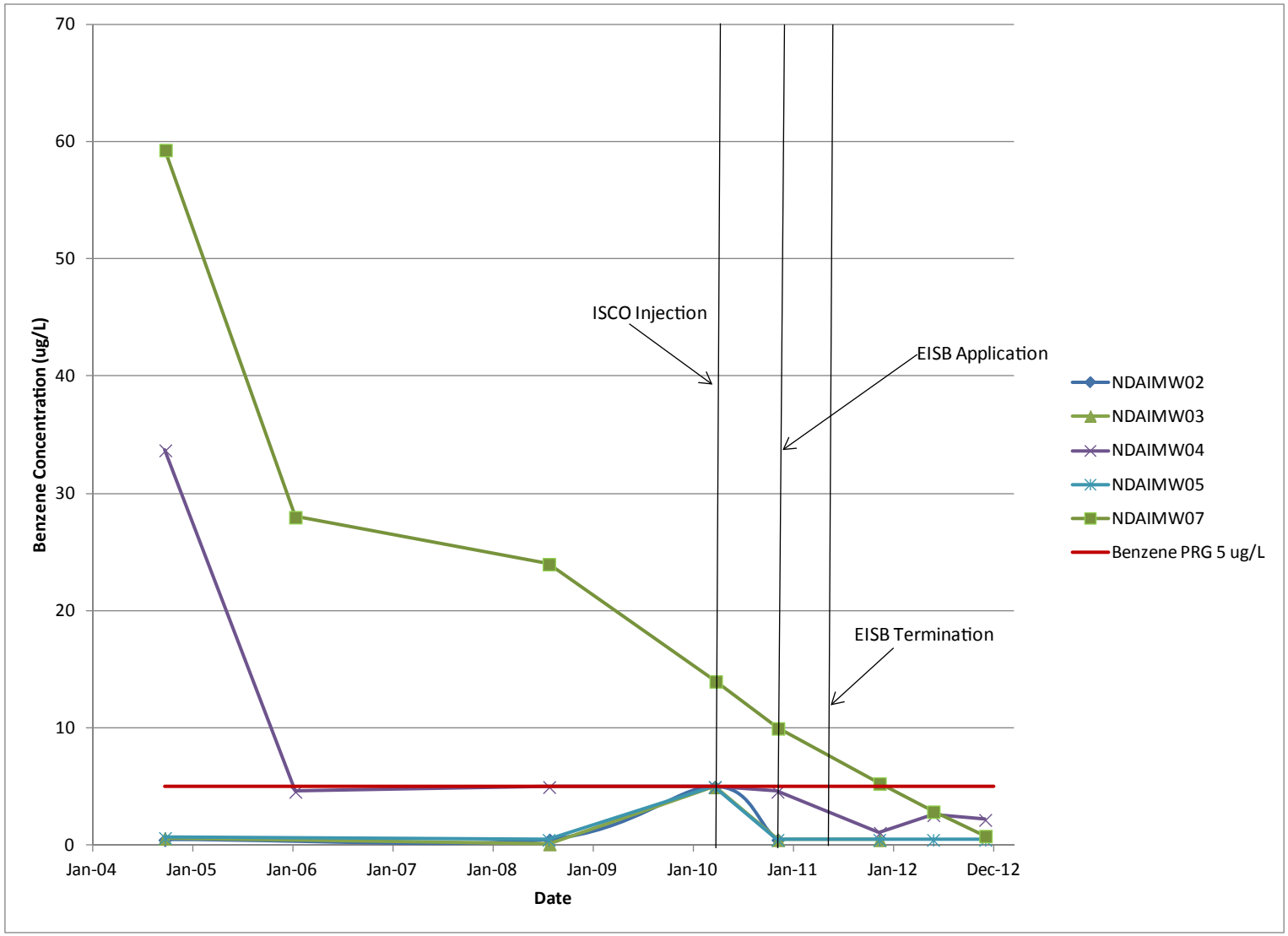
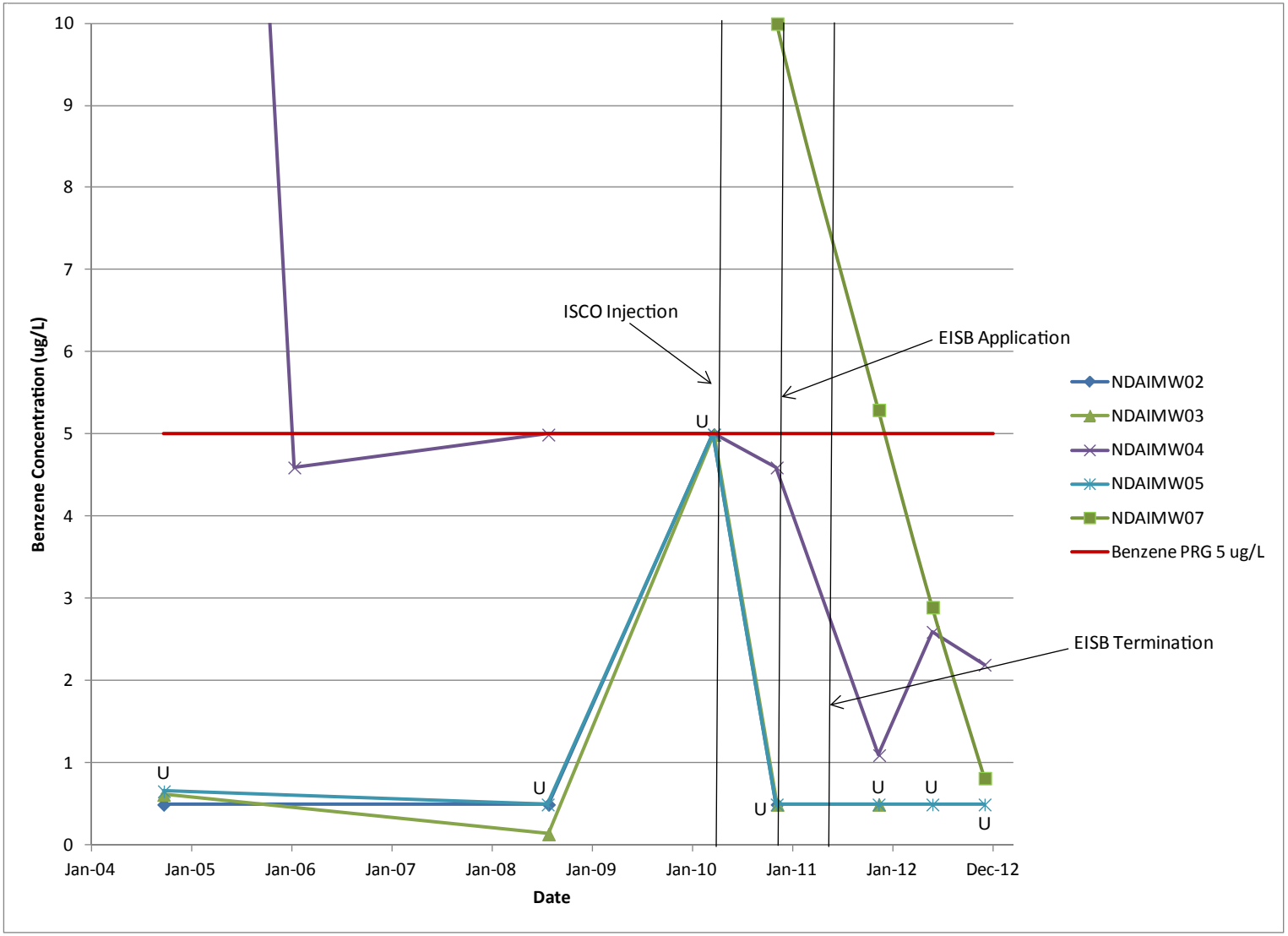


FIGURE 12
Benzene Concentration Over Time
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico



U values are the limit of detection, actual concentration is less than or equal to that value.

FIGURE 13
Details of Benzene Concentration over Time
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

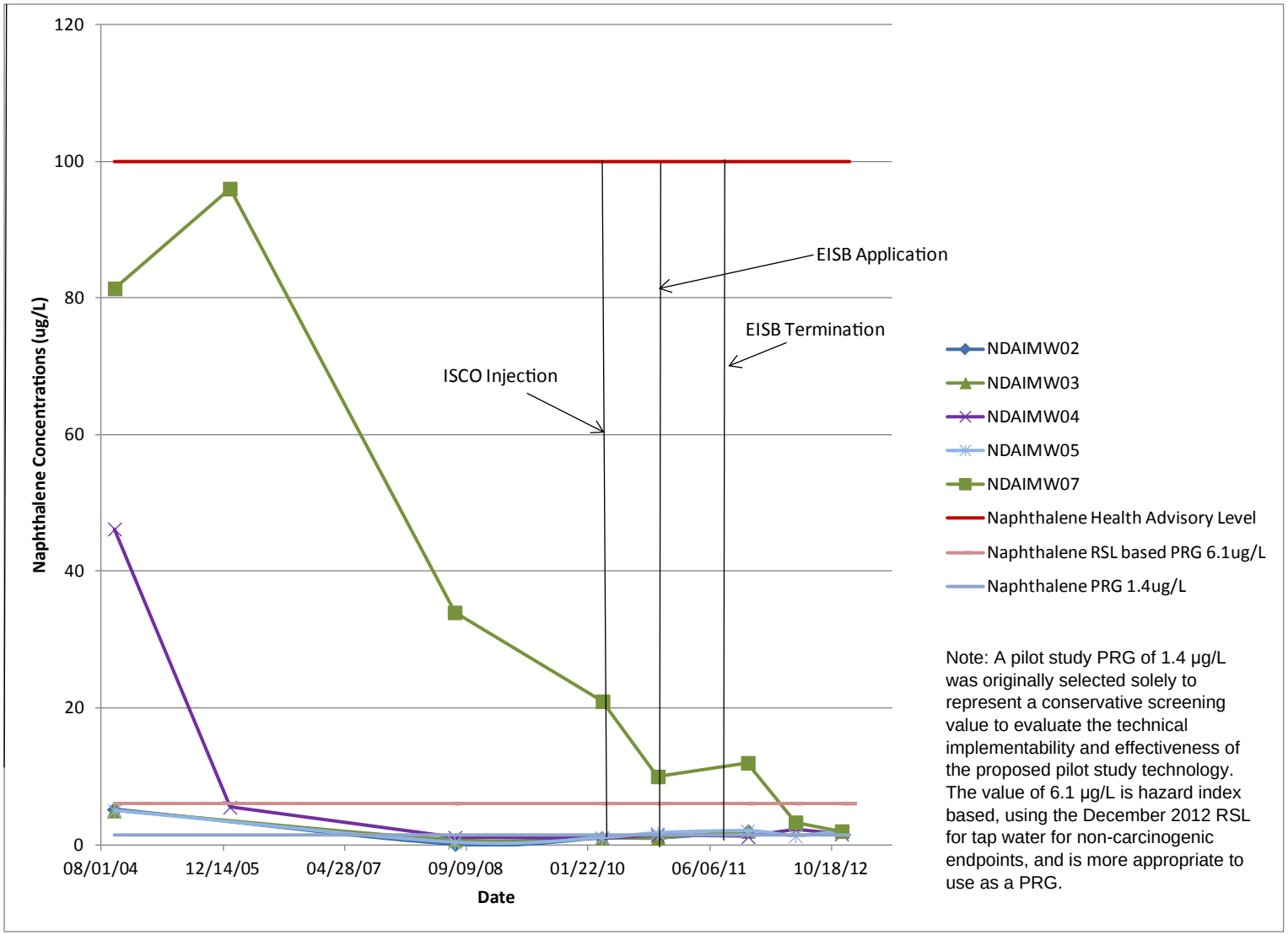
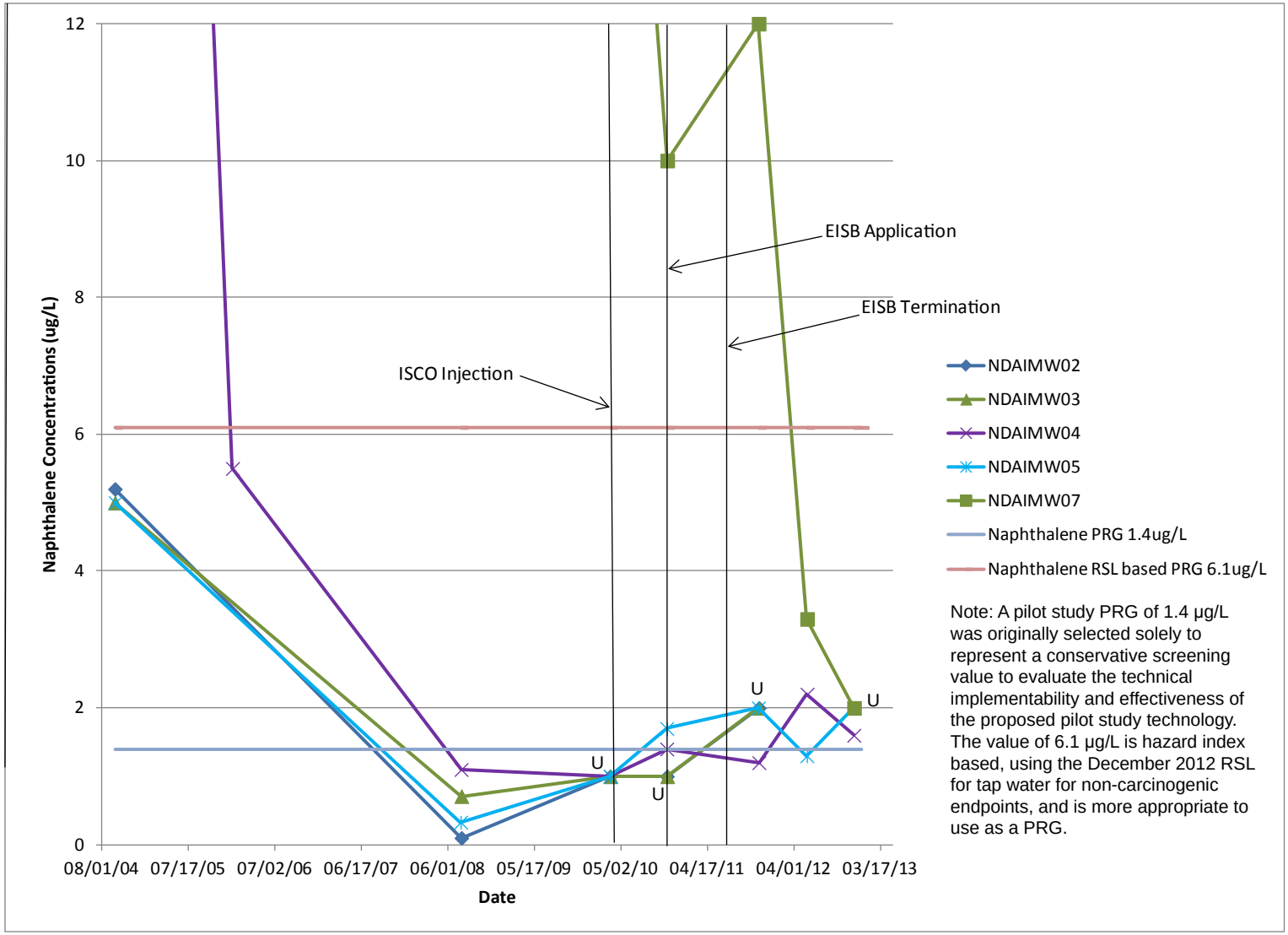


FIGURE 14
Naphthalene Concentration over Time
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico



U values are the limit of detection, actual concentration is less than or equal to that value.

FIGURE 15
Details of Naphthalene Concentration over Time
AOC I In-Situ Remediation Pilot Study Report
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

Appendix A
Performance Monitoring Data Field Forms

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW02	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 3/19/10

Weather: partly cloudy, L~82°F, H~92°F | Sample Team: D Whitaker, M. Zamboni

Total Depth: 45.80 FT.(BTOC) Measured

Depth to Water: (-) 24.16 FT.(BTOC) Measured | Date and Time On Well: 3/18/10 0752

Water Column(h): (=) 21.64 FT. 0 IN. | Pump Start Date and Time: 03/18/10 0823

Water Volume in Well ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329) | Pump Finish Date and Time: 3/18/10 10:06

Pump Depth: 40.5 FT.(BTOC) Measured | Date and Time Off Well: 3/19/10 10:12

Purge Device/Equip: SS Monsoon Pump | Air Monitoring Readings: 0ppm

Measuring Device/Equipment: Oil/Water Interface Probe | Total Purge Volume: 5.5 GAL.

SAMPLE INFORMATION

Sample ID: VWAI - MW02 - 0310 | Parameters Collected for: VOC, SVOC, filt(Fe+Mn), SO4, NO3, TOC

Sample Date/Time: 03-18-10 0940

Field Dup: YES/NO ID: N/A | Parameters Collected for: (FD) N/A

FD Sample Date/Time: N/A | (MS/MSD) VOCs, SVOCs

MS/MSD: YES/NO | Sample Appearance: clear, colorless

Were samples filtered? YES/NO | Field Test Kit Details: 0 mg/L persulfate @ D/F = 1

If YES, Which samples? Filtered Metals

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0840	~0.50	24.27	250	29.02	1170	0.58	7.0	0.53	6.73	214.7	366	cloudy, white
0845	~1.25	24.27	250	29.23	1151	0.57	3.5	0.26	6.72	193.3	121	
0850	~1.50	24.27	250	29.30	1141	0.56	2.6	0.20	6.71	189.2	43.0	
0855	~2.00	24.27	250	29.45	1124	0.55	2.0	0.15	6.70	171.4	19.4	clear
0900	~2.5	24.27	250	29.52	1115	0.55	2.5	0.19	6.70	155.2	11.8	
0905	~2.75	24.27	250	29.54	1111	0.55	2.0	0.15	6.70	146.2	8.25	
0910	~3.0	24.27	250	29.59	1108	0.54	2.1	0.16	6.70	135.1	6.15	
0915	~3.3	24.27	250	29.56	1105	0.54	2.0	0.15	6.70	129.9	4.50	
0920	~3.6	24.27	250	29.50	1101	0.54	2.2	0.17	6.69	123.8	3.63	
0925	~4.0	24.28	250	29.61	1099	0.54	1.7	0.13	6.69	119.9	3.40	
0930	~4.5	24.28	250	29.77	1099	0.54	1.5	0.12	6.69	119.1	2.79	
0935	~4.75	24.28	250	29.72	1099	0.54	1.8	0.13	6.69	113.0	2.02	
0940	Sample collection BEGINS											
1006	End pumping TVP: 5.5 gallons											
1012	demob to yard											

Signature: _____ Date: 3/19/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 3
392485.FI.FK	VWAI-MW02	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE: 5/19/10

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

Signature: _____ Date: 5/18/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW02	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 3/18/10

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Y(N)

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

DTW 24.19 immediately after dropping pump.
No Precipitation

PHOTO LOG

Photo Number	Compass Direction	Time	Description
1/2	facing S	0843	(picture double) Set up at AOC I
3/4	facing N	0844	(picture double) Set up at AOC I

Signature: [signature] Date: 03-18-10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW03	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 3/19/10

Weather: Partly cloudy, humid, L~83°, H~93° | Sample Team: D. Williams, M. Zamboni

Total Depth: 39 FT.(BTOC) Measured

Depth to Water: (-) 24.41 FT.(BTOC) Measured (24.45 for reference, 0.3' rule)

Water Column(h): (=) 14.59 FT. 0 IN.

Water Volume in Well: ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329)

Pump Depth: 34 FT.(BTOC) Measured

Purge Device/Equip: SS Monsoon Pump

Measuring Device/Equipment: Oil/Water Interface Probe

Date and Time On Well: 3/19/10 07:55

Pump Start Date and Time: 3/19/10 08:07

Pump Finish Date and Time: 3/19/10 09:27

Date and Time Off Well: 3/19/10 09:35

Air Monitoring Readings: 0.0ppm

Total Purge Volume: N3 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW03-0310 | Parameters Collected for: VOCs, SVOCs, Filtered (Fe/Mn), SO4, NO3, TOC

Sample Date/Time: 03-19-10 0910

Field Dup: YES/NO ID: VWAI-MW03P-0310 | Parameters Collected for: (FD) VOCs, SVOCs

FD Sample Date/Time: 3/19/10 0915

MS/MSD: YES/NO | Sample Appearance: clear, colorless

Were samples filtered? YES/NO | Field Test Kit Details: 0ppm @ D/F=1

If YES, Which samples? Filtered Metals

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0820	0	24.66	190	29.95	1279	0.63	15.7	1.17	6.77	170.9	198	cloudy white
0825	~0.10	24.66	190	29.27	1281	0.63	6.6	0.50	6.79	-37.9	131	
0830	~0.75	24.66	190	29.41	1280	0.63	4.7	0.36	6.80	-49.1	78.1	
0835	~1.00	24.68	190	29.47	1277	0.63	5.5	0.42	6.78	-51.3	50.0	
0840	~1.75	24.69	190	29.62	1275	0.63	3.8	0.29	6.78	-52.4	35.9	
0845	~1.90	24.69	190	29.76	1275	0.63	4.1	0.31	6.78	-52.5	26.6	clear
0850	~2.00	24.69	190	29.63	1273	0.63	4.3	0.33	6.77	-52.9	18.6	
0855	~2.40	24.69	190	29.74	1274	0.63	3.3	0.25	6.77	-51.2	14.9	
0900	~2.75	24.69	190	29.72	1274	0.63	3.4	0.25	6.77	-50.0	11.4	
0905	~3.00	24.69	190	29.68	1275	0.63	3.4	0.26	6.76	-49.4	10.2	
0910	Collect Sample VWAI-MW03-0310											
0915	FD Dup: VWAI-MW03P-0310											(V, SV only)
09:27	End Pump											
09:35	Demob + Eat											

Signature: _____ Date: 3/19/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 3
392485.FI.FK	VWAI-MW03	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study | LOCATION : AOC-I | DATE: 3/19/10

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

Signature: _____ Date: 3/19/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW03	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE 3/19/10

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? D-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes.

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision* :

DTW: 24.45' BTOC immediately after stopping pump
No exceptions. Clear well!

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: _____ Date: 3/19/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW04	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 3/19/10

Weather: mostly sunny, ~90°F, breezy, humid | Sample Team: D. Whittaker, M. Zamboni

Total Depth: 41.80 FT.(BTOC) Measured

Depth to Water: (-) 24.63 FT.(BTOC) Measured | Date and Time On Well: 3/19/10 09:45

Water Column(h): (=) ____ FT. ____ IN. | Pump Start Date and Time: 03/19/10 1000

Water Volume in Well ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329) | Pump Finish Date and Time: 03/19/10 11:40

Pump Depth: 36.8 FT.(BTOC) Measured | Date and Time Off Well: 03/19/10 11:55

Purge Device/Equip: SS Monsoon Pump | Air Monitoring Readings: 0.0 ppm

Measuring Device/Equipment: Oil/Water Interface Probe | Total Purge Volume: ~4 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW04-0310 | Parameters Collected for: VOCs, SVOCs, filtered (Fe+Mn), SO4, NO3, TOC

Sample Date/Time: 03/19/10 1125

Field Dup: YES/(NO) ID: N/A | Parameters Collected for: (FD) N/A

FD Sample Date/Time: N/A

MS/MSD: YES/(NO) | Sample Appearance: Clear

Were samples filtered? (YES)/NO | Field Test Kit Details: 0 mg/L persulfate @ DF=1

If YES, Which samples? metals (Fe/Mn)

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1015	~0.10	24.70	200	29.44	1297	0.64	7.9	0.56	6.86	48.8	313	cloudy, milky white
1020	~0.50	24.74	200	29.48	1293	0.64	4.2	0.32	6.84	44.9	160	
1025	~1.00	24.74	200	29.54	1291	0.64	3.9	0.30	6.84	45.5	104	
1030	~1.25	24.74	200	29.62	1291	0.64	3.7	0.28	6.82	40.3	81.6	
1035	~1.50	24.74	200	29.65	1290	0.64	2.8	0.21	6.82	38.8	55.3	
1040	~2.00	24.74	200	29.73	1289	0.64	2.6	0.20	6.82	36.8	37.7	
1045	~2.00	24.74	200	29.70	1290	0.64	2.2	0.16	6.81	35.1	29.3	
1050	~2.25	24.74	200	29.65	1290	0.64	2.0	0.15	6.80	35.6	23.3	
1055	~2.50	24.74	200	29.53	1289	0.64	1.9	0.14	6.79	32.7	16.7	clear, colorless
1100	~2.75	24.74	200	29.61	1289	0.64	2.1	0.16	6.79	35.3	12.8	
1105	~3.00	24.74	200	29.79	1289	0.64	2.1	0.16	6.79	34.6	10.7	
1110	~3.25	24.74	200	29.79	1290	0.64	2.3	0.18	6.78	33.3	7.89	
1115	~3.50	24.74	200	29.79	1289	0.64	2.4	0.18	6.77	31.6	6.17	
1120	~4.00	24.74	200	29.82	1289	0.64	2.3	0.17	6.77	30.8	6.09	
1125	Begin sample collection.											
1143	End purging											
1155	Demob to Acc.											
		N/A										

Signature: _____ Date: 3/19/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 3
392485.FI.FK	VWAI-MW04	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE: 3/19/10

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

Signature: _____ Date: 3/19/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW04	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE: 3/19/10

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? S-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? YES

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

DTW = 24.65' BTOC immediately after dropping pump
No exceptions (for this well).

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: _____ Date: 3/19/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW05	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 03-18-10

Weather: partly cloudy, L~82°F, H~92°F | Sample Team: D. Whitaker, M. Zambon

Total Depth: 44.60 FT.(BTOC) Measured

Depth to Water: (-) 24.31 FT.(BTOC) Measured

Water Column(h): (=) 20.29 FT. ____ IN.

Water Volume in Well ____ GAL (3.141593*h(in)*(well DIA/2)^2*0.004329)

Pump Depth: 39.50 FT.(BTOC) Measured

Purge Device/Equip: SS Monsoon Pump

Measuring Device/Equipment: Oil/Water Interface Probe

Date and Time On Well: 3/18/10 10:35

Pump Start Date and Time: 03/18/10 1044

Pump Finish Date and Time: 03/18/10 1240

Date and Time Off Well: 03/18/10 1245

Air Monitoring Readings: 0 0ppm

Total Purge Volume: ~2.75 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW05-0310

Sample Date/Time: 03/18/10 1220

Field Dup: YES (NO) ID: ____

FD Sample Date/Time: N/A

MS/MSD: YES (NO)

Were samples filtered? (YES) NO

If YES, Which samples? filtered metals

Parameters Collected for: VOCs, SVOCs, filt. metals, nitrate, sulfate, TOC

Parameters Collected for: (FD) N/A

Sample Appearance: clear, colorless

Field Test Kit Details: Persulfate 0mg/L @ DF=1

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1055	0	24.57	25	within 0.3' drawdown & DSAL (min (to 5 bv)								
1100	0	24.64	125	Although above 0.3', this is acceptable								
1105	~0.05	24.77	125	29.07	1425	0.71	31.5	2.36	6.90	-14.9	X	Not enough water turn up pump speed
1110	~0.10	24.85	150	29.84	1429	0.71	15.5	1.19	6.80	-15.0	45.1	
1115	~0.50	24.93	150	29.27	1429	0.71	10.6	0.81	6.77	-18.2	35.3	have to turn down pump speed
1120	~0.50	24.78	125	29.38	1429	0.71	9.4	0.71	6.77	-18.0	25.5	
1125	~0.75	24.77	125	29.35	1429	0.71	9.1	0.69	6.76	-12.4	18.1	
1130	~1.00	24.77	125	29.39	1428	0.71	7.8	0.59	6.76	-10.1	12.8	
1135	~1.25	24.77	125	29.31	1430	0.71	7.2	0.55	6.76	-9.0	8.79	
1140	~1.50	24.77	125	29.38	1428	0.71	6.2	0.48	6.76	-7.4	6.51	
1145	~1.75	24.77	125	29.43	1429	0.71	6.5	0.49	6.76	-6.8	6.13	
1150	~1.75	24.77	125	29.52	1430	0.71	5.7	0.44	6.75	-5.5	4.79	
1155	~2.00	24.77	125	29.59	1431	0.71	5.1	0.39	6.75	-4.2	4.05	
1200	~2.00	24.77	125	29.52	1431	0.71	4.6	0.34	6.75	-3.3	4.12	
1205	~2.10	24.77	125	29.43	1430	0.71	4.0	0.30	6.75	-3.9	4.06	
1210	~2.50	24.77	125	29.45	1431	0.71	3.8	0.29	6.74	-6.7	2.89	
1215	~2.75	24.77	125	29.56	1431	0.71	3.7	0.28	6.74	-7.0	3.49	
1220	Begin collecting GW SAMPLE											
	End purge											
	Disch.											
						MW						

Signature: D. Whitaker Date: 03-18-10

CH2MHILL

PROJECT NUMBER 392485.FI.FK | WELL NUMBER VWAI-MW05 | SHEET 2 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study | LOCATION : AOC-I | DATE: 3/11/10

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

Signature:

Date: 3/18/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW05	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 3/18/10

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? FS-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? YES

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

DTW 24.06 ; manually after stopping pump
Insufficient yield will. Can achieve 0.1 drawdown & 25mL/min, but cannot sample that slowly. Checked previous notes: field team sampled @ 100mL/min. Our pump setting at 125mL/min. This should be acceptable.

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: _____ Date: 3/18/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW07	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 3/22/10

Weather: humid, hot, L ~ 80°F, H ~ 92°F; Mostly sunny

Sample Team: D Whitaker; M. Zamboni

Total Depth: 45.20 FT.(BTOC) Measured

Depth to Water: (-) 25.04 FT.(BTOC) Measured

Water Column(h): (=) 20.16 FT. 0 IN.

Water Volume in Well: ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329)

Pump Depth: 40 FT.(BTOC) Measured

Purge Device/Equip: SS Monsoon Pump

Measuring Device/Equipment: Oil/Water Interface Probe

Date and Time On Well: 3/22/10 7:25

Pump Start Date and Time: 3/22/10 0741

Pump Finish Date and Time: 03/22/10 1040

Date and Time Off Well: 03/22/10 1045

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: ~1.75 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW07-0310

Parameters Collected for: VOCs, SVOCs, FILT Metals, nitrate, sulfate, TOC

Sample Date/Time: 03/22/10 0950

Field Dup: YES/(NO) ID: N/A

Parameters Collected for: (FD) N/A

FD Sample Date/Time: N/A

MS/MSD: YES/(NO)

Sample Appearance: clear, colorless

Were samples filtered? (YES)/NO

Field Test Kit Details: 0 mg/L persulfate C_DF = 1

If YES, Which samples? Metals (Fe/Mn)

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0756	0	25.41	70									→ MW
0801	~0.10	25.45	70	26.97	1378	0.69	28.2	7.23	6.77	-37.6	N/A	→ not enough water, cloudy white
0806	~0.10	25.41	70	27.05	1380	0.69	22.8	1.81	6.72	-61.0	310	
0811	~0.10	25.36	50	27.20	1384	0.69	18.1	1.43	6.71	-68.5	288	turn up flowrate to ~70mL/min
0816	~0.15	25.35	150	27.49	1386	0.69	17.7	1.39	6.71	-69.7	246	turn down flowrate
0821	~0.20	25.51	90	27.74	1386	0.69	14.5	1.14	6.71	-73.1	178	
0826	~0.25	25.43	90	27.95	1385	0.69	13.3	1.04	6.71	-76.9	127	
0831	~0.50	25.40	90	28.12	1385	0.69	12.7	0.99	6.71	-77.0	80.1	
0836	~0.75	25.38	75	28.21	1385	0.69	12.4	0.96	6.71	-75.9	63.9	
0841	~1.00	25.36	75	28.26	1384	0.69	11.7	0.91	6.71	-77.6	57.4	
0846	~1.00	25.34	75	28.11	1383	0.69	12.5	0.97	6.71	-78.9	50.2	
0851	~1.10	25.34	75	28.15	1380	0.69	11.0	0.87	6.71	-78.7	30.0	
0856	~1.25	25.35	75	28.28	1380	0.69	11.0	0.86	6.71	-77.7	26.7	
0901	~1.25	25.35	75	28.41	1381	0.69	11.7	0.91	6.72	-76.2	20.0	
0906	~1.25	25.35	75	28.53	1381	0.69	10.9	0.84	6.73	-74.1	17.9	
0911	~1.25	25.33	75	28.63	1380	0.69	10.5	0.81	6.72	-73.3	16.1	
0916	~1.35	25.33	75	28.66	1379	0.68	9.5	0.73	6.72	-75.4	15.9	
0921	~1.40	25.33	75	28.67	1377	0.68	7.9	0.61	6.72	-76.3	15.7	
0926	~1.50	25.32	75	28.63	1377	0.68	7.6	0.58	6.72	-76.2	13.0	
0931	~1.60	25.32	50	28.70	1375	0.68	6.0	0.46	6.72	-75.8	9.32	turn up flow
0936	~1.75	25.52	75	28.80	1375	0.68	6.5	0.50	6.72	-71.3	12.9	

Signature: [signature] Date: 03-22-10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 3
392485.FI.FK	VWAI-MW07	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE:

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0941	~175	25.40	75	28.89	1374	0.68	6 9	0.53	6.72	-71.4	11.2	
0946	~1.85	2537	75	28.93	1374	0.68	6.6	0.51	6.72	-70.6	10.9	
0950	Begin	SAMPLE collection.										

@ MW 03-22-10

Signature: _____ Date: 03-22-10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW07	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE: 3/24/09

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision* :

DTW = 24.70' BTOC immediately after stopping pump
Drawdown reached 0.3' with 70mL/min flow rate.

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW02	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11/3/10

Weather: OVERCAST, 70°F, HUMID | Sample Team: KENJI BUTLER, CHRIS REED

Total Depth: 44.8 FT.(BTOC) Measured

Depth to Water: (-) 20.29 FT.(BTOC) Measured | Date and Time On Well: 11/3, 0745

Water Column(h): (=) ____ FT. ____ IN. | Pump Start Date and Time: 11/3, 0805

Water Volume in Well ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329 | Pump Finish Date and Time: 11/3, 0945

Pump Depth: 39.8 FT.(BTOC) Measured | Date and Time Off Well: 11/3, 10:20

Purge Device/Equip: SS Monsoon Pump | Air Monitoring Readings: 0.0 PPM

Measuring Device/Equipment: Oil/Water Interface Probe | Total Purge Volume: 6.0 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW02-1110 | Parameters Collected for: VOC (3 DIFF PRESERV.), SVOC, FILT IRON/MN, NITRATE/SULFATE, TOC

Sample Date/Time: 11/3, 0925

Field Dup: YES/(NO) ID: ____ | Parameters Collected for: (FD)

FD Sample Date/Time: ____

MS/MSD: (YES)/NO | Sample Appearance: CLEAR

Were samples filtered? (YES)/NO | Field Test Kit Details: 14 PPM PERSULFATE @ 09:20

If YES, Which samples? FILT. IRON/MN → PRESERVE W/ 2mg ASCORBIC ACID

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0805		20.46	200	28.31	2039	1.04	103.5	9.19	7.66	213.5		
0810		20.	200	28.76	2388	1.22	120.8	24.27	7.83	208.5		DO PROBE NOT WORKING
CALIBRATE		BACKUP	YSI	AND	RESTART	PROBE				202.2		
0845		20.38	240	28.82	2008	1.01	232.6	17.82	7.01	197.4	32.7	DO STILL INACCURATE
0850		20.38	240	28.96	1942	0.98	205.2	15.34	6.95	194.0		
0855	↓	20.38	240	29.06	1857	0.92	169.3	12.86	6.85	189.5	7.11	70 PPM PERSULFATE
0900	2.5	20.40	240	29.21	1720	0.86	130.6	9.74	6.74	186.4		CONFIRM USING 5K DILUTION
0905		20.40	200	29.23	1684	0.84	118.0	8.97	6.69	185.4	2.32	→ ACTUAL = 78 PPM
0910		20.40	240	29.28	1639	0.82	100.8	7.72	6.63	179.0	1.63	
0915	↓	20.40	240	29.36	1622	0.81	94.7	7.18	6.61	177.8	1.15	
0920	3.5	20.40	240	29.34	1620	0.80	81.6	6.59	6.60	172.1	1.11	14 PPM PERSULFATE
0925	COLLECT	SAMPLE										→ 2mg ASCORBIC ACID

Signature: [signature] Date: 11/3/10

PROJECT NUMBER 392485.FI.FK	WELL NUMBER VWAI-MW02	SHEET 2 OF 3

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study | LOCATION : AOC-I | DATE: 11/3/10

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

CSH

Signature: Christopher S. [illegible] Date: 11/3/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW02	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE:

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? YES

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

NO EXCEPTIONS

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: _____ Date: 11/3/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW03	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I DATE: 11/4/2010

Weather: Mostly Cloudy, a scatter drizzle or two

Sample Team: K. Bates, C. Reed

Total Depth: 39.0 FT.(BTOC) Measured

Depth to Water: (-) 20.73 FT.(BTOC) Measured

Water Column(h): (=) ____ FT. ____ IN.

Water Volume in Well ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329

Pump Depth: 34.0 FT.(BTOC) Measured

Purge Device/Equip: SS Monsoon Pump

Measuring Device/Equipment: Oil/Water Interface Probe

Date and Time On Well: 11/4/2010 0810

Pump Start Date and Time: 11/4/2010 0834

Pump Finish Date and Time: 11/4/2010 1001

Date and Time Off Well: 11/4/2010 1120

Air Monitoring Readings: 0 ppm

Total Purge Volume: ~3.25 GAL

SAMPLE INFORMATION

Sample ID: VWAI-MW03-1110 & 1110A

Parameters Collected for: VOCs, SVOCs, Methane, Nitrate/Sulfate TOC,

Sample Date/Time: 11/4/2010 0950

Field Dup: YES/NO ID: ____

Parameters Collected for: (FD) —

FD Sample Date/Time: ____

MS/MSD: YES / NO

Sample Appearance: Clear

Were samples filtered? YES/NO

Field Test Kit Details: 0-0.7 ppm Peroxide reading at 1XD

If YES, Which samples? Fe/Mn

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0839	0	20.92	200	29.40	1881	0.95	13.7	1.05	7.18	-9.7	74.9	Cloudy/white
0844	1/8	20.92	200	28.52	1862	0.94	14.4	1.10	7.19	-19.8	65.5	
0849	1/4	20.92	200	29.64	1957	0.93	10.2	0.78	7.25	-20.5	55.8	
0854	1/2	20.92	200	28.73	1954	0.93	10.0	0.77	7.23	-20.6	46.5	Clear
0859	3/4	20.92	200	25.81	1941	0.92	8.9	0.70	7.26	-17.6	41.0	
0910	1.25	20.93	200	29.20	1790	0.90	6.7	0.52	7.27	-12.4	23.2	
0915	1.5	20.93	200	29.22	1793	0.90	5.7	0.44	7.29	-14.1	27.6	
0920	1.75	20.93	200	29.26	1782	0.89	5.5	0.42	7.28	-13.2	25.1	
0925	2.0	20.93	200	29.36	1776	0.89	5.1	0.39	7.27	-11.8	21.8	
0930	2.25	20.93	200	29.36	1777	0.89	5.0	0.38	7.27	-10.7	12.7	
0935	2.50	20.93	200	29.35	1779	0.90	4.9	0.37	7.28	-9.9	8.59	
0940	2.75	20.93	200	29.35	1779	0.90	4.8	0.37	7.28	-8.7	7.87	
	Sodium Persulfate vinyl color check strips 0-0.7 ppm of Peroxide at 1XD, with vs.											
	1mg Ascorbic Acid until Saturated											

Signature: _____ Date: 11/4/2010

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 3
392485.FI.FK	VWAI-MW03	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE: 11/4/2010

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

Signature: _____ Date: 11/4/2010

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW03	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I DATE:

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*: No Exceptions

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: _____ Date: 11/4/2010

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW04	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11/2/2010

Weather: Sunny, few clouds, 70s and 80s | Sample Team: K. Butler, C. Reed

Total Depth: ____ FT.(BTOC) Measured

Depth to Water: (-) 20.72 FT.(BTOC) Measured | Date and Time On Well: 11/2/2010 0800

Water Column(h): (=) ____ FT. ____ IN. | Pump Start Date and Time: 11/2/2010 0820

Water Volume in Well 36.8 GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329) | Pump Finish Date and Time: 11/2/2010 0935

Pump Depth: 36.5 FT.(BTOC) Measured | Date and Time Off Well: 11/2/2010 1015

Purge Device/Equip: SS Monsoon Pump | Air Monitoring Readings: 0 ppm

Measuring Device/Equipment: Oil/Water Interface Probe | Total Purge Volume: ~2.5 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW04-1110 & 1110A | Parameters Collected for: VOCs, SVOCs, Filtered (Fe & Mn), SO4, NO3, TOC

Sample Date/Time: 11/2/2010 0910

Field Dup: YES (NO) ID: — | Parameters Collected for: (FD) —

FD Sample Date/Time: —

MS/MSD: YES / (NO) | Sample Appearance: Clear

Were samples filtered? (YES)/NO | Field Test Kit Details: Between 0 & 0.7 mg/L on Persulfate

If YES, Which samples? Iron & Manganese

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0825	0	20.79	240	28.91	1961	0.98	20.4	1.53	7.02	177.6	107	Cloudy/white
0830	0.25	20.79	240	29.23	1940	0.98	14.8	1.12	7.00	159.0	68.2	
0835	0.50	20.79	240	29.27	1932	0.97	11.0	0.83	6.99	145.0	48.6	
0840	0.75	20.79	240	29.41	1892	0.95	6.5	0.50	6.92	110.7	26.9	Clear
0845	1.00	20.79	240	29.44	1866	0.94	5.0	0.38	6.91	106.3	19.6	
0850	1.25	20.79	240	29.43	1859	0.93	4.6	0.34	6.88	106.9	16.2	
0855	1.50	20.79	240	29.43	1849	0.92	4.0	0.30	6.87	107.2	15.4	
0900	1.85	20.79	240	29.44	1844	0.92	3.9	0.29	6.87	107.1	13.1	
0905	2.10	20.79	240	29.44	1843	0.92	3.7	0.28	6.86	106.9	11.9	
—	Sodium Persulfate visual chemetrix kit shows between 0 & 0.7 ppm Sodium Persulfate is present after											
	1mg Ascorbic acid will be added to 1 liter sample VWAI-MW04-1110A											

Signature: _____ Date: 11/2/2010

CH2MHILL

PROJECT NUMBER 392485.FI.FK

WELL NUMBER VWAI-MW04

SHEET 2 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : **In-Situ Remediation Pilot Study**

LOCATION : **AOC-I**

DATE: 11/2/2010

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

Signature:

Date: 11/2/2010

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW04	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study | LOCATION : AOC-I | DATE:

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*: No Exceptions made

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: [signature] Date: 11/2/2010

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW05	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11/2/10

Weather: SUNNY, 85°F, HUMID

Sample Team: CHRISTOPHER REED, KENJI BUTLER

Total Depth: 44.6 FT.(BTOC) Measured

Depth to Water: (-) 20.65 FT.(BTOC) Measured

Water Column(h): (=) ____ FT. ____ IN.

Water Volume in Well ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329

Pump Depth: 39.6 FT.(BTOC) Measured

Purge Device/Equip: SS Monsoon Pump

Measuring Device/Equipment: Oil/Water Interface Probe

Date and Time On Well: 11/2, 0815

Pump Start Date and Time: 11/2, 0815

Pump Finish Date and Time: 11/2, 0920

Date and Time Off Well: 11/2, 0920

Air Monitoring Readings: 0.0 PPM

Total Purge Volume: 4.0 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW05-1110

Parameters Collected for: VOC, SVOC, IRON, MN, SULFATE, NITRATE, TOC

Sample Date/Time: 11/2/10, 0920

Field Dup: YES/NO ID: NO

Parameters Collected for: (FD) —

FD Sample Date/Time: —

MS/MSD: YES / NO NO

Sample Appearance: CLEAR

Were samples filtered? YES/NO

Field Test Kit Details: SEE BELOW

If YES, Which samples? IRON / MN

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0815	0.25	23.10	300	28.90	1328	0.65	5.0	0.38	6.70	116.0	60.4	SLIGHT PETRO ODOR
0820	0.50	22.76	250	28.92	1340	0.66	5.0	0.39	6.72	51.0	50.2	
0825	0.75	22.45	250	28.95	1359	0.67	5.0	0.38	6.74	42.3	37.6	
0830	1.0	21.81	200	29.02	1366	0.68	4.3	0.33	6.73	39.1	25.0	
0835	1.25	21.25	200	28.98	1365	0.68	4.0	0.31	6.73	38.2	18.1	
0840	1.50	21.32	250	28.97	1364	0.68	4.7	0.36	6.73	34.1	12.2	
0845	1.75	21.32	250	29.04	1363	0.68	4.4	0.34	6.73	32.6	8.78	0.0 PPM PERSULFATE W/ CHEMETS
0850	2.0	21.32	250	29.15	1362	0.67	4.2	0.33	6.73	29.8	4.21	
0855	2.25	21.32	250	29.19	1360	0.67	3.6	0.30	6.72	20.0	5.36	
0900	2.50	21.32	250	29.20	1359	0.67	3.2	0.25	6.72	19.9	4.22	
0905	2.75	21.32	250	29.22	1358	0.67	3.1	0.23	6.72	18.7	4.16	
0910	3.25	21.32	250	29.22	1357	0.67	3.0	0.25	6.73	15.2		
0915	3.50	21.32	250	29.24	1358	0.68	2.9	0.21	6.73	12.5		0.0 PPM PERSULFATE W/ CHEMETS, CONFIRM USING 5X DILUTION
0920	COLLECT SAMPLE											USE 1.0 mg AA

Signature: Christopher Reed Date: 11/2/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	
392485.FI.FK	VWAI-MW05	SHEET 2 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : **In-Situ Remediation Pilot Study** LOCATION : **AOC-I** DATE: 11/2/10

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

Signature: [illegible] Date: 11/2/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW05	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I DATE: 11/2/10

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? YES

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

NO EXCEPTIONS

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Christopher D Rule Date: 11/2/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW07	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11/4/10

Weather: PARTLY SUNNY, 85° HUMID | Sample Team: CHRIS REED, KENJI BUNER

Total Depth: 45.2 FT.(BTOC) Measured

Depth to Water: ~~45.1~~ FT.(BTOC) Measured 27.18 | Date and Time On Well: 11/4, 0800

Water Column(h): (=) ____ FT. ____ IN. | Pump Start Date and Time: 11/4, 0855

Water Volume in Well ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329 | Pump Finish Date and Time: 11/4, 1105

Pump Depth: 40.2 FT.(BTOC) Measured | Date and Time Off Well: 11/4, 1200

Purge Device/Equip: SS Monsoon Pump | Air Monitoring Readings: ____

Measuring Device/Equipment: Oil/Water Interface Probe | Total Purge Volume: 4.5 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW07-1110 | Parameters Colleced for: VOC (3 DIFF PRESERV.), SVOC, FILT. IRON/MN, NITRATE/SULFATE, TOC

Sample Date/Time: 11/4, 1020

Field Dup YES/NO ID: VWAI-MW07P-1110 | Parameters Colleced for: (FD) SVOC, VOC

FD Sample Date/Time: 11/4, 1025 | ↳ NON PRES, ASCORBIC ACID

MS/MSD: YES / NO | Sample Appearance: CLEAR

Were samples filtered? YES/NO | Field Test Kit Details: 14-21 PPM PERSULFATE @ 10:45

If YES, Which samples? FILT. IRON/MN | ↳ PRESERVE W/ 2.5mg ASCORBIC ACID

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0855	|	24.22	100	29.13	10507	5.91	9.9	0.73	8.27	141.2	118	DRAWDOWN
0900	|	25.90	75	29.04	10578	5.93	8.2	0.61	8.21	136.7	100	EXCEEDING 0.3'
0905	|	25.98	90	29.04	10594	5.96	7.9	0.58	8.10	131.2	61.1	
0910	|	26.24	100	29.36	10488	5.89	6.4	0.47	7.79	124.4	31.3	
0915	|	26.42	100	29.43	10365	5.82	5.8	0.43	7.73	122.5	21.0	
0920	|	26.15	100	29.59	10248	5.74	5.1	0.38	7.61	117.4	12.8	DRW - RECHARGE
0925	|	26.0	100	29.55	10237	5.74	5.2	0.39	7.58	115.4	10.2	
0930	|	25.85	100	29.49	10232	5.73	5.3	0.39	7.52	112.1	6.31	
0935	|	25.64	100	29.42	10161	5.69	5.3	0.39	7.51	108.8	5.22	
0940	|	25.55	100	29.46	10170	5.70	5.3	0.39	7.50	108.3	5.31	
0945	|	25.32	100	29.45	10092	5.62	5.3	0.39	7.46	105.2	4.62	
0950	|	25.28	100	29.43	10031	5.61	5.2	0.38	7.45	103.8	4.43	
0955	|	25.25	100	29.77	9780	5.58	5.1	0.37	7.48	101.5	4.42	7 PPM PERSULFATE
1000	|	25.14	100	29.77	9946	5.56	5.0	0.37	7.46	98.0	4.36	
1005	|	25.08	100	29.79	9902	5.53	4.8	0.36	7.41	95.5	4.36	
1010	▽	25.08	100	29.81	9883	5.52	4.8	0.35	7.40	93.9	4.61	|
1015	4.5	25.08	100	29.80	9861	5.51	4.6	0.35	7.38	89.9	4.32	14-21 PPM PERSULFATE
1020	COLLECT SAMPLE AND DUPLICATE (10:25)											↳ 2.5 mg ASCORBIC ACID

Signature: [signature] Date: 11/4/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 3
392485.FI.FK	VWAI-MW07	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE: 11/4/10

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

Signature: _____ Date: 11/4/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW07	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study | LOCATION : AOC-I | DATE:

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? NO

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

DRAWDOWN WAS GREATER THAN 0.3' INITIALLY, BUT BEGAN TO RECHARGE AFTER 20 MINUTES OF PURGING

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Christopher S. Rund Date: 11/4/10

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 2
392485.FI.FK	VWAI-MW02	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11/10/11

Weather: Partly Cloudy, humid, mid 80's | Sample Team: K. Butler / VBO

Total Depth: 45.25 FT (BTOC) Measured

Depth to Water: (-) 15.75 FT (BTOC) Measured | Date and Time On Well: 11/10/11 0755

Water Column(h): (=) 29.50 FT ____ IN. | Pump Start Date and Time: 11/10/11 0820

Water Volume in Well ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329) | Pump Finish Date and Time: 11/10/11 1105

Pump Depth: 40.25 FT (BTOC) Measured | Date and Time Off Well: 11/10/11 1110

Purge Device/Equip: Masoneilan Pump | Air Monitoring Readings: 0 ppm

Measuring Device/Equipment: YSI Prof Series, LaMotte 2020e | Total Purge Volume: 40 GAL

SAMPLE INFORMATION

Sample ID: ____ | Parameters Collected for: VOCs, SVOC, TPH (DRO, GRO, ORO), Filtered Fe/Mn, Sulfate, Nitrate, TOC

Sample Date/Time: 11/10/11 0950

Field Dup: YES (NO) ID: NA | Parameters Collected for: (FD) NA

FD Sample Date/Time: NA

MS/MSD: (YES) / NO | Sample Appearance: Clear

Were samples filtered? (YES) NO | Field Test Kit Details: 0.7 mg/L Sodium Persulfate

If YES, Which samples? Fe/Mn

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0825	0.1	15.86	200	28.0	1945	0.98	~~20.45~~	2a.98	11.82	80.7	36.4	Cloudy, white
0830	0.3	15.86	200	28.1	1687	0.84	148.7	15.38	11.78	38.0	71.2	
0835	0.5	15.87	200	28.3	1751	0.72	168.5	13.01	11.61	8.4	59.0	
0840	0.7	15.87	200	28.5	794	0.38	110.0	8.50	4.93	-22.2	60.3	
0845	1	15.87	200	28.6	825	0.40	113.1	8.61	8.11	-31.7	51.1	
0850	1.2	15.87	200	28.6	941	0.46	63.7	4.86	7.87	-40.4	165	Cloudy white
0855	1.5	15.87	200	28.6	977	0.48	53.0	4.08	7.55	-36.6	22.3	
0900	1.7	15.87	200	28.6	1008	0.49	44.8	3.46	7.31	-29.7	20.1	Clear/colorless
0905	1.9	15.86	200	28.7	1033	0.51	38.2	2.95	7.18	-18.7	12.7	
0910	2.1	15.86	200	28.7	1045	0.51	28.7	2.66	7.14	-10.8	11.5	
0915	2.3	15.85	200	28.7	1051	0.52	32.1	2.98	7.11	-4.7	9.69	
0920	2.5	15.85	200	28.7	1054	0.52	32.6	2.51	7.09	2.1	8.45	
0925	2.7	15.85	200	28.7	1069	0.52	32.3	2.50	7.05	12.4	14.5	
0930	3.0	15.85	200	28.8	1079	0.53	30.2	2.32	6.94	20.3	7.69	
0935	3.2	15.85	200	28.5	1083	0.53	29.1	2.25	6.97	22.3	7.45	
0940	3.4	15.85	200	28.4	1084	0.53	28.9	2.23	6.97	23.5	6.58	
0945	3.6	15.85	200	28.5	1084	0.53	28.3	2.20	6.96	25.4	6.31	

Signature: ____ Date: 11/10/11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 2
392485.FI.FK	VWAI-MW02	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I DATE: 11/12/11

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? FB-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

PHOTO LOG

Photo Numbe	Compass Direction	Time	Description
1	East		White precipitate coming out of the well

EMS

Signature: _____ Date: 11/12/11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET
392485.FI.FK	VWAI-MW03	1 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11/9/11

Weather: Overcast, Some Rain, Humid High 80's | Sample Team: K. Butler/VBO, C. Vera/TDA

Total Depth: 39.86 FT.(BTOC) Measured

Depth to Water: (-) 16.18 FT.(BTOC) Measured | Date and Time On Well: 11/9/11 1005

Water Column(h): (=) 31.48 FT. ____ IN. | Pump Start Date and Time: 11/9/11 1020

Water Volume in Well ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329 | Pump Finish Date and Time: 11/9/11 1150

Pump Depth: 32.86 FT.(BTOC) Measured | Date and Time Off Well: 11/9/11 1155

Purge Device/Equip: Monsoon Pump | Air Monitoring Readings: 0.0 ppm

Measuring Device/Equipment: YSI Professional Plus/LaMotte | **Total Purge Volume:** 1.6 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW03-1111/VWAI-MW03-1111A | Parameters Collected for: VOCs, SVOCs, TPH(GRO, DRO, ORO), Filtered Fe&MN, Sulfate, Nitrate, TOC

Sample Date/Time: 11/9/11 1215

Field Dup: YES/(NO) ID: ____ | Parameters Collected for (FD) NA

FD Sample Date/Time: N/A

MS/MSD: YES / (NO) | Sample Appearance: Clear

Were samples filtered? (YES)/NO | Field Test Kit Details: Dup/1 Sodium Persulfate

If YES, Which samples? ~~FF~~ VS Fe & MN

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1030	0	16.30	150	27.3	862	0.42	38.4	5.08	9.36	30.6	-	
1035	0.1	16.34	150	27.8	1166	0.58	16.6	1.29	7.10	-108.9	48.8	Clear,
1040	0.2	16.39	150	28.1	1176	0.58	9.5	0.74	6.97	-124.1	40.5	
1045	0.3	16.39	150	28.7	1175	0.58	7.0	0.54	6.95	-135.9	29.0	Clear
1050	0.5	16.39	150	28.5	1176	0.58	5.5	0.41	6.94	-145.5	18.7	
1055	0.6	16.40	150	28.4	1172	0.58	4.9	0.37	6.92	-151.5	15.7	
1100	0.8	16.42	150	28.4	1167	0.58	4.4	0.34	6.91	-155.1	12.3	
1105	1.0	16.42	150	28.4	1162	0.57	4.2	0.33	6.91	-160.7	10.86	
1110	1.2	16.42	150	28.4	1161	0.57	4.0	0.31	6.90	-163.7	10.08	

Signature: ____ Date: 11/9/11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET
392485.FI.FK	VWAI-MW03	2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE: 11/9/11

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision* :

PHOTO LOG

Photo Numbe	Compass Direction	Time	Description

Signature: _____ Date: 11/9/11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 2
392485.FI.FK	VWAI-MW04	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11.10.11

Weather: Mostly sunny, humid 80s°F, breezy | Sample Team: D. Whitaker, C. Vera

Total Depth: 41.02 FT.(BTOC) Measured

Depth to Water: (-) 16.34 FT.(BTOC) Measured | Date and Time On Well: 11-10-11 0745

Water Column(h): (=) ____ FT. ____ IN. | Pump Start Date and Time: 11-10-11 0800

Water Volume in Well ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329) | Pump Finish Date and Time: 11-10-11 1000

Pump Depth: 36.00 FT.(BTOC) Measured | Date and Time Off Well: 11-10-11 1010

Purge Device/Equip: Monsoon pump | Air Monitoring Readings: 0.1 ppm

Measuring Device/Equipment: YSI Prof. Series / | Total Purge Volume: ____ GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW04-1111 | Parameters Collected for: VOCs, SVOCs, TPH GRO/DRO/ORO, Fe & Mn, sulfate, nitrate, T.O.C.

Sample Date/Time: 11/10/11 0930

Field Dup: YES/NO ID: / | Parameters Collected for: (FD) /

FD Sample Date/Time: /

MS/MSD: YES / NO | Sample Appearance: clear, colorless, very small floating particulate

Were samples filtered? YES/NO | Field Test Kit Details: 0.7 ppm on the Chemets Sodium Persulfate Test Kit

If YES, Which samples? Fe & Mn

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) ~~w/in 10%~~	Color / Odor / Comments
0820	0.10	16.42	250	28.6	1159	0.57	48.8	3.76	10.19	-19.1	61.4	
0825	0.25	16.41	150	—	—	—	—	—	—	—	—	Adjust pump speed
0830	0.50	16.52	300	29.1	1187	0.58	36.7	2.85	9.22	-63.2	31.3	
0835	0.75	16.47	150	28.9	1276	0.63	34.2	2.62	8.38	-79.0	24.7	
0840	1.10	16.42	200	29.1	1324	0.66	33.3	2.54	7.74	-89.8	20.6	
0845	1.80	16.44	200	28.9	1342	0.66	29.8	2.29	7.55	-91.4	17.2	
0850	2.00	16.43	200	29.2	1362	0.68	28.5	2.18	7.36	-90.8	15.8	
0855	2.10	16.43	200	29.2	1366	0.68	25.9	1.98	7.30	-88.9	17.1	
0900	2.25	16.43	200	29.3	1373	0.68	25.2	1.90	7.24	-87.0	15.9	
0905	2.90	16.43	200	29.5	1380	0.68	21.8	1.67	7.16	-85.5	11.6	
0910	3.10	16.43	200	29.2	1372	0.68	19.4	1.50	7.12	-87.5	24.3	
0915	3.35	16.43	200	29.4	1381	0.68	15.6	1.20	7.10	-87.0	23.6	
0920	3.70	16.43	200	29.3	1386	0.69	15.6	1.18	7.09	-86.2	14.4	
0925	4.00	16.43	200	29.2	1393	0.69	14.1	1.08	7.07	-85.1	11.5	

11/10/11

Signature: [signature] Date: 11/10/11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET
392485.FI.FK	VWAI-MW04	2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I DATE: 11-10-11

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

PHOTO LOG

Photo Numbe	Compass Direction	Time	Description

Date: 11-10-11

Signature: _____ Date: 11/10/11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET
392485.FI.FK	VWAI-MW05	1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I MW-05 DATE: 110811

Weather: Cloudy / warm Sample Team: D. Whitaker / C. Vick

Total Depth: 44.66 FT.(BTOC) Measured

Depth to Water: (-) 16.65 FT.(BTOC) Measured Date and Time On Well: 110811 / 0815

Water Column(h): (=) 28.01 FT. 2 IN. Pump Start Date and Time: 110811 / 0835

Water Volume in Well _____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329 Pump Finish Date and Time: 110811 / 1032

Pump Depth: 39.66 FT.(BTOC) Measured Date and Time Off Well: 110811 / 1050

Purge Device/Equip: Monsoon Pump Air Monitoring Readings: 0.0ppm

Measuring Device/Equipment: YSI Professional Plus **Total Purge Volume:** 5.75 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW05-1111 / VWAI-MW05-1111A Parameters Collected for: VOCs, SVOCs, TPH (GRO, DRO, ORO)

Sample Date/Time: 11-08-11 0935 filtered Fe+MN, Sulfate, nitrate, TOC,

Field Dup: (YES) NO ID: VWAI-MW05P-1111 Parameters Collected for (FD) VOCs, SVOCs, TPH (GRO)

FD Sample Date/Time: 11-08-11 0940 TPH (DRO & ORO)

MS/MSD: YES (NO) Sample Appearance: clear, colorless

Were samples filtered? (YES) NO Field Test Kit Details: Ø ppm

If YES, Which samples? iron / MN

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0845	1.25	17.00	250	28.3	1341	—	7.8	0.61	6.71	38.1	47.6	
0850	1.50	17.00	200	28.5	1349	—	8.3	0.64	6.70	38.6	45.1	
0855	1.75	17.00	200	28.6	1345	0.67	8.6	0.67	6.70	40.6	42.6	
0900	2.00	17.03	200	28.7	1342	0.67	13.9	1.07	6.70	44.0	39.2	
0905	2.25	17.03	200	28.7	1339	0.66	13.9	1.07	6.70	44.6	38.8	
0910	2.65	17.03	200	28.7	1339	0.66	14.1	1.09	6.71	48.5	36.4	
0915	3.00	17.02	200	29.1	1343	0.67	14.5	1.11	6.70	54.0	33.9	
0920	3.10	17.02	200	29.1	1351	0.67	14.3	1.10	6.70	53.7	25.6	
0925	3.50	17.02	200	29.0	1352	0.67	14.3	1.09	6.70	52.0	22.7	
0930	3.75	17.02	200	28.9	1348	0.67	13.7	1.05	6.69	52.9	23.8	

Done 11-08-11

Signature: _____ Date: 11-08-11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET
392485.FI.FK	VWAI-MW05	2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I DATE: 11-08-11

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? yes B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? NO

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*:**

- second set of VOCs that were for sample ID VWAI-MW05-111A where 3x rinse out HCl from 2-40 mL vials and then put in appropriate amount of ascorbic acid not completed because when completed Chemets Kit for sodium persulfate got 0.0ppm and thus, thought the 2-40mL ascorbic acid preserved vials were not needed - called lab and CH2M Hill Chemist and they also believed this, when later consulted PM, found did need to be collected. Will collect tomorrow after complete re-purge to sample VOCs (HCl preserved) and VOCs (ascorbic acid preserved) and the Field Duplicate samples as well for VOCs (HCl pres) and VOCs (ascorbic acid pres.).

PHOTO LOG

Photo Numbe	Compass Direction	Time	Description

Draw 11-08-11

Signature: _____ Date: 11/08/11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET
392485.FI.FK	VWAI-MW085	1 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11/9/11

Weather: Overcast, Some Rain, Humid Mid 80's

Sample Team: K. Butler/VBC
C. Vera/TPA

Total Depth: 44.66 FT.(BTOC) Measured

Depth to Water: (-) 16.66 FT.(BTOC) Measured

Water Column(h): (=) 28.00 FT. ____ IN.

Water Volume in Well ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329

Pump Depth: 37.66 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

Measuring Device/Equipment: YSI Professional Plus/LaMotte 2020e

Date and Time On Well: 11/9/11 0745

Pump Start Date and Time: 11/9/11 0805

Pump Finish Date and Time: 11/9/11 0910

Date and Time Off Well: 11/9/11 0920

Air Monitoring Readings: 0 ppm

Total Purge Volume: 1.5 **GAL**

SAMPLE INFORMATION

Sample ID: VWAI-MW085B-1111/VWAI-MW085B-1111 Parameters Colleced for: VOCs, VOCs (Ascorbic Acid)

Sample Date/Time: 11/9/11 0900

Field Dup: (YES)/NO ID: VWAI-MW085BP/VWAI-MW085BP-1111 Parameters Colleced for (FD) VOCs, VOCs (Ascorbic Acid)

FD Sample Date/Time: 11/9/11 0905

MS/MSD: YES / (NO)

Sample Appearance: Clear no odor.

Were samples filtered? YES/(NO)

Field Test Kit Details: 0 mg/L Sodium Persulfate

If YES, Which samples? NA

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0820	0.25	16.91	200	27.8	1239	0.61	15.4	1.16	6.77	-7.4	—	BZ: 0.0 ppm
0825	0.50	16.82	200	27.5	1273	0.63	10.7	0.83	6.72	-4.8	26.5	Clear, no odor
0830	0.60	16.92	200	27.9	1270	0.63	8.1	0.61	6.71	-4.0	29.2	
0835	2.80	16.86	150	27.8	1271	0.67	8.5	0.67	6.71	-4.1	25.6	BZ: 0.0 ppm
0840	0.95	16.94	150	27.7	1265	0.63	7.3	0.57	6.71	-4.1	20.3	
0845	1.05	16.81	150	27.6	1260	0.62	7.2	0.56	6.71	-4.0	19.6	
0850	1.15	16.81	150	27.6	1259	0.62	7.1	0.55	6.71	-4.1	21.9	0 mg/L Sodium Persulfate
0855	1.25	16.82	150	27.6	1258	0.62	7.1	0.55	6.71	-4.0	19.2	

Signature: _____ Date: 11/9/11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET
392485.FI.FK	VWAI-MW05	2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I DATE: 11/9/11

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

PHOTO LOG

Photo Numbe	Compass Direction	Time	Description

Signature: _____ Date: 11/9/11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET
392485.FI.FK	VWAI-MW07	1 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11-09-11

Weather: overcast, raining, humid ~80° | Sample Team: D. Whitaker

Total Depth: 34.50 FT.(BTOC) Measured

Depth to Water: (-) 16.92 FT.(BTOC) Measured | Date and Time On Well: 11-09-11 0745

Water Column(h): (=) ____ FT. ____ IN. | Pump Start Date and Time: 11-09-11 0811

Water Volume in Well ____ GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329 | Pump Finish Date and Time: 11-09-11 1050

Pump Depth: 29.50 FT.(BTOC) Measured | Date and Time Off Well: 11-09-11 1100

Purge Device/Equip: Monsoon Pump | Air Monitoring Readings: 0.0 ppm

Measuring Device/Equipment: YSI Prof Solo, LaMotte 2020e | Total Purge Volume: 1.25 GAL. (1.25)

SAMPLE INFORMATION

Sample ID: VWAI-MW07-1111 | Parameters Collected for: VOCs, SVOCs, GRO, DRO/ORO, nitrates, sulfate, Fe/Mn, TOC

Sample Date/Time: 11-09-11 0920

Field Dup: YES (NO) ID: ____ | Parameters Collected for (FD): N/A

FD Sample Date/Time: N/A

MS/MSD: YES (NO) | Sample Appearance: clear colorless, trace fine suspended material

Were samples filtered? YES/NO | Field Test Kit Details: 1.4 ppm Chemets Sodium Persulfate test kit

If YES, Which samples? Fe & Mn

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0815	0.20	18.25	300	28.1	8798	4.88	264.0	19.91	12.34	81.9	83.3	cloudy, trace particles, lacks not reached during well
0817	0.25	—	—	—	—	—	—	—	—	—	—	cut off pump to let recharge
0850	0.25	17.15	100	27.8	8700	4.83	432.9	31.30	12.32	72.1	63.9	
0855	0.40	17.20	150	27.8	8640	4.79	160.1	12.21	12.32	67.2	48.3	
0900	0.60	17.19	125	28.3	8512	8512	158.0	11.93	12.30	60.1	34.8	Sal: 4.71
0905	0.75	17.19	125	28.3	8310	8310	161.0	12.28	12.34	60.6	29.2	Sal: 4.57
0910	0.90	17.19	125	28.0	8280	8280	167.0	12.34	12.27	49.8	24.0	Sal: 4.57
0915	1.05	17.19	125	28.0	8280	8280	146.2	11.15	12.26	48.6	22.7	Sal: 4.55
0920	1.25	17.19	125	—	8282	—	—	—	—	—	—	collect sample

Signature: [signature] Date: 11/09/11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET
392485.FI.FK	VWAI-MW04 7	2 2 1 OF 6

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE: 11/09/11

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? yes

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

PHOTO LOG

Photo Numbe	Compass Direction	Time	Description

Signature: _____ Date: 11/09/11

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW04	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I - MW04 DATE: 5/23/12

Weather: ~75°F, SUNNY

Sample Team: D. Whitaker, P. Murphy, M. Dennis

Total Depth: 40.55 FT.(BTOC) Measured

Depth to Water: (-) 18.22 FT.(BTOC) Measured

Water Column(h): (=) 22.33 FT. 2 IN.

Water Volume in Well 3.64 GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329

Pump Depth: 35.00 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

Measuring Device/Equipment: YSI 556 MPS; HACH 2100P Turbidity Meter

Date and Time On Well: 05/23/12 0720

Pump Start Date and Time: 5/23/12 0730

Pump Finish Date and Time: 05/23/12 0840

Date and Time Off Well: 05/23/12 0850

Air Monitoring Readings: 0.0 PPM

Total Purge Volume: 3.50 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW04-0512

Sample Date/Time: 05/23/12 0825

Field Dup: YES/(NO) ID: N/A

FD Sample Date/Time: N/A

MS/MSD: YES/(NO)

Were samples filtered? YES/(NO)

If YES, Which samples? FMETAL (Fe & Mn)

Parameters Collected for: VOCs, SVOCs, FMETALS (Fe & Mn), WCHEM (SO4, NO3), WCHEM (TOC)

Parameters Collected for (FD): N/A

Sample Appearance: clear, colorless

Persulfate Test Kit Details: 0.0 ppm

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0735	0.65	18.33	250	28.72	1354	0.67	3.7	0.28	7.88	-169.9	5.17	
0740	0.90	18.32	250	28.80	1406	0.70	4.0	0.30	7.46	-169.7	6.54	
0745	1.25	18.31	250	28.91	1429	0.71	3.0	0.23	7.24	-164.3	4.36	
0750	1.65	18.33	250	28.95	1442	0.72	3.3	0.25	6.99	-151.6	3.57	
0755	1.90	18.34	250	28.96	1451	0.72	2.7	0.21	6.89	-138.0	2.62	
0800	2.45	18.34	250	28.99	1454	0.72	3.0	0.23	6.83	-130.7	2.82	
0805	2.60	18.35	250	29.01	1464	0.73	2.3	0.17	6.82	-125.0	1.79	
0810	2.95	18.35	250	29.03	1474	0.73	3.0	0.23	6.88	-117.8	1.41	
0815	3.25 (AD)	18.35	250	29.07	1483	0.74	2.5	0.19	6.89	-113.9	1.33	
0820	3.50	18.35	250	29.04	1489	0.74	2.3	0.17	6.96	-116.3	1.37	Strong Hydrocarbon Odor

N/A TMP 05/23/12

Signature: [signature] Date: 05/23/12

CH2MHILL

PROJECT NUMBER	WELL NUMBER	
392485.FI.FK	VWAI-MW~~07~~ 04 (MP)	SHEET 2 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study   LOCATION : AOC-I   DATE:

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

N/A MP 05/23/12

Signature: ____________________   Date: ____________________

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW074 dup	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : In-Situ Remediation Pilot Study LOCATION : AOC-I DATE: 05/23/12

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes FI

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? YES

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

PHOTO LOG

Photo Numbe	Compass Direction	Time	Description

N/A 05/23/12

Signature: _____ Date: 05/23/12

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW05	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 5/22/12

Weather: Sunny, humid, hot

Sample Team: Dia Wheatcraft, Maria Dan OIS, Pat Murphy

Total Depth: 44.86 QLW FT.(BTOC) Measured

Depth to Water: (-) 18.08 FT.(BTOC) Measured

Water Column(h): (=) 26.52 FT. 8 IN.

Water Volume in Well 4.24 GAL (3.141593*h(in)*(well DIA/2)^2*0.004329) (x 0.16)

Pump Depth: 39.00 FT.(BTOC) Measured

Purge Device/Equip: Monsoon (#16308)/controller (17922)

Measuring Device/Equipment: Solinst WL Meter # 11808 PINE

Date and Time On Well: 05/22/12 0930

Pump Start Date and Time: 05/22/12 0947

Pump Finish Date and Time: 05/22/12 12.10

Date and Time Off Well: 05/22/12 1225

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 1.85 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW05-0512

Parameters Collected for: VOCs, SVOCs, FE/MN, SO4, NO3, TOC

Sample Date/Time: 05/22/12 1055

Field Dup: YES (NO) ID: N/A

Parameters Collected for (FD): N/A

FD Sample Date/Time: N/A

MS/MSD: (YES) NO

Sample Appearance: clear, colorless

Were samples filtered? YES (NO) QLW

Persulfate Test Kit Details: 0.0 ppm

If YES, Which samples? ~~N/A~~ FMETAL

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1000	~~<0.50~~	18.35	125	29.36	1309	0.65	8.0	0.60	6.95	54.3	—	
1005	<0.50	18.36	125	29.32	1311	0.65	6.0	0.45	7.0	51.6	—	
1010	<0.50	18.38	125	29.46	1311	0.65	4.4	0.34	7.11	45.5	—	
1015	0.85	18.35	100	29.54	1313	0.65	4.3	0.32	7.34	44.1	10.0	
1020	1.20	18.30	100	29.92	1312	0.65	3.6	0.27	7.14	46.3	16.7	
1025	1.45	18.32	100	29.95	1312	0.65	3.3	0.25	7.12	47.5	11.6	
1030	1.50	18.33	100	29.97	1312	0.65	3.2	0.24	7.08	47.8	8.13	
1035	1.60	18.31	100	30.11	1311	0.65	3.0	0.23	7.07	45.1	6.27	
1040	1.85	18.31	100	29.87	1311	0.65	2.9	0.23	7.01	45.6	4.43	hydrocarbon odor

QLW 05/22/12

Signature: [signature] Date: 05/22/12

CH2MHILL	PROJECT NUMBER 392485.FI.FK	WELL NUMBER VWAI-MW05	SHEET 2 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : **In-Situ Remediation Pilot Study** LOCATION : **AOC-I** DATE:

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

QW 05/22/12

Signature: ______________________ Date: ______________________

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW05	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I DATE: 05/22/12

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? yes

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

PHOTO LOG

Photo Numbe	Compass Direction	Time	Description

DBW 05/22/12

Signature: [signature] Date: 05/22/12

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET
392485.FI.FK	VWAI-MW07 (DUP)	1 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 05/23/12

Weather: mostly sunny, breezy, 75°F

Sample Team: Dia Whitaker, Maria Dancis, Pat Murphy

Total Depth: 45.22 FT.(BTOC) Measured

Depth to Water: (-) 18.40 FT.(BTOC) Measured (17.60 MD) with pump in well

Water Column(h): (=) 26.82 FT. 2 IN.

Water Volume in Well 4.29 GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329

Pump Depth: 40.00 - 45.00 MD FT.(BTOC) Measured

Purge Device/Equip: Monsoon pump

Measuring Device/Equipment: YSI 556 MPS/Hach Turbidimeter

Date and Time On Well: 05/23/12 0855

Pump Start Date and Time: 05/23/12 0905

Pump Finish Date and Time: 05/23/12 1125

Date and Time Off Well: 05/23/12 1140

Air Monitoring Readings: 0.1

Total Purge Volume: 1.85 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW07-0512

Parameters Colleced for: VOCs, SVOCs, FE/MN, WCHEM (SO4, NO3, TOC)

Sample Date/Time: 05/23/12 1050 ~~1055~~ (DUP)

Field Dup: (YES)/NO ID: VWAI-MW07P-0512

Parameters Colleced for: (FD) VOCs, SVOCs

FD Sample Date/Time: 05/23/12 1055

MS/MSD: YES / (NO)

Sample Appearance: clear, colorless

Were samples filtered? (YES)/NO

Persulfate Test Kit Details: 1.4 ppm

If YES, Which samples? F Metals (FE/MN)

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0945	<0.50	20.70	70	28.21	5780	3.11	144.4	11.09	11.48	-41.1	71.6	
0950	<0.50	21.41	70	28.43	5655	3.04	127.1	11.49	11.46	-41.0	78.5	
0955	0.50	21.65	60	28.55	5610	3.01	114.4	8.71	11.41	-41.3	67.5	
MD 1000	0.60	22.01	60	28.65	5525	2.97	111.9	8.59	11.39	-36.4	66.1	
1005	0.70	22.35	60	28.69	5473	2.94	122.7	9.39	11.41	-34.9	56.6	
1010	0.75	22.80	60	28.72	5443	2.92	108.9	8.33	11.39	-32.0	62.0	
1015	0.90	23.77	60	28.86	5268	2.81	108.4	8.22	11.35	-31.6	47.1	
1020	1.10	24.45	60	29.14	5159	2.75	92.1	6.89	11.31	-30.7	37.1	
1025	1.25	25.05	60	29.02	5029	2.68	87.8	6.64	11.26	-30.1	31.2	
1030	1.40	25.85	60	29.12	4994	2.66	78.2	5.88	11.23	-32.3	34.4	
1035	1.60	26.36	60	29.34	4945	2.63	77.0	5.82	11.21	-33.6	38.9	STRONG HYDROCARBON ODOR
1040	1.70	27.00	60	29.21	4843	2.57	68.2	5.11	11.16	-37.6	22.3	
1045	1.75	27.33	60	29.37	4806	2.55	77.7	5.86	11.14	-39.4	21.5	
1050	1.85	27.85	60	29.40	4796	2.55	71.7	5.44	11.12	-41.7	19.6	

(DUP) 05/23/12

Signature: [signature] Date: 05/23/12

CH2MHILL	PROJECT NUMBER 392485.FI.FK	WELL NUMBER VWAI-MW047	SHEET 2 OF 3
	GROUNDWATER SAMPLING DATA SHEET		

PROJECT : In-Situ Remediation Pilot Study   LOCATION : AOC-I   DATE:

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments

DAW 05/23/12

Signature: ____________________ Date: ____________________

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET
392485.FI.FK	VWAI-MW07 (DUP)	3 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I DATE: 05/23/12

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? yes B-1

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? yes but few exceptions- see below

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

While starting the initial purge of MW07 @ AOC I, sampling team was unable to keep well drawdown within 0.3 ft as stated in the SOP. Well is being pumped at less than 50mL and recharge on well is insufficient to stop/hinder draw-down of ~~water~~ water in well. Sampling team is unable to slow flow rate down since it will prevent any flow; will use all pumping pressure. Sampling team notified the PM, S. Brand, who stated to continue as best as possible. Will try and resolve draw-down issue as best as possible while adhering to the SOP. NOTE: Team is using a flow restrictor and has spent about 45 minutes trying to resolve this issue.

DO is ~~very low~~ but not quite within 10% of last 3 readings, however DO is considered stabilized - the 5.11 mg/L reading was taken when the water had stopped - pump speed had to be turned up a little to resume flow - Due to pumping at such low flow volume/speed, at times during purging the pump had to be turned up a little at a time to keep the water purging.

PHOTO LOG

Photo Number	Compass Direction	Time	Description
1	W	1000	Maria taking YSI readings down in well x-back
2	N	1055	Pat collecting groundwater sample

(DUP) 05/23/12

Signature: [signature] Date: 05/23/12

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 3
392485.FI.FK	VWAI-MW04	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11/28/12

Weather: Sunny, Humid, Hot | Sample Team: P. Murphy, T. Horn

Total Depth: 41.05 FT.(BTOC) Measured

Depth to Water: (-) 25.27 FT.(BTOC) Measured | Date and Time On Well: 11/28/12 0800

Water Column(h): (=) 15.77 FT. 2 IN. | Pump Start Date and Time: 11/28/12 0820

Water Volume in Well 2.6 GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329 | Pump Finish Date and Time: 11/29/12 0920

Pump Depth: 35.00 FT.(BTOC) Measured | Date and Time Off Well: 11/29/12 0925

Purge Device/Equip: Monsoon & Controller | Air Monitoring Readings: N/A

Measuring Device/Equipment: YSI Turbidimeter | Total Purge Volume: 4.5 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW04-1112 | Parameters Collected for: VOCs, SVOCs, FM METALS, WCHEM (SO4, NO3)

Sample Date/Time: 11/28/12 0905 | WCHEM (TOC)

Field Dup: YES (NO) ID: NA | Parameters Collected for (FD): ~~NA~~ MS/MSD = VOCs, SVOCs

FD Sample Date/Time: NA | ~~NA~~

MS/MSD: (YES) / NO | Sample Appearance: Clear, slight petroleum odor

Were samples filtered? (YES) NO | Persulfate Test Kit Details: 0.0 ppm

If YES, Which samples? Filtered Metals

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0825	0.1	25.50	350	28.6	1.30			1.10	7.41	-213.2	12.24	Clear / rotten eggs small
0830		25.50	350	29.0	1.38		9.4	0.70	7.01	-222.2	9.05	Clear
0835	1.3	25.46	250	28.9	1.34		7.6	0.56	6.84	-218.8	12.27	Clear
0840	2.0	25.45	250	29.1	1.39		5.2	0.40	6.76	-225.1	8.75	Clear
0845	2.5	25.45	250	29.2	1.40		4.2	0.32	6.69	-225.9	6.34	Clear
0850	3.0	25.45	250	29.2	1.41		3.4	0.26	6.65	-232.6	3.47	Clear
0855	3.5	25.45	250	29.1	1.42		3.3	0.25	6.61	-235.9	2.65	Clear
0900	4.0	25.45	250	29.0	1.42		3.3	0.27	6.54	-232.8	1.97	Clear

Signature: [signature] Date: 11/28/12

CH2MHILL

PROJECT NUMBER 392485.FI.FK | WELL NUMBER VWAI-MW05 | SHEET 1 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11/28/12

Weather: Rain, Hot, Humid

Sample Team: P. Murphy, T. Horn

Total Depth: 44.55 FT.(BTOC) Measured

Depth to Water: (-) 25.12 FT.(BTOC) Measured

Water Column(h): (=) 19.66 FT. N/A IN.

Water Volume in Well 3.0 GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329

Pump Depth: 32.00 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump /

Measuring Device/Equipment: YSI

Date and Time On Well: 11/28/12 1015

Pump Start Date and Time: 11/28/12 1030

Pump Finish Date and Time: 11/28/12 1135

Date and Time Off Well: 11/28/12 1140

Air Monitoring Readings: N/A

Total Purge Volume: ~3.5 GAL.

SAMPLE INFORMATION

Sample ID: VWAI-MW05-1112

Sample Date/Time: 11/28/12 1125

Field Dup: YES/NO (NO circled) ID:

FD Sample Date/Time: N/A

MS/MSD: YES / NO (NO circled)

Were samples filtered? YES/NO (YES circled)

If YES, Which samples? F Metals

Parameters Colleced for: VOCs, SVOCs, F Metals, WetChem (SO4, NO3), WetChem (TOC)

Parameters Colleced for (FD): N/A

N/A

Sample Appearance: Clear

Persulfate Test Kit Details: 0.0 ppm

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1035	0.25	25.46	200	28.3	1.07		17.3	1.36	6.38	-75.7	50.6	Clear
1040	0.5	25.50	200	28.5	1.07		12.5	0.97	6.40	-91.4	31.8	Clear
1045	0.75	25.50	200	28.9	1.06		9.5	0.73	6.34	-111.6	17.7	Clear
1050	1.00	25.50	200	28.8	1.06		7.5	0.59	6.38	-132.7	13.8	Clear
1055	1.25	25.50	200	28.6	1.05		7.4	0.58	6.37	-127.9	10.7	Clear
1100	1.50	25.50	200	28.7	1.04		6.6	0.51	6.36	-114.8	8.17	Clear
1105	1.75	25.50	200	28.7	1.04		6.5	0.49	6.36	-110.9	6.73	Clear
1110	2.00	25.50	200	28.7	1.04		6.1	0.47	6.36	-108.6	4.92	Clear
1115	2.5	25.50	250	28.6	1.04		6.3	0.49	6.36	-102.3	4.0	Clear
1120	3.0	25.50	250	28.6	1.04		5.9	0.44	6.36	100.1	3.0	Clear

Signature: [signature] Date: 11/28/12

CH2MHILL

PROJECT NUMBER: 392485.FI.FK | WELL NUMBER: VWAI-MW07 | SHEET 1 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study | LOCATION: AOC-I | DATE: 11/29/12

Weather: clear sunny, cool breeze, humid 21°F

Sample Team: P Murphy, T Hirn

Total Depth: 45.22 FT.(BTOC) Measured

Depth to Water: (-) 25.52 FT.(BTOC) Measured

Water Column(h): (=) 19.70 FT. 2 IN.

Water Volume in Well: 3.21 GAL (3.141593*h(in)*(wellDIA/2)^2*0.004329

Pump Depth: 40 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

Measuring Device/Equipment: YSI Multimeter

Date and Time On Well: 11/29/12 0730

Pump Start Date and Time: 11/29/12 0745

Pump Finish Date and Time: 11/29/12 0945

Date and Time Off Well: 11/29/12 1000

Air Monitoring Readings: N/A

Total Purge Volume: 2.5 GAL

SAMPLE INFORMATION

Sample ID: VWAI-MW07-112912

Sample Date/Time: 11/29/12 0915

Field Dup: YES/NO ID: VWAI-MW07P-112912

FD Sample Date/Time: 11/29/12 0920

MS/MSD: YES / NO

Were samples filtered? YES/NO

If YES, Which samples? FMETALS

Parameters Collected for: VOCs, SVOCs, FMetal/MCHEM (SVOCs) MCHEM (TOC)

Parameters Collected for (FD): VOC, SVOCs

Sample Appearance: Clear

Persulfate Test Kit Details: 0.0 ppm

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp. (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0800	0.2	27.79	90	27.4	4.81		63.2	4.83	11.58	-60.1	6.52	Clear
0805	0.3	28.25	80	27.8	4.82		55.5	4.32	11.56	-41.9	6.65	Clear
0810	0.4	28.69	90	27.9	4.70		51.0	3.44	11.52	-95.1	6.26	Clear
0815	0.5	28.95	80	27.8	4.57		40.5	3.14	11.49	-100.6	6.22	Clear
0820	0.6	29.20	80	27.9	4.53		40.7	3.15	11.48	-104.2	5.85	Clear
0825	0.7	29.50	80	27.9	4.50		36.5	2.91	11.45	-106.6	5.86	Clear
0830	0.8	29.70	100	28.0	4.39		42.2	3.29	11.30	-107.6	8.37	Clear
0835	0.9	30.20	100	28.1	4.26		38.0	2.95	11.04	-107.3	16.1	Clear
0840	1.0	30.45	100	28.1	4.14		34.3	2.65	11.05	-107.9	17.8	Clear
0845	1.2	31.50	110	28.4	3.95		36.8	2.85	10.63	-101.6	19.5	* flow stopped/turned up
0850	1.4	31.90	110	28.6	3.81		29.1	2.23	10.51	-99.1	18.1	
0855	1.6	32.25	110	28.8	3.77		24.6	2.24	10.37	-95.7	17.3	
0900	1.9	32.70	110	29.0	3.74		24.3	2.23	10.16	-91.5	13.2	
0905	2.0	33.30	110	29.1	3.71		27.6	2.09	10.07	-92.8	12.6	
0910	2.2	33.50	110	29.2	3.70		27.0	2.01	10.00	-92.4	11.1	

Signature: [signature] Date: 11/29/12

CH2MHILL

PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
392485.FI.FK	VWAI-MW07	

GROUNDWATER SAMPLING DATA SHEET

PROJECT: In-Situ Remediation Pilot Study LOCATION: AOC-I DATE:

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes but with few exceptions

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision*:

While starting the initial purge of MW07@AOC I, sampling team was unable to keep well drawn down within 0.3ft as stated in SOPs. Well was pumped between 50mL and ~110mL; flow rate kept changing due to pumping pressure changes from well water drawn down. Well had insufficient recharge to allow steady flow rate and prevent draw down. Sampling team tried their best to prevent and minimize draw down and adhered to SOPs. Sample team stayed consistent with previous round of sampling (May 2012).

PHOTO LOG

Photo Numbe	Compass Direction	Time	Description
1		0901	T. Horn recording GW parameters while purging
2		0901	SAB, but different direction
3		0901	Purge bucket on plastic to prevent spills.

Signature: _____ Date: 11/29/12

Appendix B
ISCO Application Data March – April 2010

Vieques AOC I Field Parameters - Summary Sheet												
Time	Date	Well ID	Depth-To-Water (ft btoc)	ORP (mV)	DO (mg/L)	Conductivity (mS/cm)	pH	Temperature (°C)	Turbidity (NTU) [optional]	Persulfate Concentration (mg/L)	Sulfate Test Kit (mg/L) [optional]	Notes
Baseline Monitoring Well Sampling												
--	3/15/2010	MW-01	24.93	--	--	--	--	--	--	--	--	
0935	3/18/2010	MW-02	24.16	113.0	0.13	1.099	6.69	29.72	--	0	--	Injection MW
0905	3/19/2010	MW-03	24.41	-49.4	0.26	1.275	6.76	29.68	--	0	--	Injection MW
1120	3/19/2010	MW-04	24.63	308.0	0.17	1.289	6.77	29.82	--	0	--	Injection MW
1215	3/18/2010	MW-05	24.31	-7.0	0.28	1.431	6.74	29.56	--	0	--	
0946	3/22/2010	MW-06	25.04	-70.6	0.51	1.374	6.72	28.93	--	0	--	
--	3/15/2010	MW-07	24.85	--	--	--	--	--	--	--	--	Injection MW
--	3/15/2010	MW-08	23.55	--	--	--	--	--	--	--	--	
--	3/15/2010	MW-09	23.61	--	--	--	--	--	--	--	--	
DAY 1 - Pre-Injection Monitoring												
0834	3/27/2010	MW-01	25.69	--	--	--	--	--	--	--	--	
0831	3/27/2010	MW-02	24.97	--	--	--	--	--	--	--	--	Injection MW
0827	3/27/2010	MW-03	25.25	--	--	--	--	--	--	--	--	Injection MW
0821	3/27/2010	MW-04	25.41	--	--	--	--	--	--	--	--	Injection MW
--	--	MW-05	--	--	--	--	--	--	--	--	--	
0845	3/27/2010	MW-06	26.02	--	--	--	--	--	--	--	--	
0818	3/27/2010	MW-07	25.57	--	--	--	--	--	--	--	--	Injection MW
--	--	MW-08	--	--	--	--	--	--	--	--	--	
--	--	MW-09	--	--	--	--	--	--	--	--	--	
DAY 1 - Monitoring during Injection												
0923	3/27/2010	MW-07	25.35	--	--	--	--	--	--	--	--	Injection MW
1032	3/27/2010	MW-07	24.91	--	--	--	--	--	--	--	--	Injection MW
1043	3/27/2010	MW-07	24.87	--	--	--	--	--	--	--	--	Injection MW
DAY 2 - Monitoring during Injection												
0952	3/29/2010	MW-01	25.92	--	--	--	--	--	--	--	--	
0948	3/29/2010	MW-02	25.25	--	--	--	--	--	--	--	--	Injection MW
0950	3/29/2010	MW-03	25.54	--	--	--	--	--	--	--	--	Injection MW
--	3/29/2010	MW-04	--	--	--	--	--	--	--	--	--	Well Injection Occurring
0953	3/29/2010	MW-05	25.60	--	--	--	--	--	--	--	--	
0954	3/29/2010	MW-06	26.27	--	--	--	--	--	--	--	--	
0945	3/29/2010	MW-07	25.77	--	--	--	--	--	--	--	--	Injection MW

Vieques AOC I Field Parameters - Summary Sheet												
Time	Date	Well ID	Depth-To-Water (ft btoc)	ORP (mV)	DO (mg/L)	Conductivity (mS/cm)	pH	Temperature (°C)	Turbidity (NTU) [optional]	Persulfate Concentration (mg/L)	Sulfate Test Kit (mg/L) [optional]	Notes
0955	3/29/2010	MW-08	25.27	--	--	--	--	--	--	--	--	
0959	3/29/2010	MW-09	26.20	--	--	--	--	--	--	--	--	
1051	3/29/2010	MW-01	25.88	--	--	--	--	--	--	--	--	
1049	3/29/2010	MW-02	25.16	--	--	1.123	11.47	28.8	--	--	--	Injection MW
1046	3/29/2010	MW-03	25.45	--	--	--	--	--	--	--	--	Injection MW
--	3/29/2010	MW-04	--	--	--	--	--	--	--	--	--	Well Injection Occurring
1055	3/29/2010	MW-05	25.52	--	--	--	--	--	--	--	--	
1054	3/29/2010	MW-06	26.27	--	--	--	--	--	--	--	--	
1045	3/29/2010	MW-07	25.27	--	--	1.413	6.71	29.2	--	--	--	Injection MW
1052	3/29/2010	MW-08	25.27	--	--	--	--	--	--	--	--	
1057	3/29/2010	MW-09	26.18	--	--	--	--	--	--	--	--	
1354	3/29/2010	MW-07	25.31	--	--	1.448	6.70	29.3	--	--	--	Injection MW
Vieques AOC I Field Parameters - Summary Sheet												
Time	Date	Well ID	Depth-To-Water (ft btoc)	ORP (mV)	DO (mg/L)	Conductivity (mS/cm)	pH	Temperature (°C)	Turbidity (NTU) [optional]	Persulfate Concentration (mg/L)	Sulfate Test Kit (mg/L) [optional]	Notes
DAY 3 - Monitoring during Injection												
0749	3/30/2010	MW-01	25.94	--	--	--	--	--	--	--	--	
0754	3/30/2010	MW-02	25.58	--	--	--	--	--	--	--	--	Injection MW
0756	3/30/2010	MW-03	25.77	--	--	--	--	--	--	--	--	Injection MW
0752	3/30/2010	MW-04	25.77	--	--	--	--	--	--	--	--	Injection MW
0733	3/30/2010	MW-05	25.63	--	--	--	--	--	--	--	--	
0738	3/30/2010	MW-06	26.40	--	--	--	--	--	--	--	--	
0746	3/30/2010	MW-07	25.73	--	--	1.363	6.68	28.5	--	--	--	Injection MW
0743	3/30/2010	MW-08	25.39	--	--	--	--	--	--	--	--	
0741	3/30/2010	MW-09	26.30	--	--	--	--	--	--	--	--	
1012	3/30/2010	MW-01	25.90	--	--	1.317	7.05	29.1	--	--	--	
DAY 4 - Monitoring during Injection												
0649	3/31/2010	MW-01	26.03	--	--	--	--	--	--	--	--	

ISCO Injection Field Observation Form
Injection Well: MW02

Site: **Vieques AOC-I**
Project: *In Situ* Activated Alkaline Sodium Persulfate Injection
Contract: Navy CLEAN, CTO-83

66	66
167	233
150	383
86	469
31	500

Design Summary
Screen Interval = 31 - 41 ft bgs
Total Solution Volume = 514 gallons
(includes 20 gallons of chase water)
Persulfate Solution per Well = 475 gal
Mass of Persulfate per Well = 209 lbs
Mass of NaOH per Well = 200 lbs (19 gal; 25% solution)
Persulfate concentration: 5 %; 50 g/L

Date	Start Time	Stop Time	Pressure range (psi)	Flowrate (gpm)	Total Time (min)	Total Volume (gallons)	Notes
3/27/2010	0853	0910	10	not registering	17	66	66 gal batch injected (200 gallon batch simultaneously into MWs 2, 3, and 4). Flow readings not accurate, will switch to injecting into individual wells.
3/29/2010	1304	1330	0	2.7	43	--	167 gal batch begin injecting; stop to refuel compressor
3/29/2010	1349	1356	0	3.0 - 3.2	50	233	167 gal batch injection complete
3/29/2010	1445	--	0	1.23	--	--	200 gal batch begin injecting; gravity fed
3/29/2010	1510	1539	< 0.5 - 4.5	3.6	104	383	150 gal of the 200 gallon batch injected, put other 50 gallons in MW-03
3/30/2010	0910	0934	0	3.6	128	469	86 gal batch begin injecting; 86 gal batch injection complete
3/30/2010	1016	1025	0	3.2	137	500+10	31 gal batch + 10 gal chase water; injection complete

Notes: When the pump head was fixed to the well head the flowrate was at less than 0.5 gpm and pressure was at 2 psi. At 1445 when the pump head was unscrewed from the well head and allowed to pour in under gravity feed, the flowrate was over 4 gpm and pressure ranged from 0 - 0.5 gpm.

ISCO Injection Field Observation Form
Injection Well: MW03

Site: **Vieques AOC-I**
Project: *In Situ* Activated Alkaline Sodium Persulfate Injection
Contract: Navy CLEAN, CTO-83

Design Summary
Screen Interval = 24 - 34 ft bgs
Total Solution Volume = 514 gal
(includes 20 gallons of chase water)
Persulfate Solution per Well = 475 gal
Mass of Persulfate per Well = 209 lbs
Mass of NaOH per Well = 200 lbs (19 gal; 25% solution)
Persulfate concentration: 5 %; 50 g/L

Date	Start Time	Stop Time	Pressure range (psi)	Flowrate (gpm)	Total Time (min)	Total Volume (gallons)	Notes
3/27/2010	0853	0910	6	50	17	67	67 gal batch injected (200 gallon batch simultaneously into MWs 2, 3, and 4). Flow readings not accurate, will switch to injecting into individual wells.
3/29/2010	1549	--	0	4	--	--	50 gal batch begin injecting; gravity fed
3/29/2010	1605	1620	0	1.8	48	117	50 gal batch injection complete
3/30/2010	0810	--	0	1.4	--	--	Begin injecting
3/30/2010	0847	--	0	1.5	--	--	
3/30/2010	0910	0934	0	1.2	132	231	
3/30/2010	1016	1026	0	0.8	142	239	
3/30/2010	1027	--	0	--	--	--	
3/30/2010	1052	1153	0	1.3	228	338	Batch complete- turn off to mix new batch
3/30/2010	1242	--	0	1.1	--	--	
3/30/2010	1250	--	0	1.1	--	--	
3/30/2010	1320	--	0	1.1	--	--	
3/30/2010	1350	--	0	1.1	--	--	
3/30/2010	1420	1432	0	1.1	--	459	Batch complete- turn off to mix new batch
3/30/2010	1504	1541	0	1.1	407	500	Begin injecting last batch; Sodium persulfate injection complete
3/30/2010	1640	1650	0	--	417	510	10 gal chase water injected

Notes:

ISCO Injection Field Observation Form
Injection Well: MW04

Site: **Vieques AOC-I**
Project: *In Situ* Activated Alkaline Sodium Persulfate Injection
Contract: Navy CLEAN, CTO-83

Design Summary
Screen Interval = 30 - 40 ft bgs
Total Solution Volume = 514 gal
(includes 20 gallons of chase water)
Persulfate Solution per Well = 475 gal
Mass of Persulfate per Well = 209 lbs
Mass of NaOH per Well = 200 lbs (19 gal; 25% solution)
Persulfate concentration: 5 %; 50 g/L

Date	Start Time	Stop Time	Pressure range (psi)	Flowrate (gpm)	Total Time (min)	Total Volume (gallons)	Notes
3/27/2010	0856	0910	8	3.63	14	67	67 gal batch injected (200 gallon batch simultaneously into MWs 2, 3, and 4). Flow readings not accurate, will switch to injecting into individual wells.
3/27/2010	1014	--	13	--	--	--	200 gal batch begin injecting; inject under pressure
3/27/2010	1015	--	20	3.2	--	--	
3/27/2010	1026	--	23	--	--	--	
3/27/2010	1030	--	21	2.4	--	--	
3/27/2010	1049	--	21	2.4	--	--	
3/27/2010	1107	1127	21	2.4	87	267	200 gal batch injection complete
3/29/2010	1014	--	10	2	--	--	200 gal batch begin injecting
3/29/2010	1027	--	10	2	--	--	
3/29/2010	1111	--	10	2	--	--	
3/29/2010	1121	1136	10	2	169	467	200 gal batch injection complete; stop to mix new batch
3/29/2010	1224	1227	10	2	172	473	33 gal batch begin injecting; stop- injection well head blew off due to pressure- reaffix
3/29/2010	1233	--	10	2	--	--	
3/29/2010	1242	1246	8	2	185	500	Sodium persulfate injection complete
3/29/2010	1250	1255	10	--	190	510	10 gal chase water added

Notes:

ISCO Injection Field Observation Form
Injection Well: MW07

Site: **Vieques AOC-I**
Project: *In Situ* Activated Alkaline Sodium Persulfate Injection
Contract: Navy CLEAN, CTO-83

Design Summary
Screen Interval = 33 - 43 ft bgs
Total Solution Volume = 514 gal
(includes 20 gallons of chase water)
Persulfate Solution per Well = 475 gal
Mass of Persulfate per Well = 209 lbs
Mass of NaOH per Well = 200 lbs (19 gal; 25% solution)
Persulfate concentration: 5 %; 50 g/L

Date	Start Time	Stop Time	Pressure range (psi)	Flowrate (gpm)	Total Time (min)	Total Volume (gallons)	Notes
3/30/2010	1034	1035	0	0.4	1	0.4	tested flowrate when gravity fed- very low when put in 5 gal
3/30/2010	1044	--	--	1.5	--	--	141 gal batch injecting; inject under pressure
3/30/2010	1120	1153	18 - 21	0.9	70	62	
3/30/2010	1242	--	20	0.6	--	--	
3/30/2010	1250	--	24	0.6	--	--	
3/30/2010	1320	--	20	0.6	--	--	
3/30/2010	1350	--	16	0.6	--	--	
3/30/2010	1420	1432	15	0.6	180	141	
3/30/2010	1504	--	20	--	--	--	59 gal batch begin injecting
3/30/2010	1534	--	20	0.6	--	--	
3/30/2010	1545	--	20	--	--	--	
3/30/2010	1603	--	22	--	--	--	
3/30/2010	1627	--	22	--	--	--	
3/30/2010	1640	1641	21	--	277	200	59 gal batch injection complete
3/31/2010	0657	--	20	1.7	--	--	200 gal batch begin injecting
3/31/2010	0720	--	20	1.7	--	--	
3/31/2010	0750	--	24	1.7	--	--	
3/31/2010	0810	--	24	1.7	--	--	
3/31/2010	0840	0904	24	1.7	414	400	200 gal batch injection complete
3/31/2010	0932	--	22	1.7	--	--	100 gal batch begin injecting
3/31/2010	0950	--	30	1.7	--	--	
3/31/2010	1015	--	16	1.7	--	--	

Notes:

ISCO Injection Field Observation Form
Injection Well: MW07

Site: **Vieques AOC-I**
Project: *In Situ* Activated Alkaline Sodium Persulfate Injection
Contract: Navy CLEAN, CTO-83

Design Summary
Screen Interval = 33 - 43 ft bgs
Total Solution Volume = 514 gal
(includes 20 gallons of chase water)
Persulfate Solution per Well = 475 gal
Mass of Persulfate per Well = 209 lbs
Mass of NaOH per Well = 200 lbs (19 gal; 25% solution)
Persulfate concentration: 5 %; 50 g/L

Date	Start Time	Stop Time	Pressure range (psi)	Flowrate (gpm)	Total Time (min)	Total Volume (gallons)	Notes
3/31/2010	1030	--	29	0.6	--	--	
3/31/2010	1100	1133	28	0.6	505	500	Sodium persulfate injection complete
3/31/2010	1150	1207	--	--	522	510	10 gal chase water added

Notes:

ORIN Remediation Technologies

May 24, 2010

Stephen Brand
CH2M Hill
5700 Cleveland Street, Ste. 101
Virginia Beach, VA 23462

Subject: Summary of Remedial Chemical Injection Activities Performed at the Navy Clean Site in Vieques, Puerto Rico.

Dear Stephen:

The following is a summary of the work completed by ORIN Remediation Technologies, LLC (ORIN) for CH2M Hill at the Navy Clean Site in Vieques, Puerto Rico.

On March 22, 2010 ORIN began preparation for injection activities by discussing site specific health and safety plans with ORIN, CH2M Hill, and JFA personnel. Potential chemical injection, island specific, and Geoprobe related safety hazards were discussed. The group evaluated ways to reduce the risks, and the best practices to maintain safety.

On Tuesday March 23, 2010 ORIN began sodium persulfate injection in AOC E. ORIN injected a 20% sodium persulfate solution into monitoring wells 1, 3, 4, and 5. Sodium persulfate injection in AOC E took place March 23-26, and on March 29, 2010.

ORIN injected on monitoring wells 3, 4, and 5 before beginning injection on MW-1. During injection on the first three monitoring wells, ORIN bailed MW-1 to check for sodium persulfate. The goal was to show influence on MW-1 from injection into the surrounding wells. On Thursday March 25, 2010 a field persulfate test indicated sodium persulfate concentrations of 4.2 to 5.6 ppm in MW-1. Injection on MW-1 began later that day.

ORIN Remediation Technologies

Each of the four monitoring wells received 20 gallons of chase water following sodium persulfate injection. Injection rates, pressures, and volumes per well are included in table 1.

ORIN commenced calcium nitrate injection activities in AOC E on Monday, March 22, 2010. Immediately after starting the injection through Geoprobe rods, the treatment chemistry surfaced around the bore hole. After discussing how to proceed, CH2M Hill decided to have JFA install temporary injection points. Calcium nitrate injection resumed via installed temporary injection points Thursday March 25, 2010. Treatment chemistry was delivered by gravity feed, under zero PSI. The calcium nitrate injection was completed March 26, 2010. Following calcium nitrate injection, 20 gallons of chase water was injected into each injection point. Injection rates, pressures, and volumes per well are included in table 2.

ORIN began sodium persulfate injection in AOC I on Saturday March 27, 2010. The first 200 gallons of solution ORIN injected into MW- 2, 3, and 4 simultaneously. After the 200 gallon tank was gone, it was clear that ORINs flow meters were not correctly measuring the total gallons. To overcome this problem, ORIN began injecting on only one monitoring well at a time. Over the course of the following injection day, injection pressure in AOC-I monitoring wells steadily increased. After a successful attempt to gravity feed, ORIN began injecting with no seal on the monitoring well. Under this zero PSI, gravity feed system, injection rates increased. Following treatment chemistry injection, each monitoring well received 10 gallons of chase water. Injection in AOC I was completed Wednesday March 31, 2010. Injection rates, pressures, and volumes per well are included in table 3.

If you have any questions regarding this injection or any other project, please give us a call at (608) 838-6699 ext. 305.

Sincerely,

John Dinneen
Field Technician
ORIN Remediation Technologies, LLC.

Navy Clean AOC E
Sodium Persulfate Post Injection Summary
Table 1

Injection Point	Date	Time On	Time Off	Injection Depth (feet)	Sodium Persulfate Concentration	Injection Pressure (psi)	Flow Rate (gpm)	Gallons Injected	Comments	Total Volume
MW-3	3/23/10	7:30	17:00	40-50	20%	10	.5-1	165		
MW-4	3/23/10	7:30	17:00	40-50	20%	8	.5-1	165		
MW-5	3/23/10	7:30	17:00	40-50	20%	8	.5-1	70		
MW-3	3/24/10	7:35	10:45	40-50	20%	10	0.2	29		
		10:45	17:00	40-50	20%	20-30	0.8	236		
MW-4	3/24/10	7:35	10:45	40-50	20%	12	0.2	29		
		10:45	17:00	40-50	20%	25-30	0.8	284		
MW-5	3/24/10	7:35	11:03	40-50	20%	8	0.2	38		
		11:03	13:13	40-50	20%	8	3.5	392		**500**
MW-3	3/25/10	10:45	13:40	40-50	20%	14	0.5	85		**515**
MW-4	3/25/10	10:45	11:08	40-50	20%	28	1	15		**493**
MW-1	3/25/10	10:55	17:02	40-50	20%	18	<0.5	135		
MW-1	3/26/10	7:22	17:13	40-50	20%	18	0.2	200		
MW-1	3/29/10	7:25	9:05	40-50	20%	18	0.2	33		
		9:31	16:46	40-50	20%	18	0.25	100		
MW-1	3/30/10	7:24	9:10	40-50	20%	18	0.2	33		**501**

Navy Clean AOC E
Calcium Nitrate Post Injection Summary
Table 2

Injection Point	Date	Time On	Time Off	Injection Depth (feet)	Calcium Nitrate Concentration	Injection Pressure (psi)	Flow Rate (gpm)	Gallons Injected	Comments
IP-7	3/22/10				5%			0	Immediate short circuit around borehole. Injection points instalation began.
IP-4	3/25/2010	14:40	15:22	16-26	5%	0	4.1	172	**172**
IP-6	3/25/2010	14:40	15:24	16-26	5%	0	2.5	110	**110**
IP-7	3/25/2010	14:55	15:24	16-26	5%	0	0.75	23	
		15:24	16:50	16-26	5%	0	0.4	34	
IP-1	3/25/2010	15:33	16:24	16-26	5%	0	2	102	**102**
IP-2	3/25/2010	15:33	16:48	16-26	5%	0	1.36	102	**102**
IP-7	3/26/2010	7:43	8:07	16-26	5%	0	0.75	18	
		8:58	9:40	16-26	5%	0	0.64	27	**102**
IP-3	3/26/10	7:46	8:07	16-26	5%	0	1.5	31	
		8:53	9:40	16-26	5%	0	1.5	71	**102**
IP-5	3/26/10	7:51	7:53	16-26	5%	0	2	4	
		8:04	8:07	16-26	5%	0	0.29	1	
		9:05	11:45	16-26	5%	0	0.57	97	**102**

Navy Clean AOC I
Sodium Persulfate Post Injection Summary
Table 3

Injection Point	Date	Time On	Time Off	Injection Depth (feet)	Sodium Persulfate Concentration	Injection Pressure (psi)	Flow Rate (gpm)	Gallons Injected	Comments
MW-2	3/27/10	8:53	9:10	33-43	5%	10	3.9	66	
MW-3	3/27/10	8:53	9:10	33-43	5%	6	3.9	67	
MW-4	3/27/10	8:53	9:10	33-43	5%	8	3.9	67	
		10:14	11:27	33-43	5%	23	2.8	200	
MW-4	3/29/10	10:14	11:34	33-43	5%	11	2.5	200	
		12:24	12:47	33-43	5%	10	1.4	33	**500**
MW-2	3/29/2010	13:04	13:58	33-43	5%	0	3.7	200	
		14:45	15:36	33-43	5%	0	3	150	
MW-3	3/29/10	15:49	16:20	33-43	5%	0	1.7	50	
MW-2	3/30/10	9:10	9:34	33-43	5%	0	3.6	86	
		10:16	10:26	33-43	5%	0	3.2	31	**533**
MW-3	3/30/10	8:10	9:34	33-43	5%	0	1.3	114	
		10:16	10:26	33-43	5%	0	0.8	8	
		10:27	10:52	33-43	5%	0	0.8	20	
		10:52	11:53	33-43	5%	0	1.3	79	
		12:42	14:32	33-43	5%	0	1.1	121	
		15:04	15:41	33-43	5%	0	1.1	41	**500**
MW-7	3/30/2010	10:44	11:53	33-43	5%	20	0.9	62	
		12:42	14:32	33-43	5%	20	2.9	79	
		15:04	16:41	33-43	5%	20	1.5	59	
MW-7	3/31/2010	6:57	9:04	33-43	5%	20	1.2	200	
		9:35	10:40	33-43	5%	20	1.7	100	**500**

Appendix C
Correspondence

Technical Justification for Conducting First Post-Injection Sampling at AOC I Despite Low Residual Persulfate Concentrations

PREPARED FOR: Daniel Rodriguez/EPA
Wilmarie Rivera/PREQB
Richard Henry/FWS

PREPARED BY: CH2M HILL, on behalf of the Navy

DATE: September 20, 2010

The purpose of this memorandum is to provide technical justification for conducting the first post-oxidant-injection groundwater sampling event at AOC I, in accordance with the original schedule (i.e., October 2010, approximately 7 months following injection), despite the presence of low levels of residual persulfate in several of the wells.

During the scoping for the *In-Situ Remediation Pilot Studies (AOC E and AOC I Sites) Sampling and Analysis Plan, Former Naval Ammunition Support Detachment, Vieques, Puerto Rico* (CH2M HILL, 2010), the team concurred that prior to conducting post-injection sampling, field testing for persulfate would be conducted to ensure oxidant is not collected in the samples. The first post-injection sampling event at AOC I is scheduled for October 2010, in accordance with the current Site Management Plan (SMP) schedule. In anticipation of this, on August 24, 2010, CH2M HILL collected groundwater samples for field analysis of persulfate in monitoring wells at AOC I. The following results were obtained:

Date	Well	Persulfate (ppm)
8/24/10	MW01	0
8/24/10	MW02	>70
8/24/10	MW03	49
8/24/10	MW04	>70
8/24/10	MW05	0
8/24/10	MW06	0
8/24/10	MW07	>70

However, because the wells were not purged prior to collecting the samples, the wells showing positive persulfate results were re-sampled on August 27, 2010, following purging of approximately 1.5 to 2 well volumes. The following results were obtained:

Date	Well	Gallons Bailed	Well Volumes	Persulfate (ppm)
8/27/2010	MW02	6	1.5	14
8/27/2010	MW03	4.25	1.5	2.1
8/27/2010	MW04	5	1.5	1.4
8/27/2010	MW07	8.25	2	105

The above information was shared with FMC, Inc., the manufacturer of the sodium persulfate used as the oxidant at AOC I. As shown in the attached correspondence from FMC, concentrations of persulfate under 500 ppm are no longer reactive with contaminants. Thus, the persulfate remaining in groundwater, when below 500 ppm, will not alter the contaminant analytical results for groundwater samples. FMC stated that this finding is based on 10+ years of practice in the field, and that samples shipped to the laboratory should arrive with the same contaminant concentrations as when they left the field.

Furthermore, sodium persulfate was injected at a 20% by weight concentration in March 2010, and in August 2010 was detected at up to only 0.44 % by weight (105 ppm), evidence for considerable consumption or dilution in the subsurface.

Based on the above information, the Navy proposes that the groundwater sampling at AOC I in October 2010 proceed as planned. Following purging and prior to sampling, groundwater from each well will be field tested for persulfate to ensure the residual persulfate concentration is less than 500 ppm.

From: Julio Vazquez [Vazquez.Julio@epamail.epa.gov]
Sent: Tuesday, March 06, 2012 12:01 PM
To: Doerr, Brett/VBO
Cc: Angela Carpenter; Selcoe, Barrie/HOU; Hannah, Bill/VBO; Daniel Rodriguez; daniel.r.hood@navy.mil; dan.waddill@navy.mil; Ballam, Dennis/VBO; Diana Cutt; diane.wehner@noaa.gov; Felix_Lopez@fws.gov; fultoncom@fultoncom.com; jim@uxopro.com; Martin, John/GNV; Swenfurth, John/TPA; Tomik, John/VBO; kevin.cloe@navy.mil; KRutkowski@trcsolutions.com; madeline.rivera@navy.mil; Michael Sivak; Zamboni, Michael/WDC; Mindy Pensak; richard_henry@fws.gov; Sergio Lopez; Brand, Stephen/VBO; Struve, Susana/WDC; THall@TechLawInc.com; Garretson, Timothy/JAX; Wenk, Tim/VBO; Kappleman, William/WDC; wilmarierivera@jca.pr.gov
Subject: Re: Vieques - February 2012 Draft Tech Sub Meeting Minutes; May 2012 Draft Tech Sub Meeting Agenda; Consensus/Action Item Lists

Brett:

One of the items I was assigned to follow up for the subject meeting was the identification of the monitoring wells that should be sampled for the next two rounds for AOC I. After talking to Diana, she suggested we sample MW-04, MW-05 and MW-07, as they are the ones that had benzene concentrations initially exceeding criteria. Call me if you have any questions.

Julio F Vázquez, RPM
U.S. EPA - Region 2
Special Projects Branch/
Federal Facilities Section
New York

United States Environmental Protection Agency

Brand, Stephen/VBO

Subject: FW: First post-injection sampling event at west Vieques AOC I

From: Doerr, Brett/VBO
Sent: Thursday, September 30, 2010 9:16 AM
To: Swenfurth, John/TPA; Brand, Stephen/VBO; Hannah, Bill/VBO
Subject: FW: First post-injection sampling event at west Vieques AOC I

From: Cutt.Diana@epamail.epa.gov [mailto:Cutt.Diana@epamail.epa.gov]
Sent: Thursday, September 30, 2010 10:09 AM
To: Doerr, Brett/VBO; Rodriguez.Daniel@epamail.epa.gov
Cc: WilmarieRivera@jca.gobierno.pr; Richard_Henry@fws.gov; Sivak.Michael@epamail.epa.gov; Pensak.Mindy@epamail.epa.gov; Diane.Wehner@noaa.gov; kevin.cloe@navy.mil; daniel.r.hood@navy.mil; Tomik, John/VBO; madeline.rivera@navy.mil
Subject: RE: First post-injection sampling event at west Vieques AOC I

Just spoke to Scott Huling, EPA's in situ oxidation expert in Ada, OK. According to him, residual levels of persulfate even at the concentrations were are seeing at AOC I, can be a problem and continue to effect the contaminant concentrations in the sample. This has been the subject of much recent scrutiny and study by EPA. Although the assertation made by FMC is not necessarily a bad statement, it is leaving out such factors as: UV light, heat from the sun and a bigger issue - heating during analysis in the GS/MS headspace method. All of these factors can activate the persulfate in the sample container and effectively lower the contaimant concentrations (see Scott's note below).

Scott's suggestions are:

1. wait to sample until no persulfate remains, or
2. add a preservative to the sample. He has successfully used ascorbic acid (4:1 acid:sample ratio).

Scott is available by phone or email to discuss further if need be. Thanks.

-Diana

Diana Cutt, P.G., Geologist
EPA Region 2
ERRD/PSB/TST
290 Broadway
NY, NY 10007
212-637-4311

Diana, attached is an abstract from a journal article that was submitted to a journal for publication. I believe Phil Block is generally correct in his letter, but there are conditions in which the persulfate residual in a ground water sample can be activated and can negatively impact the quality of the ground water sample that is not addressed in the memo. Specifically, one condition involves the method of analysis. The headspace method, used to analyze VOCs in different EPA methods, involves a heating step that will activate the persulfate. Even low concentrations of persulfate, i.e., < 500 mg/L, this will significantly impact the quality of the sample. Scott

Scott G. Huling, Ph.D., P.E.
Environmental Engineer
U.S. Environmental Protection Agency
Robert S. Kerr Environmental Research Center
P.O. Box 1198 (or, 919 Kerr Lab Drive)
Ada, OK 74820
Phone: (580) 436-8610; Fax: (580) 436-8614
e-mail: Huling.Scott@epa.gov
website: http://www.epa.gov/ada/research.html

Environmental Industry Team
Chemical Products Group
1735 Market St.
Philadelphia, PA 19103

September 10, 2010

RE: Reactivity of Dilute Concentrations of Klozur® Persulfate

It is the experience of FMC over the past ten years that the minimum reactive concentration of sodium persulfate in groundwater is 0.5 g / L (500 ppm). Oxidative reaction rate is proportional to the concentration of the contaminant, the concentration of the oxidant and the concentration of the persulfate activator. At concentrations below this level, the effective reaction rate with contaminants of concern is essentially zero, and for all intents and purposes the oxidative reaction is complete. This is further impacted by the co-incident reduction in persulfate activator concentration.

Transportation of groundwater samples containing less than 500 ppm of persulfate should not occur further significant contaminant reduction in route to the laboratory, assuming the transportation time is not significant (less than a couple of days) and the sample is not exposed to a significant heat source. This can be further mitigated by shipment of the sample on ice.

Philip Block
Technology Manager – Remediation
FMC Corporation

CH2MHILL TELEPHONE CONVERSATION RECORD

Call To: Diana Cutt/EPA
Scott Huling/EPA
Susanne Borchert/CH2M HILL
Mike Zamboni/CH2M HILL
Brett Doerr/CH2M HILL

Phone No.:

Date: October 04, 2010

Call From:

Time:

Message Taken By: Brett Doerr

Subject: Ascorbic acid additive to post-injection samples collected at AOC I

Based on a comment received from EPA regarding the proposal to move forward with the first post-injection sampling at AOC I despite the presence of low levels of residual persulfate in several wells, a conference call was held on Monday October 4, 2010 among the following:

Diana Cutt/EPA – Hydrogeology technical support for Vieques environmental restoration program
Scott Huling/EPA – research lead regarding in-situ chemical oxidation
Susanne Borchert/CH2M HILL – In-situ remediation technology expert
Mike Zamboni/CH2M HILL – Chemist for Vieques environmental restoration program
Brett Doerr/CH2M HILL – Vieques environmental restoration program lead

Based on research done by EPA, samples containing residual persulfate have shown decreases in VOC concentrations in the laboratory when analyzing VOCs using the GC method with the purge and trap process. EPA has found that adding sufficient ascorbic acid to the samples prevents the loss of VOCs because the persulfate preferentially oxidizes the ascorbic acid instead of the VOCs.

Therefore, the group concurred that sampling at AOC I should proceed as planned, with the sampling protocol modified to include the addition of ascorbic acid to the sample containers as a field preservative. Ascorbic acid will be added to the sample containers at a ratio of 4 moles of ascorbic acid (or greater) per mole of persulfate. Scott stated that having more than a 4:1 ratio of ascorbic acid:persulfate (at least up to 40:1 ratio per his research) does not negatively affect the VOC results. Persulfate measurements after purging and prior to sampling will be conducted to ensure sufficient ascorbic acid is added to each sample container for VOCs analysis.

Based on the above, CH2M HILL will proceed with the sampling event during the week of October 25, 2010. If anyone has any concerns or comments on the approach, please let us know by COB Friday October 8, 2010.

Appendix D
Analytical Data Validation Reports

DataQual

Environmental Services, LLC

CH2M HILL
3011 S.W. Williston Road
Gainesville, FL 32608-3928

June 7, 2010
SDG# SJ0464, Mitkem Laboratories
Vieques Island, Puerto Rico CTO-83 AOC E & AOC I

Dear Mr. Acaron,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # SJ0464. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, January 2006- SOP #HW-24, 8270D-Rev 3 and October 2006-SOP #HW-22), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the inorganic method in this SDG (SW-846 methods 6010B) or the organic methods used to assess the fuels (SW-846 8015G for gasoline and 8015_TPH for diesel range organics). The Region II Standard Operating Procedure for the Evaluation of Metals Data for the CLP was used as applicable for the metals data. For the other fraction alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA	GRO	TPH	Fe, Mn
VWAE-MW03-0310	J0464-01	water	X	X	X	X	X
VWAE-EB01-031610	J0464-02	water	X	X	X	X	
VWAE-TB01-031610	J0464-03	water	X		X		
VWAE-MW05-0310	J0464-04	water	X	X	X	X	X
VWAE-MW04-0310	J0464-05	water	X	X	X	X	X
VWAE-MW4P-0310	J0464-06	water	X	X	X	X	
VWAE-EB01-031710	J0464-07	water	X	X	X	X	
VWAE-TB01-031710	J0464-08	water	X		X		
VWAE-MW01-0310	J0464-09	water	X	X	X	X	X
VWAI-MW02-0310	J0464-10	water	X	X			X
VWAI-MW05-0310	J0464-11	water	X	X			X
VWAI-EB01-031810	J0464-12	water	X	X			
VWAI-TB01-031810	J0464-13	water	X				
VWAI-MW03-0310	J0464-14	water	X	X			X
VWAI-MW03P-0310	J0464-15	water	X	X			
VWAI-MW4-0310	J0464-16	water	X	X			X
VWAI-EB01-031910	J0464-17	water	X	X			
VWAI-TB01-031910	J0464-18	water	X				
VWAI-EB01-032210	J0464-20	water	X	X			
VXAI-TB01-032210	J0464-21	water	X				
VWAI-MW07-0310	J0464-22	water	X	X			X
VWAE-MW03-0310MS	J0464-01MS	water	X	X	X	X	X
VWAE-MW03-0310MSD	J0464-01MSD	water	X	X	X	X	X
VWAI-MW02-0310MS	J0464-10MS	water		X			
VWAI-MW02-0310MSD	J0464-10MSD	water		X			

5830 Amberway Drive • St. Louis, MO 63128 • 314-330-1327 • Fax 314-849-6264

The following quality control samples were provided with this SDG: samples VWAE-TB01-031610, VWAE-TB01-031710, VWAI-TB01-031810, VWAI-TB01-031910 and VXAI-TB01-032210-trip blanks; samples VWAE-EB01-031610, VWAE-EB01-031710, VWAI-EB01-031810, VWAI-EB01-031910 and VWAI-EB01-032210-equipment blanks; sample VWAE-MW4P-0310-field duplicate of sample VWAE-MW4-0310; and sample VWAI-MW03P-0310-field duplicate of sample VWAI-MW03-0310.

The samples were evaluated based on the following criteria:

• Data Completeness	*
• Sample Condition	*
• Technical Holding Times	*
• GC/MS Tuning	*
• GC Performance	*
• Initial/Continuing Calibrations	*
• ICSA/ICSAB Standards	*
• CRI Standards	
• Blanks	
• Internal Standards	*
• Surrogate Recoveries	*
• Laboratory Control Samples	*
• Matrix Spike Recoveries	*
• Matrix Duplicate RPDs	*
• Serial Dilutions	*
• Field Duplicates	*
• Identification/Quantitation	
• Reporting Limits	*
• Tentatively Identified Compounds	NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

One sample required a dilution to obtain results within the calibration range.

SVOA

No qualifications to the data were required.

GRO

One of the associated rinse blanks exhibited contamination for GRO. One field sample required qualification.

TPH

No qualifications to the data were required.

Select Metals

The laboratory did not analyze a CRI standard for the analyte manganese as required. The analyte was flagged as estimated for reported concentrations <2X RL.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required. Clarification of gasoline calculation was requested from the laboratory. A copy of the e-mail correspondence is included in the validation worksheets section of this report.

Technical Holding Times

According to chain of custody records, sampling was performed on 3/16-22/10 and samples were received at the laboratory 3/17-23/10. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

CRI Standards

Select Metals

The laboratory did not analyze a CRI standard for the analyte manganese. All positive results were above the action level of 2X the reporting limit. The reported non-detect result for manganese in sample VWAE-W03-0310 was qualified as estimated UJ with a qualifier code of OT.

Blanks

GRO

One of the rinse blanks associated with samples in this SDG exhibited contamination for gasoline range organics. Specific information on the contamination is noted in the following table.

Blank ID	Compound	Concentration	Action Level	Q Flag
VWAE-EB01-031610	GRO	110 ug/L	blank level	U

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag	Q Code
VWAE-MW03-0310	GRO	U	EBL

Identification/Quantitation

VOA

A dilution was required for sample VWAE-MW05-0310 to obtain results within the calibration range. Therefore, E-flagged compound results were not used in the initial analysis of this sample in favor of the corresponding D-flagged compound result in the dilution, qualifier code: DL.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Jacqueline Cleveland

Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VWAE-MW05-0310	all E-flagged results	+	R	DL
VWAE-MW05-0310DL	all compound except D-flagged results	+/-	R	DL

SVOA

Sample ID	Compound	Results	Q flag	Q Code
No qualifications				

GRO

Sample ID	Compound	Results	Q flag	Q Code
VWAE-MW03-0310	GRO	+	U	EBL

DRO

Sample ID	Compound	Results	Q flag	Q Code
No qualifications				

Select Metals

Sample ID	Analyte	Results	Q flag	Q Code
VWAE-MW03-0310	manganese	-	UJ	OT

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW03-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-01A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4989.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/17/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U

06/2/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-EB01-031610

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-02A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4990.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/17/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U

WM 06/2/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-TB01-031610

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-03A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4987.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/17/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U

LW 060210

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW05-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-04A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4991.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/18/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	340	E
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	4.5	J
1330-20-7	Xylene (Total)	5.0	U

R, DL

06/02/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW05-0310DL

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-04ADL

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L5281.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/18/2010

% Moisture: not dec. Date Analyzed: 04/01/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 5.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	520	D
107-06-2	1,2-Dichloroethane	25	U
71-43-2	Benzene	25	U
1330-20-7	Xylene (Total)	25	U

R, DL

WS 060210

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW04-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-05A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L5199.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/18/2010

% Moisture: not dec. Date Analyzed: 03/30/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	130	
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U

06/2/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW4P-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-06A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4993.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/18/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	96	
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U

06/22/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-EB01-031710

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-07A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4994.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/18/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U

WW 04/21/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-TB01-031710

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-08A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4995.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/18/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U

VW 06/2/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW01-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-09A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4996.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/18/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	120	
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	6.4	
1330-20-7	Xylene (Total)	5.0	U

06/21/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW02-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-10A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4997.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/19/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U

DL 03/22/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW05-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-11A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4998.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/19/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U

06/22/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-031810

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-12A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4999.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/19/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-TB01-031810

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-13A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L4988.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/19/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U

06/22/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

WVWAI-MW03-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-14A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L5000.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/20/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U

WV1 06020

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW03P-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-15A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L5001.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/20/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U

06/22/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW4-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-16A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L5002.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/20/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U

WW DLOLD

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-031910

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-17A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V1L2328.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/20/2010

% Moisture: not dec. Date Analyzed: 04/02/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U

D6020

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-TB01-031910

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-18A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L5003.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/20/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U

06/22/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-032210

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-20A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V1L2329.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/20/2010

% Moisture: not dec. Date Analyzed: 04/02/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U

DL 04/2/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VXAI-TB01-032210

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-21A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L5291.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/20/2010

% Moisture: not dec. Date Analyzed: 04/01/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U

4/02/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW07-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-22A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V1L2330.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/23/2010

% Moisture: not dec. Date Analyzed: 04/02/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
107-06-2	1,2-Dichloroethane	5.0	U
71-43-2	Benzene	14	
78-87-5	1,2-Dichloropropane	5.0	U

06020

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW03-0310MS

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-01AMS

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L5004.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/17/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	54	
107-06-2	1,2-Dichloroethane	53	
71-43-2	Benzene	58	
1330-20-7	Xylene (Total)	170	

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW03-0310MSD

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-01AMSD

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2L5005.D

Level: (TRACE/LOW/MED) LOW Date Received: 03/17/2010

% Moisture: not dec. Date Analyzed: 03/22/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
1634-04-4	Methyl tert-butyl ether	49	
107-06-2	1,2-Dichloroethane	47	
71-43-2	Benzene	51	
1330-20-7	Xylene (Total)	150	

WM 04/22/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW03-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-01E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3654.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/17/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/23/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/26/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U

VM 06/02/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-EB01-031610

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-02B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3657.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/17/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/23/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/26/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U

VM 060210

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW05-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-04E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3661.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/18/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/24/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/26/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	13	
91-57-6	2-Methylnaphthalene	5.8	

WM 060210

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW04-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-05E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3662.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/18/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/24/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/26/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U

06/2/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW4P-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-06B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3663.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/18/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/24/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/26/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U

VM D60510

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-EB01-031710

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-07B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3664.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/18/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/24/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/26/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U

D60210

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW01-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-09E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3665.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/18/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/24/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/26/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	6.6	
91-57-6	2-Methylnaphthalene	8.0	

06/2/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW02-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-10E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3668.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/19/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/25/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/26/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U

D6010

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW05-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-11E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3671.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/19/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/25/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/27/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	3.0	
117-81-7	Bis(2-ethylhexyl)phthalate	1.4	J

06/02/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-031810

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-12B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3672.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/19/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/25/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/27/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U

D6/2/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

WVWAI-MW03-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-14E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3737.D

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 03/20/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/26/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/30/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U

06/02/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW03P-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-15B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3738.D

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 03/20/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/26/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/30/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U

WM 04/02/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW4-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-16E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3739.D

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 03/20/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/26/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/30/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U

WM 06/2/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-031910

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-17B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3740.D

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 03/20/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/26/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/30/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U

D4/2/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-032210

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-20B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3741.D

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 03/23/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/26/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/30/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	1.0	U
91-57-6	2-Methylnaphthalene	1.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	1.2	J

06/02/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW07-0310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-22E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3742.D

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 03/23/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/26/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/30/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	21	
91-57-6	2-Methylnaphthalene	17	
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U

06/22/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW03-0310MS

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-01EMS

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3655.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/17/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/23/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/26/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	41	
91-57-6	2-Methylnaphthalene	39	

MW 06210

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAE-MW03-0310MSD

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-01EMSD

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3656.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/17/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/23/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/26/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	31	
91-57-6	2-Methylnaphthalene	30	

04/02/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW02-0310MS

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J0464 Mod. Ref No.: SDG No.: SJ0464

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J0464-10EMS

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3G3669.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 03/19/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 03/25/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 03/26/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) µG/L	Q
91-20-3	Naphthalene	42	
91-57-6	2-Methylnaphthalene	41	
117-81-7	Bis(2-ethylhexyl)phthalate	44	

Mitkem Laboratories

Date: *01-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-MW03-0310
Lab ID: J0464-01

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/16/10 9:40

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015 -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	55	U EBL	50	ug/L	1	03/24/2010 11:42	50058
Surrogate: Bromofluorobenzene	98.1		87-112	%REC	1	03/24/2010 11:42	50058

JAC 6/4/10

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *01-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-EB01-031610
Lab ID: J0464-02

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/16/10 12:15

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015 -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	110		50	ug/L	1	03/24/2010 13:29	50058
Surrogate: Bromofluorobenzene	91.3		87-112	%REC	1	03/24/2010 13:29	50058

JVC 6/4/10

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *01-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-TB01-031610
Lab ID: J0464-03

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/16/10 12:20

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015 -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		50	ug/L	1	03/24/2010 14:38	50058
Surrogate: Bromofluorobenzene	91.6		87-112	%REC	1	03/24/2010 14:38	50058

JMC 6410

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *01-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-MW05-0310
Lab ID: J0464-04

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/17/10 6:50

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015 -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	250		50	ug/L	1	03/24/2010 15:14	50058
Surrogate: Bromofluorobenzene	96.0		87-112	%REC	1	03/24/2010 15:14	50058

JMC 4/10

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *01-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-MW04-0310
Lab ID: J0464-05

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/17/10 9:10

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015 -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	65		50	ug/L	1	03/24/2010 15:48	50058
Surrogate: Bromofluorobenzene	93.4		87-112	%REC	1	03/24/2010 15:48	50058

JLC 6410

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *01-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-MW4P-0310
Lab ID: J0464-06

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/17/10 9:15

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015 -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	60		50	ug/L	1	03/24/2010 16:23	50058
Surrogate: Bromofluorobenzene	97.0		87-112	%REC	1	03/24/2010 16:23	50058

JLC 6/4/10

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *01-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-EB01-031710
Lab ID: J0464-07

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/17/10 9:35

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015 -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		50	ug/L	1	03/24/2010 16:59	50058
Surrogate: Bromofluorobenzene	87.9		87-112	%REC	1	03/24/2010 16:59	50058

JAC 6/4/10

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *01-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-TB01-031710
Lab ID: J0464-08

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/17/10 9:40

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015 -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		50	ug/L	1	03/24/2010 17:34	50058
Surrogate: Bromofluorobenzene	93.7		87-112	%REC	1	03/24/2010 17:34	50058

JMC 6410

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *01-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-MW01-0310
Lab ID: J0464-09

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/17/10 12:15

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015 -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	150		50	ug/L	1	03/24/2010 18:08	50058
Surrogate: Bromofluorobenzene	87.6		87-112	%REC	1	03/24/2010 18:08	50058

JRC 6/4/10

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *13-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-MW03-0310
Lab ID: J0464-01

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/16/10 9:40

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015B -- Total Petroleum Hydrocarbons (TPH) by GC-FID							**TPH_W**
Extractable Total Petroleum Hydrocarbon	ND		0.35	mg/L	1	03/23/2010 18:27	49996
Oil Range Organics	ND		0.35	mg/L	1	03/23/2010 18:27	49996
Surrogate: ortho-Terphenyl	76.7		50-150	%REC	1	03/23/2010 18:27	49996
Surrogate: 5a-Androstane	44.0		30-110	%REC	1	03/23/2010 18:27	49996

JAC 6410

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *13-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-EB01-031610
Lab ID: J0464-02

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/16/10 12:15

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015B -- Total Petroleum Hydrocarbons (TPH) by GC-FID							TPH_W
Extractable Total Petroleum Hydrocarbon	ND		0.35	mg/L	1	03/23/2010 22:21	49996
Oil Range Organics	ND		0.35	mg/L	1	03/23/2010 22:21	49996
Surrogate: ortho-Terphenyl	78.7		50-150	%REC	1	03/23/2010 22:21	49996
Surrogate: 5a-Androstane	54.4		30-110	%REC	1	03/23/2010 22:21	49996

JAC 6410

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *13-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-MW05-0310
Lab ID: J0464-04

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/17/10 6:50

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015B -- Total Petroleum Hydrocarbons (TPH) by GC-FID							**TPH_W**
Extractable Total Petroleum Hydrocarbon	1.3		0.35	mg/L	1	03/23/2010 23:00	49996
Oil Range Organics	ND		0.35	mg/L	1	03/23/2010 23:00	49996
Surrogate: ortho-Terphenyl	64.3		50-150	%REC	1	03/23/2010 23:00	49996
Surrogate: 5a-Androstane	33.1		30-110	%REC	1	03/23/2010 23:00	49996

JMC 6410

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *13-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-MW04-0310
Lab ID: J0464-05

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/17/10 9:10

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015B -- Total Petroleum Hydrocarbons (TPH) by GC-FID							TPH_W
Extractable Total Petroleum Hydrocarbon	1.6		0.35	mg/L	1	03/23/2010 23:39	49996
Oil Range Organics	0.54		0.35	mg/L	1	03/23/2010 23:39	49996
Surrogate: ortho-Terphenyl	72.0		50-150	%REC	1	03/23/2010 23:39	49996
Surrogate: 5a-Androstane	40.7		30-110	%REC	1	03/23/2010 23:39	49996

4/6/10

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *13-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-MW4P-0310
Lab ID: J0464-06

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/17/10 9:15

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015B -- Total Petroleum Hydrocarbons (TPH) by GC-FID							TPH_W
Extractable Total Petroleum Hydrocarbon	1.5		0.35	mg/L	1	03/24/2010 0:19	49996
Oil Range Organics	0.63		0.35	mg/L	1	03/24/2010 0:19	49996
Surrogate: ortho-Terphenyl	70.3		50-150	%REC	1	03/24/2010 0:19	49996
Surrogate: 5a-Androstane	32.4		30-110	%REC	1	03/24/2010 0:19	49996

JMC 6410

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *13-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-EB01-031710
Lab ID: J0464-07

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/17/10 9:35

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015B -- Total Petroleum Hydrocarbons (TPH) by GC-FID							**TPH_W**
Extractable Total Petroleum Hydrocarbon	ND		0.35	mg/L	1	03/24/2010 0:58	49996
Oil Range Organics	ND		0.35	mg/L	1	03/24/2010 0:58	49996
Surrogate: ortho-Terphenyl	78.1		50-150	%REC	1	03/24/2010 0:58	49996
Surrogate: 5a-Androstane	61.9		30-110	%REC	1	03/24/2010 0:58	49996

JAC 6/4/10

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Mitkem Laboratories

Date: *13-Apr-10*

Client: CH2M Hill, Inc.
Client Sample ID: VWAE-MW01-0310
Lab ID: J0464-09

Project: CTO-0083 Vieques AOC E and I
Collection Date: 03/17/10 12:15

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015B -- Total Petroleum Hydrocarbons (TPH) by GC-FID							**TPH_W**
Extractable Total Petroleum Hydrocarbon	3.5		0.35	mg/L	1	03/24/2010 1:37	49996
Oil Range Organics	0.87		0.35	mg/L	1	03/24/2010 1:37	49996
Surrogate: ortho-Terphenyl	79.3		50-150	%REC	1	03/24/2010 1:37	49996
Surrogate: 5a-Androstane	55.3		30-110	%REC	1	03/24/2010 1:37	49996

JAC 6/4/10

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAE-MW01-0310

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: NRAS No.: SDG No.: SJ0464

Matrix (soil/water): WATER Lab Sample ID: J0464-09

Level (low/med): MED Date Received: 03/18/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	5860			P
7439-96-5	Manganese	2130			P

JAC 6310

Comments:

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAE-MW03-0310

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: NRAS No.: SDG No.: SJ0464

Matrix (soil/water): WATER Lab Sample ID: J0464-01

Level (low/med): MED Date Received: 03/17/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	200	U		P
7439-96-5	Manganese	50.0	~~U~~	UJ	P

OT

JC 0310

Comments:

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAE-MW04-0310

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: NRAS No.: SDG No.: SJ0464

Matrix (soil/water): WATER Lab Sample ID: J0464-05

Level (low/med): MED Date Received: 03/18/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	4730			P
7439-96-5	Manganese	4350			P

JMC 6310

Comments:

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAE-MW05-0310

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: NRAS No.: SDG No.: SJ0464

Matrix (soil/water): WATER Lab Sample ID: J0464-04

Level (low/med): MED Date Received: 03/18/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	4100			P
7439-96-5	Manganese	2040			P

JAC 6310

Comments:

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW02-0310

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: NRAS No.: SDG No.: SJ0464

Matrix (soil/water): WATER Lab Sample ID: J0464-10

Level (low/med): MED Date Received: 03/19/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	200	U		P
7439-96-5	Manganese	1500			P

JAC 03/10

Comments:

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-0310

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: NRAS No.: SDG No.: SJ0464

Matrix (soil/water): WATER Lab Sample ID: J0464-11

Level (low/med): MED Date Received: 03/19/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	318			P
7439-96-5	Manganese	1300			P

JAC 6310

Comments:

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07-0310

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: NRAS No.: SDG No.: SJ0464

Matrix (soil/water): WATER Lab Sample ID: J0464-22

Level (low/med): MED Date Received: 03/23/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	1510			P
7439-96-5	Manganese	1700			P

JAC 6310

Comments:

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW4-0310

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: NRAS No.: SDG No.: SJ0464

Matrix (soil/water): WATER Lab Sample ID: J0464-16

Level (low/med): MED Date Received: 03/20/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	65.5	J		P
7439-96-5	Manganese	2130			P

JMC 6310

Comments:

USEPA - CLP

1A-IN

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

WVWAI-MW03-0310

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: NRAS No.: SDG No.: SJ0464

Matrix (soil/water): WATER Lab Sample ID: J0464-14

Level (low/med): MED Date Received: 03/20/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-89-6	Iron	578			P
7439-96-5	Manganese	1850			P

JC 6310

Comments:

SDG Narrative

Mitkem Laboratories, a Division of Spectrum Analytical, Inc. submits the enclosed data package in response to CH2M Hill's 1000-CTO-0083, Vieques project. Under this deliverable, analysis results are presented for twenty-two samples that were received at Mitkem from March 17 to March 23, 2010 and logged in under Mitkem Work Order Number J0464. The sample was analyzed per instructions in the chain of custody forms and instruction from client.

The analyses were performed according to EPA SW-846 methods, with this hardcopy report produced in a CLP-type format for Level 4 deliverable with the exception of gasoline range organics and total petroleum hydrocarbons. The analysis results for gasoline range organics and total petroleum hydrocarbons are presented in the standard Mitkem format with supporting raw data.

The following observation and/or deviations are observed for the following analyses:

1. Total Volatile Analysis:

Soil samples were analyzed by Method 8260C for a select list of volatile organic compounds.

Surrogate recovery: recoveries were within the QC limits.

Lab control sample/lab control sample duplicate: spike recoveries were within the QC limits.

Matrix spike/matrix spike duplicate: duplicate matrix spikes were performed on sample VWAE-MW03-0310. Spike recovery and replicate RPD were within the QC limits

Sample analysis: due to the high concentration of target analytes, sample VWAE-MW05-0310 was re-analyzed at 5x dilution. No other unusual observation was made for the analysis.

2. GRO Analysis:

Samples were analyzed for Gasoline Range Organics (GRO) by the purgable organics option of SW846 Method 8015. GRO includes all resolved and unresolved compounds eluting between the retention times of MTBE and naphthalene inclusive. The instrument is calibrated using an average response factor obtained from injections of a mixture of individual analytes. The lab control sample is spiked with gasoline product.

Surrogate recovery: spike recovery was within the QC limits.

Lab control sample/lab control sample duplicate: spike recovery was within the QC limits.

Matrix spike/matrix spike duplicate: duplicate matrix spikes were performed on sample VWAE-MW03-0310. Spike recovery and replicate RPD were within the QC limits

Sample analysis: no unusual observation was made for the analysis.

3. Semivolatile Analysis:

The samples analyzed for naphthalene and 2-methylnaphthalene by Method 8270D.

Surrogate recovery: recoveries were within the QC limits.

Lab control sample/lab control sample duplicate: spike recoveries were within the QC limits.

Matrix spike/matrix spike duplicate: duplicate matrix spikes were performed on samples VWAE-MW03-0310 and VWAI-MW02-0310. Spike recoveries and replicate RPDs were within the QC limits for both samples.

Sample analysis: no unusual observation was made for the analysis.

4. TPH Analysis:

The samples were analyzed for extractable Total Petroleum Hydrocarbons (TPH) by the extractable organics option of SW846 Method 8015. TPH includes all resolved and unresolved compounds eluting between the retention times of C9 and C36 inclusive. The instrument is calibrated using an average response factor obtained from injections of a mixture of individual n-alkanes. The lab control sample is spiked with diesel fuel product.

Surrogate recovery: spike recoveries were within the QC limits.

Lab control sample: spike recovery was within the QC limits.

Matrix spike/matrix spike duplicate: duplicate matrix spikes were performed on sample VWAE-MW03-0310. Spike recovery and replicate RPD were within the QC limits

Sample analysis: no unusual observation was made for the analysis.

5. Metals Analysis:

Samples were analyzed for iron and manganese by SW-846 method 6010C.

Lab control sample: spike recoveries were within the QC limits.

Matrix spike: matrix spike was performed on sample VWAE-MW03-0310. Spike recoveries were within the QC limits.

Duplicate: duplicate analysis was performed on sample VWAE-MW03-0310. Replicate RPDs were within the QC limits.

Sample analysis: serial dilution was performed on sample VWAE-MW03-0310. Percent differences were within the QC limits. No unusual observations were made during sample analysis.

6. Wet Chemistry Analyses:

Samples were analyzed for the anions nitrate, and sulfate by EPA Method 300.0 and total organic carbon by SM5310B.

Laboratory control sample: percent recoveries were within the QC limits.

Matrix spike/matrix spike duplicate: duplicate matrix spikes were performed on samples VWAE-MW03-0310, VWAE-MW03-0310, VWAI-MW02-0310 and VWAI-MW07-0310 for anions. Percent recoveries and percent RPDs were within the QC limits.

Matrix spike/matrix duplicate: matrix spike and matrix duplicate analyses were performed on sample VWAE-MW03-0310 total organic carbon. Spike recovery and percent RPD were within the QC limits.

Sample analysis: the diluted analysis for nitrate in sample VWAE-MW03-0310 was performed outside of the 48-hour hold time. The initial analysis was performed within hold time. Both the initial and diluted analysis have been reported for VWAE-MW03-0310. Nitrate and sulfate were detected in method blanks MB-49893, -49929, -49960, -49979 and -50060 below the reporting limit but above the method detection limit. Samples associated with these blanks also contained nitrate and/or sulfate, either at concentrations below the reporting limit, or more than 10X the method blank concentration, indicating no significant impact of laboratory background levels on sample results. Sample results associated with these blanks are qualified with the "B". No other unusual occurrences were noted during sample analysis.

7. CENSUS and PLFA Analyses:

CENSUS and PLFA analyses were performed by MicorbialInsights of Rockford, TN. The entire MicorbialInsights report, including any notes on these analyses is enclosed.

All pages in this report have been numbered consecutively, starting with the title page and ending with a page saying only "Last Page of Data Report". The Columbia data report is paginated separately, following the "Last" page.

I certify that this data package is in compliance, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.

Agnes Huntley
CLP Project Manager
04/14/10

SPECTRUM ANALYTICAL, INC.
Featuring
HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling: 28-Calendar day
☑ Standard TAT - ~~7 to 10 business days~~
☐ Rush TAT - Date Needed: _____
· All TATs subject to laboratory approval.
· Min. 24-hour notification needed for rushes.
· Samples disposed of after 60 days unless otherwise instructed.

Report To: Juan Acaron / GNV
3011 S.W. Williston Road
Gainesville, FL 32608

Telephone #: (352) 335-7991
Project Mgr. Stephin Brand / VBO

Invoice To: Denver, CO (Cham Hill)
(See Contract)

P.O. No.: _____ RQN: _____

Project No.: 1000-CTO-0083 Vieques
Site Name: Vieques AOC E
Location: West Vieques State: PR
Sampler(s): Dia Whitaker / Michael Zamboni

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= H_3PO_4 10= _____ 11= _____

List preservative code below: 2 X 4 2 X X 9

QA/QC Reporting Notes:
(check as needed)

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= AQ X2= _____ X3= _____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: List E 8270C	List E Fe+Mn 6010A	TPH-GRO 8015	TPH-DRO ORO 8015	SO_4, NO_3 300.0	TOC 5310 Quad
01	VWAE-MW03-0310	3/16/10	0940	G	GW	18	12		6	X	X	X	X	X	X
	VWAE-MW03-0310MS		↓	↓	↓	↓	↓		↓	X	X	X	X	X	X
	VWAE-MW03-0310SD		↓	↓	↓	↓	↓		↓	X	X	X	X	X	X
02	VWAE-EB01-031610		1215	G	AQ	4	4			X	X	X	X		
03	VWAE-TB01-031610		1220	G	AQ	4				X		X			

Run QA/QC
MS
MSD

Temperature Blank (1/cooler). Special Standards on SVOCs. Compound lists are reduced and QCs are set by VFP-SAP.

mja

Relinquished by:	Received by:	Date:	Time:	Temp°C
Michael Zamboni 3/16/10	12:30	3/17/10	9:00	3.3

☑ EDD Format SNEDD
☑ E-mail to JAcaron@Cham-com

☐ Ambient ☒ Iced ☐ Refrigerated ☐ Fridge temp ___ °C ☐ Freezer temp ___ °C

☐ Provide MA DEP MCP CAM Report
☐ Provide CT DPH RCP Report
QA/QC Reporting Level
☐ Standard ☐ No QC
☑ Other Level IV

State specific reporting standards: _____

SPECTRUM ANALYTICAL, INC.
Featuring
HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling: 28 Calendar
- ☐ ~~Standard TAT - 7 to 10 business days~~
- ☐ Rush TAT - Date Needed: _____
- All TATs subject to laboratory approval.
- Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: Juan Acaron/GNV
3011 SW Williston Road
Gainesville, FL 32608

Telephone #: (352) 335-7991
Project Mgr. Stephen Brand/VBO

Invoice To: Denver, CO (Tetra Tech)
(STL Contract)

P.O. No.: _____ RQN: _____

Project No.: 1000-CTO-0083 Vieques
Site Name: Vieques AOC E
Location: West Vieques State: PR
Sampler(s): Dia Whitaker/Michael Zamboni

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8=$NaHSO_4$ 9=H_3PO_4 10=_____ 11=_____

List preservative code below: 2 X 4 2 X X 9

QA/QC Reporting Notes: (check as needed)

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW=Surface Water SO=Soil SL=Sludge A=Air
X1=AQ X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: List E 8260B	List E 8270C	Field-filtered Fe+Mn 6010B	TPH-GRO 8015	TPH DRO ORO 8015	SO_4 NO_3 300.0	TOC 5310 Quad
04 04	VWAE-MW05-0310	3/17/10	0650	G	GW	6	4		2	X	X	X	X	X	X	X
05 03	VWAE-MW04-0310		0910			6	4		2	X	X	X	X	X	X	X
06 04	VWAE-MW04P-0310		0915			4	4			X	X		X	X		
07 05	VWAE-EB01-031710		0935		AQ	4	4			X	X		X	X		
08 06	VWAE-TB01-031710		0940			4				X			X			
MSD 3/18/10 08 07	VWAE-MW01-0310		1215		GW	6	4		2	X	X	X	X	X	X	X

Temperature Blank (1/cooler). Special standards for SVOCs. (compound list reduced and QLs are set by VFP-SAP.

- ☐ Provide MA DEP MCP CAM Report
- ☐ Provide CT DPH RCP Report

QA/QC Reporting Level
☐ Standard ☐ No QC
☑ Other Level III

State specific reporting standards: _____

Relinquished by:	Received by:	Date:	Time:	Temp°C
Michael Zamboni 3/17/10 13:00	[signature]	3/18/10	9:15	5.3 2

☑ EDD Format SNEDD
☑ E-mail to JAcaron@tetratech-com

☐ Ambient ☒ Iced ☐ Refrigerated ☐ Fridge temp ___ °C ☐ Freezer temp ___ °C

SPECTRUM ANALYTICAL, INC.
Featuring
HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling: 28 Calendar days
- ☑ Standard TAT - ~~7 to 10 business days~~
- ☐ Rush TAT - Date Needed: _____
- All TATs subject to laboratory approval.
- Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: Jun Acaron/GNV
3011 SW Williston Road
Gainesville, FL 32608

Telephone #: (352)335-7991
Project Mgr. Stephen Brand/VDO

Invoice To: Denver, Co (CH2MHill
(See Contract)

P.O. No.: _____ RQN: _____

Project No.: 1000-CTO-0083 Vieques
Site Name: Vieques AOC I
Location: West Vieques State: PR
Sampler(s): Dia Whitaker/Michael Zamboni

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= H3PO4 10= _____ 11= _____

List preservative code below:

2	X	4	X	9			

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= AQ X2= _____ X3= _____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: Ltr I 8260B	Ltr I 8270C	Field Filtered Fe+Mn	NO_3 300.0, SO_4	TOC 5310 Quad
10	VIAI-MW02-0310	3/18/10	0940	G	GW	2	2		2	X	X	X	X	X
	VIAI-MW02-0310MS					2	2			X	X			
	VIAI-MW02-0310SD					2	2			X	X			
11	VIAI-MW05-0310		1220			2	2		2	X	X	X	X	X
12	VIAI-EB01-031810		1300		AQ	2	2			X	X			
13	VIAI-TB01-031810		1305			2				X				

Temperature Blank (1/cooler) - Special Standards for SVOCs. Compound lists are revised and QLs are set by VFP-SAP

Relinquished by:	Received by:	Date:	Time:	Temp°C
3/18/10 13:00		3/19/10	8:52	4.3°C

QA/QC Reporting Notes:
(check as needed)

- ☐ Provide MA DEP MCP CAM Report
- ☐ Provide CT DPH RCP Report

QA/QC Reporting Level
☐ Standard ☐ ~~No QC~~
☑ Other Level IV

State specific reporting standards: _____

4 VOA vials, Run QA/QC
MS
MSD

- ☑ EDD Format SNEDD
- ☑ E-mail to JAaron@CH2M-com

☐ Ambient ☒ Iced ☐ Refrigerated ☐ Fridge temp ___°C ☐ Freezer temp ___°C

SPECTRUM ANALYTICAL, INC.
Featuring
HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling: 28 cal day

☑ Standard TAT - ~~7 to 10 business days~~
☐ Rush TAT - Date Needed: ____
- All TATs subject to laboratory approval.
- Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: Juan Acaron / GNV
3011 SW Williston Road
Gainesville, FL 32608

Telephone #: (352) 335-7991
Project Mgr. Stephen Brand / VAO

Invoice To: Denver, CO ((H2M Hill))
(See Contract)

P.O. No.: ____ RQN: ____

Project No.: 1000-CTU-0083 Vieques
Site Name: Vieques AOC I
Location: West Vieques State: PR
Sampler(s): Dia Whitaker / Michael Zamboni

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= H_3PO_4 10= ____ 11= ____

List preservative code below: 2 X 4 X 9

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= AQ X2= ____ X3= ____

G=Grab C=Composite

J0464

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	List I 8260B	List II 8270C	Diss-Filtered 6010C	SO4 NO3 300.0	TOC 5310
14	VVAI-MW03-0310	3/19/10	0910	G	GV	4	2		2	X	X	X	X	X
15	VVAI-MW03P-0310	↓	0915	G	GV	2	2			X	X			
16	VVAI-MW04-0310	↓	1125	G	GV	4	2		2	X	X	X	X	X
17	VVAI-EB01-031910	↓	1210	G	AQ	2	2			X	X			
18	VVAI-TB01-031910	↓	1215	G	AQ	2				X				

Temperature Blank (1/cooler). Special standards for SVOCs. Compound lists are reduced and QLs are set by VFP-SAP

QA/QC Reporting Notes: (check as needed)

☐ Provide MA DEP MCP CAM Report
☐ Provide CT DPH RCP Report

QA/QC Reporting Level
☐ Standard ☐ ~~No QC~~
☑ Other Level IV

State specific reporting standards: ____

Relinquished by:	Received by:	Date:	Time:	Temp°C
[signature] 13:00 3/19/10	Fedex			
Fedex	[signature]	3/20/10	09:00	2°/3°

☑ EDD Format SWEDD
☑ E-mail to JAcaron@CH2M.com

☐ Ambient ☑ Iced ☐ Refrigerated ☐ Fridge temp ___°C ☐ Freezer temp ___°C

084 00015

SPECTRUM ANALYTICAL, INC.
Featuring
HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling: 28 calendar da
- ☑ Standard TAT - ~~7 to 10 business days~~
- ☐ Rush TAT - Date Needed: _____
- All TATs subject to laboratory approval.
- Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: JUAN ACARON
3011 SW WILLISON ROAD
GAINESVILLE, FL 32608
Telephone #: (352) 335-7991
Project Mgr. Stephen Brand

Invoice To: Denver, Colorado (CH2M HILL) (See contract)
P.O. No.: _____ RQN: _____

Project No.: 1000-CTO-0083
Site Name: VIEQUES AOCI
Location: West Vieques (AOCI) State: P.R.
Sampler(s): D. Whitaker / M. Zamboni

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= H_3PO_4 10= _____ 11= _____

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= AQ X2= _____ X3= _____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	List preservative code below: 2 X 4 X 9 — Analyses: List I 8260B	List I 8270C	Field Filt. Fe+Mn 6010B	SO_4, NO_3 3000	TOC 5310 Quad	QA/QC Reporting Notes: (check as needed)
22 ~~19~~ After 3 bottle	VWAI-MW07-0310	03/22/10	0950	G	GW	4	2		2	X	X	X	X	X	
20	VWAI-EB01-032210	↓	1050	G	AQ	2	2			X	X				
21	VWAI-FB01-032210	↓	1055	G	AQ	2				X					"TB01"

M/S

Relinquished by:	Received by:	Date:	Time:	Temp°C
~~03/22/10 1200~~ FEDEX	Fedex	03/22/10	1200	
		3/23/10	11:52	4

☑ EDD Format SNEDD
☐ E-mail to juan.acaron@ch2m.com

☐ Ambient ☑ Iced ☐ Refrigerated ☐ Fridge temp ___°C ☐ Freezer temp ___°C

QA/QC Reporting Notes:
- ☐ Provide MA DEP MCP CAM Report
- ☐ Provide CT DPH RCP Report

QA/QC Reporting Level
☐ Standard ☐ No QC
☑ Other Level IV

State specific reporting standards: _____

0915 0850

Sample Condition Form

Page 1 of 1

Received By: AED | Reviewed By: SW | Date: 3/17/10 | Mitkem Work Order #: J046Y

Client Project: CTO - 007 VIEQUES | Client: CH2M

1) Cooler Sealed — (Yes) / No

2) Custody Seal(s) — (Present) / Absent
(Coolers) / Bottles
(Intact) / Broken

3) Custody Seal Number(s) N/A

4) Chain-of-Custody — (Present) / Absent

5) Cooler Temperature 3°C, 3°C
IR Temp Gun ID MT-1
Coolant Condition ICED

6) Airbill(s) — (Present) / Absent
Airbill Number(s) FEDEX
8658615 9120
8602943 1979

7) Samples Bottles — (Intact) / Broken / Leaking

8) Date Received 3/17/10

9) Time Received 9:05

Preservative Name/Lot No.:

Lab Sample ID		Preservation (pH) HNO_3	H_2SO_4	HCl	NaOH	H_3PO_4	VOA Matrix	Soil Headspace or Air Bubble ≥ 1/4"
J0464	01	<2				<2	H	
J0464	02						H	
J0464	03						H	

AED 3/17/10

VOA Matrix Key:

US = Unpreserved Soil	A = Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form yes / (no)

Rad OK yes / no

Sample Condition Form

Page 1 of 1

Received By: AED	Reviewed By: SW	Date:	Mitkem Work Order #: J0464
Client Project: CTO-007 VIEQUES		Client: CH2M	

1) Cooler Sealed — (Yes) / No

2) Custody Seal(s) — (Present) / Absent
Coolers / Bottles
Intact / Broken

3) Custody Seal Number(s) N/A

4) Chain-of-Custody — (Present) / Absent

5) Cooler Temperature 2°C, 3°C, 5°C
IR Temp Gun ID MT-1
Coolant Condition ICED

6) Airbill(s) — (Present) / Absent
Airbill Number(s) FEDEX
8640 9096 4029
8640 9096 4030
8640 9096 4018

7) Samples Bottles — (Intact) / Broken / Leaking

8) Date Received 3/18/10

9) Time Received 9:15

Preservative Name/Lot No.:

Lab Sample ID		Preservation (pH) HNO_3	H_2SO_4	HCl	NaOH	H_3PO_4	VOA Matrix	Soil Headspace or Air Bubble ≥ 1/4"
J0464	04	<2				<2	H	
	05	<2				<2		
	06							
	07							
	08							
J0464	09	<2				<2	H	

AED 3/18/10

VOA Matrix Key:

US = Unpreserved Soil	A = Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form yes / (no)

Rad OK yes / no

Sample Condition Form

Received By: AED | Reviewed By: [illegible] | Date: 3/19/10 | Mitkem Work Order #: J0464

Client Project: CTO-007 Vieques | Client: CH2M

1) Cooler Sealed — Yes / No

2) Custody Seal(s) — Present / Absent
Coolers / Bottles
Intact / Broken

3) Custody Seal Number(s) N/A

4) Chain-of-Custody — Present / Absent

5) Cooler Temperature 4°C, 5°C
IR Temp Gun ID MT-1
Coolant Condition ICED

6) Airbill(s) — Present / Absent
Airbill Number(s) FEDEX
865861519141
865861519152

7) Samples Bottles — Intact / Broken / Leaking

8) Date Received 3/19/10

9) Time Received 8:50

Preservative Name/Lot No.:

Lab Sample ID		Preservation (pH) HNO_3	H_2SO_4	HCl	NaOH	H_3PO_4	VOA Matrix	Soil Headspace or Air Bubble ≥ 1/4"
J0464	10	<2				<2	H	
	11	<2				<2		
	12							
J0464	13						H	

AED 3/19/10

VOA Matrix Key:

US = Unpreserved Soil	A = Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form yes / no

Rad OK yes / no

Sample Condition Form

Page 1 of 1

Received By: [illegible] Reviewed By: TR Date: 3/20 Mitkem Work Order #: J0464

Client Project: Nieves Client: CH2M-Hill

		Lab Sample ID		Preservation (pH) HNO_3	H_2SO_4	HCl	NaOH	H_3PO_4	VOA Matrix	Soil Headspace or Air Bubble ≥ 1/4"
1) Cooler Sealed	Yes / No	J0464	14	<2					H	
			15						H	
2) Custody Seal(s)	Present / Absent		16	<2					H	
	Coolers / Bottles		17						H	
	Intact / Broken	J0464	18						H	
3) Custody Seal Number(s)	—									
4) Chain-of-Custody	Present / Absent									
5) Cooler Temperature	2° / 3°									
IR Temp Gun ID	MH-1									
Coolant Condition	Ice / Ice (OK)									
6) Airbill(s)	Present / Absent									
Airbill Number(s)	8658-6151-9163									
	8658-6151-9174									
7) Samples Bottles	Intact / Broken / Leaking									
8) Date Received	3/20/10									
9) Time Received	09:00									

3/20/10

Preservative Name/Lot No.:

VOA Matrix Key:

US = Unpreserved Soil	A = Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form yes / no

Rad OK yes / no

Sample Condition Form

Received By: AED | Reviewed By: GN | Date: 3/23/10 | Mitkem Work Order #: J0464

Client Project: CTO 007 VIBRUES | Client: CH2M

1) Cooler Sealed — (Yes) / No

2) Custody Seal(s) — Present / Absent
Coolers / Bottles
Intact / Broken

3) Custody Seal Number(s) N/A

4) Chain-of-Custody — Present / Absent

5) Cooler Temperature 4°C
IR Temp Gun ID MT-1
Coolant Condition ICED

6) Airbill(s) — Present / Absent
Airbill Number(s) FEDEX
865861519185

7) Samples Bottles — Intact / Broken / Leaking

8) Date Received 3/23/10

9) Time Received 11:58

Preservative Name/Lot No.:

Lab Sample ID		Preservation (pH) HNO_3	H_2SO_4	HCl	NaOH	H_3PO_4	VOA Matrix	Soil Headspace or Air Bubble ≥ 1/4"
J0464	20						H	
J0464	21						H	
J0464	22	22					H	

AED 3/23/10

VOA Matrix Key:

US = Unpreserved Soil	A = Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form yes / (no)

Rad OK yes / no

USEPA Region II
SW846 Method 8260B VOA

Date: January 2006
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: SJ0464 LAB: Mitkem Labs

SITE NAME: Vieques AOC E CTO-83

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? [Y] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? [Y] ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? [Y] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? [Y] ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? [Y] ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

Sampled 3/16-22/10 Analy 3/22-4/2/10
Rec 3/17-23/10 Temp 2-5°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal,make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, sectiom 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ✓ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits.

[ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? ☑ ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? ☑ ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [✓] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7) for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] [✓] ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD resuts in conjunction with other QC criteria to determine the need for some qualificatios.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as welll as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determned that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	**Non-Detected Spiked Compounds**
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

000

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject (R) all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ___

	YES	NO	N/A
7.2 Do any field/rinse blanks have positive volatile organic compound results?		✓	

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified forsurrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

✓VWAE-TB01-03-1610
✓VWAI-TB01-03-1810
✓VWAE-EB01-03-1610
✓VWAE-EB01-03-1710
✓VWAE-TB01-03-1710
✓VWAI-EB01-03-1810
✓VWAI-TB01-03-1910
✓VXAI-TB01-03-2210
✓VWAI-EB01-03-1910
✓VWAI-EB01-03-2210

Mod

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or quanity the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ☑ ___ ___

NOTE: For the analysis of volatiles, the method requires requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ☑ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ☑ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ☑ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ☑ ___

9.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ☑ ___ ___

ACTION: Use professional judgement to determine wheather associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

	YES	NO	N/A
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

NO TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? ✓ ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] [✓] ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [ ] ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? [✓] ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VWAE-MW4-03-10 > all attached
VWAE-MW4P-03-10 > sheet, no qual

WVWAI-MW3-0310 >
WVWAI-MW03P-0310 > No ⊕

Dilution — VWAE-MW05-0310

Initial Calibration Date: 3/29/2010
RRF and %RSD Calculations:

Compound Name: MTBE
Lab Value: 0.752

Area of Compound	1606395
Area of Internal STD	534322
Conc. of Internal STD	50
Conc. of Compound	200
Calculated RRF	0.752

Compound Name: benzene
Lab Value: 6.5

RRF of STD 1	0.979
RRF of STD 2	1.040
RRF of STD 3	1.065
RRF of STD 4	0.925
RRF of STD 5	1.087
Calculated % RSD	6.5

Continuing Calibration File ID: 4/2/2010
RRF and %D Calculations:

Compound Name: 1,2-dichloroethane
Lab Value: 0.329

Area of Compound	180904
Area of Internal STD	549516
Conc. of Internal STD	50
Conc. of Compound	50
Calculated RRF	0.329

Compound Name: xylene (total)
Lab Value: 2.9

Average RRF	0.599
Calibration Check RRF	0.582
Calculated % D	2.8

DataQual VOA

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VWAE-MW04-0310
Duplicate Sample ID: VWAE-MW04P-0310

Water: RPD>75%
Soil: RPD>100%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
MTBE	130	96	30
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: No qualifications

* result below the CRQL

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: SJ0464 LAB: Mitkem Labs

SITE NAME: Vieques AOC E CTO-83

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ☑ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ☑ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ".

Temp 2-5°C

Sampled 3/16-22/10 Extr 3/23-26/10 Rec 3/17-23/10 Analy 3/26-30/10

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ☑ ___

Continuous extraction of water samples for semivolatile analysis must be started within **7** days of the date of collection. Soil/sediment samples must be extracted within **14** days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

	YES	NO	N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [✓] ___ ___

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 80000C-24). [ ] ___ ✓

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ ✓

	YES	NO	N/A
Were method blanks re-analyzed?	[ ]	___	✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II?	___	✓	___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [✓] ___ ___

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low Solid [ ] ___ ___

c. Med Solid [ ] ___ ___

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [✓] ___ ___

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water

0 out of 3

Solids

___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
0 out of 3	____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ✓ ___ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

VWAI-EB01-032210
bis(2 eh) phth 1.25 > no qual

all other QC blks exhibited no Q

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

	YES	NO	N/A
that exceeded the initial calibration range.	[ ]	___	✓
6.5 Does the instrument blank have positive results for target analytes and/or TICs?	___	[ ]	✓

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column.	[✓]	___	___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)?	[✓]	___	___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

	YES	NO	N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

	YES	NO	N/A
ACTION: If ion abundance criteria are not met, take action specified in section 3.2			
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.			
8.8 Are the spectra of the mass calibration compound acceptable?	✓		
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates	✓		
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?			✓

	YES	NO	N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate	[✓]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[✓]	___	___
c. Blanks	[✓]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report?	[✓]	___	___
9.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	[✓]	___	___
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___
Other:_____	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

	YES	NO	N/A
each sample?	✓		

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	✓		
9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum?	✓		
9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum?	✓		

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

	YES	NO	N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

	[ ]	___	___
a. Samples and/or fractions as appropriate	[ ]	___	___
b. Blanks	[ ]	___	___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ___

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

	YES	NO	N/A
sample mass spectrum?	[ ]	___	✓
10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%?	[ ]	___	✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	___	✓	___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

	YES	NO	N/A
11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture?	✓	___	___

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ✓ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 15.0%)? [4] ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is $\geq$ 15.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ [✓] ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ [✓] ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? [ ] ✓ ___

	YES	NO	N/A
13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%?	___	[ ]	✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

	YES	NO	N/A
14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest?	[✓]	___	___
14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument?	[✓]	___	___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

	YES	NO	N/A
call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").			
14.3 Do any of the SPCCs have an RRF <0.05?	___	✓	___
If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18.	✓	___	___
14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?			
ACTION: If yes, make a note in data assessment.			
14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%?	___	✓	___
ACTION: Circle all outliers in red.			
ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.			
14.6 Do any semivolatile compounds have a RRF < 0.05?	___	✓	___
ACTION: Circle all outliers in red.			
ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.			
14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more).	___	✓	___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ✓ ___ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ✓ ___ ___

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ✓ ___ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

VWAE-MW04-0310
VWAE-MW04P-0310 > MDL

WVWAI-MW03-0310
WVWAI-MW03P-0310 > MDL

This SDG contains Gasoline results SW-846 method 8015. Region II validation guidelines were used as applicable, however, the Region has not developed an SOP for this method so these worksheets are used as an alternative.

Holding Times

Sampling Date: 3/16-22/10
Received Date: 3/17-3/23
Preparation Date: 3/24
Analysis Dates: 3/24

14-day soil sample holding time and 7 day water sample holding time was applied based on SW-846 recommendations

COC documentation was present and in order. All sample extraction and analysis holding time requirements were met for these water and field QC blank samples.

Calibrations

A seven-point calibration curve was analyzed for both the target compound and the surrogate compound. %RSDs were calculated for the target fuel ranges as well as for individual hydrocarbons over the range of retention times of interest and the surrogate compounds. Continuing calibration standards were analyzed per the method. All %D values were within QC limits with the exception of one hydrocarbon. All average %Ds were within 20%. No qualifications were required. These samples were analyzed on one sequence.

Blank Summary

Blank qualification guidelines:

- No action is taken if a compound is found in the blank but not in the sample.
- **Sample weight, volume or dilution factor must be taken into consideration when applying criteria.**
- Apply the same data validation guidelines to any associated method, trip, rinse and field blanks and all associated samples.
- Qualification/Action codes:

U -	The blank contamination concentration is ≤ RL or > RL and sample result is < RL. Result is qualified as U at the RL.
U -	The blank contamination concentration is >RL and sample result is either is >RL but < blank contamination concentration. Result is qualified as U at reported concentration.
J -	The blank contamination concentration is >RL and sample result is <10X blank contamination level.
NA	The sample is greater than the RL when the blank contamination concentration is < RL or the sample result is greater than 10X blank contamination concentration when the blank contamination concentration is >RL.

Blank Contamination and Qualification Summaries

Blank ID	Compound	Concentration	Action Level	Q Flag
VWAE-EB01-031610	GRO	110 ug/L	blank level	U

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
VWAE-MW03-0310	GRO	U

Surrogate Recoveries Summary

All surrogate recoveries were acceptable. No qualifications were required.

Matrix Spike/Matrix Spike Duplicate Summary

The MS/MSD pair in this SDG exhibited acceptable recoveries and RPDs. The submitted LCS samples were acceptable. No qualifications were required.

Field Duplicate Sample Summary

Sample ID: VWAE-MW04-0310 Duplicate Sample ID: VWAE-MW04P-0310

Compound	Sample Conc.	Duplicate Conc.	RPD
GRO	65	60	8%

Comments: 30% RPD criteria, No qualifications were required.

Sample Result Verification

Specific Comments:

Raw data was verified.

Reviewer JACleveland **Date:** 6/4/10

Initial Calibration Date: 11/18/2009

RF and %RSD Calculations:

Compound Name: GRO, level 1 (2.5)

Lab Value: 8.449×10^4

Area of Compound	2112328
Conc of Compd	3
Calculated RRF	844931

Compound Name: GRO

Lab Value: 4.4

RRF of STD 1	84490
RRF of STD 2	76470
RRF of STD 3	77450
RRF of STD 4	76640
RRF of STD 5	75220
RRF of STD 6'	80320
Calculated % RSD	4.37

Continuing Calibration File ID: CCV 3/23/10, 22:04

RF and %D Calculations:

Compound Name: GRO

Lab Value CF: 68319

Lab Value %D: 12.9

Area of compound	34159318
Concentration	500
Calculated CF	68318.6

Average CF	78430
Calibration Check CF	68319
Calculated % D	12.9

SAMPLE CALCULATION

Sample ID: VWAE-MW01-0310
Standard ID: ICAL, 11/18/09
Compound: GRO
Concentration: 150 ug/L

	Water (mg/L)	Soil (mg/Kg)
Area of Compound	13291102	
CF of Compound	78430	
Final Volume	5	
Dilution Factor	1	
GPC Factor	NA	
Injection Volume	1	
Weight of Sample	NA	
Initial Volume of Sample	5	NA
% Solids Factor	NA	
Concentration	169.46	#DIV/0!

Final Conc = GRO Conc. - Surrogate Conc.= 169.46-17.51 = 151.95 ug/L

Jacqueline Cleveland

From: Jacqueline Cleveland [cleve137@charter.net]
Sent: Monday, June 07, 2010 1:56 PM
To: 'Edward Lawler [Mitkem]'
Cc: 'DataQual'; 'Juan.Acaron@CH2M.com'
Subject: RE: Vieques CTO-83 GRO

Thanks so much Ed. I thought that might be it so I subtracted out the surrogate area then calculated the GRO result but I didn't check it for the after calculation concentrations!! Have a good day!

From: Edward Lawler [Mitkem] [mailto:elawler@mitkem.com]
Sent: Monday, June 07, 2010 1:20 PM
To: Jacqueline Cleveland
Cc: DataQual; Juan.Acaron@CH2M.com
Subject: RE: Vieques CTO-83 GRO

Hi Jackie—

It is because of the surrogate. For GRO, the surrogate elutes within the retention time range for GRO, so we have to subtract the concentration of the surrogate from the GRO before we calculate the final value. In this case (J0464-09) it is 169.464 – 17.513 = 151.95, which rounds to 150.

Please let me know if you need more information, or have any additional questions.

Thanks.

--Ed

From: Jacqueline Cleveland [mailto:cleve137@charter.net]
Sent: Monday, June 07, 2010 2:00 PM
To: Edward Lawler [Mitkem]
Cc: 'DataQual'; Juan.Acaron@CH2M.com
Subject: Vieques CTO-83 GRO
Importance: High

Good Afternoon Ed,

I have what I hope is a very quick question! For Mitkem Work Order Number J0464 the GRO results on the Form 1s do not match my calculations or the raw data quant pages. For example: sample VWAE-MW01-0310 (J0464-09) Form 1 result is 150 ug/L but quant page (page 400 of data package) & my recalculation of the result say 169 ug/L. Please clarify the discrepancy with resubmissions and/or an explanation, as necessary! I planned to ship this DV report to the client today so if you are able to respond this afternoon that would be fantastic!

Jackie

Jacqueline Cleveland
Vice-President
DataQual, ES, LLC
636-352-9391
cleve137@charter.net

147A

This SDG contains Diesel results SW-846 method 8015M. Region II validation guidelines were used as applicable, however, the Region has not developed an SOP for this method so these worksheets are used as an alternative.

Holding Times

Sampling Date: 3/16-22/10
Received Date: 3/17-3/23
Preparation Date: 3/22
Analysis Dates: 3/23-3/24

14-day soil sample holding time and 7 day water sample holding time was applied based on SW-846 recommendations

COC documentation was present and in order. All sample extraction and analysis holding time requirements were met for these water and field QC blank samples.

Calibrations

A seven-point calibration curve was analyzed for both the target compound and the surrogate compound. %RSDs were calculated for the target fuel ranges as well as for individual hydrocarbons over the range of retention times of interest and the surrogate compounds. Continuing calibration standards were analyzed per the method. All %D values were within QC limits with the exception of one hydrocarbon. All average %Ds were within 20%. No qualifications were required. These samples were analyzed on one sequence.

Blank Summary

Blank qualification guidelines:

- No action is taken if a compound is found in the blank but not in the sample.
- **Sample weight, volume or dilution factor must be taken into consideration when applying criteria.**
- Apply the same data validation guidelines to any associated method, trip, rinse and field blanks and all associated samples.
- Qualification/Action codes:

U -	The blank contamination concentration is ≤ RL or > RL and sample result is < RL. Result is qualified as U at the RL.
U -	The blank contamination concentration is >RL and sample result is either is >RL but < blank contamination concentration. Result is qualified as U at reported concentration.
J -	The blank contamination concentration is >RL and sample result is <10X blank contamination level.
NA	The sample is greater than the RL when the blank contamination concentration is < RL or the sample result is greater than 10X blank contamination concentration when the blank contamination concentration is >RL.

Blank Contamination and Qualification Summaries

Blank ID	Compound	Concentration	Action Level	Q Flag
no contamination				

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag

Surrogate Recoveries Summary

All surrogate recoveries were acceptable. No qualifications were required.

Matrix Spike/Matrix Spike Duplicate Summary

The MS/MSD pairs in this SDG exhibited acceptable recoveries and RPDs. The submitted LCS samples were acceptable. No qualifications were required.

Field Duplicate Sample Summary

Sample ID: VWAE-MW04-0310 Duplicate Sample ID: VWAE-MW04P-0310

Compound	Sample Conc.	Duplicate Conc.	RPD
ETPH	1.6	1.5	6%
ORO	0.54	0.63	15%

Comments: 30% RPD criteria, No qualifications were required.

Sample Result Verification

Specific Comments:

Raw data was verified.

Reviewer JACleveland **Date:** 6/4/10

Initial Calibration Date: 1/20/2010

RRF and %RSD Calculations:

Compound Name: triacontane

Lab Value: 1.1200

Area of Compound	5090095
Conc. of Compound	2.5
Area of Internal Standard	72747684
Conc. of Internal Standard	40
Calculated CF	1.1195

Compound Name: TPH (C9..C28)

Lab Value: 6.52

CF of STD 1	1.1060
CF of STD 2	1.0570
CF of STD 3	1.1230
CF of STD 4	1.0850
CF of STD 5	0.9480
CF of STD 6	
CF of STD 7	
Calculated % RSD	6.51

Continuing Calibration File ID: 3/24/10, 0454

RRF and %D Calculations:

Compound Name: octane

Lab Value: 1

Area of Compound	38314083
Conc. of Compound	50
Area of Internal Standard	60758444
Conc. of Internal Standard	40
Calculated CF	0.5045

Compound Name: TPH (C9..C28)

Lab Value: 3.4

Average CF	1.0640
Calibration Check CF	1.1000
Calculated % D	-3.4

SAMPLE CALCULATION

Sample ID: VWAE-MW05-0310
Standard ID: ICAL, 1/20/10
Compound: DRO
Concentration: 1.3 mg/L

	Water (mg/L)	Soil (mg/Kg)
Area of Compound	2315375528	
CF of Compound	1.064	
Area of Internal Standard	68179633	
Concentration of Internal Standard	40	
Final Volume	1	
Dilution Factor	1	
GPC Factor	NA	
Injection Volume	1	
Weight of Sample	NA	
Initial Volume of Sample	1000	NA
% Solids Factor	NA	
Concentration	1.28	#DIV/0!

Site: Vieques PR

Case #:

SDG #: JØ464

Samples: **Soil** **Water**

	YES	NO	N/A
A.I.1 Contract Compliance Screening Report			
Present?	[ ]		✓
ACTION: If no, contact RSCC/PO.			
A.I.2 Record of Communication (from RSCC)			
Present?	[ ]		✓
ACTION: If no, request from the RSCC.			
A.1.3 Sampling Trip Report			
Present and complete?	[ ]		✓
ACTION: If no, contact RSCC/PO.			
A.I.4 Chain of Custody/Sample Traffic Report			
Present?	[✓]		
Legible?	[✓]		
Signature of sample custodian present?	[✓]		
ACTION: If no, contact RSCC/WAM/PO.			
A.I.5 Cover Page			
Present?	[✓]		
Is the Cover Page properly filled in and the verbatim signed by the lab manager or the manager's designee?	[✓]		
Do the sample identification numbers on the Cover Page agree with sample Identification numbers on:			
(a) Traffic Report Sheet? COC	[✓] JLC 10/10		✓

	YES	NO	N/A
(b) Form I's?	[✓]	___	___
Is the number of samples on the Cover Page the same as the number of samples on the Traffic Report sheet and the Regional Record of Communication (ROC) for the data Case?	[___]	___	___

ACTION:
If no for any of the above, prepare Telephone Record Log and contact RSCC/PO for re-submittal of the corrected Cover Page from the laboratory.

A.1.6 **SDG Narrative, DC-1 & DC-2 Form**

Is the SDG Narrative present?	[___]	___	___
Is Sample Log-In Sheet(Form DC-1) present and complete?	[___]	___	___
Is Complete SDG Inventory Sheet(Form DC-2) present and complete?	[___]	___	___

ACTION:
If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.

A.1.7 **Form I to XV**

A.1.7.1 Are all the Form I through Form XV labeled with:

Laboratory Name?	[___]	___	___
Laboratory Code?	[___]	___	___
RAS/Non-RAS Case No.?	[___]	___	___
SDG No.?	[___]	___	___

		YES	NO	N/A
	Contract No.?	[✓]	[ ]	[ ]

ACTION:
If no for any of the above, note under Contract Problem/Non-Compliance Section of the "Data Review Narrative" and contact PO for corrected Form(s) from the laboratory.

A.1.7.2 After comparing values on Forms I-IX against the raw data, do any computation/ transcription errors exceed 10% of the reported values on the Forms for:

(a) all analytes analyzed by ICP-AES?	[ ]	[✓]	[ ]
(b) all analytes analyzed by ICP-MS?	[ ]	[ ]	[✓]
(c) Mercury?	[ ]	[ ]	[✓]
(d) Cyanide?	[ ]	[ ]	[✓]

ACTION:
If yes, prepare Telephone Record Log and contact CLP PO/TOPO for the corrected data from the laboratory.

A.1.8 Raw Data

Data shall not be validated without the hard/electronic copies of the associated raw data for samples and QC samples.

A.1.8.1 Digestion/Distillation Log

Digestion Log for ICP-AES (Form XII)present?	[✓]	[ ]	[ ]
Digestion Log for ICP-MS (Form XII) present?	[ ]	[ ]	[✓]
Digestion Log for mercury (Form XII) present?	[ ]	[ ]	[✓]
Distillation Log for cyanide (Form XII) present?	[ ]	[ ]	[✓]

Are pH values for metals and

	YES	NO	N/A
cyanide reported for each aqueous sample?	[ ]		✓
Are percent solids calculations present for soils/sediments?	[ ]		✓
Are preparation dates present on the sample preparation logs/bench sheets?	[ ]		✓

NOTE:
Digestion/Distillation log must include weights, volumes, and dilutions used to obtain the reported results.

A.1.8.2 Is the analytical instrument real-time printouts present for:

ICP-AES?	✓		
ICP-MS?	[ ]		✓
Mercury?	[ ]		✓
Cyanide?	[ ]		✓

Are all laboratory bench sheets and instrument raw data printouts necessary to support all sample analyses and QC operations:

Legible?	✓		
Properly labeled?	✓		

Are all field samples, QC samples and field QC samples present on:

Digestion/Distillation log?	✓		
Instrument Printouts?	✓		

ACTION:
If no for any of the above questions in Section A.1.8.1 and Section A.1.8.2, write Telephone Record Log and contact TOPO/PO for re-submittal from the laboratory.

		YES	NO	N/A
A.1.9	**Technical Holding Times**: (Aqueous and soil samples) (Examine sample Traffic Reports and digestion/distillation logs to determine the holding time from the sample collection date to the sample preparation date.)			
A.1.9.1	Cyanide distillation(14 days)exceeded?	_	[ ]	✓
	Mercury analysis(28 days) exceeded?	_	[ ]	✓
	Other Metals analysis(180 days)exceeded?	___	___	[✓] _

ACTION:
If yes, reject (R) and red-line non-detects and flag as estimated (J)results ≥ MDL even if sample(s) was preserved properly.

NOTE:
In addition to qualifying the data, a list of all samples and analytes which exceeded the holding times must be prepared. Report for each sample the number of days that were exceeded. (Subtract the sample collection date from the sample preparation date). Attach this list to the data review narrative.

A.1.9.2	Is pH of aqueous samples for:			
	Metals Analysis ≤ 2?	[✓]	___	___
	Cyanide Analysis ≥ 12?	[ ]	_	_ ✓

ACTION:
If no for any of the above, flag non-detects as "R" and detects as "J".

A.1.9.3	Is the cooler temperature ≤ 10 C°?	[✓]	_	_

ACTION:
If cooler temperature is >10 ^{0}C , flag non-detects as "UJ" and detects as "J".

A.1.10 **Final Data Correctness - Form I**

A.1.10.1 Are Form I's for all samples

	YES	NO	N/A
present and complete?	[✓]	___	___

ACTION:
If no, prepare Telephone Record Log and contact CLP PO/TOPO for submittal from the laboratory.

A.1.10.2 Verify there are no calculation and transcription errors in the results reported on Form I's. Circle on each Form I all results that are incorrect.

Is the calculation error less than 10% of the correct result?	[✓]	___	___
Are results on Form I's reported in correct units (ug/L for aqueous and MG/KG for soils)?	[✓]	___	___
Are results on Form I'S reported by correct significant figures?	[✓]	___	___
Are soil sample results on Form I's corrected for percent solids?	[___]	___	✓
Are all "less than MDL" values reported by the CRQLs and coded with "U"?	[✓]	___	___
Are values less than the CRQLs but greater than or equal to the MDLs flagged with "J"?	[✓]	___	___
Are appropriate contractual quality control and Method qualifiers used?	[✓]	___	___

ACTION:
If no for any of the above questions, prepare Telephone Record Log, and contact CLP PO/TOPO for corrected data.

A.1.10.3 Do EPA sample identification numbers and the corresponding laboratory sample identification numbers match on the Cover Page, Form I's and in the raw data? [✓] ___ ___

Was a brief physical description

	YES	NO	N/A
of the samples before and after digestion given on the Form I's?	[___]	✓	
Was any sample result outside the mercury/cyanide calibration range or the ICP-AES/ICP-MS linear range diluted and noted on the Form I?	[___]		✓

ACTION:
If no for any of the above, note under the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.11 **Initial Calibration**

A.1.11.1	Is a record of at least 2 point (A blank and a standard)calibration present for ICP-AES analysis?	[✓]		
	Is a record of at least 2 point (a blank and a standard)calibration present for ICP-MS analysis?	[___]		✓
	Is a record of at least 5 point calibration (a blank & 4 standards)present for Hg analysis?	[___]		✓
	Is a record of at least 4 point calibration (a blank & 4 standards)present for cyanide?	[___]		✓

ACTION:
If incomplete or no initial calibration was performed, reject (R) and red-line the associated data (detects & non-detects).

	Is one initial calibration standard at the CRQL level for cyanide and mercury?	[___]		✓

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the Data Review Narrative.

A.1.11.2 Is the curve correlation coefficient $\geq$ 0.995 for:

		YES	NO	N/A
	Mercury Analysis?	[___]	___	___ ✓
	Cyanide Analysis?	[___]	___	___ ✓
	ICP-AES(more than 2 point Calib.)?	[✓]	___	___
	ICP-MS (more than 2 point calib.)?	[___]	___	___ ✓

ACTION:
If no, qualify the associated sample results ≥ MDL as estimated "J" and non-detects as "UJ".

NOTE:
The correlation coefficient shall be calculated by the data validator using standard concentrations and the corresponding instrument response (e.g. absorbance, peak area, peak height, etc.).

A.1.12 **Initial and Continuing Calibration Verification- Form IIA**

A.1.12.1	Present and complete for every metal and cyanide?	[✓]	___	___
	Present and complete for ICP-AES and ICP-MS when both these methods were used for the same analyte?	[___]	___	___ ✓

ACTION:
If no for any of the above, prepare a Telephone Record Log and contact PO/TOPO for re-submittal from the laboratory.

A.1.12.2	Was a Continuing Calibration Verification performed every 10 samples or every 2 hours whichever is more frequent?	[✓]	___	___

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.12.3	Was an ICV or a mid-range standard distilled and analyzed with each batch of cyanide samples?	[___]	___	___ ✓

	YES	NO	N/A

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative and qualify results ≥ MDL as estimated (J).

A.1.12.2 Circle on each Form IIA all percent recoveries that are outside the contract windows.

Are ICV/CCVs within control limits for:

Metals - 90-110%R?	[✓]	___	___
Hg - 80-120%R?	[___]	___	✓
Cyanide - 85-115%R?	[___]	___	✓

ACTION:
If no, qualify all samples between a previous technically acceptable CCV standard and a subsequent technically acceptable CCV standard as follows as follows:

Qualify as estimated (J) all detects and non-detects, if the ICV/CCV %R is between 75-89%(65-79% for Hg; 70-84% for CN). Qualify only positive results(≥ MDL) as "J" if the ICV/CCV %R is between 111-125%(121-135% for Hg;116-130% for CN). Reject (R) and red-line only
detects if the recovery is greater than 125% (135% for Hg; 130% for CN). Reject (R) and red-line all associated results (hits and non-detects)if the recovery is less than 75%(65% for Hg;70% for CN).

NOTE:
For ICV that does not fall within the acceptance limits, qualify all samples reported from the analytical run.

A.1.12.3 Was the distilled ICV or mid-range standard for cyanide within acceptance limits (85-115%)? [___] ___ ___

ACTION:
If no, Qualify all cyanide results ≥ MDL as "J".

A.1.13 **CRQL Standard Analysis - Form IIB**

A.1.13.1 For each ICP-AES run, was a CRI

	YES	NO	N/A
(CRQL or MDL when MDL > CRQL) standard analyzed? (Note:CRI is not required for Al, Ba, Ca, Fe, Mg, Na and K.)	[✓]	✓	
For each ICP-MS run, was a CRI (CRQL or MDL when MDL > CRQL) standard analyzed for each mass/isotope used for the analysis?	[ ]		✓
For each mercury run, was a CRQL standard analyzed?	[ ]		✓
For each cyanide run, was a CRQL standard analyzed?	[ ]		✓

jac 6310

one target was iron other target is manganese

ACTION:
If no for any of the above, write this deficiency in the Contract Problems/ Non-Compliance Section of the Data Review Narrative, inform CLP PO and flag results in the affected ranges (detects <2xCRQL)as J and non-detects UJ.

Note- flag Mn UJ in sample VMAE-MW03-0310 All other Results >> 2X RL.

The affected ranges are:
ICP-AES Analysis - *True Value ± CRQL
ICP-MS Analysis - *True Value ± CRQL
Mercury Analysis - *True Value ± CRQL
Cyanide Analysis - *True Value ± CRQL
* True value of the CRQL Standard

A.1.13.2 Was a CRQL standard analyzed after the ICV/ICB, before the final CCV/CCB and once every 20 analytical samples in the analytical run for each analysis? [ ] ✓

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the "Data Review Narrative".

A.1.13.3 Circle on each Form IIB all percent recoveries that are outside the acceptance windows.

	YES	NO	N/A
Is the CRQL standard within control limits for:			
Metals(ICP-AES/ICP-MS)- 70 - 130%?	[___]	___	✓
Mercury- 70 - 130%?	[___]	___	✓
Cyanide - 70 - 130%?	[___]	___	✓

ACTION:
If no, flag detects <2xCRQL as "J" and non-detects as "UJ" if the CRQL standard recovery is between 50-69%. Flag(J) only detects <2xCRQL if the recovery is between 131% and ≤180%. If the recovery is less than 150%, reject(R) and red-line non-detects and detects < 2xCRQL, and flag (J) detects between 2xCRQL and ICV/CCV. Reject and red-line only detects <2xCRQL and flag (J)detects ≥ 2xCRQL but < ICV/CCV if the recovery is > 180%.

NOTE:
1. Qualify all field samples analyzed between a previous technically acceptable analysis of the CRQL standard and a subsequent acceptable analysis of the CRQL standard
2. Flag (J) or reject (R) only the final sample results on Form I's when **Sample raw data** are within the affected ranges and the CRQL standard is outside the acceptance windows.
3. The samples and the CRQL standard must be analyzed in the same analytical run.

A.1.14 Initial and Continuing Calibration Blanks - Form III

A.1.14.1	Present and complete for all the instruments used for the metals and cyanide analyses?	[✓]	___	___
	Was an initial Calibration Blank analyzed after ICV?	[✓]	___	___
	Was a continuing Calibration Blank analyzed after every CCV and every 10 samples or every 2 hours, whichever is more frequent?	[✓]	___	___
	Were the ICB & CCB values ≥ MDL but < CRQL reported on Form III and flagged "J" by			

		YES	NO	N/A
	using MDLs from direct analysis(Preparation Method "NP1")? (Check Form III against the raw data)	[✓]	___	___

ACTION:
If no, inform CLP PO/TOPO and make a note in the Contract-Problems/Non-Compliance Section of the "Data Review Narrative".

A.1.14.2 Circle with red pencil on each Form III all Calib. Blank values that are:

≥ MDL but ≤ CRQL

> CRQL

A.1.14.2.1	When MDL < CRQL, is any Calib. Blank value ≥ MDL but ≤ CRQL?	___	[✓]	___

ACTION:
If yes, change sample results ≥ MDL but ≤ CRQL to the CRQL with a "U". Do not qualify non-detects.

A.1.14.2.2	When MDL < CRQL, is any Calib. Blank value > CRQL?	___	[✓]	___

ACTION:
If yes, reject (R) and red line the associated sample results > CRQL but <ICB/CCB Blank Result. Flag as "J" detects > ICB/CCB blank value but < 10xICB/CCB value. Change the sample results ≥ MDL but ≤ the CRQL to CRQL with a "U".

A.1.14.2.3	Is any Calibration Blank value below the negative CRQL?	___	[✓]	___

ACTION:
If yes, flag (J) as estimated all associated sample results ≥ CRQL but <10xCRQL.

NOTE:
1. For ICB that does not meet the technical QC Criteria, apply the action to all samples

	YES	NO	N/A

reported from the analytical run.
2. For CCBs that do not meet the technical QC criteria, apply the action to all samples analyzed between a previous technically acceptable analysis of CCB and a subsequent technically acceptable analysis of the CCB in the analytical run.,

A.1.15 **Preparation Blank - FORM III**

NOTE:The Preparation Blank for mercury is the same as the calibration blank.

A.1.15.1 Was one Preparation Blank prepared with and analyzed for:

Each Sample Delivery Group (SDG)?	[✓]	___	___
Each batch of the SDG samples digested/distilled?	[✓]	___	✓ JMC 6/3/10
Each matrix type?	[✓]	___	___
All instruments used for metals and cyanide analyses?	[✓]	___	___

ACTION:
If no for any of the above, flag as estimated (J) all the associated positive data <10xMDL for which the Preparation Blank was not analyzed.

NOTE:
If only one blank was analyzed for more than 20 samples, then the first 20 samples analyzed are not estimated(J),but all additional samples must be qualified (J).

A.1.15.2 Circle with red pencil on each Form III all Prep. Blank values that are:

≥ MDL but ≤ CRQL, and

> CRQL

A.1.15.2.1 When MDL < CRQL, is any preparation blank value ≥ MDL but ≤ CRQL?	___	[✓]	___

ACTION:
If yes, change sample result ≥ MDL

	YES	NO	N/A

but ≤ CRQL to CRQL with a "U".

A.1.15.2.2 When the MDL ≤ CRQL, is any Preparation Blank value greater than its CRQL? ___ [✓] ___

If yes, is the Prep. Blank value greater than the value of the associated Field Blank collected and analyzed with the SDG samples? ___ [___] ✓

If yes, is the lowest concentration of that analyte in the associated samples less than 10 times the Preparation Blank value? ___ [___] ✓

ACTION:
If yes, reject (R) and red-line all associated sample results greater than the CRQL but less than the Prep.Blank value. Flag as "J" detects > Prep. Blank value but <10xPrep.Blank. If the sample result ≥ MDL but ≤ CRQL, replace it with CRQL-U.

If the Prep. Blank value is less than the same analyte value in the Field Blank, do not qualify the sample results due to the Prep. Blank criteria.

NOTE:
Convert soil sample result to mg/Kg on wet weight basis to compare with the soil Prep. Blank result on Form III.

A.1.15.2.3 Is the Prep. Blank concentration below the negative CRQL? ___ [✓] ___

ACTION:
If yes, flag (J) all associated sample results less than 10xCRQL. Qualify non-detects as estimated (UJ).

A.1.15.2.4 When the MDL is greater than the CRQL, is the preparation blank concentration on Form III greater than two times the MDL? ___ [✓] ___

ACTION:

		YES	NO	N/A
	If yes, reject (R) and red-line all positive sample results with sample raw data less than 10 times the Preparation Blank value.			

A.1.16 **ICP-AES/ICP-MS Interference Check Sample (ICS)- Form IV**

NOTE: Not required for CN, Hg, Al, Ca, Fe and Mg.

A.1.16.1	Present and complete?	[✓]	___	___
	Was ICS analyzed at the beginning and end of each analytical run, and once for every 20 analytical samples?	[✓]	___	___
	Was ICS analyzed at the beginning of the ICP-MS analytical run?	[___]	___	✓

ACTION:
If no, flag as estimated (J) all sample results.

A.1.16.2 **ICP-AES Method**

A.1.16.2.1	**ICSA Solution:** For ICP-AES, are the ICSA "Found" analyte values within the control limits ± of CRQL of the true/established mean value?	[✓]	___	___
	If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSA Solution on Form IV?	[___]	___	✓

ACTION:
If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run:

Flag (J) as estimated only sample results ≥MDL

	YES	NO	N/A

for which the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag non-detects as "UJ" and detects as "J".

A.1.16.2.3 **ICSAB Solution**

For ICP-AES, are all analyte results in ICSAB within the control limits of 80-120 of the true/established mean value? [✓] ___ ___

If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSAB Solution on Form IV? [___] ___ ✓

ACTION:
If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79%, qualify sample results ≥ MDL as "J" and non-detects as "UJ". Reject (R) and red-line all sample results (detects & non-detects) for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only positive results.

A.1.16.3 **ICP-MS Method**

A.1.16.3.1 **ICSA Solution:**

For ICP-MS, are the ICSA "Found" analyte values within the control limits of ±CRQL of the true/established mean value? [___] ___ ✓

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated only sample results ≥ MDL if the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag the associated sample detects as "J" and non-detects as "UJ".

		YES	NO	N/A
A.1.16.3.3	**ICSAB Solution** For ICP-MS, are all analyte results in ICSAB within the control limits of 80-120% of the true/established mean value, whichever is greater?	[___]	___	✓

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79% flag (J) as estimated the associated sample results ≥ MDL. Reject (R) and red-line those all sample detects and non-detects for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only detects (≥ MDL).

A.1.17 **Spiked Sample Recovery: Pre-Digestion/Pre-Distillation)-Form V A**
Note: Not required for Ca, Mg, K, and Na (both matrices); Al and Fe (soil only)

		YES	NO	N/A
A.1.17.1	Was Matrix Spike analysis performed:			
	For each matrix type?	[✓]	___	___
	For each SDG?	[✓]	___	___
	On one of the SDG samples?	[✓]	___	___
	For each concentration range (i.e., low, med., high)?	[✓]	___	___
	For each analytical Method (ICP-AES, ICP-MS, Hg, CN) used?	[✓]	___	___
	Was a spiked sample prepared and analyzed with the SDG samples?	[✓]	___	___

ACTION:
If no for any of the above, flag as estimated (J) all the positive data for which a spiked sample was not analyzed.

NOTE:
If more than one spiked sample were analyzed for one SDG, then qualify the associated data based on the worst spiked sample analysis.

		YES	NO	N/A
A.1.17.2	Was a field blank or PE sample used for the spiked sample analysis?	___	[✓]	___

ACTION:
If yes, flag (J) as estimated positive data of the associated SDG samples for which field blank or PE sample was used for the spiked sample analysis.

A.1.17.3	Circle on each Form VA all spike recoveries that are outside the control limits (75-125%) that have sample concentrations less than four times the added spike concentrations.			
	Are all recoveries within the control limits when sample concentrations are less than or equal to four times the spike concentrations?	[✓]	___	___
	NOTE: Disregard the out of control spike recoveries for analytes whose concentrations are greater than or equal to four times the spike added.			
	Are results outside the control limits (75-125%)flagged with Lab Qualifier "N" on Form I's and Form VA?	[___]	___	✓

ACTION:
If no for any of the above, write in the Contract - Problems/Non-Compliance Section of the Data Review Narrative.

A.1.17.4	**Aqueous**			
	Are any spike recoveries:			
	(a) less than 30%?	___	[✓]	___
	(b) between 30-74%?	___	[✓]	___
	(c) between 126-150%?	___	[✓]	___
	(d) greater than 150%?	___	[✓]	___

ACTION:
If the matrix spike recovery is less than 30%,reject (R) and red-line all associated aqueous data (detects & non-detects). If between 30-74%, qualify all associated aqueous data ≥ MDL as "J" and non-detects

	YES	NO	N/A

as "UJ". If between 126-150%, flag (J) all data ≥ MDL as "J". If greater than 150%, reject (R) and red-line all associated data ≥ MDL.

(**NOTE**:Replace "N" with "J", "R" as appropriate.)

A.1.17.5 **Soil/Sediment**

Are any spike recoveries:

(a) less than 10%?	___	[___]	✓
(b) between 10-74%?	___	[___]	✓
(c) between 126-200%?	___	[___]	✓
(d) greater than 200%?	___	[___]	✓

ACTION:
If yes for any of the above, proceed as follows:

If the matrix spike recovery is less than 10%,reject (R) and red-line all associated data (detects & non-detects); if between 10-74%,qualify all associated data ≥ MDL as "J" and non-detects as "UJ"; if between 126-200%, flag (J) all associated data ≥ MDL as "J" If greater than 200%, reject (R) and red-line all associated data ≥ MDL.
(**NOTE**:Replace "N" with "J" or "R" as appropriate.)

A.1.18 **Lab Duplicates) - Form VI**

A.1.18.1 Was the lab duplicate analysis performed:

For each SDG?	[✓]	___	___
On one of the SDG samples?	[✓]	___	___
For each matrix type?	[✓]	___	___
For each concentration range (low or med.)?	[✓]	___	___
For each analytical Method (ICP-AES/ICP-MS,Hg,CN)Used?	[✓]	___	___
Was a lab duplicate prepared and analyzed with the SDG samples?	[✓]	___	___

		YES	NO	N/A
	ACTION: If no for any of the above, flag (J) as estimated all the SDG sample results (detects & non-detects) for which the lab duplicate analysis was not performed.			
	NOTE: If more than one lab duplicate sample were analyzed for an SDG, then qualify the associated samples based on the worst lab duplicate analysis.			
A.1.18.2	Was a Field Blank or PE sample used for the Lab Duplicate analysis?	___	[✓]	___
	ACTION: If yes, flag as estimated (J) all SDG sample results (hits & non-detects) for which Field Blank or PE sample was used for duplicate analysis.			
A.1.18.3	Circle on each Form VI all values that are: RPD > 20%, or Absolute Difference > CRQL			
	Are all values within control limits (RPD ≤ 20% or absolute difference ≤ ±CRQL)?	[✓]	___	___
	If no, are all results outside the control limits flagged with an "*" (Lab Qualifier) on Form VI and on all Form I's?	[___]	___	✓
	ACTION: If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.			
	NOTE: The laboratory is not required to report on Form VI the RPD when both values are non-detects.			
A.1.18.4	**Aqueous**			
A.1.18.4.1	When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			

	YES	NO	N/A
is any RPD > 20% but < 100%?	___	[✓]	___
is any RPD ≥ 100%?	___	[✓]	___

ACTION:
If the RPD is > 20% but < 100%, flag (J) as estimated the associated sample data ≥ CRQL. If the RPD is ≥ 100%, reject (R) and red-line the associated sample data ≥ CRQL.

(**NOTE**:Replace "*" with "J" or "R" as appropriate.)

A.1.18.4.2 When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate values:

> ± CRQL?	___	[✓]	___
> ± 2xCRQL?	___	[✓]	___

ACTION:
If the absolute difference is > CRQL, flag as estimated all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 2xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but < 5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.18.5 **Soil/Sediment**

A.1.18.5.1 When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 35% but < 120%?	___	[___]	✓
is any RPD ≥ 120%?	___	[___]	✓

ACTION:
If the RPD is ≥ 35% and < 120%, flag (J) as estimated the associated sample

	YES	NO	N/A

data ≥ CRQL. If the RPD is ≥ 120%, reject (R) and red-line the associated sample data ≥ CRQL.

A.1.18.5.2 When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and duplicate:

> ± 2 x CRQL?	___	[___]	✓
> ± 4 x CRQL	___	[___]	✓

ACTION:
If the absolute difference is > 2 x CRQL, flag all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 4xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but <5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.19 Field Duplicates

Aqueous Field Duplicates

A.1.19.1 Was an aqueous Field Duplicate pair collected and analyzed? [___] ✓ ___
(Check Sampling Trip Report)

no Field dup submitted for this fraction

ACTION:
If yes, prepare a Form (Appendix A.4) for each aqueous Field Duplicate pair. Report the sample and Field Duplicate results on Appendix A.4 from their respective Form I's. Calculate and report RPD on Appendix A.4 when sample and its Field Duplicate values are both > 5xCRQL. Calculate and report the absolute difference on Appendix A.4 when at least one value (sample or duplicate) is <5xCRQL. Evaluate the aqueous Field Duplicate analysis in accordance with the

	YES	NO	N/A

QC criteria stated in Sections A.1.19.2 and A.1.19.3.

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this the criteria to qualify the results.

A.1.19.2 Circle all values on the Form (Appendix A.4) for Field Duplicates that have:

RPD ≥ 20% or

Difference > ± CRQL

When sample and duplicate values are both ≥5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 20%?	___	[___]	✓ ___
is any RPD ≥ 100%?	___	[___]	✓ ___

ACTION:
If the RPD is >20% but < 100%, flag (J) only the associated sample and its Field Duplicate results ≥ CRQL. If the RPD is ≥ 100%, reject (R) and red-line only the associated sample and its Field Duplicate result ≥ CRQL.

A.1.19.3 When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate:

> ± CRQL?	___	[___]	✓ ___
> ± 2 x CRQL?	___	[___]	✓ ___

ACTION:
If the absolute difference is > CRQL, flag detects ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the difference is > 2xCRQL, reject (R) and red-line non-detects

		YES	NO	N/A
	and results ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			

Soil/Sediment Field Duplicates

A.1.19.4	Was a soil field duplicate pair collected and analyzed? (Check Sampling Trip Report)	[___]	___	✓

ACTION:
If yes, for each soil Field Duplicate pair proceed as follows:

Prepare Appendix A.4 for each Field Duplicate pair. Report on Appendix A.4 all sample and its Field Duplicate results in MG/KG from their respective Form I's. Calculate and report RPD when sample and its duplicate values are both greater than 5xCRQL. Calculate and report the absolute difference when at least one value (sample or duplicate)is < 5xCRQL. Evaluate the Field Duplicate analysis in accordance with the QC Criteria stated in Sections A.1.19.5 and A.1.19.6.

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and apply the criteria to qualify the results.

A.1.19.5	Circle on each Appendix A.4 all values that have: RPD ≥ 35%, or Difference > ± 2xCRQL When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			
	is any RPD ≥ 35% but < 120%?	___	[___]	✓
	is any RPD ≥ 120%?	___	[___]	✓

ACTION:
If the RPD is ≥ 35% but < 120%,

		YES	NO	N/A
	flag only the associated sample and its Field Duplicate results ≥ CRQL as "J". If the RPD is ≥ 120%, reject (R) and red-line only the sample and its Field Duplicate results ≥ CRQL.			
A.1.19.6	When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and Field Duplicate:			
	> ± 2 x CRQL?	___	[___]	✓
	> ± 4 x CRQL?	___	[___]	✓
	ACTION: If the absolute difference is > 2xCRQL, flag Sample and its Field Duplicate resuts ≥ MDL but <5xCRQL as "J" and non-detects as "UJ". If the difference is >4xCRQL, reject(R) and red-line non-detects and detects ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
A.1.20	**Laboratory Control Sample (LCS)- Form VII**			
A.1.20.1	Was one LCS prepared and analyzed for:			
	Each SDG?	[✓]	___	___
	Each matrix type?	[✓]	___	___
	Each batch samples digested/distilled?	[✓]	___	___
	For each Method(ICP-AES,ICP-MS,Hg,CN) used?	[✓]	___	___
	Was an LCS prepared and analyzed with the samples?	[___]	___	✓
	ACTION: If no for any of the above, prepare Telephone Record Log and contact CLP PO or TOPO for submittal of the LCS results. Flag (J) as estimated all the data for which an LCS was not analyzed.			
	NOTE: If only one LCS was analyzed for			

	YES	NO	N/A

more than 20 samples, then the first 20 samples analyzed are not flagged(J), but all additional samples must be qualified (J).

A.1.20.2 **Aqueous LCS**

Circle on each Form VII the LCS percent recoveries outside control limits 80-120%.

NOTE: 1.Use digested ICV as LCS for aqueous mercury
2.Use distilled ICV as LCS for aqueous cyanide

Is any LCS recovery:

Less than 50%?	___	[✓]	___
Between 50% and 79%?	___	[✓]	___
Between 121% and 150%?	___	[✓]	___
Greater than 150%?	___	[✓]	___

ACTION:
If the LCS recovery is less than 50%, reject (R) and red-line all associated sample data (detects & non-detects); for a recovery between 50-79%, flag detects as "J" all non-detects as "UJ". if the LCS recovery is between 121-150%, flag only detects as "J". if the recovery is greater than 150%, reject (R) and red-line all detects.

A.1.20.3 **Solid LCS**

If an analyte's MDL is equal to or greater than the true value of LCS, disregard the "Action" below for that analyte even though the LCS is out of control limits.

Is the LCS "Found" value greater than the Upper Control Limit reported on Form VII?	___	[___]	✓

ACTION:

		YES	NO	N/A
	If yes, flag (J) all the associated detects ≥ MDL as estimated (J).			
	Is the LCS "Found" value lower than the Lower Control Limit reported on Form VII?	___	[___]	✓
	ACTION: If yes, flag detects as "J" and non-dectes as "UJ".			
A.1.21	**ICP-AES/ICP-MS Serial Dilution - Form VIII** **NOTE:** Serial dilution analysis is required only when the initial concentration is equal to or greater than 50 x MDL.			
A.1.21.1	Was a Serial Dilution analysis performed:			
	For each SDG?	[✓]	___	___
	On one of the SDG samples?	[✓]	___	___
	For each matrix type?	[✓]	___	___
	For each concentration range (low or med.)?	[✓]	___	___
	Was a Serial Dilution sample analyzed with the SDG samples?	[___]	___	✓
	ACTION: If no for any of the above, flag as estimated (J) detects ≥ MDL of all the SDG samples for which the ICP Serial Dilution Analysis was not performed.			
A.1.21.2	Was a Field Blank or PE sample used for the Serial Dilution Analysis?	___	[✓]	___
	ACTION: If yes, flag as estimated (J) detects ≥ MDL of all the SDG samples			
A.1.21.3	Circle on Form VIII the Percent Differences (%D) between sample results and its dilution results that are outside the control limits ± 10%			

		YES	NO	N/A
	when initial concentrations ≥ 50 x MDLs.			
	Are results outside the control limits flagged with an "E"(Lab Qualifier) on Form VIII and all Form I's?	[___]	___	✓
	ACTION: If no, write in the Contract-Problem/ Non-Compliance Section of the Data Review Narrative.			
A.1.21.4	Are any %D values:			
	> 10%?	___	[✓]	___
	≥ 100%?	___	[✓]	___
	ACTION: If the Percent Difference (%D) is greater than 10%, flag (J) as estimated all associated samples whose **raw data** ≥ MDL; if the %D is ≥ 100%, reject (R) and red-line all associated samples with **raw data** ≥ MDL. (**NOTE**:Replace "E" with "J" or "R" as appropriate.)			
A.1.22	**Total/Dissolved or Inorganic/Total Analytes**			
A.1.22.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s)?	___	[___]	✓
	Were any analyses performed for inorganic as well as total analytes on the same sample(s)?	___	[___]	✓
	ACTION: If yes, prepare a Form (Appendix A.5) to compare the differences between dissolved (or inorganic)and total analyte concentrations. Compute each difference on Appendix A.5 as a percent of the total analyte only when both of the following conditions are fulfilled: (1) The dissolved(or inorganic)concentration is greater than total concentration, and (2) greater than or equal to 5xMDL.			
A.1.22.2	Is any dissolved (or inorganic) concentration greater than its total concentration by more than 20%?	___	[___]	✓

		YES	NO	N/A
A.1.22.3	Is any dissolved(or inorganic) concentration greater than its total concentration by more than 50%?	___	[___]	✓ ___

ACTION:
If the percent difference is greater than 20%, flag (J) both dissolved/inorganic and total concentrations as estimated. If the difference is more than 50%, reject (R) and red-line both the values.

A.1.23 **Field Blank - Form I**
NOTE: Designate "Field Blank" as such on Form I

A.1.23.1	Was a Field/Rinsate Bank collected and analyzed with the SDG samples?	[___]	✓ ___	___
	If yes, is any Field/Rinsate Blank absolute value of an analyte on Form I greater than its CRQL(or 2xMDL when MDL>CRQL)?	___	[___]	✓ ___
	If yes, circle the Field Blank value on Form I that is greater than the CRQL, (or 2 x MDL when MDL > CRQL).			
	Is any Field Blank value greater than CRQL also greater than the Preparation Blank value?	___	[___]	✓ ___
	If yes, is the Field Blank value (> CRQL and > the prep. blank value) already rejected due to other QC criteria?	[___]	___	✓ ___

ACTION:
If the Field Blank value was not rejected, reject all associated sample data (except the Field Blank results)greater than the CRQL but less than the Field Blank value. Reject on Form I's the soil sample results whose raw values in ug/L in the instrument printout are greater than the CRQL but less than the Field Blank value in ug/L. Flag as "J" detects between the Field Blank value and 10xField Blank value. If the sample result $\geq$ MDL but $\leq$ CRQL, replace it with CRQL-U.

If the Field Blank value is less than the

		YES	NO	N/A
	Prep.Blank value, do not qualify the sample results due to the Field Blank criteria.			

NOTE:
1. Field Blank result previously rejected due to other criteria cannot be used to qualify field samples.
2. Do not use Rinsate Blank associated with soils to qualify water samples and vice versa.

A.1.24 **Verification of Instrumental Parameters - Form IX, XA, XB, XI**

A.1.24.1 Is verification report present for:

Method Detection Limits (Form IX-Annually)?	[✓]	___	___
ICP-AES Interelement Correction Factors (Form XA & XB -Quarterly)?	[✓]	___	___
ICP-AES & ICP-MS Linear Ranges (Form XI-Quarterly)?	[✓]	___	___

ACTION:
If no, contact CLP PO/TOPO for submittal from the laboratory.

A.1.24.2 **Method Detection Limits - Form IX**

A.1.24.2.1 Are MDLs present on Form IX for:

All the analytes?	[✓]	___	___
All the instruments used?	[✓]	___	___
Digested and undigested samples and Calib.Blanks?	[___]	___	✓
ICP-AES and ICP-MS when both instruments are used for the same analyte?	[___]	___	✓

ACTION:
If no for any of the above, prepare Telephone Record Log and contact CLP PO/TOPO for submittal of the MDLs from the laboratory. Report to CLP PO and write in the Contract Problems/ Non-Compliance Section of the Data Review Narrative if the MDL concentration is not less than ½ CRQL.

		YES	NO	N/A
A.1.24.2.2	Is MDL greater than the CRQL for any analyte?	___	[✓]	___
	If yes, is the analyte concentration on Form I greater than 5 x MDL for the sample analyzed on the instrument whose MDL exceeds CRQL?	[___]	___	✓

ACTION:
If no, flag as estimated (J) all values less than five times MDL for the analyte whose MDL exceeds the CRQL.

A.1.24.3 **Linear Ranges - Form XI**

A.1.24.3.1	Was any sample result higher than the high linear range for ICP-AES or ICP-MS?	___	[✓]	___
	Was any sample result higher than the highest calibration standard for mercury or cyanide?	___	[___]	✓
	If yes for any of the above, was the sample diluted to obtain the result reported on Form I?	[___]	___	✓

ACTION:
If no, flag (J) as estimated the affected detects (≥ MDL) reported on Form I.

A.1.25 **ICP-MS Tune Analysis - Form XIV**

A.1.25.1	Was the ICP-MS instrument tuned prior to calibration?	[___]	___	✓

ACTION:
If no, reject (R) and red-line all sample data for which tuning was not performed.

A.1.25.2	Was the tuning solution analyzed or scanned at least five times consecutively?	[___]	___	✓
	Were all the required isotopes spanning the analytical range present in the tuning solution?	[___]	___	✓
	Was the mass resolution within			

		YES	NO	N/A
	0.1 amu for each isotope in the tuning solution?	[___]	___	✓
	Was %RSD less than 5% for each isotope of each analyte in the tuning solution?	[___]	___	✓

ACTION:
If no for any of the above, qualify all results ≥ MDL associated with that Tune as estimated "J", and all non-detects associated with that Tune as "UJ".

A.1.26 **ICP-MS Internal Standards - Form XV**

A.1.26.1	Were the Internal Standards added to all the samples and all QC samples and calibration standards (except the Tuning Solution)?	[___]	___	✓
	Were all the target analyte masses bracketed by the masses of the five internal standards?	[___]	___	✓

ACTION:
If none of the Internal Standards was added to the samples, reject (R) and red-line all the associated sample data (detects & non-detects). If internal standards were used but did not cover all the analyte masses, reject (R) and red-line only the analyte results not bracketed by the internal standard masses.

A.1.26.2	Was the intensity of an Internal Standard in each sample within 60-125% of the intensity of the same Internal Standard in the calibration blank?	[___]	___	✓
	If no, was the original sample diluted two fold, Internal Standard added and the sample re-analyzed?	[___]	___	✓
	Was the %RI for the two fold diluted sample within the acceptance limits (60-125%)?	[___]	___	✓

ACTION:
If no for any of the above, flag detects as "J" and non-detects "UJ" of all the analytes with atomic masses between the

atomic mass of the internal standard lighter

SAMPLE CALCULATION

EPA SAMPLE ID: VWAE-MW01-0310
COMPOUND: Manganese
CONCENTRATION: 2130 ug/L
%Solids – NA
Raw Data result: 2.1347 mg/L

2.1347 mg/L (1000ug/1mg) = 2134.7 ug/L

FIELD DUPLICATE SAMPLE SUMMARY

Note: All reported results are noted in the table below because the client requested that the MDL be used as reporting limit instead of the RL for this project. RPDs or absolute differences were calculated based on Region II guidelines: if results are >5X RL RPD is calculated, if results are <5X RL the absolute difference is calculated. Flags are applied to field duplicate pair only as follows: For RPD values - RPD ≥ 35% but <120% results are J, RPD >120%, results are R. For absolute difference values - >+/- 2X RL results are J, >+/- 4X RL results are R.

Sample ID: none Duplicate Sample ID:

Analyte	Sample Conc.	Duplicate Conc.	RPD or absolute difference
			0.000
			#DIV/0!

Comments: No qualifications required.

Sample ID: none Duplicate Sample ID:

Analyte	Sample Conc.	Duplicate Conc.	RPD or absolute difference
			0.000
			0.000

Comments: No qualifications required.

Reviewer Jacqueline Cleveland **Date:** 6/4/10

DataQual

Environmental Services, LLC

CH2M HILL
3011 S.W. Williston Road
Gainesville, FL 32608-3928

December 27, 2010
SDG# SJ2254, Mitkem Laboratories
Vieques Island, Puerto Rico

Dear Mr. Acaron,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # SJ2254. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the metals in this SDG (SW-846 methods 6010C). The Region II Standard Operating Procedure for the Evaluation of Metals Data for the CLP was used as applicable for the metals data. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID*	Matrix	VOA	SVOA	Fe, Mn
VWAI-MW04-1110H	J2254-01A	water	X		
VWAI-MW04-1110	J2254-01F	water	X	X	X
VWAI-MW04-1110A	J2254-02A	water	X		
VWAI-MW05-1110H	J2254-03A	water	X		
VWAI-MW05-1110	J2254-03F	water	X	X	X
VWAI-MW05-1110A	J2254-04A	water	X		
VWAI-EB01-110210	J2254-05F	water	X	X	
VWAI-EB01-110210A	J2254-06A	water	X		
VWAI-TB01-110210	J2254-07A	water	X		
VWAI-MW02-1110H	J2254-08A	water	X		
VWAI-MW02-1110	J2254-08F	water	X	X	X
VWAI-MW02-1110A	J2254-09A	water	X		
VWAI-EB01-110310	J2254-10B	water	X	X	
VWAI-EB01-110310A	J2254-11A	water	X		
VWAI-TB01-110310	J2254-12A	water	X		
VWAI-MW03-1110H	J2254-13A	water	X		
VWAI-MW03-1110	J2254-13F	water	X	X	X
VWAI-MW03-1110A	J2254-14A	water	X		
VWAI-MW07-1110H	J2254-15A	water	X		
VWAI-MW07-1110	J2254-15F	water	X	X	X
VWAI-MW07-1110A	J2254-16A	water	X		
VWAI-MW07P-1110	J2254-17F	water	X	X	
VWAI-MW07P-1110A	J2254-18A	water	X		
VWAI-EB01-110410	J2254-19F	water	X	X	
VWAI-EB01-1110A	J2254-20A	water	X		
VWAI-TB01-110410	J2254-21A	water	X		

Sample ID	Lab ID*	Matrix	VOA	SVOA	Fe, Mn
VWAI-MW02-1110 MS	J2254-08FMS	water	X	X	
VWAI-MW02-1110 MSD	J2254-08FMSD	water	X	X	
VWAI-MW02-1110A MS	J2254-09AMS	water	X		
VWAI-MW02-1110A MSD	J2254-09AMSD	water	X		

**Lab IDs listed were used for VOA samples as samples were analyzed with multiple preservatives (H: hydrochloric acid only, A; ascorbic acid only and no letter: ice only)*

The following quality control samples were provided with this SDG: samples VWAI-TB01-110210, VWAI-TB01-110310 and VWAI-TB01-110410-trip blanks; samples VWAI-EB01-110210, VWAI-EB01-110210A, VWAI-EB01-110310, VWAI-EB01-110310A, VWAI-EB01-110410 and VWAI-EB01-1110A-equipment blanks; and sample VWAI-MW07P-1110-field duplicate of sample VWAI-MW07-1110.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *
- ICP MS Tuning *
- Initial/Continuing Calibrations *
- ICSA/ICSAB Standards *
- RL Standards
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries *
- Matrix Duplicate RPDs *
- Serial Dilutions *
- Field Duplicates *
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However,

information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications to the data were required.

SVOA

No qualifications to the data were required.

Select Filtered Metals

Blank contamination was noted in one of the associated CCB samples. Qualifications were required.

The laboratory did not perform a matrix spike or a serial dilution in this SDG. These QC samples are required by Region II. Qualifications were required.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 11/2-4/10 and samples were received at the laboratory 11/3-5/10. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Blanks

Select Filtered Metals

One associated blank exhibited contamination as noted in the following table. Please see the Glossary of Qualification Flags and Abbreviations for details.

Blank ID	Analyte	Concentration	Action Level	Q Flag
CCB 2	iron	44.3B ug/L	LOD	U at LOD

Associated samples and required qualifications are noted in the following table.

Sample ID	Analyte	Q Flag
VWAI-MW03-1110, VWAI-MW04-1110	iron	U at LOD

Matrix Spike

Select Filtered Metals

The laboratory did not perform a matrix spike sample on a sample from this SDG. Region II required that all positive results be qualified as estimated J because of this. Therefore, the reported positive results for iron and manganese were qualified as estimated J with a qualifier code of OT.

Serial Dilution

Select Filtered Metals

The laboratory did not perform a serial dilution sample on a sample from this SDG. Region II required that all positive results be qualified as estimated J because of this. Therefore, the reported positive results for iron and manganese were qualified as estimated J with a qualifier code of OT.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
No qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
No qualifications				

Select Filtered Metals

Sample ID	Analyte	Results	Q flag	Q Code
VWAI-MW03-1110, VWAI-MW04-1110	iron	+B	U at LOD	MBL
all samples	iron, manganese	+	J	OT

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

LOD	level of detection
RL	reporting limit (equivalent to the LOD)
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
MBL, EBL, FBL or TBL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW04-1110H

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-01A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7446.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/03/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	4.6	J	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

12/7/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW04-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-01F

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7328.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/03/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	4.3	J	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WM 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW04-1110A

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-02A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7329.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/03/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	4.0	J	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WM 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-1110H

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-03A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7447.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/03/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WA 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-03F

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7330.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/03/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WW 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-1110A

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-04A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7331.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/03/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WS 12210

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-110210

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-05F

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7332.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/03/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VM 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-110210 A

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-06A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7333.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/03/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WW 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-TB01-110210

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-07A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7334.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/03/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VM 12270

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW02-1110H

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-08A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7448.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/04/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW02-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-08F

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7335.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/04/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

12270

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW02-1110A

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-09A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7336.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/04/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WA 122710

020

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-110310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-10B

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7337.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/04/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VM 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-110310 A

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-11A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7338.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/04/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VW 12270

022

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-TB01-110310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-12A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7327.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/04/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

12270

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW03-1110H

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-13A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7449.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/05/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

MM 122710

024

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW03-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-13F

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7437.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/05/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WW 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW03-1110A

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-14A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7438.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/05/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WM 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07-1110H

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-15A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7450.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/05/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	9.4		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VM 122710

027

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-15F

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7439.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/05/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	9.5		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WW 122710

028

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07-1110A

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-16A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7440.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/05/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	9.5		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WM 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07P-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-17F

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7441.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/05/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	10		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WW 12270

030

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07P-1110A

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-18A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7442.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/05/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	9.5		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-110410

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-19F

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7443.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/05/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WW 12270

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-1110A

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-20A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7444.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/05/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

11/22/10

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-TB01-110410

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-21A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7445.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/05/2010

% Moisture: not dec. Date Analyzed: 11/09/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

MM 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW02-1110MS

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-08FMS

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7339.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/04/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	52		0.41	0.50	5.0
71-43-2	Benzene	49		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	53		0.61	1.0	5.0

122710

035

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW02-1110MSD

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-08FMSD

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7340.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/04/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	52		0.41	0.50	5.0
71-43-2	Benzene	48		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	54		0.61	1.0	5.0

MM 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW02-1110AMS

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-09AMS

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7341.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/04/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	51		0.41	0.50	5.0
71-43-2	Benzene	49		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	52		0.61	1.0	5.0

WA 122710

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW02-1110AM SD

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-09AMSD

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6H7342.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/04/2010

% Moisture: not dec. Date Analyzed: 11/04/2010

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: µG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	52		0.41	0.50	5.0
71-43-2	Benzene	51		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	55		0.61	1.0	5.0

WW 122710

038

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW04-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-01E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H0517.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/03/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/05/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 11/24/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	1.4		0.96	1.0	1.0
91-57-6	2-Methylnaphthalene	1.0	U	0.94	1.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	1.4	J	1.3	5.0	5.0

122710

039

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW05-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-03E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H0518.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/03/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/05/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 11/24/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	1.7		0.96	1.0	1.0
91-57-6	2-Methylnaphthalene	20		0.94	1.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U	1.3	5.0	5.0

WW 12270

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SW846

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-110210

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-05E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H0519.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/03/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/05/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 11/24/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	1.0	U	0.96	1.0	1.0
91-57-6	2-Methylnaphthalene	1.0	U	0.94	1.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U	1.3	5.0	5.0

12270

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW02-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-08E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H0520.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/04/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/05/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 11/24/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	1.0	U	0.96	1.0	1.0
91-57-6	2-Methylnaphthalene	1.0	U	0.94	1.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U	1.3	5.0	5.0

12270

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-110310

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-10A

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H0523.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/04/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/05/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 11/24/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	1.0	U	0.96	1.0	1.0
91-57-6	2-Methylnaphthalene	1.0	U	0.94	1.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U	1.3	5.0	5.0

12/7/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW03-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-13E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H0524.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/05/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/05/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 11/24/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	1.0	U	0.96	1.0	1.0
91-57-6	2-Methylnaphthalene	1.0	U	0.94	1.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U	1.3	5.0	5.0

12270

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW07-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-15E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H0525.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/05/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/05/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 11/24/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	7.9		0.96	1.0	1.0
91-57-6	2-Methylnaphthalene	7.7		0.94	1.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U	1.3	5.0	5.0

WW 12270

s10.10.18.A

SW846

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW07P-1110

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-17E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H0526.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/05/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/05/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 11/25/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	10		0.96	1.0	1.0
91-57-6	2-Methylnaphthalene	9.9		0.94	1.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U	1.3	5.0	5.0

12/7/10

s10.10.18.A

SW846

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-110410

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-19E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H0527.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/05/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/05/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 11/25/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	1.0	U	0.96	1.0	1.0
91-57-6	2-Methylnaphthalene	1.0	U	0.94	1.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	5.0	U	1.3	5.0	5.0

12/7/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW02-1110MS

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-08EMS

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H0521.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/04/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/05/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 11/24/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	36		0.96	1.0	1.0
91-57-6	2-Methylnaphthalene	39		0.94	1.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	45		1.3	5.0	5.0

WM 12/7/10

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW02-1110MSD

Lab Name: MITKEM LABORATORIES Contract:

Lab Code: MITKEM Case No.: J2254 Mod. Ref No.: SDG No.: SJ2254

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: J2254-08EMSD

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H0522.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/04/2010

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/05/2010

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 11/24/2010

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	33		0.96	1.0	1.0
91-57-6	2-Methylnaphthalene	35		0.94	1.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	49		1.3	5.0	5.0

WM 122710

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

VWAI-MW02-1110

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SJ2254

Matrix (soil/water): WATER Lab Sample ID: J2254-08

Level (low/med): MED Date Received: 11/04/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	100	U		P	31.0	100	200
7439-96-5	Manganese	70.7		J OT	P	10.0	10.0	50.0

JAC 122710

Comments:

ISM_002 FORM I - IN SW846

050

0328

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

VWAI-MW03-1110

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SJ2254

Matrix (soil/water): WATER Lab Sample ID: J2254-13

Level (low/med): MED Date Received: 11/05/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	100 ~~53.0~~	B	U MBL	P	31.0	100	200
7439-96-5	Manganese	589		J OT	P	10.0	10.0	50.0

JMC 122710

Comments:

ISM_002

FORM I - IN

SW846

051

0329

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

VWAI-MW05-1110

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SJ2254

Matrix (soil/water): WATER Lab Sample ID: J2254-03

Level (low/med): MED Date Received: 11/03/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	311		J OT	P	31.0	100	200
7439-96-5	Manganese	1300		J OT	P	10.0	10.0	50.0

JMC 12/7/10

Comments:

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

VWAI-MW07-1110

Lab Name: Mitkem Laboratories Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SJ2254

Matrix (soil/water): WATER Lab Sample ID: J2254-15

Level (low/med): MED Date Received: 11/05/2010

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	51.1	~~B~~	J OT	P	31.0	100	200
7439-96-5	Manganese	222		J OT	P	10.0	10.0	50.0

JMC 122710

Comments:

ISM_002 FORM I - IN SW846

REPORT NARRATIVE

Mitkem Laboratories, a Division of Spectrum Analytical, Inc.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC E and I

Laboratory Workorder / SDG #: J2254

SW846 6010C

I. SAMPLE RECEIPT

No exceptions or unusual conditions were encountered unless a Sample Condition Notification Form, or other record of communication is included with the Sample Receipt Documentation.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed following procedures in laboratory test code: SW846 6010C

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: ICP_W_PR(3005A)

V. INSTRUMENTATION

The following instrumentation was used to perform the analyses:

Instrument Code: OPTIMA2
Instrument Type: ICP
Description: Optima 3100 XL
Manufacturer: Perkin-Elmer
Model: 3100 XL

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Spikes:

1. Laboratory Control Spikes (LCS/LCSD):

Percent recoveries and RPD for lab control samples were within the QC limits.

2. Matrix spike (MS):

No client-requested MS analysis was included in this SDG.

D. Post Digestion/Distillation Spike (PDS):

No PDS was performed on any sample in this SDG.

E. Duplicate sample:

No client requested duplicate analysis was included in this SDG.

F. Serial Dilution (SD):

No SD was performed on any sample in this SDG.

G. Samples:

No other unusual occurrences were noted during sample analysis.

No sample in this SDG required reanalysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Mitkem, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed: Shawn B Jones

Date: 12/3/10

MITKEM LABORATORIES

A DIVISION OF SPECTRUM ANALYTICAL, INC. Featuring HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: CH2M HILL

Invoice To: CH2M HILL

Project No.: 392485.FI.FK
Site Name: AOCI
Location: Vieques State: PR
Sampler(s): Kenji Butler / Chris Reed

Project Mgr.: Stephen Brand

P.O. No.: _____ RQN: _____

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= H_3PO_4 10=_____ 11=_____

List preservative code below: 6 | 9 | | 2

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: 8260C VOCs	8260C VOCs	TOC		8260C VOCs HOLD				Notes:
01	VWAI-MW04-1110	11/2/2010	0910	G	GW	7				2		3		2				Hold VOCs w/HCl preservative
02	VWAI-MW04-1110A	11/2/2010	0910	G	GW	2					2							1mg Ascorbic Acid Used
03	VWAI-MW05-1110	11/2/2010	0920	G	GW	7				2		3		2				Hold VOCs w/HCl preservative
04	VWAI-MW05-1110A	11/2/2010	0920	G	GW	2					2							1mg Ascorbic Acid Used
05	VWAI-EB01-110210	11/2/2010	1125	G	GW	2				2								
06	VWAI-EB01-110210A	11/2/2010	1125	G	GW	2					2							1mg Ascorbic Acid Used
07	VWAI-TB01-110210	11/2/2010	1100	G	GW	2				2								
																		All 8260C VOCs are for List I VOCs

☐ E-mail to _____
EDD Format _____

Condition upon receipt: ☒ Iced ☐ Ambient ☒ °C 3°C

Relinquished by:	Received by:	Date:	Time:
Kenji Butler		11/2/2010	1230
Reed		11/3/10	0950

MITKEM LABORATORIES

A DIVISION OF SPECTRUM ANALYTICAL, INC. Featuring HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
· All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
· Samples disposed of after 30 days unless otherwise instructed.

Report To: CH2M HILL

Invoice To: CH2M HILL

Project No.: 392485.FI.FK
Site Name: AOC-I
Location: Vieques State: PR
Sampler(s): Keaji Butler / Chris Reed

Project Mgr.: Stephen Brandt

P.O. No.: _____ RQN: _____

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9=_____ 10=_____ 11= _____

List preservative code below:

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: List I SVOC	Sulfate/Nitrate	Filtered Fe/Mn					
01	VWAI-MW04-1110	11/2/2010	0910	G	GW		2		2	2	1	1					0.45 micron Filtered on Fe/Mn
03	VWAI-MW05-1110	11/2/2010	0920	G	GW		2		2	2	1	1					0.45 micron Filtered on Fe/Mn
05	VWAI-EB01-110210	11/2/2010	1125	G	GW		2			2							

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____

State specific reporting standards:
_____

☐ E-mail to _____
EDD Format _____
PM _____

Condition upon receipt: ☒ Iced ☐ Ambient ☒ °C 2°C

Relinquished by:	Received by:	Date:	Time:
		11/2/2010	1230
		11/3/10	09:00

MITKEM LABORATORIES

A DIVISION OF SPECTRUM ANALYTICAL, INC. Featuring HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: CH2M Hill

Invoice To: CH2M Hill

Project No.: 392485.FI.FK
Site Name: AOC-I
Location: Vieques State: PR
Sampler(s): Kenji Butler / Chris Reed

Project Mgr.: Stephen Brandt

P.O. No.: _____ RQN: _____

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= H_3PO_4 10= Unpreserved 11= _____

List preservative code below: 2 10 6 9

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____

State specific reporting standards: _____

Lab Id: (J2054)	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Containers:	List I VOC (HCl)	List I VOC (unpres)	List I VOC (AA)	TOC	Analyses:	Notes:
08	VWAI-MW02-1110	11/3/2010	0925	G	GW	7					(H)	X		X		(H): Hold for Analysis
—	VWAI-MW02-1110 MS	11/3/2010	0925	G	GW	2						X	MS			
—	VWAI-MW02-1110MSA	11/3/2010	0925	G	GW	2							X			2mg AA used
—	VWAI-MW02-1110SD	11/3/2010	0925	G	GW	2						X				
—	VWAI-MW02-1110SDA	11/3/2010	0925	G	GW	2							X			2mg AA used
10	VWAI-EB01-110310	11/3/2010	1110	G	GW	2						X				
12	VWAI-TB01-110310	11/3/2010	1105	G	GW	2						X				
09	VWAI-MW02-1110A	11/3/2010	0925	G	GW	2							X			2mg AA used
11	VWAI-EB01-110310A	11/3/2010	1110	G	GW	2							X			2mg AA used
																Unpreserved & AA have 7day HT

☐ E-mail to _____
EDD Format _____

Condition upon receipt: ☑ Iced ☐ Ambient ☑ °C 3.5°C

Relinquished by:	Received by:	Date:	Time:
Fedex	Fedex		1130
		11/4/10	0857

MITKEM LABORATORIES

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CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: CH2M Hill

Invoice To: CH2M Hill

Project No.: 392485. FI. FK

Site Name: AOC-I

Location: Vieques State: PR

Sampler(s): Kenji Butler / Chris Reed

Project Mgr.: Stephen Brandt

P.O. No.: _____ RQN: _____

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= Unpreserved 10=_____ 11=_____

List preservative code below: 9 9 4

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: List I SVOC	Sulfate/Nitrate	F Metal (Fe/Mn)	QA/QC Reporting Level
08	VWAI-MW02-1110	11/3/2010	0925	G	GW		2		2	X	X	X	0.45 micron filter used on Fe/Mn
"	VWAI-MW02-1110MS	11/3/2010	0925	G	GW		2			X			
"	VWAI-MW02-1110SD	11/3/2010	0925	G	GW		2			X			
"	~~VWAI-MW02-KB~~	~~11/3/2010~~	—										
10	VWAI-EB01-110310	11/3/2010	1110	G	GW		2			X			

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____

State specific reporting standards: _____

☐ E-mail to _____
EDD Format _____

Condition upon receipt: ☐ Iced ☐ Ambient ☐ °C 4°C

Relinquished by:	Received by:	Date:	Time:
	FedEx		1130
		11/4/10	08:57

MITKEM LABORATORIES

A DIVISION OF SPECTRUM ANALYTICAL, INC. Featuring HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Special Handling:

TAT- Indicate Date Needed: ______

- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: CH2M Hill

Project Mgr.: Stephen Brand

Invoice To: CH2M Hill

P.O. No.: ______ RQN: ______

Project No.: 392485.FI.FK

Site Name: AOC-I

Location: Vieques State: PR

Sampler(s): Kenji Butler / Chris Reed

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= H_3PO_4 10= Unpreserved 11= ______

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=______ X2=______ X3=______

G=Grab C=Composite

List preservative code below: 2 | 10 | 6 | 9

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic		List I VOC (HCl)	List I VOC (unpres)	List I VOC (AA)	TOC				Notes:
13	VWAI-MW03-1110	11/4/2010	0950	G	GW	7					(H)	X		X				(H): Hold for Analysis
14	VWAI-MW03-1110A	11/4/2010	0950	G	GW	2							X					1mg AA used
15	VWAI-MW07-1110	11/4/2010	1020	G	GW	7					(H)	X		X				(H): Hold for Analysis
16	VWAI-MW07-1110A	11/4/2010	1020	G	GW	2							X					2.5mg AA Used
17	VWAI-MW07P-1110	11/4/2010	1025	G	GW	2						X						
18	VWAI-MW07P-1110A	11/4/2010	1025	G	GW	2							X					2.5mg AA Used
19	VWAI-EB01-110410	11/4/2010	1210	G	GW	2						X						
20	VWAI-EB01-110410A	11/4/2010	1210	G	GW	2							X					2.5mg AA Used
21	VWAI-TB01-110410	11/4/2010	1205	G	GW	2						X						
																		Unpreserved & AA have 7 day HT

QA/QC Reporting Level

☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other ______

State specific reporting standards: ______

☐ E-mail to ______

EDD Format ______

Condition upon receipt: ☒ Iced ☐ Ambient ☒ °C 1°C

Relinquished by:	Received by:	Date:	Time:
Kenji Butler	FedEx		1230
FedEx	[signature]	11/5/10	09:05

MITKEM LABORATORIES

A DIVISION OF SPECTRUM ANALYTICAL, INC. Featuring HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: CH2M Hill

Invoice To: CH2M Hill

Project No.: 392485. FI. FK

Site Name: AOC-I

Location: Vieques State: PR

Sampler(s): Kenji Butler / Chris Reed

Project Mgr.: Stephen Brand

P.O. No.: _____ RQN: _____

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= Unpreserved 10=_____ 11=_____

List preservative code below: 9 9 4

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: List I SVOC	Sulfate/Nitrate	F Metal (Fe/Mn)
13	VWAI-MW03-1110	11/4/2010	0950	G	GW		2		2	X	X	X
15	VWAI-MW07-1110	11/4/2010	1020	G	GW		2		2	X	X	X
17	VWAI-MW07P-1110	11/4/2010	1025	G	GW		2			X		
—	~~VWAI-[illegible]~~	—	—									
19	VWAI-EB01-110410	11/4/2010	1210	G	GW		2			X		

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____

State specific reporting standards:

0.45 Micron Filter used on Fe/Mn
0.45 micron Filter used on Fe/Mn

☐ E-mail to _____

EDD Format _____

Condition upon receipt: ☒ Iced ☐ Ambient ☒ °C 1°C

Relinquished by:	Received by:	Date:	Time:
Kenji Butler	Eddy		1230
Eddy	Ed Jones	11/5/10	08:05

Analysis Groups v. Analytical Methods for Navy CLEAN 1000-CTO-0083 Vieques AOC I First Post-Injection Event

PREPARED FOR:	Ed Lawler/Mitkem
PREPARED BY:	Zamboni, Michael/WDC
COPIES:	Jennifer Myers/WDC Juan Acaron/GNV Angela Barch/ATL
DATE:	October 15, 2010
PROJECT NUMBER:	392485.FI.FK

For this sample collection effort, the field team will mark the chain-of-custody for each sample to be analyzed for one or more of the following analysis groups: List I VOC (HCl), List I VOC (unpres), List I VOC (AA), List I SVOC, FMETAL, and/or WCHEM. These analysis groups correspond to the following analytical methods:

List I VOC (HCl):	VOCs via SW-846 8260C (TCL from Worksheet 15-6 List I). LOQ = 5ug/L for all compounds. Preserved with HCl (holding time = 14 days). Note that this will likely be marked "hold for analysis" and we do not intend to analyze these samples at this time.
List I VOC (unpres):	VOCs via SW-846 8260C (TCL from Worksheet 15-6 List I). LOQ = 5ug/L for all compounds. Unpreserved (**holding time = 7 days**).
List I VOC (AA):	VOCs via SW-846 8260C (TCL from Worksheet 15-6 List I). LOQ = 5ug/L for all compounds. Preserved with 4:1 molar (AA : persulfate) ascorbic acid (**holding time = 7 days**).
List I SVOC:	SVOCs via SW-846 8270D (TCL from Worksheet 15-7 List I). LOQ = 1ug/L for Naphthalene and 2-Methylnaphthalene and LOQ = 5ug/L for bis(2-ethylhexyl)phthalate.
FMETAL:	Field-Filtered Iron and Manganese via SW-846 6010B.
WCHEM:	Sulfate and Nitrate via EPA 300.0 Total Organic Carbon (TOC) via SM5310B Quad

Note that the acronym "H" refers to "hold for analysis" and that we do not intend to analyze these samples at this time.

Please ensure that this memo is appended to each chain-of-custody record.

Edward Lawler [Mitkem]

From: Michael.Zamboni@CH2M.com
Sent: Friday, November 05, 2010 2:48 PM
To: Edward Lawler [Mitkem]
Cc: Michael.Zamboni@CH2M.com; Victoria.Brynildsen@CH2M.com; Stephen.Brand@CH2M.com; Brett.Doerr@CH2M.com
Subject: RE: Vleques, final COC and Login and...

...and please pull those samples off of hold! We think the HCl v. AA v. unpres comparison will be useful.

COC Sample ID	Preservation	Lab Samp ID	Action	Rename (Client Sample ID) to:	New I ID?
VWAI-MW02-1110	HCl	J2254-08A	Analyze	VWAI-MW02-1110H	✓
VWAI-MW03-1110	HCl	J2254-13A	Analyze	VWAI-MW03-1110H	✓
VWAI-MW04-1110	HCl	J2254-01A	Analyze	VWAI-MW04-1110H	✓
VWAI-MW05-1110	HCl	J2254-03A	Analyze	VWAI-MW05-1110H	✓
VWAI-MW07-1110	HCl	J2254-15A	Analyze	VWAI-MW07-1110H	✓

Thanks for your help, Ed. Please let me know if that table isn't legible for you and I'll resend it in Excel. Have a great weekend!

Thanks,
Mike Z.

From: Edward Lawler [Mitkem] [mailto:elawler@mitkem.com]
Sent: Friday, November 05, 2010 1:50 PM
To: Zamboni, Michael/WDC; Brynildsen, Victoria/VBO
Subject: VIeques, final COC and Login and...

Hi Mike, Vickie—

Attached are the final COCs and Logins for all the samples received from the Vieques project.

The other file is what appears to be someone's To-Do list, which was written on the back side of one of the Technical Memorandum pages. I assume all these items have been accomplished, but just in case.....here it is again.

Have a great weekend!

--Ed

Edward A. Lawler
Deputy Director for Quality Services, Mitkem Laboratories
a Division of Spectrum Analytical Inc. featuring Hanibal Technology
401-732-3400 x315 401-732-3499 (fax)

MITKEM LABORATORIES

Sample Condition Form

Page 1 of 1

Received By:	Reviewed By: SR	Date: 11/3	Mitkem Work Order #: J2254
Client Project: Vapors		Client: CH2m Hill	

1) Cooler Sealed — Yes / No

2) Custody Seal(s) — Present / Absent
Coolers / Bottles
Intact / Broken

3) Custody Seal Number(s) N/A

4) Chain-of-Custody — Present / Absent

5) Cooler Temperature 3° / 2°
IR Temp Gun ID MT-1 / MT-7
Coolant Condition Ice / Ice

6) Airbill(s) — Present / Absent
Airbill Number(s) Fedex
8627-2265-3298
8627-2265-3302

7) Samples Bottles — Intact / Broken / Leaking

8) Date Received 11/3/10

9) Time Received 09:00

Lab Sample ID		Preservation (pH) HNO_3	H_2SO_4	HCl	NaOH	H_3PO_4	VOA Matrix	Soil Headspace or Air Bubble ≥ 1/4"
J2254	01	L2					H/AA	
	02						AA	
	03	L2					H/AA	
	04						AA	
	05						H/AA	
	06						AA	
J2254	07						U	

Preservative Name/Lot No.:

AA = Ascorbic Acid

VOA Matrix Key:

US = Unpreserved Soil	A = Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form yes / no

Form ID: QAF.0006 Rad OK yes / no

Y:\Controlled Forms\QAF.0006 sample condition form

MITKEM LABORATORIES

Sample Condition Form

Page 1 of 1

Received By:	Reviewed By:	Date:	Mitkem Work Order #: J2054
Client Project: Viegues		Client: CH2M-Hill	

1) Cooler Sealed — Yes / No

2) Custody Seal(s) — Present / Absent
Coolers / Bottles
Intact / Broken

3) Custody Seal Number(s) tape

4) Chain-of-Custody — Present / Absent

5) Cooler Temperature 3.5° / 4.0°
IR Temp Gun ID MT-1 / MT-1
Coolant Condition Ice / Ice - OK

6) Airbill(s) — Present / Absent
Airbill Number(s) Fedex Intl
8627-2265-3324
8627-2265-3335

7) Samples Bottles — Intact / Broken / Leaking

8) Date Received 11/4/10

9) Time Received 08:57

Preservative Name/Lot No.:

AA = Acetic Acid

Lab Sample ID		Preservation (pH) HNO_3	H_2SO_4	HCl	NaOH	H_3PO_4	VOA Matrix	Soil Headspace or Air Bubble ≥ 1/4"
J2054	08						H/UA	
	09						AA	
	10						UA	
	11						AA	
J2054	12						UA	

VOA Matrix Key:

US = Unpreserved Soil	A = Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form yes / no

Form ID: QAF.0006

Rad OK yes / no

Y:\Controlled Forms\QAF.0006 sample condition form

MITKEM LABORATORIES

Sample Condition Form

Received By: [signature] Reviewed By: CAK Date: 11/5 Mitkem Work Order #: J2254

Client Project: Vieques Client: Chem-Hill

1) Cooler Sealed — Yes / No

2) Custody Seal(s) — Present / Absent; Coolers / Bottles; Intact / Broken

3) Custody Seal Number(s) taped

4) Chain-of-Custody — Present / Absent

5) Cooler Temperature 1° / 1°

IR Temp Gun ID M1-1

Coolant Condition Ice-dry, both

6) Airbill(s) — Present / Absent

Airbill Number(s) Fedex

8627-2265-3520

8627-2265-3530

7) Samples Bottles — Intact / Broken / Leaking

8) Date Received 11/5/10

9) Time Received 09:05

Preservative Name/Lot No.:

AA = Ascorbic Acid

Lab Sample ID		Preservation (pH) HNO_3	H_2SO_4	HCl	NaOH	H_3PO_4	VOA Matrix	Soil Headspace or Air Bubble ≥ 1/4"
J2254	13	≤2					H/UA	
	14						AA	
	15	≤2					H/UA	
	16						AA	
	17							
	18						AA	
	19							
	20						AA	
J2254	21							

VOA Matrix Key:

US = Unpreserved Soil	A = Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form yes / no

Form ID: QAF.0006 Rad OK yes / no

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: J2254 LAB: Mitkem

SITE NAME: Vieques CTO-83

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

Sampled 11/2-4/10 Analy 11/4-9
Rec 11/3-5 Temp 1-4°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ✓ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ✓ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? ✓ ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? ✓ ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [✓] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ☑ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ☑ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ☑ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ☑ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are <u>not</u> used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ☐ ___ ☑

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VWAI-TB01-110410 no⊕
EB01-1110A no⊕
EB01-110410 no⊕
TB01-110310 no⊕
EB01-110310A no⊕
EB01-110310 no⊕
TB01-110210 no⊕
EB01-110210A no⊕
EB01-110210 no⊕

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) [Y] ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? [Y] ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? [Y] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ [Y] ___

9.7 Have the appropriate number of significant figures (two) been reported? [Y] ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. [Y] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☑ ___ ___

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☑ ___ ___

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

	YES	NO	N/A
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

NO TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ___ ✓

b. Blanks [ ] ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? ✓ ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ☑ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ☑ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

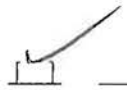
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis?  ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

DataQual **VOA**

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VWAI-MW07-1110
Duplicate Sample ID: VWAI-MW07-1110

Water: RPD>75%
Soil: RPD>100%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
benzene	9.5	10	5
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: No qualifications

* one of the results below the CRQL

DataQual **VOA**

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VWAI-MW07-1110A
Duplicate Sample ID: VWAI-MW07P-1110A

Water: RPD>75%
Soil: RPD>100%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
benzene	9.5	9.5	0
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
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			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: No qualifications

* one of the results below the CRQL

REPORT NARRATIVE

Mitkem Laboratories, a Division of Spectrum Analytical, Inc.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC E and I

Laboratory Workorder / SDG #: J2254

SW846 8260C

I. SAMPLE RECEIPT

No exceptions or unusual conditions were encountered unless a Sample Condition Notification Form, or other record of communication is included with the Sample Receipt Documentation.

Samples for volatile organics analyses were received with multiple preservations, including ice only, ice + ascorbic acid, and ice + hydrochloric acid.

Vials containing hydrochloric acid preservative were originally identified as "HOLD", but subsequently requested for analysis. Identifications for these samples had the letter "H" appended. Please note that the instructions to analyze these sample aliquots and append the letter "H" were not listed on the original chain of custody forms.

II. HOLDING TIMES

All samples were analyzed within the holding times specified in the method, shortened by the analytical specification and instructions for this program.

III. METHODS

Samples were analyzed following procedures in laboratory test code: SW846 8260C. A select list of volatile compounds were analyzed-for and reported.

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW5030B_PR(METHOD).

V. INSTRUMENTATION

The following instrumentation was used
Instrument Code: V6
Instrument Type: GCMS-VOA
Description: HP6890 / HP5973
Manufacturer: Hewlett-Packard
Model: 6890 / 5973
GC Column used: 30 m X 0.25 mm ID [1.40 um thickness] DB-624 capillary column.

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Surrogates:

Surrogate standard percent recoveries were within the QC limits.

D. Spikes:

1. Laboratory Control Spikes (LCS):

   Percent recoveries for lab control samples were within the QC limits.

2. Matrix Spike / Matrix Spike Duplicate (MS/MSD):

   Duplicate matrix spikes were performed on samples: VWAI-MW02-1110 (J2254-08FMS/MSD) VWAI-MW02-1110A (J2254-09AMS/MSD).

   Percent recoveries were within the QC limits.

E. Internal Standards:

Internal standard peak areas were within the QC limits.

F. Dilutions:

No sample in this SDG required analysis at dilution.

G. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Mitkem, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed: Edward A. Lasky

Date: 12/3/-

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: J2254 LAB: Mitkem

SITE NAME: Vieques CTO-83

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

	YES	NO	N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ".

Temp 1-4°C

Sampled 11/2-4/10 Extr 11/5 Rec 11/3-5 Analy 11/24-25

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within **7** days of the date of collection. Soil/sediment samples must be extracted within **14** days of collection. Extracts must be analyzed within

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YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received (See Traffic Report)	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

	YES	NO	N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water	[✓]	___	___
b. Low/Med Soil	[ ]	___	___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water	[✓]	___	___
b. Low/Med Soil	[ ]	___	___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk?	[ ]	___	✓

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 80000C-24).	[ ]	✓	___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed?	[ ]	___	✓

	YES	NO	N/A
Were method blanks re-analyzed?	[ ]	___	✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II?	___	[ ]	✓

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [✓] ___ ___

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low Solid [ ] ___ ___

c. Med Solid [ ] ___ ___

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. ✓ ___ ___

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water

0 out of 36
UR 12/27

Solids

____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
0 out of 3	____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

	YES	NO	N/A
the calibration standard or at any other time during the analytical shift for each GC/MS system used ?	✓		

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra. Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles?	✓		

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary.		✓	
6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)?		✓	

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YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

VWAI-EB01-110210 no
↓ EB01-110310 no
EB01-110410 no

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

	YES	NO	N/A
that exceeded the initial calibration range.	[ ]	___	✓
6.5 Does the instrument blank have positive results for target analytes and/or TICs?	___	[ ]	✓

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column.	[✓]	___	___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)?	[✓]	___	___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

	YES	NO	N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

	YES	NO	N/A
ACTION: If ion abundance criteria are not met, take action specified in section 3.2			
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.			
8.8 Are the spectra of the mass calibration compound acceptable?	✓		
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
9.0 Target Analytes			
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates	✓		
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?			✓

	YES	NO	N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate	[✓]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[✓]	___	___
c. Blanks	[✓]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report?	[✓]	___	___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability?	[✓]	___	___
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___
Other:_____	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

	YES	NO	N/A
each sample?	✓		

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	✓		
9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum?	✓		
9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum?	✓		

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

	YES	NO	N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? NO TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ___ ✓

b. Blanks [ ] ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ___ ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

	YES	NO	N/A
sample mass spectrum?	[ ]	___	✓
10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%?	[ ]	___	✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	___	[ ] ✓	___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture?	[ ] ✓	___	___

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YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ✓ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? [✓] ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is $\geq$ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? [ ] ✓ ___

	YES	NO	N/A
13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%?	___	[ ]	✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest?	✓	___	___
14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument?	✓	___	___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

	YES	NO	N/A
call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").			
14.3 Do any of the SPCCs have an RRF <0.05?		✓	
If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18.		✓	
14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?			
ACTION: If yes, make a note in data assessment.			
14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%?		✓	
ACTION: Circle all outliers in red.			
ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.			
14.6 Do any semivolatile compounds have a RRF < 0.05?		✓	
ACTION: Circle all outliers in red.			
ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.			
14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more).		✓	

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? [✓] ___ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? [✓] ___ ___

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? [✓] ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? [✓] ___ ___

DataQual **SVOA**

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VWAI-MW07-1110
Duplicate Sample ID: VWAI-MW07-1110D

Water: RPD>50%
Soil: RPD>75%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
napthalene	7.9	10	23
2-methylnapthalene	7.7	9.9	25
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

* one or both values below CRQL

COMMENTS: No qualifications required.

REPORT NARRATIVE

Mitkem Laboratories, a Division of Spectrum Analytical, Inc.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC E and I

Laboratory Workorder / SDG #: J2254

SW846 8270D

I. SAMPLE RECEIPT

No exceptions or unusual conditions were encountered unless a Sample Condition Notification Form, or other record of communication is included with the Sample Receipt Documentation.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed following procedures in laboratory test code: SW846 8270D. A select list of semivolatile compounds were analyzed-for and reported.

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: BNA_W_PR(SEPF)

V. INSTRUMENTATION

The following instrumentation was used
Instrument Code: S3
Instrument Type: GCMS-SEMI
Description: HP6890 / HP5973
Manufacturer: Hewlett-Packard
Model: 6890 / 5973
GC Column used: 30 m X 0.25 mm ID [0.25 um thickness] Rxi-5sil MS capillary column.

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Surrogates:

Surrogate standard percent recoveries were within the QC limits.

D. Spikes:

1. Laboratory Control Spikes (LCS):

Percent recoveries for lab control samples were within the QC limits.

2. Matrix Spike / Matrix Spike Duplicate (MS/MSD):

Duplicate matrix spikes were performed on sample: VWAI-MW02-1110 (J2254-08EMS/MSD)

Percent recoveries were within the QC limits.

G. Internal Standards:

Internal standard peak areas were within the QC limits.

H. Dilutions:

No sample in this SDG required analysis at dilution.

H. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Mitkem, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed: _____

Date: 12/3/10

Site: Vieques AOC E & I

Case #:

SDG #: J2254

Samples: **Soil** **Water** (circled)

Note - most CLP forms were not used - (receipt forms & some documentation forms). Report forms were CLP format.

	YES	NO	N/A
A.I.1 **Contract Compliance Screening Report** Present?	[ ]	___	✓
ACTION: If no, contact RSCC/PO.			
A.I.2 **Record of Communication (from RSCC)** Present?	[ ]	___	✓
ACTION: If no, request from the RSCC.			
A.1.3 **Sampling Trip Report** Present and complete?	[ ]	___	✓
ACTION: If no, contact RSCC/PO.			
A.I.4 **Chain of Custody/Sample Traffic Report** Present?	[✓]	___	___
Legible?	[✓]	___	___
Signature of sample custodian present?	[✓]	___	___
ACTION: If no, contact RSCC/WAM/PO.			
A.I.5 **Cover Page** Present?	[ ]	___	✓
Is the Cover Page properly filled in and the verbatim signed by the lab manager or the manager's designee?	[ ]	___	✓
Do the sample identification numbers on the Cover Page agree with sample Identification numbers on:			
(a) Traffic Report Sheet?	[ ]	___	✓

	YES	NO	N/A
(b) Form I's?	[✓]	___	___
Is the number of samples on the Cover Page the same as the number of samples on the Traffic Report sheet and the Regional Record of Communication (ROC) for the data Case?	[___]	___	✓

ACTION:
If no for any of the above, prepare Telephone Record Log and contact RSCC/PO for re-submittal of the corrected Cover Page from the laboratory.

A.1.6 **SDG Narrative, DC-1 & DC-2 Form**

Is the SDG Narrative present?	[✓]	___	___
Is Sample Log-In Sheet(Form DC-1) present and complete?	[___]	___	✓
Is Complete SDG Inventory Sheet(Form DC-2) present and complete?	[___]	___	✓

ACTION:
If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.

Receipt paperwork was present & in order.

A.1.7 **Form I to XV**

A.1.7.1 Are all the Form I through Form XV labeled with:

Laboratory Name?	[✓]	___	___
Laboratory Code?	[✓]	___	___
RAS/Non-RAS Case No.?	[___]	___	✓
SDG No.?	[✓]	___	___

		YES	NO	N/A
	Contract No.?	[✓]	___	___

ACTION:
If no for any of the above, note under Contract Problem/Non-Compliance Section of the "Data Review Narrative" and contact PO for corrected Form(s) from the laboratory.

A.1.7.2	After comparing values on Forms I-IX against the raw data, do any computation/ transcription errors exceed 10% of the reported values on the Forms for:			
	(a) all analytes analyzed by ICP-AES?	___	[✓]	___
	(b) all analytes analyzed by ICP-MS?	___	[___]	✓
	(c) Mercury?	___	[___]	✓
	(d) Cyanide?	___	[___]	✓

ACTION:
If yes, prepare Telephone Record Log and contact CLP PO/TOPO for the corrected data from the laboratory.

A.1.8 Raw Data

Data shall not be validated without the hard/electronic copies of the associated raw data for samples and QC samples.

A.1.8.1 Digestion/Distillation Log

Digestion Log for ICP-AES (Form XII)present?	[✓]	___	___
Digestion Log for ICP-MS (Form XII) present?	[___]	___	✓
Digestion Log for mercury (Form XII) present?	[___]	___	✓
Distillation Log for cyanide (Form XII) present?	[___]	___	✓

Are pH values for metals and

	YES	NO	N/A
cyanide reported for each aqueous sample?	[✓]	_	_
Are percent solids calculations present for soils/sediments?	[_]	_	✓
Are preparation dates present on the sample preparation logs/bench sheets?	[✓]	_	_

NOTE:
Digestion/Distillation log must include weights, volumes, and dilutions used to obtain the reported results.

A.1.8.2 Is the analytical instrument real-time printouts present for:

ICP-AES?	[✓]	_	_
ICP-MS?	[_]	_	✓
Mercury?	[_]	_	✓
Cyanide?	[_]	_	✓

Are all laboratory bench sheets and instrument raw data printouts necessary to support all sample analyses and QC operations:

Legible?	[✓]	_	_
Properly labeled?	[✓]	_	_

Are all field samples, QC samples and field QC samples present on:

Digestion/Distillation log?	[✓]	_	_
Instrument Printouts?	[✓]	_	_

ACTION:
If no for any of the above questions in Section A.1.8.1 and Section A.1.8.2, write Telephone Record Log and contact TOPO/PO for re-submittal from the laboratory.

		YES	NO	N/A
A.1.9	**Technical Holding Times**: (Aqueous and soil samples) (Examine sample Traffic Reports and digestion/distillation logs to determine the holding time from the sample collection date to the sample preparation date.)			
A.1.9.1	Cyanide distillation(14 days)exceeded?	__	[__]	✓
	Mercury analysis(28 days) exceeded?	__	[__]	✓
	Other Metals analysis(180 days)exceeded? ___	___	[✓]	__

ACTION:
If yes, reject (R) and red-line non-detects and flag as estimated (J)results ≥ MDL even if sample(s) was preserved properly.

NOTE:
In addition to qualifying the data, a list of all samples and analytes which exceeded the holding times must be prepared. Report for each sample the number of days that were exceeded. (Subtract the sample collection date from the sample preparation date). Attach this list to the data review narrative.

A.1.9.2	Is pH of aqueous samples for:			
	Metals Analysis ≤ 2?	[✓]	___	___
	Cyanide Analysis ≥ 12?	[__]	__	__ ✓

ACTION:
If no for any of the above, flag non-detects as "R" and detects as "J".

A.1.9.3	Is the cooler temperature ≤ 10 C°?	✓ [__]	__	__

ACTION:
If cooler temperature is >10 ^{0}C , flag non-detects as "UJ" and detects as "J".

A.1.10 **Final Data Correctness - Form I**

A.1.10.1 Are Form I's for all samples

	YES	NO	N/A
present and complete?	[✓]	___	___

ACTION:
If no, prepare Telephone Record Log and contact CLP PO/TOPO for submittal from the laboratory.

A.1.10.2 Verify there are no calculation and transcription errors in the results reported on Form I's. Circle on each Form I all results that are incorrect.

Is the calculation error less than 10% of the correct result?	[✓]	___	___
Are results on Form I's reported in correct units (ug/L for aqueous and MG/KG for soils)?	[✓]	___	___
Are results on Form I'S reported by correct significant figures?	[✓]	___	___
Are soil sample results on Form I's corrected for percent solids?	[___]	___	✓
Are all "less than MDL" values reported by the ~~CRQLs~~ LODs and coded with "U"?	[✓]	___	___
Are values less than the ~~CRQLs~~ LODs but greater than or equal to the MDLs flagged with "J"? flagged B - Reviewer flagged J as needed	[___]	✓	___
Are appropriate contractual quality control and Method qualifiers used?	[✓]	___	___

ACTION:
If no for any of the above questions, prepare Telephone Record Log, and contact CLP PO/TOPO for corrected data.

A.1.10.3 Do EPA sample identification numbers and the corresponding laboratory sample identification numbers match on the Cover Page, Form I's and in the raw data? [✓] ___ ___

Was a brief physical description

	YES	NO	N/A
of the samples before and after digestion given on the Form I's?	[___]	___	___
Was any sample result outside the mercury/cyanide calibration range or the ICP-AES/ICP-MS linear range diluted and noted on the Form I?	[___]	___	___

ACTION:
If no for any of the above, note under the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.11 **Initial Calibration**

		YES	NO	N/A
A.1.11.1	Is a record of at least 2 point (A blank and a standard)calibration present for ICP-AES analysis?	[___]	___	___
	Is a record of at least 2 point (a blank and a standard)calibration present for ICP-MS analysis?	[___]	___	___
	Is a record of at least 5 point calibration (a blank & 4 standards)present for Hg analysis?	[___]	___	___
	Is a record of at least 4 point calibration (a blank & 4 standards)present for cyanide?	[___]	___	___

ACTION:
If incomplete or no initial calibration was performed, reject (R) and red-line the associated data (detects & non-detects).

	Is one initial calibration standard at the CRQL level for cyanide and mercury?	[___]	___	___

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the Data Review Narrative.

A.1.11.2	Is the curve correlation coefficient $\geq$ 0.995 for:			

		YES	NO	N/A
	Mercury Analysis?	[___]	___	✓
	Cyanide Analysis?	[___]	___	✓
	ICP-AES(more than 2 point Calib.)?	[✓]	___	___
	ICP-MS (more than 2 point calib.)?	[___]	___	✓

ACTION:
If no, qualify the associated sample results ≥ MDL as estimated "J" and non-detects as "UJ".

NOTE:
The correlation coefficient shall be calculated by the data validator using standard concentrations and the corresponding instrument response (e.g. absorbance, peak area, peak height, etc.).

A.1.12 **Initial and Continuing Calibration Verification- Form IIA**

A.1.12.1	Present and complete for every metal and cyanide?	[✓]	___	___
	Present and complete for ICP-AES and ICP-MS when both these methods were used for the same analyte?	[___]	___	✓

ACTION:
If no for any of the above, prepare a Telephone Record Log and contact PO/TOPO for re-submittal from the laboratory.

A.1.12.2	Was a Continuing Calibration Verification performed every 10 samples or every 2 hours whichever is more frequent?	[✓]	___	___

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.12.3	Was an ICV or a mid-range standard distilled and analyzed with each batch of cyanide samples?	[___]	___	✓

	YES	NO	N/A

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative and qualify results ≥ MDL as estimated (J).

A.1.12.2 Circle on each Form IIA all percent recoveries that are outside the contract windows.

Are ICV/CCVs within control limits for:

Metals - 90-110%R?	[✓]	___	___
Hg - 80-120%R?	[___]	___	✓
Cyanide - 85-115%R?	[___]	___	✓

ACTION:
If no, qualify all samples between a previous technically acceptable CCV standard and a subsequent technically acceptable CCV standard as follows as follows:

Qualify as estimated (J) all detects and non-detects, if the ICV/CCV %R is between 75-89%(65-79% for Hg; 70-84% for CN). Qualify only positive results(≥ MDL) as "J" if the ICV/CCV %R is between 111-125%(121-135% for Hg;116-130% for CN). Reject (R) and red-line only
detects if the recovery is greater than 125% (135% for Hg; 130% for CN). Reject (R) and red-line all associated results (hits and non-detects)if the recovery is less than 75%(65% for Hg;70% for CN).

NOTE:
For ICV that does not fall within the acceptance limits, qualify all samples reported from the analytical run.

A.1.12.3 Was the distilled ICV or mid-range standard for cyanide within acceptance limits (85-115%)? [___] ___ ✓

ACTION:
If no, Qualify all cyanide results ≥ MDL as "J".

A.1.13 **CRQL Standard Analysis - Form IIB**

A.1.13.1 For each ICP-AES run, was a CRI

	YES	NO	N/A
(CRQL or MDL when MDL > CRQL) standard analyzed? (Note:CRI is not required for Al, Ba, Ca, Fe, Mg, Na and K.)	[___]	___	___
For each ICP-MS run, was a CRI (CRQL or MDL when MDL > CRQL) standard analyzed for each mass/isotope used for the analysis?	[___]	___	___
For each mercury run, was a CRQL standard analyzed?	[___]	___	___
For each cyanide run, was a CRQL standard analyzed?	[___]	___	___

ACTION:
If no for any of the above, write this deficiency in the Contract Problems/ Non-Compliance Section of the Data Review Narrative, inform CLP PO and flag results in the affected ranges (detects <2xCRQL)as J and non-detects UJ.

Mn - no CRI std run - all results were >2X LOD of 10; no goals required.

The affected ranges are:
ICP-AES Analysis - *True Value ± CRQL
ICP-MS Analysis - *True Value ± CRQL
Mercury Analysis - *True Value ± CRQL
Cyanide Analysis - *True Value ± CRQL
* True value of the CRQL Standard

A.1.13.2 Was a CRQL standard analyzed after the ICV/ICB, before the final CCV/CCB and once every 20 analytical samples in the analytical run for each analysis? [___] ___ ___

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the "Data Review Narrative".

A.1.13.3 Circle on each Form IIB all percent recoveries that are outside the acceptance windows.

	YES	NO	N/A
Is the CRQL standard within control limits for:			
Metals(ICP-AES/ICP-MS)- 70 - 130%?	[___]	___	___ ✓
Mercury- 70 - 130%?	[___]	___	___ ✓
Cyanide - 70 - 130%?	[___]	___	___ ✓

ACTION:
If no, flag detects <2xCRQL as "J" and non-detects as "UJ" if the CRQL standard recovery is between 50-69%. Flag(J) only detects <2xCRQL if the recovery is between 131% and ≤180%. If the recovery is less than 50%, reject(R) and red-line non-detects and detects < 2xCRQL, and flag (J) detects between 2xCRQL and ICV/CCV. Reject and red-line only detects <2xCRQL and flag (J)detects ≥ 2xCRQL but < ICV/CCV if the recovery is > 180%.

NOTE:
1. Qualify all field samples analyzed between a previous technically acceptable analysis of the CRQL standard and a subsequent acceptable analysis of the CRQL standard
2. Flag (J) or reject (R) only the final sample results on Form I's when **Sample raw data** are within the affected ranges and the CRQL standard is outside the acceptance windows.
3. The samples and the CRQL standard must be analyzed in the same analytical run.

A.1.14 Initial and Continuing Calibration Blanks - Form III

		YES	NO	N/A
A.1.14.1	Present and complete for all the instruments used for the metals and cyanide analyses?	[✓]	___	___
	Was an initial Calibration Blank analyzed after ICV?	[✓]	___	___
	Was a continuing Calibration Blank analyzed after every CCV and every 10 samples or every 2 hours, whichever is more frequent?	[✓]	___	___
	Were the ICB & CCB values ≥ MDL but < CRQL reported on Form III and flagged "J" by			

		YES	NO	N/A
	using MDLs from direct analysis(Preparation Method "NP1")? (Check Form III against the raw data)	[✓]	___	___

ACTION:
If no, inform CLP PO/TOPO and make a note in the Contract-Problems/Non-Compliance Section of the "Data Review Narrative".

A.1.14.2 Circle with red pencil on each Form III all Calib. Blank values that are:

≥ MDL but ≤ CRQL

> CRQL

A.1.14.2.1	When MDL < CRQL, is any Calib. Blank value ≥ MDL but ≤ CRQL?	✓	[___]	___

ACTION:
If yes, change sample results ≥ MDL but ≤ CRQL to the CRQL with a "U". Do not qualify non-detects.

Flag U @ LOD in MW04 03 — Note - all but MW07 were assoc with CCB that was contam

A.1.14.2.2	When MDL < CRQL, is any Calib. Blank value > CRQL?	___	[✓]	___

ACTION:
If yes, reject (R) and red line the associated sample results > CRQL but <ICB/CCB Blank Result. Flag as "J" detects > ICB/CCB blank value but < 10xICB/CCB value. Change the sample results ≥ MDL but ≤ the CRQL to CRQL with a "U".

A.1.14.2.3	Is any Calibration Blank value below the negative CRQL?	___	[✓]	___

ACTION:
If yes, flag (J) as estimated all associated sample results ≥ CRQL but <10xCRQL.

NOTE:

1. For ICB that does not meet the technical QC Criteria, apply the action to all samples

BLANKS

Lab Name: Mitkem Laboratories Contract: 933562, N62470-08-D-1000, Proj 3924

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SJ2254

Preparation Blank Matrix (soil/water): WATER

Method Blank ID: MB-55727

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

OPTIMA2_101120A

Analyte	Initial Calibration Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Iron	31.0	U	31.0	U	44.3	B	31.0	U	31.000	U	P
Manganese	10.0	U	10.0	U	10.0	U	10.0	U	10.000	U	P

MW04 ✓
05 ✓ Flag U @ LOD
02
03 ✓

	YES	NO	N/A

reported from the analytical run.

2. For CCBs that do not meet the technical QC criteria, apply the action to all samples analyzed between a previous technically acceptable analysis of CCB and a subsequent technically acceptable analysis of the CCB in the analytical run.,

A.1.15 **Preparation Blank - FORM III**

NOTE: The Preparation Blank for mercury is the same as the calibration blank.

A.1.15.1 Was one Preparation Blank prepared with and analyzed for:

Each Sample Delivery Group (SDG)?	[✓]	___	___
Each batch of the SDG samples digested/distilled?	[✓]	___	✗
Each matrix type?	[✓]	___	___
All instruments used for metals and cyanide analyses?	[✓]	___	___

ACTION:
If no for any of the above, flag as estimated (J) all the associated positive data <10xMDL for which the Preparation Blank was not analyzed.

NOTE:
If only one blank was analyzed for more than 20 samples, then the first 20 samples analyzed are not estimated(J),but all additional samples must be qualified (J).

A.1.15.2 Circle with red pencil on each Form III all Prep. Blank values that are:

≥ MDL but ≤ CRQL, and

> CRQL

A.1.15.2.1 When MDL < CRQL, is any preparation blank value ≥ MDL but ≤ CRQL? ___ [✓] ___

ACTION:
If yes, change sample result ≥ MDL

		YES	NO	N/A
	If yes, reject (R) and red-line all positive sample results with sample raw data less than 10 times the Preparation Blank value.			
A.1.16	**ICP-AES/ICP-MS Interference Check Sample (ICS)- Form IV** **NOTE:** Not required for CN, Hg, Al, Ca, Fe and Mg.			
A.1.16.1	Present and complete?	[✓]	___	___
	Was ICS analyzed at the beginning and end of each analytical run, and once for every 20 analytical samples?	[✓]	___	___
	Was ICS analyzed at the beginning of the ICP-MS analytical run?	[___]	___	✓
	ACTION: If no, flag as estimated (J) all sample results.			
A.1.16.2	**ICP-AES Method**			
A.1.16.2.1	**ICSA Solution:** For ICP-AES, are the ICSA "Found" analyte values within the control limits ± of CRQL of the true/established mean value?	[✓]	___	___
	If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSA Solution on Form IV?	[___]	___	✓
	ACTION: If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run: Flag (J) as estimated only sample results ≥MDL			

	YES	NO	N/A

for which the ICSA "Found' value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag non-detects as "UJ" and detects as "J".

A.1.16.2.3 **ICSAB Solution**

For ICP-AES, are all analyte results in ICSAB within the control limits of 80-120 of the true/established mean value? [✓] ___ ___

If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSAB Solution on Form IV? [___] ___ ✓

ACTION:

If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79%, qualify sample results ≥ MDL as "J" and non-detects as "UJ". Reject (R) and red-line all sample results (detects & non-detects) for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only positive results.

A.1.16.3 **ICP-MS Method**

A.1.16.3.1 **ICSA Solution:**

For ICP-MS, are the ICSA "Found" analyte values within the control limits of ±CRQL of the true/established mean value? [___] ___ ✓

ACTION:

If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated only sample results ≥ MDL if the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag the associated sample detects as "J" and non-detects as "UJ".

	YES	NO	N/A

A.1.16.3.3 **ICSAB Solution**

For ICP-MS, are all analyte results in ICSAB within the control limits of 80-120% of the true/established mean value, whichever is greater? [___] ___ ✓

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79% flag (J) as estimated the associated sample results ≥ MDL. Reject (R) and red-line those all sample detects and non-detects for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only detects (≥ MDL).

A.1.17 **Spiked Sample Recovery: Pre-Digestion/Pre-Distillation)-Form V A**

Note: Not required for Ca, Mg, K, and Na (both matrices); Al and Fe (soil only)

A.1.17.1 Was Matrix Spike analysis performed:

For each matrix type?	[___]	✓	___
For each SDG?	[___]	✓	___
On one of the SDG samples?	[___]	✓	___
For each concentration range (i.e., low, med., high)?	[___]	✓	___
For each analytical Method (ICP-AES, ICP-MS, Hg, CN) used?	[___]	✓	___
Was a spiked sample prepared and analyzed with the SDG samples?	[___]	✓	___

ACTION:
If no for any of the above, flag as estimated (J) all the positive data for which a spiked sample was not analyzed.

No MS & /or MSD was performed
J all + results

NOTE:
If more than one spiked sample were analyzed for one SDG, then qualify the associated data based on the worst spiked sample analysis.

		YES	NO	N/A
A.1.17.2	Was a field blank or PE sample used for the spiked sample analysis?	___	[✓]	___

ACTION:
If yes, flag (J) as estimated positive data of the associated SDG samples for which field blank or PE sample was used for the spiked sample analysis.

A.1.17.3	Circle on each Form VA all spike recoveries that are outside the control limits (75-125%) that have sample concentrations less than four times the added spike concentrations.			
	Are all recoveries within the control limits when sample concentrations are less than or equal to four times the spike concentrations?	[___]	___	✓

NOTE:
Disregard the out of control spike recoveries for analytes whose concentrations are greater than or equal to four times the spike added.

	Are results outside the control limits (75-125%)flagged with Lab Qualifier "N" on Form I's and Form VA?	[___]	___	✓

ACTION:
If no for any of the above, write in the Contract - Problems/Non-Compliance Section of the Data Review Narrative.

A.1.17.4 **Aqueous**

	Are any spike recoveries:			
	(a) less than 30%?	___	[___]	✓
	(b) between 30-74%?	___	[___]	___
	(c) between 126-150%?	___	[___]	___
	(d) greater than 150%?	___	[___]	___

ACTION:
If the matrix spike recovery is less than 30%, reject (R) and red-line all associated aqueous data (detects & non-detects). If between 30-74%, qualify all associated aqueous data ≥ MDL as "J" and non-detects

	YES	NO	N/A

as "UJ". If between 126-150%, flag (J) all data ≥ MDL as "J". If greater than 150%, reject (R) and red-line all associated data ≥ MDL.

(**NOTE**:Replace "N" with "J", "R" as appropriate.)

A.1.17.5 **Soil/Sediment**

Are any spike recoveries:

(a) less than 10%?	___	[___]	✓
(b) between 10-74%?	___	[___]	___
(c) between 126-200%?	___	[___]	___
(d) greater than 200%?	___	[___]	___

ACTION:
If yes for any of the above, proceed as follows:

If the matrix spike recovery is less than 10%, reject (R) and red-line all associated data (detects & non-detects); if between 10-74%, qualify all associated data ≥ MDL as "J" and non-detects as "UJ"; if between 126-200%, flag (J) all associated data ≥ MDL as "J" If greater than 200%, reject (R) and red-line all associated data ≥ MDL.
(**NOTE**:Replace "N" with "J" or "R" as appropriate.)

A.1.18 **Lab Duplicates) - Form VI**

A.1.18.1 Was the lab duplicate analysis performed:

For each SDG?	[___]	___	✓
On one of the SDG samples?	[___]	___	___
For each matrix type?	[___]	___	___
For each concentration range (low or med.)?	[___]	___	___
For each analytical Method (ICP-AES/ICP-MS, Hg, CN) Used?	[___]	___	___
Was a lab duplicate prepared and analyzed with the SDG samples?	[___]	___	___

		YES	NO	N/A
	ACTION: If no for any of the above, flag (J) as estimated all the SDG sample results (detects & non-detects) for which the lab duplicate analysis was not performed.			
	NOTE: If more than one lab duplicate sample were analyzed for an SDG, then qualify the associated samples based on the worst lab duplicate analysis.			
A.1.18.2	Was a Field Blank or PE sample used for the Lab Duplicate analysis?	___	[✓]	___
	ACTION: If yes, flag as estimated (J) all SDG sample results (hits & non-detects) for which Field Blank or PE sample was used for duplicate analysis.			
A.1.18.3	Circle on each Form VI all values that are: RPD > 20%, or Absolute Difference > CRQL			
	Are all values within control limits (RPD ≤ 20% or absolute difference ≤ ±CRQL)?	[___]	___	✓ ___
	If no, are all results outside the control limits flagged with an "*" (Lab Qualifier) on Form VI and on all Form I's?	[___]	___	✓ ___
	ACTION: If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.			
	NOTE: The laboratory is not required to report on Form VI the RPD when both values are non-detects.			
A.1.18.4	**Aqueous**			
A.1.18.4.1	When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			

	YES	NO	N/A
is any RPD > 20% but < 100%?	___	[___]	___
is any RPD ≥ 100%?	___	[___]	___

ACTION:
If the RPD is > 20% but < 100%, flag (J) as estimated the associated sample data ≥ CRQL. If the RPD is ≥ 100%, reject (R) and red-line the associated sample data ≥ CRQL.

(**NOTE**:Replace "*" with "J" or "R" as appropriate.)

A.1.18.4.2 When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate values:

> ± CRQL?	___	[___]	___
> ± 2xCRQL?	___	[___]	___

ACTION:
If the absolute difference is > CRQL, flag as estimated all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 2xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but < 5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.18.5 **Soil/Sediment**

A.1.18.5.1 When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 35% but < 120%?	___	[___]	___
is any RPD ≥ 120%?	___	[___]	___

ACTION:
If the RPD is ≥ 35% and < 120%, flag (J) as estimated the associated sample

		YES	NO	N/A
	data ≥ CRQL. If the RPD is ≥ 120%, reject (R) and red-line the associated sample data ≥ CRQL.			
A.1.18.5.2	When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and duplicate:			
	> ± 2 x CRQL?	___	[___]	✓
	> ± 4 x CRQL	___	[___]	___

ACTION:
If the absolute difference is > 2 x CRQL, flag all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 4xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but <5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.19 Field Duplicates

Aqueous Field Duplicates

		YES	NO	N/A
A.1.19.1	Was an aqueous Field Duplicate pair collected and analyzed? (Check Sampling Trip Report)	[___]	___	✓

ACTION:
If yes, prepare a Form (Appendix A.4) for each aqueous Field Duplicate pair. Report the sample and Field Duplicate results on Appendix A.4 from their respective Form I's. Calculate and report RPD on Appendix A.4 when sample and its Field Duplicate values are both > 5xCRQL. Calculate and report the absolute difference on Appendix A.4 when at least one value (sample or duplicate) is <5xCRQL. Evaluate the aqueous Field Duplicate analysis in accordance with the

	YES	NO	N/A

QC criteria stated in Sections A.1.19.2 and A.1.19.3.

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this the criteria to qualify the results.

A.1.19.2 Circle all values on the Form (Appendix A.4) for Field Duplicates that have:

RPD ≥ 20% or

Difference > ± CRQL

When sample and duplicate values are both ≥5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 20%?	___	[___]	✓
is any RPD ≥ 100%?	___	[___]	✓

ACTION:
If the RPD is >20% but < 100%, flag (J) only the associated sample and its Field Duplicate results ≥ CRQL. If the RPD is ≥ 100%, reject(R) and red-line only the associated sample and its Field Duplicate result ≥ CRQL.

A.1.19.3 When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate:

> ± CRQL?	___	[___]	✓
> ± 2 x CRQL?	___	[___]	✓

ACTION:
If the absolute difference is > CRQL, flag detects ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the difference is > 2xCRQL, reject (R) and red-line non-detects

		YES	NO	N/A

and results ≥ MDL but <5xCRQL of the sample and its Field Duplicate.

Soil/Sediment Field Duplicates

A.1.19.4 Was a soil field duplicate pair collected and analyzed? (Check Sampling Trip Report) [___] ___ ✓

ACTION:
If yes, for each soil Field Duplicate pair proceed as follows:

Prepare Appendix A.4 for each Field Duplicate pair. Report on Appendix A.4 all sample and its Field Duplicate results in MG/KG from their respective Form I's. Calculate and report RPD when sample and its duplicate values are both greater than 5xCRQL. Calculate and report the absolute difference when at least one value (sample or duplicate) is < 5xCRQL. Evaluate the Field Duplicate analysis in accordance with the QC Criteria stated in Sections A.1.19.5 and A.1.19.6.

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and apply the criteria to qualify the results.

A.1.19.5 Circle on each Appendix A.4 all values that have:

RPD ≥ 35%, or Difference > ± 2xCRQL
When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 35% but < 120%? ___ [___] ✓

is any RPD ≥ 120%? ___ [___] ✓

ACTION:
If the RPD is ≥ 35% but < 120%,

		YES	NO	N/A
	flag only the associated sample and its Field Duplicate results ≥ CRQL as "J". If the RPD is ≥ 120%, reject (R) and red-line only the sample and its Field Duplicate results ≥ CRQL.			
A.1.19.6	When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and Field Duplicate:			✓
	> ± 2 x CRQL?	___	[___]	___
	> ± 4 x CRQL?	___	[___]	✓
	ACTION: If the absolute difference is > 2xCRQL, flag Sample and its Field Duplicate resuts ≥ MDL but <5xCRQL as "J" and non-detects as "UJ". If the difference is >4xCRQL, reject(R) and red-line non-detects and detects ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
A.1.20	**Laboratory Control Sample (LCS)- Form VII**			
A.1.20.1	Was one LCS prepared and analyzed for:			
	Each SDG?	[✓]	___	___
	Each matrix type?	[✓]	___	___
	Each batch samples digested/distilled?	[✓]	___	___
	For each Method(ICP-AES,ICP-MS,Hg,CN) used?	[___]	___	___
	Was an LCS prepared and analyzed with the samples?	[✓]	___	___
	ACTION: If no for any of the above, prepare Telephone Record Log and contact CLP PO or TOPO for submittal of the LCS results. Flag (J) as estimated all the data for which an LCS was not analyzed.			
	NOTE: If only one LCS was analyzed for			

	YES	NO	N/A

more than 20 samples, then the first 20 samples analyzed are not flagged(J), but all additional samples must be qualified (J).

A.1.20.2 **Aqueous LCS**

Circle on each Form VII the LCS percent recoveries outside control limits 80-120%.

NOTE: 1.Use digested ICV as LCS for aqueous mercury
2.Use distilled ICV as LCS for aqueous cyanide

Is any LCS recovery:

Less than 50%?	___	[✓]	___
Between 50% and 79%?	___	[___]	✓
Between 121% and 150%?	___	[___]	✓
Greater than 150%?	___	[___]	✓

ACTION:
If the LCS recovery is less than 50%, reject (R) and red-line all associated sample data (detects & non-detects); for a recovery between 50-79%, flag detects as "J" all non-detects as "UJ". if the LCS recovery is between 121-150%, flag only detects as "J". if the recovery is greater than 150%, reject (R) and red-line all detects.

A.1.20.3 **Solid LCS**

If an analyte's MDL is equal to or greater than the true value of LCS, disregard the "Action" below for that analyte even though the LCS is out of control limits.

Is the LCS "Found" value greater than the Upper Control Limit reported on Form VII?	___	[___]	✓

ACTION:

		YES	NO	N/A
	If yes, flag (J) all the associated detects ≥ MDL as estimated (J).			
	Is the LCS "Found" value lower than the Lower Control Limit reported on Form VII?	___	[___]	✓
	ACTION: If yes, flag detects as "J" and non-dectes as "UJ".			
A.1.21	**ICP-AES/ICP-MS Serial Dilution - Form VIII** NOTE: Serial dilution analysis is required only when the initial concentration is equal to or greater than 50 x MDL.			
A.1.21.1	Was a Serial Dilution analysis performed:			
	For each SDG?	[___]	✓	___
	On one of the SDG samples?	[___]	✓	___
	For each matrix type?	[___]	✓	___
	For each concentration range (low or med.)?	[___]	✓	___
	Was a Serial Dilution sample analyzed with the SDG samples?	[___]	✓	___
	ACTION: If no for any of the above, flag as estimated (J) detects ≥ MDL of all the SDG samples for which the ICP Serial Dilution Analysis was not performed.			
A.1.21.2	Was a Field Blank or PE sample used for the Serial Dilution Analysis?	___	[___]	✓
	ACTION: If yes, flag as estimated (J) detects ≥ MDL of all the SDG samples			
A.1.21.3	Circle on Form VIII the Percent Differences (%D) between sample results and its dilution results that are outside the control limits ± 10%			

		YES	NO	N/A
	when initial concentrations ≥ 50 x MDLs.			
	Are results outside the control limits flagged with an "E"(Lab Qualifier) on Form VIII and all Form I's?	[___]	___	✓
	ACTION: If no, write in the Contract-Problem/ Non-Compliance Section of the Data Review Narrative.			
A.1.21.4	Are any %D values:			
	> 10%?	___	[___]	✓
	≥ 100%?	___	[___]	✓
	ACTION: If the Percent Difference (%D) is greater than 10%, flag (J) as estimated all associated samples whose **raw data** ≥ MDL; if the %D is ≥ 100%, reject (R) and red-line all associated samples with **raw data** ≥ MDL.			
	(**NOTE**:Replace "E" with "J" or "R" as appropriate.)			
A.1.22	**Total/Dissolved or Inorganic/Total Analytes**			
A.1.22.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s)?	___	[___]	✓
	Were any analyses performed for inorganic as well as total analytes on the same sample(s)?	___	[___]	✓
	ACTION: If yes, prepare a Form (Appendix A.5) to compare the differences between dissolved (or inorganic) and total analyte concentrations. Compute each difference on Appendix A.5 as a percent of the total analyte only when both of the following conditions are fulfilled:			
	(1) The dissolved(or inorganic)concentration is greater than total concentration, and (2) greater than or equal to 5xMDL.			
A.1.22.2	Is any dissolved (or inorganic) concentration greater than its total concentration by more than 20%?	___	[___]	✓

Dissolved analysis only

		YES	NO	N/A
A.1.22.3	Is any dissolved(or inorganic) concentration greater than its total concentration by more than 50%?	___	[___]	___ ✓

ACTION:
If the percent difference is greater than 20%, flag (J) both dissolved/inorganic and total concentrations as estimated. If the difference is more than 50%, reject (R) and red-line both the values.

A.1.23 **Field Blank - Form I**
NOTE: Designate "Field Blank" as such on Form I

A.1.23.1	Was a Field/Rinsate Bank collected and analyzed with the SDG samples?	[___]	___	___ ✓
	If yes, is any Field/Rinsate Blank absolute value of an analyte on Form I greater than its CRQL(or 2xMDL when MDL>CRQL)?	___	[___]	___ ✓
	If yes, circle the Field Blank value on Form I that is greater than the CRQL, (or 2 x MDL when MDL > CRQL).			
	Is any Field Blank value greater than CRQL also greater than the Preparation Blank value?	___	[___]	___ ✓
	If yes, is the Field Blank value (> CRQL and > the prep. blank value) already rejected due to other QC criteria?	[___]	___	___ ✓

ACTION:
If the Field Blank value was not rejected, reject all associated sample data (except the Field Blank results) greater than the CRQL but less than the Field Blank value. Reject on Form I's the soil sample results whose raw values in ug/L in the instrument printout are greater than the CRQL but less than the Field Blank value in ug/L. Flag as "J" detects between the Field Blank value and 10xField Blank value. If the sample result > MDL but ≤ CRQL, replace it with CRQL-U.

no Field QC blanks submitted with metals samples

If the Field Blank value is less than the

		YES	NO	N/A
	Prep.Blank value, do not qualify the sample results due to the Field Blank criteria.			

NOTE:
1. Field Blank result previously rejected due to other criteria cannot be used to qualify field samples.
2. Do not use Rinsate Blank associated with soils to qualify water samples and vice versa.

A.1.24 **Verification of Instrumental Parameters - Form IX, XA, XB, XI**

A.1.24.1 Is verification report present for:

Method Detection Limits (Form IX-Annually)?	[✓]	___	___
ICP-AES Interelement Correction Factors (Form XA & XB -Quarterly)?	[✓]	___	___
ICP-AES & ICP-MS Linear Ranges (Form XI-Quarterly)?	[✓]	___	___

ACTION:
If no, contact CLP PO/TOPO for submittal from the laboratory.

A.1.24.2 **Method Detection Limits - Form IX**

A.1.24.2.1 Are MDLs present on Form ~~IX~~ 10 for:

All the analytes?	[✓]	___	___
All the instruments used?	[✓]	___	___
Digested and undigested samples and Calib.Blanks?	[___]	___	✓
ICP-AES and ICP-MS when both instruments are used for the same analyte?	[___]	___	✓

ACTION:
If no for any of the above, prepare Telephone Record Log and contact CLP PO/TOPO for submittal of the MDLs from the laboratory. Report to CLP PO and write in the Contract Problems/ Non-Compliance Section of the Data Review Narrative if the MDL concentration is not less than ½ CRQL.

		YES	NO	N/A
A.1.24.2.2	Is MDL greater than the CRQL for any analyte?	___	[✓]	___
	If yes, is the analyte concentration on Form I greater than 5 x MDL for the sample analyzed on the instrument whose MDL exceeds CRQL?	[___]	___	✓
	ACTION: If no, flag as estimated (J) all values less than five times MDL for the analyte whose MDL exceeds the CRQL.			
A.1.24.3	**Linear Ranges - Form XI**			
A.1.24.3.1	Was any sample result higher than the high linear range for ICP-AES or ICP-MS?	___	[✓]	___
	Was any sample result higher than the highest calibration standard for mercury or cyanide?	___	[✓]	___
	If yes for any of the above, was the sample diluted to obtain the result reported on Form I?	[___]	___	✓
	ACTION: If no, flag (J) as estimated the affected detects (≥ MDL) reported on Form I.			
A.1.25	**ICP-MS Tune Analysis - Form XIV**			
A.1.25.1	Was the ICP-MS instrument tuned prior to calibration?	[___]	___	✓
	ACTION: If no, reject (R) and red-line all sample data for which tuning was not performed.			
A.1.25.2	Was the tuning solution analyzed or scanned at least five times consecutively?	[___]	___	✓
	Were all the required isotopes spanning the analytical range present in the tuning solution?	[___]	___	✓
	Was the mass resolution within			

		YES	NO	N/A
	0.1 amu for each isotope in the tuning solution?	[___]	___	___ ✓
	Was %RSD less than 5% for each isotope of each analyte in the tuning solution?	[___]	___	___ ✓

ACTION:
If no for any of the above, qualify all results ≥ MDL associated with that Tune as estimated "J", and all non-detects associated with that Tune as "UJ".

A.1.26 **ICP-MS Internal Standards - Form XV**

A.1.26.1	Were the Internal Standards added to all the samples and all QC samples and calibration standards (except the Tuning Solution)?	[___]	___	___ ✓
	Were all the target analyte masses bracketed by the masses of the five internal standards?	[___]	___	___ ✓

ACTION:
If none of the Internal Standards was added to the samples, reject (R) and red-line all the associated sample data (detects & non-detects). If internal standards were used but did not cover all the analyte masses, reject (R) and red-line only the analyte results not bracketed by the internal standard masses.

A.1.26.2	Was the intensity of an Internal Standard in each sample within 60-125% of the intensity of the same Internal Standard in the calibration blank?	[___]	___	___ ✓
	If no, was the original sample diluted two fold, Internal Standard added and the sample re-analyzed?	[___]	___	___ ✓
	Was the %RI for the two fold diluted sample within the acceptance limits (60-125%)?	[___]	___	___ ✓

ACTION:
If no for any of the above, flag detects as "J" and non-detects "UJ" of all the analytes with atomic masses between the

atomic mass of the internal standard lighter

than the affected internal standard, and the atomic mass of the internal standard heavier than the affected internal standard.

A.1.27 **Percent Solids of Sediments**

A.1.27.1 Are percent solids in sediment(s):

< 50%? ___ [___] ✓

ACTION:
If yes, qualify as estimated (J) all detects and non-detects of a sample that has percent solids less than 50%(i.e.,moisture content greater than 50%).

NOTE:
Flag(J) only the sample results that were not previously flagged due to other QC criteria.

Inorganic Data Review Narrative

Case# _____ **Site:** _____ **Matrix: Soil** ____

SDG# _____ **Lab:** _____ **Water** ____

Sampling Team: _____ **Reviewer:** _____ **Other** _____

A.2.1 **Data Validation Flags:**
The following flags may have been applied in red by the data validator and must be considered by the data user.

J - This flag indicates the result qualified as **estimated**

R and Red-Line - A red-line drawn through a sample result indicates **unusable** value. The red-lined data are known to contain significant errors based on documented information and must not be used by the data user.

U - This data validation qualifier is applied to sample results ≥ MDL when associated blank is contaminated

Fully Usable Data - The results that do not carry "J" or "red-line" are fully **usable**.

A.2.2 **Laboratory Qualifiers:**
The CLP laboratory applies a contractual qualifier on all

SAMPLE CALCULATION

EPA SAMPLE ID: VWAI-MW02-1110
COMPOUND: Manganese
CONCENTRATION: 70.7 ug/L
%Solids – NA
Raw Data result: 0.0707 mg/L

0.0707 mg/L (1000ug/1mg) = 70.7 ug/L

FIELD DUPLICATE SAMPLE SUMMARY

Note: All reported results are noted in the table below because the client requested that the MDL be used as reporting limit instead of the RL for this project. RPDs or absolute differences were calculated based on Region II guidelines: if results are >5X RL RPD is calculated, if results are <5X RL the absolute difference is calculated. Flags are applied to field duplicate pair only as follows: For RPD values - RPD ≥ 35% but <120% results are J, RPD >120%, results are R. For absolute difference values - >+/- 2X RL results are J, >+/- 4X RL results are R.

Sample ID: none Duplicate Sample ID:

Analyte	Sample Conc.	Duplicate Conc.	RPD or absolute difference
			0.000
			#DIV/0!

Comments: No qualifications required.

Reviewer JACleveland **Date:** 12-27-10

DataQual
Environmental Services, LLC

CH2M HILL
15010 Conference Center Dr.
Suite 200
Chantilly, VA 20151

January 16, 2012
SDG# SK2359, Spectrum Analytical, Inc.
Vieques Island, Puerto Rico- CTO-083, AOC-I

Dear Ms. Ott,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # SK2359. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24, 8270D-Rev 4, August 2008-SOP #HW-22), and professional judgment. Region II has not developed a validation checklist SOP for the inorganic method in this SDG (SW-846 methods 6010C) or the organic methods used to assess the fuels (SW-846 8015G for gasoline and 8015D_TPH for diesel range organics). The Region II Standard Operating Procedure for the Evaluation of Metals Data for the CLP was used as applicable for the metals data. For the other fraction alternative worksheets were provided. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA	GRO	DRO	Fe, Mn
VWAI-TB01-110811	K2359-01	water	X		X		
VWAI-MW05-1111	K2359-02	water		X	X	X	X
VWAI-MW05P-1111	K2359-03	water		X	X	X	
VWAI-EB01-110811	K2359-04	water	X	X	X	X	
VWAI-MW05B-1111	K2359-05	water	X				
VWAI-MW05BP-1111	K2359-07	water	X				
VWAI-MW07-1111	K2359-09	water	X		X	X	X
VWAI-MW03-1111	K2359-11	water	X	X	X	X	X
VWAI-EB01-110911	K2359-13	water	X	X		X	
VWAI-TB01-110911	K2359-14	water	X		X		
VWAI-MW07-1111	K2359-15	water		X			
VWAI-TB01-111011	K2359-17	water	X		X		
VWAI-MW04-1111	K2359-18	water	X	X	X	X	X
VWAI-MW02-1111	K2359-20	water	X	X	X	X	X
VWAI-EB01-111011	K2359-22	water	X	X	X	X	
VWAI-MW02-1111 MS	K2359-20MS	water		X	X	X	
VWAI-MW02-1111 MSD	K2359-20MSD	water		X	X	X	

The following quality control samples were provided with this SDG: samples VWAI-TB01-110811, VWAI-TB01-110911 and VWAI-TB01-111011-trip blanks; samples VWAI-EB01-110811, VWAI-EB01-110911 and VWAI-EB01-111011-equipment

blanks; and sample VWAI-MW05BP-1111-field duplicate of sample VWAI-MW05B-1111; sample VWAI-MW05P-1111- field duplicate of sample VWAI-MW05-1111.

The samples were evaluated based on the following criteria:

• Data Completeness	*
• Sample Condition	*
• Technical Holding Times	*
• GC/MS Tuning	*
• GC Performance	*
• ICP MS Tuning	NA
• Initial/Continuing Calibrations	*
• ICSA/ICSAB Standards	*
• RL Standards	
• Blanks	*
• Internal Standards	*
• Surrogate Recoveries	*
• Laboratory Control Samples	*
• Matrix Spike Recoveries	
• Matrix Duplicate RPDs	*
• Serial Dilutions	
• Field Duplicates	
• Identification/Quantitation	*
• Reporting Limits	*
• Tentatively Identified Compounds	NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications to the data were required.

SVOA

No qualifications to the data were required.

GRO

No qualifications to the data were required.

TPH

The field duplicate pair exhibited a non-compliant RPD (>20%) between the native sample and the field duplicate. The reported results were qualified as estimated J.

Select Filtered Metals

The laboratory did not analyze a CRI standard for the analyte manganese as required. The analyte was flagged as estimated for reported concentrations <2X RL. This resulted in the qualification of only one non-detect result as estimated UJ.

The laboratory did not perform a matrix spike or a serial dilution in this SDG. These QC samples are required by Region II. Qualifications were required.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 11/8-10/11 and samples were received at the laboratory 11/9-12/11. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

CRI Standards

Select Metals

The laboratory did not analyze a CRI standard for the analyte manganese. All positive results were above the action level of 2X the reporting limit. The reported non-detect result for manganese in sample VWAI-MW07-1111 was qualified as estimated UJ with a qualifier code of OT.

Matrix Spike

Select Filtered Metals

The laboratory did not perform a matrix spike sample on a sample from this SDG. Region II required that all positive results be qualified as estimated J because of this. Therefore, the reported positive results for iron and manganese were qualified as estimated J with a qualifier code of OT.

Serial Dilution

Select Filtered Metals

The laboratory did not perform a serial dilution sample on a sample from this SDG. Region II required that all positive results be qualified as estimated J because of this. Therefore, the reported positive results for iron and manganese were qualified as estimated J with a qualifier code of OT.

Field Duplicates

TPH

The field duplicate pair of samples VWAI-MW05-1111 and VWAI-MW05P-1111 exhibited a RPD >20% (27%) for Oil Range Organics (ORO). The reported positive results for ORO in the two samples were qualified as estimated J with a qualifier code of FD.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
No qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
No qualifications				

GRO

Sample ID	Compound	Results	Q flag	Q Code
No qualifications				

TPH

Sample ID	Compound	Results	Q flag	Q Code
VWAI-MW05-1111, VWAI-MW05P-1111	ORO	+	J	FD

Select Filtered Metals

Sample ID	Analyte	Results	Q flag	Q Code
VWAI-MW07-1111	manganese	-	UJ	OT
all samples	iron, manganese	+	J	OT

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the LOQ (2X sample LOQ for common laboratory contaminants) when the blank value is less than the LOQ. The sample result for the blank contaminant is not qualified with any blank qualifiers.
LOQ	The sample result for the blank contaminant is less than the LOQ (2X sample LOQ for common laboratory contaminants) but greater than the MDL when the blank value is less than the LOQ. The sample result for the blank contaminant is changed to the LOQ and qualified as non-detect U.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the LOQ and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the LOQ, result is reported as non-detect at the LOQ, when the ICB/CCB/PB result is less or greater than the LOQ.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the LOQ and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the LOQ.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the LOQ.

J/UJ - Sample result is less than 10X LOQ when blank result is below the negative LOQ.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the LOQ and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the LOQ, result is reported as non-detect at the LOQ, when the FB result is less or greater than the LOQ.

R - Sample result is greater than the LOQ and less than the FB value when the FB value is greater than the LOQ.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the LOQ.

General Abbreviations

RL	reporting limit
MDL	method detection limit
IDL	instrument detection limit
LOD	Level of Detection
LOQ	Level of Quantitation
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
MBL, EBL, FBL or TBL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-TB01-110811

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-01A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I4038.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/09/2011

% Moisture: not dec. Date Analyzed: 11/18/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VM
D10572

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-110811

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-04A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I4039.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/09/2011

% Moisture: not dec. Date Analyzed: 11/18/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WW 010512

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW05B-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-05A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V8A7783.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/11/2011

% Moisture: not dec. Date Analyzed: 11/18/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

010572

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW05BP-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-07A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V8A7784.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/11/2011

% Moisture: not dec. Date Analyzed: 11/18/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

LM 010512

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW07-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-09A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I3902.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/11/2011

% Moisture: not dec. Date Analyzed: 11/15/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	5.3		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VM 010512

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW03-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-11A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I3903.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/09/2011

% Moisture: not dec. Date Analyzed: 11/15/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

D10512

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-110911

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-13A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I3904.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/11/2011

% Moisture: not dec. Date Analyzed: 11/15/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

010572

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-TB01-110911

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-14A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I3905.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/11/2011

% Moisture: not dec. Date Analyzed: 11/15/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VM 010512

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-TB01-111011

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-17A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I4040.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/12/2011

% Moisture: not dec. Date Analyzed: 11/18/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

010512

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW04-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-18A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V8A7785.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/12/2011

% Moisture: not dec. Date Analyzed: 11/18/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	1.1	J	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VM 010512

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW02-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-20A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I3906.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/12/2011

% Moisture: not dec. Date Analyzed: 11/15/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

D10522

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-111011

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-22A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I4041.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/12/2011

% Moisture: not dec. Date Analyzed: 11/18/2011

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WI 010572

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW05-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-02E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H7593.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/09/2011

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/14/2011

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/02/2011

GPC Cleanup:(Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	1.0
91-57-6	2-Methylnaphthalene	11		0.94	2.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

D10572

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
VWAI-MW05P-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-03B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H7594.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/09/2011

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/14/2011

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/02/2011

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	1.0
91-57-6	2-Methylnaphthalene	11		0.94	2.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

WI 010572

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1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-110811

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-04B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H7595.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/09/2011

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/14/2011

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/02/2011

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	1.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW03-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-11E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H7596.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/09/2011

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/14/2011

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/02/2011

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	1.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

WI 010512

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW07-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-15A

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H7597.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/11/2011

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/14/2011

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/03/2011

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	12		0.96	2.0	1.0
91-57-6	2-Methylnaphthalene	7.0		0.94	2.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	1.3	J	1.3	2.0	5.0

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-110911

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-16A

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H7598.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/11/2011

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/14/2011

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/03/2011

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	1.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

WM 010512

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1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW04-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-18E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H7599.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/12/2011

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/14/2011

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/03/2011

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	1.2		0.96	2.0	1.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

WW 010512

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW02-1111

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-20E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H7600.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/12/2011

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/14/2011

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/03/2011

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	1.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

WW 010572

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-EB01-111011

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-22E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H7603.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/12/2011

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/14/2011

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/03/2011

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	1.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

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SW846

ID - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW02-1111MS

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-20EMS

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H7601.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/12/2011

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/14/2011

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/03/2011

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	44		0.96	2.0	1.0
91-57-6	2-Methylnaphthalene	45		0.94	2.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	60		1.3	2.0	5.0

VM 010512

030

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SW8 46

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VWAI-MW02-1111MSD

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: K2359-20EMSD

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S3H7602.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/12/2011

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/14/2011

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/03/2011

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	43		0.96	2.0	1.0
91-57-6	2-Methylnaphthalene	45		0.94	2.0	1.0
117-81-7	Bis(2-ethylhexyl)phthalate	59		1.3	2.0	5.0

WM 010512

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-TB01-110811 Project: CTO-0083 Vieques AOC I
Lab ID: K2359-01 Collection Date: 11/08/11 9:30

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015D GRO -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		100	ug/L	1	11/22/2011 10:21	63101
Surrogate: Bromofluorobenzene	99.1		87-112	%REC	1	11/22/2011 10:21	63101

010512

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

032

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW05-1111
Lab ID: K2359-02

Project: CTO-0083 Vieques AOC 1
Collection Date: 11/08/11 9:35

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015D GRO -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		100	ug/L	1	11/22/2011 16:09	63101
Surrogate: Bromofluorobenzene	98.7		87-112	%REC	1	11/22/2011 16:09	63101

010512

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW05P-1111
Lab ID: K2359-03
Project: CTO-0083 Vieques AOC I
Collection Date: 11/08/11 9:40

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015D GRO -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		100	ug/L	1	11/22/2011 16:38	63101
Surrogate: Bromofluorobenzene	107		87-112	%REC	1	11/22/2011 16:38	63101

VWI 010512

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

034

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-EB01-110811
Lab ID: K2359-04

Project: CTO-0083 Vieques AOC I
Collection Date: 11/08/11 11:30

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015D GRO -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		100	ug/L	1	11/22/2011 10:51	63101
Surrogate: Bromofluorobenzene	102		87-112	%REC	1	11/22/2011 10:51	63101

VWI 010512

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

035

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW07-1111
Lab ID: K2359-09
Project: CTO-0083 Vieques AOC I
Collection Date: 11/09/11 9:20

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015D GRO -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	800		400	ug/L	4	11/22/2011 15:39	63101
Surrogate: Bromofluorobenzene	109		87-112	%REC	4	11/22/2011 15:39	63101

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

036

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW03-1111
Lab ID: K2359-11
Project: CTO-0083 Vieques AOC I
Collection Date: 11/09/11 11:15

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015D GRO -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		100	ug/L	1	11/22/2011 17:08	63101
Surrogate: Bromofluorobenzene	111		87-112	%REC	1	11/22/2011 17:08	63101

WW 010512

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

037

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-TB01-110911
Lab ID: K2359-14
Project: CTO-0083 Vieques AOC I
Collection Date: 11/09/11 7:00

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015D GRO -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		100	ug/L	1	11/22/2011 12:08	63101
Surrogate: Bromofluorobenzene	93.3		87-112	%REC	1	11/22/2011 12:08	63101

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-TB01-111011
Lab ID: K2359-17
Project: CTO-0083 Vieques AOC I
Collection Date: 11/10/11 7:00

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015D GRO -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		100	ug/L	1	11/22/2011 12:38	63101
Surrogate: Bromofluorobenzene	96.0		87-112	%REC	1	11/22/2011 12:38	63101

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW04-1111
Lab ID: K2359-18

Project: CTO-0083 Vieques AOC I
Collection Date: 11/10/11 9:20

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015D GRO -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		100	ug/L	1	11/22/2011 15:09	63101
Surrogate: Bromofluorobenzene	104		87-112	%REC	1	11/22/2011 15:09	63101

WW 010512

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

040

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW02-1111
Lab ID: K2359-20
Project: CTO-0083 Vieques AOC I
Collection Date: 11/10/11 9:50

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015D GRO -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		100	ug/L	1	11/22/2011 13:37	63101
Surrogate: Bromofluorobenzene	95.5		87-112	%REC	1	11/22/2011 13:37	63101

WW 010572

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

041

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-EB01-111011
Lab ID: K2359-22
Project: CTO-0083 Vieques AOC I
Collection Date: 11/10/11 11:05

Analyses	Result	Qual	RL	Units	DF	Date Analyzed	Batch ID
SW846 8015D GRO -- Gasoline Range Organic (GRO) by GC-FID							GRO_W
Gasoline Range Organics	ND		100	ug/L	1	11/22/2011 13:07	63101
Surrogate: Bromofluorobenzene	101		87-112	%REC	1	11/22/2011 13:07	63101

WP 010572

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
RL - Reporting Limit

042

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW05-1111
Lab ID: K2359-02

Project: CTO-0083 Vieques AOC I
Collection Date: 11/08/11 9:35

Analyses	Result	Qual	LOD	LOQ	Units	DF	Date Analyzed	Batch ID
SW846 8015D TPH -- TOTAL PETROLEUM HYDROCARBONS (TPH) BY GC-FID						TPH_W		
Extractable Total Petroleum Hydrocarbon	1.9		0.20 ^	0.20	mg/L	1	11/29/2011 16:04	63035
Oil Range Organics	0.54	J FD	0.35 ^	0.35	mg/L	1	11/29/2011 16:04	63035
Surrogate: ortho-Terphenyl	76.6			50-150	%REC	1	11/29/2011 16:04	63035

JC 11512

Qualifiers:
ND - Not Detected at the Limit of Detection
J - Analyte detected below Limit of Quantitation
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
^ Qualified to Limit of Detection (LOD)
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
LOQ - Limit of Quantitation
LOD - Limit of Detection

m11.11.23:A

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW05P-1111
Lab ID: K2359-03
Project: CTO-0083 Vieques AOC I
Collection Date: 11/08/11 9:40

Analyses	Result	Qual	LOD	LOQ	Units	DF	Date Analyzed	Batch ID
SW846 8015D TPH -- TOTAL PETROLEUM HYDROCARBONS (TPH) BY GC-FID					TPH_W			
Extractable Total Petroleum Hydrocarbon	1.9		0.20 ^	0.20	mg/L	1	11/29/2011 16:24	63035
Oil Range Organics	0.71	J FD	0.35 ^	0.35	mg/L	1	11/29/2011 16:24	63035
Surrogate: ortho-Terphenyl	69.6			50-150	%REC	1	11/29/2011 16:24	63035

JHC 11512

Qualifiers:
ND - Not Detected at the Limit of Detection
J - Analyte detected below Limit of Quantitation
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
^ Qualified to Limit of Detection (LOD)
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
LOQ - Limit of Quantitation
LOD - Limit of Detection

m11.11.23.A

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-EB01-110811
Lab ID: K2359-04
Project: CTO-0083 Vieques AOC I
Collection Date: 11/08/11 11:30

Analyses	Result	Qual	LOD	LOQ	Units	DF	Date Analyzed	Batch ID
SW846 8015D TPH -- TOTAL PETROLEUM HYDROCARBONS (TPH) BY GC-FID						TPH_W		
Extractable Total Petroleum Hydrocarbon	ND		0.20 ^	0.20	mg/L	1	11/29/2011 16:44	63035
Oil Range Organics	ND		0.35 ^	0.35	mg/L	1	11/29/2011 16:44	63035
Surrogate: ortho-Terphenyl	94.6			50-150	%REC	1	11/29/2011 16:44	63035

11512

Qualifiers:
ND - Not Detected at the Limit of Detection
J - Analyte detected below Limit of Quantitation
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
^ Qualified to Limit of Detection (LOD)
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
LOQ - Limit of Quantitation
LOD - Limit of Detection

m11.11.23.A

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW03-111.1
Lab ID: K2359-11
Project: CTO-0083 Vieques AOC I
Collection Date: 11/09/11 11:15

Analyses	Result	Qual	LOD	LOQ	Units	DF	Date Analyzed	Batch ID
SW846 8015D TPH -- TOTAL PETROLEUM HYDROCARBONS (TPH) BY GC-FID						TPH_W		
Extractable Total Petroleum Hydrocarbon	0.49		0.20 ^	0.20	mg/L	1	11/29/2011 17:04	63035
Oil Range Organics	ND		0.35 ^	0.35	mg/L	1	11/29/2011 17:04	63035
Surrogate: ortho-Terphenyl	78.7			50-150	%REC	1	11/29/2011 17:04	63035

JAC 11-5-12

Qualifiers:
ND - Not Detected at the Limit of Detection
J - Analyte detected below Limit of Quantitation
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
^ Qualified to Limit of Detection (LOD)
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
LOQ - Limit of Quantitation
LOD - Limit of Detection

m11.11.23.A

046

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW07-1111
Lab ID: K2359-15
Project: CTO-0083 Vieques AOC I
Collection Date: 11/09/11 9:20

Analyses	Result	Qual	LOD	LOQ	Units	DF	Date Analyzed	Batch ID
SW846 8015D TPH -- TOTAL PETROLEUM HYDROCARBONS (TPH) BY GC-FID					TPH_W			
Extractable Total Petroleum Hydrocarbon	1.7		0.20 ^	0.20	mg/L	1	11/29/2011 18:04	63035
Oil Range Organics	ND		0.35 ^	0.35	mg/L	1	11/29/2011 18:04	63035
Surrogate: ortho-Terphenyl	69.5			50-150	%REC	1	11/29/2011 18:04	63035

1512

Qualifiers:
ND - Not Detected at the Limit of Detection
J - Analyte detected below Limit of Quantitation
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
^ Qualified to Limit of Detection (LOD)
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
LOQ - Limit of Quantitation
LOD - Limit of Detection

m11.11.23.A

047

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-EB01-110911
Lab ID: K2359-16

Project: CTO-0083 Vieques AOC I
Collection Date: 11/09/11 11:20

Analyses	Result	Qual	LOD	LOQ	Units	DF	Date Analyzed	Batch ID
SW846 8015D TPH -- TOTAL PETROLEUM HYDROCARBONS (TPH) BY GC-FID					TPH_W			
Extractable Total Petroleum Hydrocarbon	ND		0.20 ^	0.20	mg/L	1	11/29/2011 18:24	63035
Oil Range Organics	ND		0.35 ^	0.35	mg/L	1	11/29/2011 18:24	63035
Surrogate: ortho-Terphenyl	99.4			50-150	%REC	1	11/29/2011 18:24	63035

JAC 1/5/12

Qualifiers:
ND - Not Detected at the Limit of Detection
J - Analyte detected below Limit of Quantitation
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
^ Qualified to Limit of Detection (LOD)
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
LOQ - Limit of Quantitation
LOD - Limit of Detection

m11.11.23.A

048

Spectrum Analytical, Inc. Featuring Hanibal Technology -- Rhode Island Division

12/06/2011

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW04-1111
Lab ID: K2359-18

Project: CTO-0083 Vieques AOC I
Collection Date: 11/10/11 9:20

Analyses	Result	Qual	LOD	LOQ	Units	DF	Date Analyzed	Batch ID
SW846 8015D TPH -- TOTAL PETROLEUM HYDROCARBONS (TPH) BY GC-FID						TPH_W		
Extractable Total Petroleum Hydrocarbon	0.48		0.20 ^	0.20	mg/L	1	11/29/2011 18:44	63035
Oil Range Organics	ND		0.35 ^	0.35	mg/L	1	11/29/2011 18:44	63035
Surrogate: ortho-Terphenyl	94.5			50-150	%REC	1	11/29/2011 18:44	63035

JMC 11512

Qualifiers:
ND - Not Detected at the Limit of Detection
J - Analyte detected below Limit of Quantitation
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
^ Qualified to Limit of Detection (LOD)
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
LOQ - Limit of Quantitation
LOD - Limit of Detection

m11.11.23.A

049

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-MW02-1111
Lab ID: K2359-20

Project: CTO-0083 Vieques AOC I
Collection Date: 11/10/11 9:50

Analyses	Result	Qual	LOD	LOQ	Units	DF	Date Analyzed	Batch ID
SW846 8015D TPH -- TOTAL PETROLEUM HYDROCARBONS (TPH) BY GC-FID					TPH_W			
Extractable Total Petroleum Hydrocarbon	ND		0.20 ^	0.20	mg/L	1	11/29/2011 19:04	63035
Oil Range Organics	ND		0.35 ^	0.35	mg/L	1	11/29/2011 19:04	63035
Surrogate: ortho-Terphenyl	94.0			50-150	%REC	1	11/29/2011 19:04	63035

JJC 11212

Qualifiers:
ND - Not Detected at the Limit of Detection
J - Analyte detected below Limit of Quantitation
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
^ Qualified to Limit of Detection (LOD)
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
LOQ - Limit of Quantitation
LOD - Limit of Detection

mJ1.11.23.A

050

Client: CH2M-Hill, Inc.
Client Sample ID: VWAI-EB01-111011
Lab ID: K2359-22

Project: CTO-0083 Vieques AOC I
Collection Date: 11/10/11 11:05

Analyses	Result	Qual	LOD	LOQ	Units	DF	Date Analyzed	Batch ID
SW846 8015D TPH -- TOTAL PETROLEUM HYDROCARBONS (TPH) BY GC-FID					TPH_W			
Extractable Total Petroleum Hydrocarbon	ND		0.20 ^	0.20	mg/L	1	11/29/2011 20:04	63035
Oil Range Organics	ND		0.35 ^	0.35	mg/L	1	11/29/2011 20:04	63035
Surrogate: ortho-Terphenyl	99.1			50-150	%REC	1	11/29/2011 20:04	63035

Qualifiers:
ND - Not Detected at the Limit of Detection
J - Analyte detected below Limit of Quantitation
B - Analyte detected in the associated Method Blank
DF - Dilution Factor
^ Qualified to Limit of Detection (LOD)
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
LOQ - Limit of Quantitation
LOD - Limit of Detection

m11.11.23.A

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
VWAI-MW02-1111

Lab Name: Spectrum Analytical, Inc. Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SK2359

Matrix (soil/water): WATER Lab Sample ID: K2359-20

Level (low/med): MED Date Received: 11/12/2011

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	50	U		P	31.0	50.0	200
7439-96-5	Manganese	155		J OT	P	10.0	15.0	50.0

JMC 11512

Comments:

ibn11.10.09.A

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW03-1111

Lab Name: Spectrum Analytical, Inc. Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SK2359

Matrix (soil/water): WATER Lab Sample ID: K2359-11

Level (low/med): MED Date Received: 11/09/2011

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	113	B	J OT	P	31.0	50.0	200
7439-96-5	Manganese	1350		J OT	P	10.0	15.0	50.0

JJC 11/5/12

Comments:

ilm11.10.09.A

FORM I - IN SW846

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

VWAI-MW04-1111

Lab Name: Spectrum Analytical, Inc. Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SK2359

Matrix (soil/water): WATER Lab Sample ID: K2359-18

Level (low/med): MED Date Received: 11/12/2011

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	50	U		P	31.0	50.0	200
7439-96-5	Manganese	789		J OT	P	10.0	15.0	50.0

JC 1/5/12

Comments:

ilm11.10.09.A

FORM I - IN SW846

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-1111

Lab Name: Spectrum Analytical, Inc. Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SK2359

Matrix (soil/water): WATER Lab Sample ID: K2359-02

Level (low/med): MED Date Received: 11/09/2011

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	54.2	B	J OT	P	31.0	50.0	200
7439-96-5	Manganese	1280		J OT	P	10.0	15.0	50.0

JC 1/5/12

Comments:

ilm11.10.09.A

FORM I - IN SW846

055

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

VWAI-MW07-1111

Lab Name: Spectrum Analytical, Inc. Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SK2359

Matrix (soil/water): WATER Lab Sample ID: K2359-09

Level (low/med): MED Date Received: 11/11/2011

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	50	U		P	31.0	50.0	200
7439-96-5	Manganese	15	~~U~~	WJ QT	P	10.0	15.0	50.0

JLC 11512

Comments:

MITKEM LABORATORIES
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CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: Stephen.brand@ch2m.com
Michael.Zamboni@ch2m.com

Project Mgr.: Stephen BRAND

Invoice To: _____

P.O. No.: _____ RQN: _____

Project No.: 342485.FT.FK
Site Name: AOC I
Location: Vieques State: PR
Sampler(s): D.Whitaker / C. Vera

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= H_3PO_4 10= _____ 11= _____

List preservative code below: 2 / 2 / 4 / 9

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= DI water X2= _____ X3= _____

G=Grab C=Composite

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____
State specific reporting standards: _____

Lab Id: (K2359)	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: List I VOCs SW-846 8260C	List I SVOCs SW-846 8270D	TPH (8015D)	TPH (DRO) (8015D GC)	Field Filtered Fe & Mn	Sulfate, Nitrate	T.O.C.	see notes
01	VWAI-TB01-110811	11-08-11	0930	~~GRAB~~	X1	4				(2)X			(2)X				
02	VWAI-MW65-1111	11-08-11	0935	~~GRAB~~	GW	7	4		2	2	2	2	2	1	1	3	
03	VWAI-MW05P-1111	11-08-11	0940	~~GRAB~~	GW	4				2			2				
04	VWAI-EB01-110811	11-08-11	1130	~~GRAB~~	X1	4				(2)X			(2)X				

☐ E-mail to _____
EDD Format _____

Condition upon receipt: ☑ Iced ☐ Ambient ☑ °C 4°C 5°C

Relinquished by:	Received by:	Date:	Time:
[signature]	FedEx	11-08-11	1300
FedEx	Daniel Mitkem	11-09-11	10:30

MITKEM LABORATORIES

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CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: Stephen.bland@ch2m.com

Project Mgr.: Stephen bland

Invoice To: _____

P.O. No.: _____ RQN: _____

Project No.: 392485.FI.FK

Site Name: ACCI

Location: VIEQUES State: PR

Sampler(s): D.Whitaker / C.Vera

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8=$NaHSO_4$ 9=_____ 10=_____ 11=_____

List preservative code below: /

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: List 1 SVOCs SW-846 8270D	TPH DRO GCFID							
03	VWAI-MW05P-111	11-08-11	0940	G	GW		4			2	2							
04	VWAI-EBW-110811	11-08-11	1130	G	GW		4			2	2							

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____

State specific reporting standards:
_____

☐ E-mail to _____

EDD Format _____

Condition upon receipt: ☑ Iced ☐ Ambient ☑ °C 4°C

Relinquished by:	Received by:	Date:	Time:
[signature]	FedEx	11-08-11	1300
FedEx 11-09-11	Daniel Mitkem	11-09-11	10:30

175 Metro Center Boulevard • Warwick, RI 02886-1755 • 401-732-3400 • Fax 401-732-3499 • www.mitkem.com

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CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: stephen.brand@ch2m.com

Project Mgr.: Stephen Brand

Invoice To: _____

P.O. No.: _____ RQN: _____

Project No.: 392485.FI.FIC

Site Name: ACCI Vieques

Location: Vieques State: PR

Sampler(s): D.Winters / C. Vera

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= H_3PO_4 10= _____ 11= _____

List preservative code below: 2 / 2 / 4 / 9 / 6

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= DI. water X2= _____ X3= _____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: LIST I VOCs SW-846 8260 C	LIST I SVOCs SW-846 8270 D	TPH (GRO)	TPH (DRO) (Extr.)	Field Filtered Fe, Mn	Sulfate / Nitrate	T.O.C.	LIST I VOCs SW-846 8260C	
5	VNAI-MW05B-1111	11/09/11	0900	G	GW	2				2								
6	VNAI-MW05B-1111A		0900	G	GW	2											2	
7	VNAI-MW05BP-1111		0905	G	GW	2				2								
8	VNAI-MW05BP-1111A		0905	G	GW	2											2	
9	VNAI-MW07-1111		0920	G	GW	~~4~~ 3	~~2~~ 1		2	2		2		1	1	3		
10	VNAI-MW07-1111A		0920	G	GW	2											2	
11	VNAI-MW03-1111		1115	G	GW	7	4		2	2	2	2	2	1	1	3		
12	VNAI-MW03-1111A		1115	G	GW	2											2	
13	VNAI-EB01-110911		1120	G	X1	4				2		2						equipment blank
14	VNAI-TB01-110911		0700	G	X1	4				2		2						trip blank

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____

State specific reporting standards: _____

☐ E-mail to _____

EDD Format _____

Condition upon receipt: ☑ Iced ☐ Ambient ☐ °C 5.0

Relinquished by:	Received by:	Date:	Time:
[signature]	FedEx	11/09/11	1330
FedEx	[signature]	11/11/11	9:05

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CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT Indicate Date Needed. _____
All TATs subject to laboratory approval.
Min. 24-hour notification needed for rushes.
Samples disposed of after 30 days unless otherwise instructed.

Report To: _____

Invoice To: _____

Project No.: 72485-FIR

Site Name: ACC Vieques

Location: _____ State: PR

Project Mgr.: Stephen Beard

P.O. No.: _____ RQN: _____

Sampler(s): Dawnivee De Leon

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8=$NaHSO_4$ 9=_____ 10=_____ 11=_____

List preservative code below:

2	/	2	/	7	/	7	6

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW=Surface Water SO=Soil SL=Sludge A=Air
X1= DI water X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses:								
15	VWAI-MW07-1111	11.09.11	0920	G	GW		4				2		2					
16	VWAI-EBQ1-110911	11.09.11	1120	G	X1		4				2		2					

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____

State specific reporting standards: _____

☐ E-mail to _____

EDD Format _____

Condition upon receipt: ☐ Iced ☐ Ambient °C 4

Relinquished by:	Received by:	Date:	Time:
	FedEx	11.09.11	1330
		11/11/11	9205

COOLER 1

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CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: _____

Invoice To: _____

Project No.: 39248S.FI.FK
Site Name: AOC I Vieques
Location: Vieques State: Puerto Rico
Sampler(s): D. Whitaker

Project Mgr.: Stephen Brand
P.O. No.: _____ RQN: _____

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8=$NaHSO_4$ 9=H_3PO_4 10=_____ 11=_____

List preservative code below: 2 / 6 / 2 / 4 / 9

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= DI water X2=_____ X3=_____

G=Grab C=Composite

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____
State specific reporting standards:

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	List 1 + SW846 8260C VOCs	Analyses: List 1 VOCs SW846 8260C	List 1 SVOCs SW 846 8270D	TPH (EPA)	TPH (DRO (EPA))	Field Filtered Fe & Mn	Sulfate/Nitrate	T.O.C.	
17	VWAI-TB01-111011	11/10/11	0700	G	X1	4				2			2					
18	VWAI-MW04-1111		0920	G	GW	7			2	2			2		1	1	3	
19	VWAI-MW04-1111A		0920	G	GW	2					2							
20	VWAI-MW02-1111		0950	G	GW	7			2	2			2		1	1	3	
21	VWAI-MW02-1111A		0950	G	GW	2					2							
20	VWAI-MW02-1111MS		0950	G	GW	4				2			2					
—	VWAI-MW02-1111MSA		0950	G	GW	2					2							
20	VWAI-MW02-1111SD		0950	G	GW	4				2			2					
—	VWAI-MW02-1111SDA		0950	G	GW	2					2							
22	VWAI-EB01-111011		1105	G	X1	4	4			2		2	2	2				

☐ E-mail to _____
EDD Format _____

Condition upon receipt: ☑ Iced ☐ Ambient ☑ °C 5-5.2-4.2

Relinquished by:	Received by:	Date:	Time:
[signature]	Fedex	11/10/11	1330
FedEx	Dawn Mellon	11-12-11	9:00

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cooler 2

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CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: _____

Invoice To: _____

Project No.: 392485.FI.FK
Site Name: Vieques ACCI
Location: Vieques State: Puerto Rico
Sampler(s): D. Whitaker

Project Mgr.: Stephen Brand

P.O. No.: _____ RQN: _____

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= H_3PO_4 10= _____ 11= _____

List preservative code below: ✓

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= DI water X2= _____ X3= _____

G=Grab C=Composite

Containers: # of VOA Vials | # of Amber Glass | # of Clear Glass | # of Plastic

Analyses: List 1 SVOCs + MW 8270D

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____
State specific reporting standards: _____

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	List 1 SVOCs + MW 8270D
18	VWAI-MW04-1111	11/10/11	0920	G	GW		2			2
19	VWAI-MW02-1111MS	11/10/11	0950	G	GW		2			2
20	VWAI-MW02-1111SD	11/10/11	0950	G	GW		2			2
20	VWAI-MW02-1111	11/10/11	0950	G	GW		2			2
							11/10/11			

☐ E-mail to _____
EDD Format _____

Condition upon receipt: ☑ Iced ☐ Ambient ☑ °C 5°C 5°C 4°C

Relinquished by:	Received by:	Date:	Time:
[signature]	Fedex	11/10/11	1330
FedEx	[signature]	11-12-11	9:00

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CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: _____

Invoice To: CH2M Hill

Project No.: 392485.FI.FK

Site Name: AOC I Vieques

Location: Vieques State: PR

Project Mgr.: Stephen BRAND

P.O. No.: _____ RQN: _____

Sampler(s): D. Whitaker

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9=_____ 10=_____ 11= _____

List preservative code below: ✓

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

Containers: # of VOA Vials | # of Amber Glass | # of Clear Glass | # of Plastic

Analyses: TPH-(DRO/GRO)

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____
State specific reporting standards: _____

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	TPH-(DRO/GRO)
18	VWAI-MW04-1111	11/10/11	0920	G	GW		2			2
20	VWAI-MW02-1111MS	11/10/11	0950	G	GW		2			2
20	VWAI-MW02-1111SD	11/10/11	0950	G	GW		2			2
20	VWAI-MW02-1111	11/10/11	0950	G	GW		2			2

11/10/11

☐ E-mail to _____

EDD Format _____

Relinquished by:	Received by:	Date:	Time:
	Fedex	11/10/11	1330
Fedex		11-12-11	9:00

Condition upon receipt: ☑ Iced ☐ Ambient ☐ °C 5°C 5°C 4°C

Spectrum Analytical, Inc. Featuring Hanibal Technology -- Rhode Island Division

Received By: Daniel Mullen	Page 01 of 01
Reviewed By: C Parker	Log-in Date 11/09/2011
Work Order: K2359	Client Name: CH2M Hill Inc.
Project Name/Event: CTO-0083 Vieques AOC E and I	

Remarks: (1/2) Please see associated sample/extract transfer logbook pages submitted with this data package.

1. Custody Seal(s) — Present / Absent
   Intact / Broken
2. Custody Seal Nos. — N/A
3. Traffic Reports/ Chain of Custody Records (TR/COCs) or Packing Lists — Present / Absent
4. Airbill — AirBill / Sticker
   Present / Absent
5. Airbill No. — FedEx 8763 4395 5638
6. Sample Tags — Present / Absent
   Sample Tag Numbers — Listed / Not Listed on Chain-of-Custody
7. Sample Condition — Intact / Broken / Leaking
8. Cooler Temperature Indicator Bottle — Present / Absent

9. Cooler Temperature	5 °C
10. Does information on TR/COCs and sample tags agree?	Yes / No
11. Date Received at Laboratory	11/09/2011
12. Time Received	10:30

Lab Sample ID	Preservation (pH) HNO3	H2SO4	HCl	NaOH	H3PO4	VOA Matrix	Soil HeadSpace or Air Bubble > or equal to 1/4"
K2359-01						H	
K2359-02	<2					H	
K2359-03						H	
K2359-04						H	

Sample Transfer

Fraction (1) TVOA/VOA	Fraction (2) SVOA/PEST/ARO
Area #	Area #
By	By
On	On

IR Temp Gun ID:MT-1

CoolantCondition: ICE

Preservative Name/Lot No:

VOA Matrix Key:

US = Unpreserved Soil	A= Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form — Yes / No

Rad OK — Yes / No

WO: K2359 / CID:900948 / CWID:001576

Spectrum Analytical, Inc. Featuring Hanibal Technology -- Rhode Island Division

Received By: Daniel Miller | Page 01 of 01

Reviewed By: [signature] | Log-in Date 11/11/2011

Work Order: K2359 | Client Name: CH2M Hill Inc.

Project Name/Event: CTO-0083 Vieques AOC I / AOC-I

Remarks: (1/2) Please see associated sample/extract transfer logbook pages submitted with this data package.

1. Custody Seal(s) — Present / Absent
   Intact / Broken
2. Custody Seal Nos. N/A
3. Traffic Reports/ Chain of Custody Records (TR/COCs) or Packing Lists — Present / Absent
4. Airbill — AirBill / Sticker
   Present / Absent
5. Airbill No. FedEx 8762 4395 5649
6. Sample Tags — Present / Absent
   Sample Tag Numbers — Listed / Not Listed on Chain-of-Custody
7. Sample Condition — Intact / Broken / Leaking
8. Cooler Temperature Indicator Bottle — Present / Absent
9. Cooler Temperature: 5 °C
10. Does information on TR/COCs and sample tags agree? Yes / No
11. Date Received at Laboratory: 11/11/2011
12. Time Received: 09:05

Lab Sample ID	Preservation (pH) HNO3	H2SO4	HCl	NaOH	H3PO4	VOA Matrix	Soil HeadSpace or Air Bubble > or equal to 1/4"
K2359-05						H	
K2359-06						H	
K2359-07						H	
K2359-08						H	
K2359-09	<2					H	
K2359-10						H	
K2359-11	<2					H	
K2359-12						H	
K2359-13						H	
K2359-14						H	
K2359-15							
K2359-16							

Sample Transfer

Fraction (1) TVOA/VOA	Fraction (2) SVOA/PEST/ARO
Area #	Area #
By	By
On	On

IR Temp Gun ID:MT-1

CoolantCondition: ICE

Preservative Name/Lot No:

VOA Matrix Key:

US = Unpreserved Soil — A= Air
UA = Unpreserved Aqueous — H = HCl
M = MeOH — E = Encore
N = NaHSO4 — F = Freeze

See Sample Condition Notification/Corrective Action Form Yes / No

Rad OK Yes / No

Spectrum Analytical, Inc. Featuring Hanibal Technology -- Rhode Island Division

Received By: Daniel Miller	Page 01 of 01
Reviewed By:	Log-in Date 11/12/2011
Work Order: K2359	Client Name: CH2M Hill Inc.
Project Name/Event: CTO-0083 Vieques AOC I / AOC-I	

Remarks: (1/2) Please see associated sample/extract transfer logbook pages submitted with this data package.

1. Custody Seal(s)	Present / Absent
	Intact / Broken
2. Custody Seal Nos.	N/A
3. Traffic Reports/ Chain of Custody Records (TR/COCs) or Packing Lists	Present / Absent
4. Airbill	AirBill / Sticker
	Present / Absent
5. Airbill No.	FedEx 8762 4395 5844
6. Sample Tags	Present / Absent
Sample Tag Numbers	Listed / Not Listed on Chain-of-Custody
7. Sample Condition	Intact / Broken / Leaking
8. Cooler Temperature Indicator Bottle	Present / Absent
9. Cooler Temperature	5 °C
10. Does information on TR/COCs and sample tags agree?	Yes / No
11. Date Received at Laboratory	11/12/2011
12. Time Received	09:00

Lab Sample ID	Preservation (pH) HNO3	H2SO4	HCl	NaOH	H3PO4	VOA Matrix	Soil HeadSpace or Air Bubble > or equal to 1/4"
K2359-17							
K2359-18	<2					H	
K2359-19						UA	
K2359-20	<2					H	
K2359-21						UA	
K2359-22						H	

Sample Transfer

Fraction (1) TVOA/VOA	Fraction (2) SVOA/PEST/ARO
Area #	Area #
By	By
On	On

IR Temp Gun ID:MT-1

CoolantCondition: ICE

Preservative Name/Lot No:

VOA Matrix Key:

US = Unpreserved Soil	A= Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form Yes / No

Rad OK Yes / No

Spectrum Analytical, Inc. RI Division Sample Condition Notification

Project#: K2359 **Date of Receipt:** 11-09-11
Client: CH2M **Received By:** Daniel Mercier
Client project #/name: Vicques

Unusual Occurance Description:

VWA2 - MW05 - 1111 = 1L amber rec'd broken
3L left

Client Contacted:

Contacted via: Phone/Fax/E-mail
Date: 11/9 Time: _____
Contacted By: EL
Name of person contacted: Anita Dotse

Client Response:

Responded via: Phone/Fax/E-mail
Date: _____
Name of person responding: _____
Responding to: _____

Action Taken: See attached emails

Form ID: QAF.0005

Edward Lawler [Warwick]

From: Anita.Dodson@CH2M.com
Sent: Friday, November 11, 2011 10:41 AM
To: Hillary.Ott@CH2M.com; Edward Lawler [Warwick]; Stephen.Brand@CH2M.com
Cc: John.Swenfurth@CH2M.com
Subject: RE: another FW: Minor correction for FW: Samples shipped from AOC I today 11/10/11 from Vieques to Mitkem

Hillary - Thanks for the update.

Stephen – Since the cooler with FEDEX airbill 5866 is unaccounted for, I think it best that we go ahead and assume those samples will need to be recollected. IF FEDEX can find this cooler and get it to Mitkem tomorrow we will be ok, but barring a miracle, that's likely NOT to happen. Please go ahead and plan on recollecting those samples. I will call your cell phone tomorrow if the cooler arrives at Mitkem.

Ed – Would it be possible to get an update from Mitkem on the status of cooler receipt tomorrow? I will be checking email and can also be reached on my cell at 757-284-9208.

Thanks,
Anita

From: Ott, Hillary/WDC
Sent: Friday, November 11, 2011 10:37 AM
To: Edward Lawler [Warwick]; Brand, Stephen/VBO; Dodson, Anita/VBO
Cc: Swenfurth, John/TPA
Subject: RE: another FW: Minor correction for FW: Samples shipped from AOC I today 11/10/11 from Vieques to Mitkem

Hello Everyone,

I just got off the phone with FEDEX. Two coolers ending in 5844, 5855 are still in Memphis, TN and should arrive tomorrow for Saturday delivery. The customer service representative placed an expedited shipping note to those two coolers. FEDEX has also put an inquiry into tracking down the third cooler, 5866. At this point no one is quite sure where this cooler is. They will be calling me with updates when they have located the package.

Please remember to be very careful when filling out the Air Bills. It looks like the address for Mitkem was incorrect.

Thanks,

Hillary Ott
Environmental Information Specialist
CH2M Hill
15010 Conference Center Drive
Chantilly, VA 20151

From: Edward Lawler [Warwick] [mailto:elawler@mitkem.com]
Sent: Friday, November 11, 2011 10:17 AM

To: Brand, Stephen/VBO; Ott, Hillary/WDC; Dodson, Anita/VBO
Cc: Swenfurth, John/TPA
Subject: another FW: Minor correction for FW: Samples shipped from AOC I today 11/10/11 from Vieques to Mitkem

Actually, the second cooler we received today was shipped two days ago.

So in summary, we have received both coolers that were shipped on 11/9, and none of the coolers shipped yesterday.

Our understanding is that the third cooler shipped yesterday, with the incorrect deliver-to address (airbill ending in 5866), needs someone from CH2M-Hill to contact Fedex and change the deliver-to address. We will be here until noon on Saturday to receive samples.

Thanks.

--Ed

From: Edward Lawler [Warwick]
Sent: Friday, November 11, 2011 10:12 AM
To: 'Stephen.Brand@CH2M.com'; Hillary.Ott@CH2M.com; Anita.Dodson@CH2M.com
Cc: John.Swenfurth@CH2M.com
Subject: Minor correction for FW: Samples shipped from AOC I today 11/10/11 from Vieques to Mitkem

There is a minor correction to the information below. We have received ONE cooler that was shipped yesterday. The airbill ending in 5650, the COC with SVOCs and DRO. The rest of the information remains the same.

--Ed

From: Edward Lawler [Warwick]
Sent: Friday, November 11, 2011 9:43 AM
To: 'Stephen.Brand@CH2M.com'; Hillary.Ott@CH2M.com; Anita.Dodson@CH2M.com
Cc: John.Swenfurth@CH2M.com
Subject: RE: Samples shipped from AOC I today 11/10/11 from Vieques to Mitkem

Good morning—

As of 9:40am on 11/11/11, we received the cooler that was supposed to be here yesterday. Samples are in the lab, and there is a good chance we will have the NO3 analyzed within the holding time. Cooler arrived at 5 degrees C.

However, we have NOT received the 3 coolers that were shipped yesterday. I tracked these, and two of them say they will be here by 10:30 (which I believe to be fiction, because we typically get all Fedex deliveries at the same time of the day, and there were no additional coolers on the truck that left here a short while ago). The third cooler (tracking number ending in 5866) they couldn't seem to find. I think the airbill was not completed correctly.

We will be here tomorrow to receive any samples that arrive on Saturday.

--Ed

From: Stephen.Brand@CH2M.com [mailto:Stephen.Brand@CH2M.com]
Sent: Thursday, November 10, 2011 3:39 PM
To: Edward Lawler [Warwick]; Hillary.Ott@CH2M.com; Anita.Dodson@CH2M.com
Cc: John.Swenfurth@CH2M.com
Subject: Samples shipped from AOC I today 11/10/11 from Vieques to Mitkem

Here are the chains, notes, and FedEx forms for today's shipment. Three coolers. Let me know if

there are any problems.

Stephen Braud P.G.
Hydrogeologist
5700 Cleveland Street, Suite 101
Virginia Beach, VA 23462
Direct - 757.671.6211
Fax - 703.376.5970
Mobile - 757.285.7685
www.ch2mhill.com

Target Zero!

Please consider the environment before printing this email

Edward Lawler [Warwick]

From: Michael.Zamboni@CH2M.com
Sent: Tuesday, November 15, 2011 10:04 AM
To: Edward Lawler [Warwick]
Cc: Stephen.Brand@CH2M.com; Michael.Zamboni@CH2M.com; John.Swenfurth@CH2M.com; Hillary.Ott@CH2M.com; Brett.Doerr@CH2M.com
Subject: RE: Vieques AOC I Groundwater Samples
Attachments: 20111115 Cancelled Samples.xlsx

Thanks Ed. Because the persulfate concentration in each well (immediately prior to sampling) was less than a cutoff point, we didn't need to collect the ascorbic acid-preserved VOCs. The VOCs should have been HCl-preserved. Therefore, I can cancel the analysis of AA-VOCs samples (sample IDs end in "A") as long as there is a corresponding HCl-preserved analysis for the same sample. Would you please cancel analysis for the attached samples and let me know if anything seems out-of-the ordinary?

Thanks,
Mike Z.

K2359 - 06A, 08A, 10A, 12A, 19A, 21A

From: Edward Lawler [Warwick] [mailto:elawler@mitkem.com]
Sent: Tuesday, November 15, 2011 8:04 AM
To: Zamboni, Michael/WDC
Cc: Brand, Stephen/VBO
Subject: RE: Vieques AOC I Groundwater Samples

Mike—

These were going to be analyzed this morning. I have put them "on-hold" so they won't be run. If you decide to have these analyzed (I think the 7-day hold time goes out tomorrow), please let me know ASAP.

Thanks

--Ed

From: Michael.Zamboni@CH2M.com [mailto:Michael.Zamboni@CH2M.com]
Sent: Monday, November 14, 2011 5:27 PM
To: Edward Lawler [Warwick]
Cc: Michael.Zamboni@CH2M.com; Stephen.Brand@CH2M.com
Subject: Vieques AOC I Groundwater Samples

Hi Ed,

I was just wondering if you've analyzed any of the Vieques AOC I Groundwater Samples yet for VOCs from ascorbic acid-preserved vials. These are the sample IDs which end in "A". We were contemplating if we could cancel these analyses, but it may be a moot point if you've already analyzed them.

Thanks,
Mike Z.

Sample ID to Cancel	Date/Time	Analysis
VWAI-MW02-1111A	11/10/2011 9:50	VOCs (AA)
VWAI-MW02-1111MSA	11/10/2011 9:50	VOCs (AA)
VWAI-MW02-1111SDA	11/10/2011 9:50	VOCs (AA)
VWAI-MW03-1111A	11/9/2011 11:15	VOCs (AA)
VWAI-MW04-1111A	11/10/2011 9:20	VOCs (AA)
VWAI-MW05B-1111A	11/9/2011 9:00	VOCs (AA)
VWAI-MW05BP-1111A	11/9/2011 9:05	VOCs (AA)
VWAI-MW07-1111A	11/9/2011 9:20	VOCs (AA)

Edward Lawler [Warwick]

From: Hillary.Ott@CH2M.com
Sent: Tuesday, November 15, 2011 3:50 PM
To: Edward Lawler [Warwick]
Cc: Michael.Zamboni@CH2M.com
Subject: Vieques AOCI - Login Revisions
Attachments: Vieques-AOCI-CTF.pdf

Hi Ed,

After reviewing the Login for Vieques AOC 1, I found a couple mistakes that will need to be updated. I have attached a Corrections to File Memo documenting the changes that need to be made. Also, I noticed on the login for VWAI-MW05-1111 and VWAI-MW05P-1111 you have them logged in for SW8260 but we cancelled those analyses last week.

Can you please update and send me the revised login?

Thanks,

Hillary Ott
Environmental Information Specialist
CH2M Hill
15010 Conference Center Drive
Chantilly, VA 20151

E2359-02, -03

MEMORANDUM **CH2MHILL**

Corrections to COCs

TO: Ed Lawler, Mitkem.

COPIES: File
Data Validation Package
Laboratory Package SDG: K2359

FROM: Hillary Ott
Project Data Manager

DATE: November 15, 2011

This memo is to document corrections made to entries on the Chains of Custody (COC) and Logins for Vieques, AOCI.

The corrections include changes to the sample time on the Login:

Sample ID	Date Collected	Incorrect Time Collected	Correct Time Collected	SDG
VWAI-TB01-111011	11/10/2011	9:00	7:00	K2359

-017

The corrections include changes to the sample date on the Login:

Sample ID	Incorrect Date Collected	Correct Date Collected	Time Collected	SDG
VWAI-EB01-111011	1/10/2011	11/10/2011	7:00	K2359

K2359-22

The corrections include cancellation of analyses:

Sample ID	Date Collected	Time Collected	Requested Analyses	Analyses to Cancel	SDG
VWAI-MW05-1111	11/8/2011	9:35	List 1 VOCs, SVOCs, GRO, DRO, ORO, Field Filtered Iron & Manganese, Sulfate, Nitrate, TOC.	List 1 VOCs	K2359
VWAI-MW05P-1111	11/8/2011	9:40	List 1 VOCs, SVOCs, GRO, DRO, ORO, Field Filtered Iron & Manganese, Sulfate, Nitrate, TOC.	List 1 VOCs	K2359

-02

-05

Edward Lawler [Warwick]

From: Hillary.Ott@CH2M.com
Sent: Wednesday, November 16, 2011 9:14 AM
To: Edward Lawler [Warwick]
Cc: Michael.Zamboni@CH2M.com
Subject: RE: Vieques AOCI - Login Revisions

Hi Ed,

Please cancel the 2 samples for VOC. The VWAI-MW05B-1111 and VWAI-MW05BP-1111 you received on 11/9 were the recollected samples for VOC.

Thanks,

Hillary Ott
Environmental Information Specialist
CH2M Hill
15010 Conference Center Drive
Chantilly, VA 20151

From: Edward Lawler [Warwick] [mailto:elawler@mitkem.com]
Sent: Wednesday, November 16, 2011 7:45 AM
To: Ott, Hillary/WDC
Subject: RE: Vieques AOCI - Login Revisions

Hi Hillary—

I recall Anita saying that those 2 VOC samples would be cancelled and recollected, but we never received the recollected samples. So I didn't cancel the original analyses. (with so much other confusion about this project, I may have missed another communication).

Can you please confirm that you don't want these 2 samples analyzed for VOCs? (we still have them scheduled for GRO analysis).

Thanks

-_Ed

From: Hillary.Ott@CH2M.com [mailto:Hillary.Ott@CH2M.com]
Sent: Tuesday, November 15, 2011 3:50 PM
To: Edward Lawler [Warwick]
Cc: Michael.Zamboni@CH2M.com
Subject: Vieques AOCI - Login Revisions

Hi Ed,

After reviewing the Login for Vieques AOC 1, I found a couple mistakes that will need to be updated. I have attached a Corrections to File Memo documenting the changes that need to be made. Also, I noticed on the login for VWAI-MW05-1111 and VWAI-MW05P-1111 you have them logged in for SW8260 but we cancelled those analyses last week.

Can you please update and send me the revised login?

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: K2359 LAB: Spectrum Analytical

SITE NAME: Vieques CTO-083 AOC I (limited compd list)

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ☑ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ☑ ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

Sampled 11/8-10/11 Analy 11/15-18/11
Recd 11/9-12/11 Temp 4-5°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

lab

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ✓ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits.

[ ] ___ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

NO MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [✓] ___ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VWAI-TB01-110811 – no
VWAI-TB01-110911 – no
VWAI-TB01-111011 – no

VWAI-EB01-110811 – no
VWAI-EB01-110911 – no
VWAI-EB01-111011 – no

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

	YES	NO	N/A
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

NO TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ___ ✓

b. Blanks [ ] ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] [✓] ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [ ] ___ ✓

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? [✓] ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VWAI-MW05B-1111
VWAI-MW05BP-1111 > MDL

Initial Calibration Date: 11/14/2011

RRF and %RSD Calculations:

Compound Name: 1,2-dichloroethane

Lab Value: 0.2720

Area of Compound	1251031
Area of Internal STD	1151324
Conc. of Internal STD	50
Conc. of Compound	200
Calculated RRF	0.272

Compound Name: benzene

Lab Value: 12.90

RRF of STD 1	0.9940
RRF of STD 2	0.9550
RRF of STD 3	0.8120
RRF of STD 4	0.8100
RRF of STD 5	0.7160
RRF of STD 6	0.9750
Calculated % RSD	12.90

Continuing Calibration File ID: 11/15/2011

RRF and %D Calculations:

Compound Name: 1,2-dichloroethane

Lab Value: 0.289

Area of Compound	377827
Area of Internal STD	1309593
Conc. of Internal STD	50
Conc. of Compound	50
Calculated RRF	0.289

Compound Name: 1,2-dichloropropane

Lab Value: 1.5

Average RRF	0.252
Calibration Check RRF	0.248
Calculated % D	1.59

SAMPLE CALCULATION

Sample ID: VWAI-MW07-1111
Standard ID: 11/15/2011
Compound: benzene
Concnetration: 5.3 ug/L

	Water (ug/L)	Soil (ug/Kg)	Soil ug/Kg)
Area of Compound	120597		
Area of Internal STD	1298350		
Conc. of Internal (ng)	250	250	
RRF of Compound	0.877		
Dilution Factor	1	1	
Weight of Sample	NA		
Volume of Sample	5	NA	
% Moisture	NA		
Aliquot of sample	NA	NA	
Concentration	5.30	#DIV/0!	#DIV/0!

	RT of Internal STD	RT of Compound	RRT
Sample	5.057	4.832	0.956
Standard	5.057	4.832	0.956

REPORT NARRATIVE

Spectrum Analytical, Inc. Featuring Hanibal Technology, RI Division.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC I

Laboratory Workorder / SDG #: K2359

SW846 8260C, VOC by GC-MS

I. SAMPLE RECEIPT

Several communications with the client regarding samples to analyze and/or cancel are included in the Sample Transmittal section of this report.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed for a select list of volatile compounds following procedures in laboratory test code: SW846 8260C.

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW5030.

V. INSTRUMENTATION

The following instrumentation was used:

Instrument Code: V10
Instrument Type: GCMS-VOA
Description: HP7890A
Manufacturer: Agilent
Model: 7890A / 5975C
GC Column used: 30 m X 0.25 mm ID [1.40 um thickness] DB-624 capillary column.

Instrument Code: V6
Instrument Type: GCMS-VOA
Description: HP6890 / HP5973
Manufacturer: Hewlett-Packard
Model: 6890 / 5973
GC Column used: 30 m X 0.25 mm ID [1.40 um thickness] DB-624 capillary column.

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Surrogates:

Surrogate standard percent recoveries were within the QC limits.

D. Laboratory Control Spikes (LCS):

Percent recoveries for lab control samples were within the QC limits.

E. Internal Standards:

Internal standard peak areas were within the QC limits.

F. Dilutions:

No sample in this SDG required analysis at dilution.

G. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Spectrum, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed:___ 

Date:_____12/9/11_____

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: K2359 LAB: Spectrum Analytical

SITE NAME: Vieques CTO-083 AOC I (limited compd list)

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ".

Temp 4-5°C

Sampled 11/8-10/11 Extr. 11/14/11
Recd 11/9-12/11 Analy 12/2-3/11

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received (See Traffic Report)	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

	YES	NO	N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a.	Low Water	[✓]	___	___
b.	Low/Med Soil	[ ]	___	___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a.	Low Water	[✓]	___	___
b.	Low/Med Soil	[ ]	___	___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [✓] ___ ___

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 80000C-24). [ ] [✓] ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ [✓]

2H - FORM II SV-2

WATER SEMIVOLATILE DEUTERATED MONITORING COMPOUND RECOVERY

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: K2359 Mod. Ref No.: SDG No.: SK2359

	CLIENT SAMPLE NO.	SDMC1 (NBZ) #	SDMC2 (FBP) #	SDMC3 (TPH) #						TOT OUT
01	MB-63017	102	99	126						0
02	VWAI-MW05-1111	93	92	51						0
03	VWAI-MW05P-1111	93	90	47 *						1
04	VWAI-EB01-110811	89	86	99						0
05	VWAI-MW03-1111	78	80	61						0
06	VWAI-MW07-1111	70	54	49 *						1
07	VWAI-EB01-110911	94	87	87						0
08	VWAI-MW04-1111	85	85	71						0
09	VWAI-MW02-1111	91	88	72						0
10	VWAI-MW02-1111MS	94	95	72						0
11	VWAI-MW02-1111MSD	95	91	78						0
12	VWAI-EB01-111011	90	85	97						0
13	LCS-63017	93	92	121						0
14	LCSD-63017	88	83	116						0

		QC LIMITS
SDMC1	(NBZ) = Nitrobenzene-d5	(40-110)
SDMC2	(FBP) = 2-Fluorobipheny1	(50-110)
SDMC3	(TPH) = Terpheny1-d14	(50-135)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D DMC diluted out

som111.10.27.A

	YES	NO	N/A
Were method blanks re-analyzed?	[ ]	___	✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II?	___	✓	___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [✓] ___ ___

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low Solid [ ] ___ ___

c. Med Solid [ ] ___ ___

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. Y ___ ___

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water

0 out of 6

Solids

___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
0 out of 3	____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a method blank been analyzed either after

	YES	NO	N/A
the calibration standard or at any other time during the analytical shift for each GC/MS system used ?	[ ]		

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles?	[✓]		

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary.		[✓]	
6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)?		[✓]	

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

VWAI-EB01-110811 — NO
VWAI-EB01-110911 — NO
VWAI-EB01-111011 — NO

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

	YES	NO	N/A
that exceeded the initial calibration range.	[ ]	___	✓
6.5 Does the instrument blank have positive results for target analytes and/or TICs?	___	[ ]	✓ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column.	✓ [ ]	___	___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)?	✓ [ ]	___	___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

	YES	NO	N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

	YES	NO	N/A
ACTION: If ion abundance criteria are not met, take action specified in section 3.2			
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.			
8.8 Are the spectra of the mass calibration compound acceptable?	✓		
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates	✓		
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?			✓

	YES	NO	N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate	[✓]	[ ]	[ ]
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[✓]	[ ]	[ ]
c. Blanks	[✓]	[ ]	[ ]

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? [✓] [ ] [ ]

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability?	[✓]	[ ]	[ ]
Resolution?	[✓]	[ ]	[ ]
Peak shape?	[✓]	[ ]	[ ]
Full-scale graph (attenuation)?	[✓]	[ ]	[ ]
Other:_____	[ ]	[ ]	[ ]

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

	YES	NO	N/A
each sample?	✓		

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	✓		
9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum?	✓		
9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum?	✓		

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

	YES	NO	N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? no TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

	YES	NO	N/A
sample mass spectrum?	[ ]	___	✓
10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%?	[ ]	___	✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	___	[✓]	___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture?	[ ]	___	✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ✓ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)?  ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is $\geq$ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ [✓] ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ [✓] ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? [ ] ___ ___

	YES	NO	N/A
13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%?	___	[ ]	✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest?	[ ]	___	___
14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument?	[ ]	___	___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

	YES	NO	N/A
call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").			
14.3 Do any of the SPCCs have an RRF <0.05?	___	✓	___
If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18.	[ ]	✓	___
14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?			
ACTION: If yes, make a note in data assessment.			
14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%?	___	✓	___
ACTION: Circle all outliers in red.			
ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.			
14.6 Do any semivolatile compounds have a RRF < 0.05?	___	✓	___
ACTION: Circle all outliers in red.			
ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.			
14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more).	___	✓	___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? [ ] [✓] ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? [✓] ___ ___

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? [✓] ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? [✓] ___ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

VWAI-MW05-1111
VWAI-MW05P-1111 > no qual

Initial Calibration Date: 12/1/2011

RRF and %RSD Calculations:

Compound Name: naphthalene

Lab Value: 1.155

Area of Compound	621062
Area of Internal STD	268811
Conc. of Internal STD	40
Conc. of Compound	80
Calculated RRF	1.155

Compound Name: 2-methylnaphthalene

Lab Value: 7.7

RRF of STD 1	0.696
RRF of STD 2	0.74
RRF of STD 3	0.747
RRF of STD 4	0.744
RRF of STD 5	0.799
RRF of STD 6	0.879
RRF of STD 7	0.741
Calculated % RSD	7.7

Continuing Calibration File ID: 12/5/2011

RRF and %D Calculations:

Compound Name: bis(2-ethylhexyl)phthalate

Lab Value: 0.689

Area of Compound	217885
Area of Internal STD	505725
Conc. of Internal STD	40
Conc. of Compound	25
Calculated RRF	0.689

Compound Name: naphthalene

Lab Value: 6.8

Average RRF	1.022
Calibration Check RRF	0.953
Calculated % D	6.8

SAMPLE CALCULATION

Sample ID: VWAI-MW05-1111
Standard ID: 12/2/2011
Compound: 2-methylnaphthalene
Concnetration: 11 ug/L

	Water (ug/L)	Soil (ug/Kg)
Area of Compound	41944	
Area of Internal STD	193580	
Conc. of Internal (ng)	40	2
RRF of Compound	0.764	
Final Volume	1000	1000
Dilution Factor	1	1
GPC Factor	NA	1
Injection Volume	1	1
Weight of Sample	NA	
Initial Volume of Sample	1000	
% Moisture	NA	
Concentration	11.34	#DIV/0!

	RT of Internal STD	RT of Compound	RRT
Sample	5.32	6.655	1.251
Standard	5.319	6.655	1.251

DataQual **SVOA**

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VWAI-MW05-111
Duplicate Sample ID: VWAI-MW05P-111

Water: RPD>75%
Soil: RPD>100%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
2-methylnaphthalene	11	11	0
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

* one values below LOD
only values above LOD listed

COMMENTS: No qualifications required.

REPORT NARRATIVE

Spectrum Analytical, Inc. Featuring Hanibal Technology, RI Division.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC I

Laboratory Workorder / SDG #: K2359

SW846 8270D, SVOA by GC-MS

I. SAMPLE RECEIPT

Several communications with the client regarding samples to analyze and/or cancel are included in the Sample Transmittal section of this report.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed for select semivolatile organic compounds following procedures in laboratory test code: SW846 8270D.

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW3510.

V. INSTRUMENTATION

The following instrumentation was used:

Instrument Code: S3
Instrument Type: GCMS-SEMI
Description: HP6890 / HP5973
Manufacturer: Hewlett-Packard
Model: 6890 / 5973

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Surrogates:

Surrogate standard percent recoveries were within the QC limits with the following exceptions. Please note that the QC acceptance criteria generally allow one surrogate recovery outside of the QC limits per fraction.

VWAI-MW05P-1111 (K2359-03B), recovery is below criteria for Terphenyl-d14 at 47% with criteria of (50-135).

VWAI-MW07-1111 (K2359-15A), recovery is below criteria for Terphenyl-d14 at 49% with criteria of (50-135).

D. Spikes:

1. Laboratory Control Spikes (LCS):

Percent recoveries for lab control samples were within the QC limits.

2. Matrix Spike / Matrix Spike Duplicate (MS/MSD):

Matrix spikes were performed on samples: VWAI-MW02-1111 (K2359-20EMS) and VWAI-MW02-1111 (K2359-20EMSD).

Percent recoveries and replicate RPDs were within the QC limits.

E. Internal Standards:

Internal standard peak areas were within the QC limits.

F. Dilutions:

No sample in this SDG required analysis at dilution.

G. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Spectrum, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed:____ _____

Date:_____12/12/11_____

DataQual *Worksheets – GRO BY 8015B*

This SDG contains GRO results SW-846 method 8015B. Region II validation guidelines were used as applicable, however, the Region has not developed an SOP for this method so these worksheets are used as an alternative.

Laboratory: Spectrum Analytical

Holding Times

Sampling Date:	11/8-10/11	14-day sample holding time was applied based on SW-846 recommendations
Received Date:	11/9-12/11	
Analysis Dates:	11/22/11	
Cooler Temp:	4-5°C	

All sample analysis holding time requirements were met.

Calibrations

A five-point calibration curve was analyzed for both the target compound and the surrogate compound. The RFs and %RSDs were calculated and met criteria for both the target compound and the surrogate compound. Continuing calibration standards were analyzed per the method. All %Ds were within QC limits.

Blank Summary

Blank qualification guidelines:

- No action is taken if a compound is found in the blank but not in the sample.
- Sample weight, volume or dilution factor must be taken into consideration when applying criteria.
- Apply the same data validation guidelines to any associated method, trip, rinse and field blanks and all associated samples.
- Qualification/Action codes:

U -	The blank contamination concentration is ≤ RL or > RL and sample result is < RL. Result is qualified as U at the RL.
U -	The blank contamination concentration is >RL and sample result is either is >RL but < blank contamination concentration. Result is qualified as U at reported concentration.
NA	The sample is greater than the RL when the blank contamination concentration is < RL or the sample result is greater than the blank contamination concentration when the blank contamination concentration is >RL.

No contamination was exhibited in the method -no qualifications required. All QC blanks exhibited no contamination.

Surrogate Recoveries Summary

All criteria met with.

Laboratory Control Spike

All criteria met.

Matrix Spike/Matrix Spike Duplicate Summary

An MS/MSD was submitted for sample VWAI-MW02-1111-ALL CRITERIA WERE MET.

Field Duplicate Sample Summary

A field duplicate was not submitted for this data package.

Sample ID: VWAI-MW05-1111 Duplicate Sample ID: VWAI-MW05P-1111

Compound	Sample Conc.	Duplicate Conc.	RPD
GRO	0	0	#DIV/0!

Comments: **No qualifications required.**

Specific Comments:

Raw data was verified.

Validator Signature: _____ **Date:** 1/2/12

Initial Calibration Date: 5/17/2011
RF and %RSD Calculations:

Compound Name: GRO
Lab Value: 4.692 E4

Area of Compound	93849135
Conc of Compd	2000
Calculated RRF	46924.57

Compound Name: GRO
Lab Value: 18.17

RRF of STD 1	4.670
RRF of STD 2	4.787
RRF of STD 3	4.694
RRF of STD 4	4.692
RRF of STD 5	6.791
Calculated % RSD	18.17

Continuing Calibration File ID: 11/22/2011
RF and %D Calculations:

Compound Name: GRO
Lab Value CF: 43.665 E3
Lab Value %D: 14.8

Area of compound	21832321
Concentration	500
Calculated CF	43664.6

Average CF	51.268
Calibration Check CF	43.665
Calculated % D	14.83

REPORT NARRATIVE

Spectrum Analytical, Inc. Featuring Hanibal Technology, RI Division.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC I

Laboratory Workorder / SDG #: K2359

SW846 8015D GRO, Gasoline Range Organic (GRO) by GC-FID

I. SAMPLE RECEIPT

Several communications with the client regarding samples to analyze and/or cancel are included in the Sample Transmittal section of this report.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed following procedures in laboratory test code: SW846 8015D GRO.

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW5030.

V. INSTRUMENTATION

The following instrumentation was used:

Instrument Code: V4

Instrument Type: GC-FID/PID
Description: HP5890 A
Manufacturer: Hewlett-Packard
Model: 5890

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

Gasoline Range Organics are calibrated using the average response factor from a GRO component spike. This GRO component spike includes compounds from MTBE through Naphthalene. Samples are integrated from the retention times of MTBE through Naphthalene range inclusive. The laboratory control sample spikes are performed using a gasoline product spike.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Surrogates:

Surrogate standard percent recoveries were within the QC limits.

D. Spikes:

1. Laboratory Control Spikes (LCS):

Percent recoveries for lab control samples were within the QC limits.

2. Matrix Spike / Matrix Spike Duplicate (MS/MSD):

Matrix spikes were performed on samples: VWAI-MW02-1111 (K2359-20AMS) and VWAI-MW02-1111 (K2359-20AMSD).

Percent recoveries and replicate RPDs were within the QC limits.

E. Dilutions:

No sample in this SDG required analysis at dilution.

F. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Spectrum, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed:_____

Date:_____12/12/11_____

DataQual *Worksheets – DRO BY_8015D_*

This SDG contains DRO results SW-846 method 8015D. Region II validation guidelines were used as applicable, however, the Region has not developed an SOP for this method so these worksheets are used as an alternative.

Sampling Date: 11/8-10/11
Received Date: 11/9/11; 1/11/11
11/12/11
Preparation Date: 11/15/11
Analysis Dates: 11/29/11

Holding Times

7-day water or 14 day soil sample holding time was applied based on SW-846 recommendation, cooler temps ***were/were not*** acceptable. Appropriate preservation ***was/was not*** used.

All sample extraction and analysis holding time requirements ***were/were not*** met for all samples in this SDG. Qualifications needed: NONE

Calibrations

____6_____-point calibration curves were analyzed for both the target and the surrogate compound on the __1___ instrument(s) used to analyze these samples. The CFs and %RSD's were calculated and ***did/did not*** meet criteria for both the target the surrogate compound. Continuing calibration standards ***were/were not*** analyzed per the method. All %Ds ***were/were not*** within QC limits in all CCVs. These samples were analyzed on __1__instrument(s) and __1___ sequence(s). Qualifications needed:

Blank Summary

Blank qualification guidelines:

- No action is taken if a compound is found in the blank but not in the sample.
- **Sample weight, volume or dilution factor must be taken into consideration when applying criteria.**
- Apply the same data validation guidelines to any associated method, trip, rinse and field blanks and all associated samples.
- Qualification/Action codes:

U -	The blank contamination concentration is ≤ RL or > RL and sample result is < RL. Result is qualified as U at the RL.
U -	The blank contamination concentration is >RL and sample result >RL but < blank contamination concentration. Result is qualified as U at reported concentration.
NA	The sample is greater than the RL when the blank contamination concentration is < RL or the sample result is greater than the blank contamination concentration when the blank contamination concentration is >RL.

Please note: the LOD = RL for this project.

Blank Contamination and Qualification Summaries

Blank ID	Compound	Concentration	LOD
no contamination noted			

Associated samples and required qualifications are noted in the following table.

Sample ID	Compound	Q Flag
no qualifications were required		

Surrogate Recoveries Summary

All surrogate recoveries ***were/were not*** acceptable in these samples. Qualifications needed: NONE

Matrix Spike/Matrix Spike Duplicate Summary

The MS/MSD pair submitted in this SDG exhibited ***acceptable/unacceptable*** recoveries and RPDs. LCS recoveries ***were/were not*** acceptable. Qualifications needed: **NONE**

Field Duplicate Sample Summary

Sample ID: VWAI-MW05-1111 Duplicate Sample ID: VWAI-MW05P-1111

Compound	Sample Conc.	Duplicate Conc.	RPD
ETPH	1.9	1.9	0%
ORO	0.54	0.71	27%

Comments: Flag ORO as estimated in both samples (>20% RPD).

Sample Result Verification

Specific Comments:

The samples required manual integration for the target compounds due to the nature of the compounds (multi-component). Positive results were reported in the field water samples. Raw data and quantitation calculations were verified.

Reviewer JA Cleveland **Date:** 1-16-12

Initial Calibration Date: 11/22/11 on F1.I
RRF and %RSD Calculations:

Compound Name: dro C10 TO C28 in Level 2
Lab Value: 0.9190

Area of Compound	54809086
Conc. of Compound	200
Area of Internal Standard	11929317
Conc. of Internal Standard	40
Calculated RF	0.9189

Compound Name: DRO (C10-C28)
Lab Value: 3.83

RF of STD 1	0.8560
RF of STD 2	0.9190
RF of STD 3	0.9280
RF of STD 4	0.9650
RF of STD 5	0.9180
RF of STD 6	0.9430
RF of STD 7	
Calculated % RSD	3.97

*DIFFERENCE IS DUE TO ROUNDING OF RESPONSE FACTORS TO 3 SD BY THE LAB. NO IMPACT ON RESULTS.

Continuing Calibration File ID: TPH F CCAL L5 100 PPM, 11/29/11, 2024
RRF and %D Calculations: FILE ID 111129A.B\F1H7460.D

Compound Name: ORO - C29 TO C40
Lab Value: 0.922

Area of Compound	430286026
Conc. of Compound	1400
Area of Internal Standard	13327694
Conc. of Internal Standard	40
Calculated RF	0.9224

Compound Name: ORO
Lab Value: 1.2

Average RF	0.9330
Calibration Check RF	0.9220
Calculated % D	1.2

SAMPLE CALCULATION

Sample ID: VWAI-MW05-1111
Standard ID: ICAL, 11/29/11, F1
Compound: DRO
Concentration: 1.9 mg/L

	Water (mg/L)	Soil (mg/Kg)
Area of Compound	562472983	
RF of Compound	0.928	
Area of Internal Standard	12678236	
Conc. Of Internal Standard	40	
Final Volume	1	
Dilution Factor	1	
GPC Factor	NA	
Injection Volume	1	
Weight of Sample	NA	
Initial Volume of Sample	1000	NA
% Solids Factor	NA	
Concentration	1.91	#DIV/0!

REPORT NARRATIVE

Spectrum Analytical, Inc. Featuring Hanibal Technology, RI Division.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC I

Laboratory Workorder / SDG #: K2359

SW846 8015D TPH, Total Petroleum Hydrocarbons (TPH) by GC-FID

I. SAMPLE RECEIPT

Several communications with the client regarding samples to analyze and/or cancel are included in the Sample Transmittal section of this report.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed following procedures in laboratory test code: SW846 8015D TPH.

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW3510.

V. INSTRUMENTATION

The following instrumentation was used:

Instrument Code: F1
Instrument Type: GC-FID

Description: HP6890
Manufacturer: Hewlett-Packard
Model: 6890

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

Calibrations met the Method/SOP acceptance criteria. Diesel Range Organics (DRO) are quantified using the average response factor from C9 - C28 hydrocarbon standards. Oil range organics (ORO) are quantified using the average response factor from C29 - C40 hydrocarbon standards. Continuing calibration verifications are evaluated by comparison of the average response for the individual C9 through C28 peaks (for DRO, or C29 - C 40 for ORO) to the average from the initial calibration. Samples are integrated from the retention time of C9 through C28 (for DRO or C29 - C40 for ORO) inclusive. The laboratory control sample spikes are performed using a diesel fuel product spike.

Please note that the analyte DRO (C9 - C28 range hydrocarbons) are reported as "Extractable Total Petroleum Hydrocarbons" on the data sheets, while ORO (C29 - C40) are reported as "Oil Range Organics" on the data sheets. These results are as described above, with "Extractable Total Petroleum Hydrocarbons" including only the C9 - C28 range organics.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Surrogates:

Surrogate standard percent recoveries were within the QC limits.

D. Spikes:

1. Laboratory Control Spikes (LCS):

Percent recoveries for lab control samples were within the QC limits. Please note that laboratory QC spikes appear in the DRO range only, not in the ORO range.

2. Matrix Spike / Matrix Spike Duplicate (MS/MSD):

Matrix spikes were performed on samples: VWAI-MW02-1111 (K2359-20EMS) and VWAI-MW02-1111 (K2359-20EMSD).

Percent recoveries were within the QC limits.

Replicate RPDs were within the advisory QC limits.

E. Dilutions:

No sample in this SDG required analysis at dilution.

F. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Spectrum, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed:____ _____

Date:_____12/9/11_____

	YES	NO	N/A
A.1.1 **Contract Compliance Screening Report** Present?	[ ]		✓
ACTION: If no, contact RSCC/PO.			
A.1.2 **Record of Communication (from RSCC)** Present?	[ ]		✓
ACTION: If no, request from the RSCC.			
A.1.3 **Sampling Trip Report** Present and complete?	[ ]		✓
ACTION: If no, contact RSCC/PO.			
A.1.4 **Chain of Custody/Sample Traffic Report** Present?	✓		
Legible?	✓		
Signature of sample custodian present?	✓		
ACTION: If no, contact RSCC/WAM/PO.			
A.1.5 **Cover Page** Present?	✓		
Is the Cover Page properly filled in and the verbatim signed by the lab manager or the manager's designee?	[ ]		
Do the sample identification numbers on the Cover Page agree with sample Identification numbers on:			
(a) Traffic Report Sheet? COC & log-in forms agree	[ ]		✓

	YES	NO	N/A
(b) Form I's?	[✓]	___	___
Is the number of samples on the Cover Page the same as the number of samples on the Traffic Report sheet and the Regional Record of Communication (ROC) for the data Case?	[___]	___	✓

ACTION:
If no for any of the above, prepare Telephone Record Log and contact RSCC/PO for re-submittal of the corrected Cover Page from the laboratory.

A.1.6 **SDG Narrative, DC-1 & DC-2 Form**

CLP Forms not provided Log In Info is Complete

Is the SDG Narrative present?	[✓]	___	___
Is Sample Log-In Sheet(Form DC-1) present and complete?	[✓]	___	___
Is Complete SDG Inventory Sheet(Form DC-2) present and complete?	[___]	___	✓

ACTION:
If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.

A.1.7 **Form I to XV**

A.1.7.1 Are all the Form I through Form XV labeled with:

Laboratory Name?	[✓]	___	___
Laboratory Code?	[✓]	___	___
RAS/Non-RAS Case No.?	[___]	___	✓
SDG No.?	[✓]	___	___

REPORT NARRATIVE

Spectrum Analytical, Inc. Featuring Hanibal Technology, RI Division.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC I

Laboratory Workorder / SDG #: K2359

SW846 6010C

I. SAMPLE RECEIPT

Several communications with the client regarding samples to analyze and/or cancel are included in the Sample Transmittal section of this report.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed for Iron and Manganese only following procedures in laboratory test code: SW846 6010C

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW3005A

V. INSTRUMENTATION

The following instrumentation was used to perform

Instrument Code: OPTIMA3
Instrument Type: ICP
Description: Optima ICP-OES
Manufacturer: Perkin-Elmer
Model: 4300 DV

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Laboratory Control Spikes (LCS):

Percent recoveries for laboratory control samples were within the QC limits.

D. Samples:

No unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Spectrum, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed:__ _____

Date:____12/9/11_____

		YES	NO	N/A
	Contract No.?	[✓]	___	___

ACTION:
If no for any of the above, note under Contract Problem/Non-Compliance Section of the "Data Review Narrative" and contact PO for corrected Form(s) from the laboratory.

A.1.7.2	After comparing values on Forms I-IX against the raw data, do any computation/ transcription errors exceed 10% of the reported values on the Forms for:			
	(a) all analytes analyzed by ICP-AES?	___	[✓]	___
	(b) all analytes analyzed by ICP-MS?	___	[___]	✓
	(c) Mercury?	___	[___]	✓
	(d) Cyanide?	___	[___]	✓

ACTION:
If yes, prepare Telephone Record Log and contact CLP PO/TOPO for the corrected data from the laboratory.

A.1.8 Raw Data

Data shall not be validated without the hard/electronic copies of the associated raw data for samples and QC samples.

A.1.8.1 Digestion/Distillation Log

Digestion Log for ICP-AES (Form XII)present?	[✓]	___	___
Digestion Log for ICP-MS (Form XII) present?	[___]	___	✓
Digestion Log for mercury (Form XII) present?	[___]	___	✓
Distillation Log for cyanide (Form XII) present?	[___]	___	___
Are pH values for metals and			✓

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	YES	NO	N/A
cyanide reported for each aqueous sample?	[ ]	_	✓
Are percent solids calculations present for soils/sediments?	[ ]	_	✓
Are preparation dates present on the sample preparation logs/bench sheets?	[✓]	_	_

NOTE:
Digestion/Distillation log must include weights, volumes, and dilutions used to obtain the reported results.

A.1.8.2 Is the analytical instrument real-time printouts present for:

ICP-AES?	[✓]	_	_
ICP-MS?	[ ]	_	✓
Mercury?	[ ]	_	✓
Cyanide?	[ ]	_	✓

Are all laboratory bench sheets and instrument raw data printouts necessary to support all sample analyses and QC operations:

Legible?	[✓]	_	_
Properly labeled?	[✓]	_	_

Are all field samples, QC samples and field QC samples present on:

Digestion/Distillation log?	[✓]	_	_
Instrument Printouts?	[✓]	_	_

ACTION:
If no for any of the above questions in Section A.1.8.1 and Section A.1.8.2, write Telephone Record Log and contact TOPO/PO for re-submittal from the laboratory.

		YES	NO	N/A
A.1.9	**Technical Holding Times**: (Aqueous and soil samples) (Examine sample Traffic Reports and digestion/distillation logs to determine the holding time from the sample collection date to the sample preparation date.)			
A.1.9.1	Cyanide distillation(14 days)exceeded?	_	[ ]	_
	Mercury analysis(28 days) exceeded?	_	[ ]	_
	Other Metals analysis(180 days)exceeded?	___	___	[✓] _

ACTION:
If yes, reject (R) and red-line non-detects and flag as estimated (J)results ≥ MDL even if sample(s) was preserved properly.

NOTE:
In addition to qualifying the data, a list of all samples and analytes which exceeded the holding times must be prepared. Report for each sample the number of days that were exceeded. (Subtract the sample collection date from the sample preparation date). Attach this list to the data review narrative.

A.1.9.2	Is pH of aqueous samples for:			
	Metals Analysis ≤ 2?	[✓]	___	___
	Cyanide Analysis ≥ 12?	[ ]	_	_

ACTION:
If no for any of the above, flag non-detects as "R" and detects as "J".

A.1.9.3	Is the cooler temperature ≤ 10 C°?	[✓]	_	_

ACTION:
If cooler temperature is >10 °C , flag non-detects as "UJ" and detects as "J".

A.1.10 **Final Data Correctness - Form I**

A.1.10.1 Are Form I's for all samples

SAMPLE CALCULATION

EPA SAMPLE ID: VWAI-MW03-1111
COMPOUND: Manganese
CONCENTRATION: 1350 ug/L
%Solids – NA
Raw Data result: 1.3545 mg/L

1.3545 mg/L (1000ug/1mg) = 1354.5 ug/L

FIELD DUPLICATE SAMPLE SUMMARY

Note: All reported results are noted in the table below because the client requested that the MDL be used as reporting limit instead of the RL for this project. RPDs or absolute differences were calculated based on Region II guidelines: if results are >5X RL RPD is calculated, if results are <5X RL the absolute difference is calculated. Flags are applied to field duplicate pair only as follows: For RPD values - RPD ≥ 35% but <120% results are J, RPD >120%, results are R. For absolute difference values - >+/- 2X RL results are J, >+/- 4X RL results are R.

Sample ID: none Duplicate Sample ID:

Analyte	Sample Conc.	Duplicate Conc.	RPD or absolute difference
			0.000
			#DIV/0!

Comments: No qualifications required.

Sample ID: none Duplicate Sample ID:

Analyte	Sample Conc.	Duplicate Conc.	RPD or absolute difference
			0.000
			0.000

Comments: No qualifications required.

Reviewer JCleveland **Date:** 1/16/12

	YES	NO	N/A
present and complete?	[✓]	___	___

ACTION:
If no, prepare Telephone Record Log and contact CLP PO/TOPO for submittal from the laboratory.

A.1.10.2 Verify there are no calculation and transcription errors in the results reported on Form I's. Circle on each Form I all results that are incorrect.

Is the calculation error less than 10% of the correct result?	[✓]	___	___
Are results on Form I's reported in correct units (ug/L for aqueous and MG/KG for soils)?	[✓]	___	___
Are results on Form I'S reported by correct significant figures?	[✓]	___	___
Are soil sample results on Form I's corrected for percent solids?	[___]	___	✓
Are all "less than MDL" values reported by the CRQLs and coded with "U"?	[✓]	___	___
Are values less than the CRQLs but greater than or equal to the MDLs flagged with "J"? (MDL, LOD, PQL } on Form Is)	[✓]	___	___
Are appropriate contractual quality control and Method qualifiers used? (Lab used B flag - reviewer changed to J)	[✓]	___	___

ACTION:
If no for any of the above questions, prepare Telephone Record Log, and contact CLP PO/TOPO for corrected data.

A.1.10.3 Do EPA sample identification numbers and the corresponding laboratory sample identification numbers match on the Cover Page, Form I's and in the raw data? [✓] ___ ___

Was a brief physical description

	YES	NO	N/A
of the samples before and after digestion given on the Form I's?	[___]	___	___
Was any sample result outside the mercury/cyanide calibration range or the ICP-AES/ICP-MS linear range diluted and noted on the Form I?	[___]	___	___

not CLP project

ACTION:
If no for any of the above, note under the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.11 **Initial Calibration**

A.1.11.1 Is a record of at least 2 point (A blank and a standard)calibration present for ICP-AES analysis?	[___]	___	___
Is a record of at least 2 point (a blank and a standard)calibration present for ICP-MS analysis?	[___]	___	___
Is a record of at least 5 point calibration (a blank & 4 standards)present for Hg analysis?	[___]	___	___
Is a record of at least 4 point calibration (a blank & 4 standards)present for cyanide?	[___]	___	___

ACTION:
If incomplete or no initial calibration was performed, reject (R) and red-line the associated data (detects & non-detects).

Is one initial calibration standard at the CRQL level for cyanide and mercury?	[___]	___	___

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the Data Review Narrative.

A.1.11.2 Is the curve correlation coefficient $\geq$ 0.995 for:

		YES	NO	N/A
	Mercury Analysis?	[___]	___	___
	Cyanide Analysis?	[___]	___	___
	ICP-AES(more than 2 point Calib.)?	[___]	___	___
	ICP-MS (more than 2 point calib.)?	[___]	___	___

ACTION:
If no, qualify the associated sample results ≥ MDL as estimated "J" and non-detects as "UJ".

NOTE:
The correlation coefficient shall be calculated by the data validator using standard concentrations and the corresponding instrument response (e.g. absorbance, peak area, peak height, etc.).

A.1.12 Initial and Continuing Calibration Verification- Form IIA

A.1.12.1	Present and complete for every metal and cyanide?	[___]	___	___
	Present and complete for ICP-AES and ICP-MS when both these methods were used for the same analyte?	[___]	___	___

ACTION:
If no for any of the above, prepare a Telephone Record Log and contact PO/TOPO for re-submittal from the laboratory.

A.1.12.2	Was a Continuing Calibration Verification performed every 10 samples or every 2 hours whichever is more frequent?	[___]	___	___

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.12.3	Was an ICV or a mid-range standard distilled and analyzed with each batch of cyanide samples?	[___]	___	___

	YES	NO	N/A

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative and qualify results ≥ MDL as estimated (J).

A.1.12.2 Circle on each Form IIA all percent recoveries that are outside the contract windows.

Are ICV/CCVs within control limits for:

Metals - 90-110%R?	[✓]	___	___
Hg - 80-120%R?	[___]	___	✓
Cyanide - 85-115%R?	[___]	___	✓

ACTION:
If no, qualify all samples between a previous technically acceptable CCV standard and a subsequent technically acceptable CCV standard as follows as follows:

Qualify as estimated (J) all detects and non-detects, if the ICV/CCV %R is between 75-89%(65-79% for Hg; 70-84% for CN). Qualify only positive results(≥ MDL) as "J" if the ICV/CCV %R is between 111-125%(121-135% for Hg;116-130% for CN). Reject (R) and red-line only
detects if the recovery is greater than 125% (135% for Hg; 130% for CN). Reject (R) and red-line all associated results (hits and non-detects)if the recovery is less than 75%(65% for Hg;70% for CN).

NOTE:
For ICV that does not fall within the acceptance limits, qualify all samples reported from the analytical run.

A.1.12.3 Was the distilled ICV or mid-range standard for cyanide within acceptance limits (85-115%)? [___] ___ ✓

ACTION:
If no, Qualify all cyanide results ≥ MDL as "J".

A.1.13 **CRQL Standard Analysis - Form IIB**

A.1.13.1 For each ICP-AES run, was a CRI

	YES	NO	N/A
(CRQL or MDL when MDL > CRQL) standard analyzed? (Note:CRI is not required for Al, Ba, Ca, Fe, Mg, Na and K.)	[___]	✓	___
For each ICP-MS run, was a CRI (CRQL or MDL when MDL > CRQL) standard analyzed for each mass/isotope used for the analysis?	[___]	___	___ ✓
For each mercury run, was a CRQL standard analyzed?	[___]	___	✓
For each cyanide run, was a CRQL standard analyzed?	[___]	___	✓

not required for iron not run for Mn

ACTION:
If no for any of the above, write this deficiency in the Contract Problems/ Non-Compliance Section of the Data Review Narrative, inform CLP PO and flag results in the affected ranges (detects <2xCRQL)as J and non-detects UJ.

all Mn detects were > 2X POL & non-detect result in MW07 was flagged UJ.

The affected ranges are:
ICP-AES Analysis - *True Value ± CRQL
ICP-MS Analysis - *True Value ± CRQL
Mercury Analysis - *True Value ± CRQL
Cyanide Analysis - *True Value ± CRQL
* True value of the CRQL Standard

A.1.13.2 Was a CRQL standard analyzed after the ICV/ICB, before the final CCV/CCB and once every 20 analytical samples in the analytical run for each analysis? [___] ✓ ___

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the "Data Review Narrative".

A.1.13.3 Circle on each Form IIB all percent recoveries that are outside the acceptance windows.

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	YES	NO	N/A
Is the CRQL standard within control limits for:			
Metals(ICP-AES/ICP-MS)- 70 - 130%?	[___]	___	✓
Mercury- 70 - 130%?	[___]	___	✓
Cyanide - 70 - 130%?	[___]	___	✓

ACTION:
If no, flag detects <2xCRQL as "J" and non-detects as "UJ" if the CRQL standard recovery is between 50-69%. Flag(J) only detects <2xCRQL if the recovery is between 131% and ≤180%. If the recovery is less than 150%, reject(R) and red-line non-detects and detects < 2xCRQL, and flag (J) detects between 2xCRQL and ICV/CCV. Reject and red-line only detects <2xCRQL and flag (J)detects ≥ 2xCRQL but < ICV/CCV if the recovery is > 180%.

Lab did not run CRI stds.

NOTE:
1. Qualify all field samples analyzed between a previous technically acceptable analysis of the CRQL standard and a subsequent acceptable analysis of the CRQL standard
2. Flag (J) or reject (R) only the final sample results on Form I's when Sample raw data are within the affected ranges and the CRQL standard is outside the acceptance windows.
3. The samples and the CRQL standard must be analyzed in the same analytical run.

A.1.14 Initial and Continuing Calibration Blanks - Form III

		YES	NO	N/A
A.1.14.1	Present and complete for all the instruments used for the metals and cyanide analyses?	[✓]	___	___
	Was an initial Calibration Blank analyzed after ICV?	[✓]	___	___
	Was a continuing Calibration Blank analyzed after every CCV and every 10 samples or every 2 hours, whichever is more frequent?	[✓]	___	___
	Were the ICB & CCB values ≥ MDL but < CRQL reported on Form III and flagged "J" by			

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		YES	NO	N/A
	using MDLs from direct analysis(Preparation Method "NP1")? (Check Form III against the raw data)	[___]	___	✓

ACTION:
If no, inform CLP PO/TOPO and make a note in the Contract-Problems/Non-Compliance Section of the "Data Review Narrative".

no + results reported in ICB or CCB stds.

A.1.14.2 Circle with red pencil on each Form III all Calib. Blank values that are:

≥ MDL but ≤ CRQL

> CRQL

A.1.14.2.1	When MDL < CRQL, is any Calib. Blank value ≥ MDL but ≤ CRQL?	___	[___]	✓

ACTION:
If yes, change sample results ≥ MDL but ≤ CRQL to the CRQL with a "U". Do not qualify non-detects.

A.1.14.2.2	When MDL < CRQL, is any Calib. Blank value > CRQL?	___	[___]	✓

ACTION:
If yes, reject (R) and red line the associated sample results > CRQL but <ICB/CCB Blank Result. Flag as "J" detects > ICB/CCB blank value but < 10xICB/CCB value. Change the sample results ≥ MDL but ≤ the CRQL to CRQL with a "U".

A.1.14.2.3	Is any Calibration Blank value below the negative CRQL?	___	[✓]	✓

ACTION:
If yes, flag (J) as estimated all associated sample results ≥ CRQL but <10xCRQL.

NOTE:

1. For ICB that does not meet the technical QC Criteria, apply the action to all samples

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	YES	NO	N/A

reported from the analytical run.
2. For CCBs that do not meet the technical QC criteria, apply the action to all samples analyzed between a previous technically acceptable analysis of CCB and a subsequent technically acceptable analysis of the CCB in the analytical run.,

A.1.15 Preparation Blank - FORM III

NOTE: The Preparation Blank for mercury is the same as the calibration blank.

A.1.15.1 Was one Preparation Blank prepared with and analyzed for:

Each Sample Delivery Group (SDG)?	[✓]	___	___
Each batch of the SDG samples digested/distilled?	[✓]	___	___
Each matrix type?	[✓]	___	___
All instruments used for metals and cyanide analyses?	[✓]	___	___

ACTION:
If no for any of the above, flag as estimated (J) all the associated positive data <10xMDL for which the Preparation Blank was not analyzed.

NOTE:
If only one blank was analyzed for more than 20 samples, then the first 20 samples analyzed are not estimated(J),but all additional samples must be qualified (J).

A.1.15.2 Circle with red pencil on each Form III all Prep. Blank values that are:

≥ MDL but ≤ CRQL, and

> CRQL

A.1.15.2.1 When MDL < CRQL, is any preparation blank value ≥ MDL but ≤ CRQL?	___	[✓]	___

ACTION:
If yes, change sample result ≥ MDL

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		YES	NO	N/A
	but ≤ CRQL to CRQL with a "U".			
A.1.15.2.2	When the MDL ≤ CRQL, is any Preparation Blank value greater than its CRQL?	___	[✓]	___
	If yes, is the Prep. Blank value greater than the value of the associated Field Blank collected and analyzed with the SDG samples?	___	[___]	✓
	If yes, is the lowest concentration of that analyte in the associated samples less than 10 times the Preparation Blank value?	___	[___]	✓

ACTION:
If yes, reject (R) and red-line all associated sample results greater than the CRQL but less than the Prep.Blank value. Flag as "J" detects > Prep. Blank value but <10xPrep.Blank. If the sample result ≥ MDL but ≤ CRQL, replace it with CRQL-U.

If the Prep. Blank value is less than the same analyte value in the Field Blank, do not qualify the sample results due to the Prep. Blank criteria.

NOTE:
Convert soil sample result to mg/Kg on wet weight basis to compare with the soil Prep. Blank result on Form III.

A.1.15.2.3	Is the Prep. Blank concentration below the negative CRQL?	___	[✓]	___

ACTION:
If yes, flag (J) all associated sample results less than 10xCRQL. Qualify non-detects as estimated (UJ).

A.1.15.2.4	When the MDL is greater than the CRQL, is the preparation blank concentration on Form III greater than two times the MDL?	___	[✓]	___

ACTION:

		YES	NO	N/A
	If yes, reject (R) and red-line all positive sample results with sample raw data less than 10 times the Preparation Blank value.			
A.1.16	**ICP-AES/ICP-MS Interference Check Sample (ICS)- Form IV** NOTE: Not required for CN, Hg, Al, Ca, Fe and Mg.			
A.1.16.1	Present and complete?	[✓]	___	___
	Was ICS analyzed at the beginning and end of each analytical run, and once for every 20 analytical samples?	[✓]	___	___
	Was ICS analyzed at the beginning of the ICP-MS analytical run?	[___]	___	✓
	ACTION: If no, flag as estimated (J) all sample results.			
A.1.16.2	**ICP-AES Method**			
A.1.16.2.1	**ICSA Solution:** For ICP-AES, are the ICSA "Found" analyte values within the control limits ± of CRQL of the true/established mean value?	[✓]	___	___
	If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSA Solution on Form IV?	[___]	___	✓
	ACTION: If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run: Flag (J) as estimated only sample results ≥MDL			

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	YES	NO	N/A

for which the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag non-detects as "UJ" and detects as "J".

A.1.16.2.3 **ICSAB Solution**

For ICP-AES, are all analyte results in ICSAB within the control limits of 80-120 of the true/established mean value? [✓] ___ ___

If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSAB Solution on Form IV? [___] ___ ✓

ACTION:
If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79%, qualify sample results ≥ MDL as "J" and non-detects as "UJ". Reject (R) and red-line all sample results (detects & non-detects) for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only positive results.

A.1.16.3 ICP-MS Method

A.1.16.3.1 **ICSA Solution:**

For ICP-MS, are the ICSA "Found" analyte values within the control limits of ±CRQL of the true/established mean value? [___] ___ ✓

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated only sample results ≥ MDL if the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag the associated sample detects as "J" and non-detects as "UJ".

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		YES	NO	N/A
A.1.16.3.3	**ICSAB Solution** For ICP-MS, are all analyte results in ICSAB within the control limits of 80-120% of the true/established mean value, whichever is greater?	[___]	___	✓

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79% flag (J) as estimated the associated sample results ≥ MDL. Reject (R) and red-line those all sample detects and non-detects for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only detects (≥ MDL).

A.1.17 **Spiked Sample Recovery: Pre-Digestion/Pre-Distillation)-Form V A**
Note: Not required for Ca, Mg, K, and Na (both matrices); Al and Fe (soil only)

A.1.17.1	Was Matrix Spike analysis performed:			
	For each matrix type?	[___]	✓	___
	For each SDG?	[___]	✓	___
	On one of the SDG samples?	[___]	✓	___
	For each concentration range (i.e., low, med., high)?	[___]	✓	___
	For each analytical Method (ICP-AES, ICP-MS, Hg, CN) used?	[___]	✓	___
	Was a spiked sample prepared and analyzed with the SDG samples?	[___]	✓	___

ACTION:
If no for any of the above, flag as estimated (J) all the positive data for which a spiked sample was not analyzed.

Lab did not perform MS/MSD (client did not request). J all + results for both Fe & Mn

NOTE:
If more than one spiked sample were analyzed for one SDG, then qualify the associated data based on the worst spiked sample analysis.

		YES	NO	N/A
A.1.17.2	Was a field blank or PE sample used for the spiked sample analysis?	___	[✓]	___
	ACTION: If yes, flag (J) as estimated positive data of the associated SDG samples for which field blank or PE sample was used for the spiked sample analysis.			
A.1.17.3	Circle on each Form VA all spike recoveries that are outside the control limits (75-125%) that have sample concentrations less than four times the added spike concentrations.			
	Are all recoveries within the control limits when sample concentrations are less than or equal to four times the spike concentrations?	[___]	___	✓
	NOTE: Disregard the out of control spike recoveries for analytes whose concentrations are greater than or equal to four times the spike added.			
	Are results outside the control limits (75-125%) flagged with Lab Qualifier "N" on Form I's and Form VA?	[___]	___	✓
	ACTION: If no for any of the above, write in the Contract - Problems/Non-Compliance Section of the Data Review Narrative.			
A.1.17.4	Aqueous			
	Are any spike recoveries:			
	(a) less than 30%?	___	[___]	✓
	(b) between 30-74%?	___	[___]	___
	(c) between 126-150%?	___	[___]	___
	(d) greater than 150%?	___	[___]	___
	ACTION: If the matrix spike recovery is less than 30%, reject (R) and red-line all associated aqueous data (detects & non-detects). If between 30-74%, qualify all associated aqueous data ≥ MDL as "J" and non-detects			

	YES	NO	N/A

as "UJ". If between 126-150%, flag (J) all data ≥ MDL as "J". If greater than 150%, reject (R) and red-line all associated data ≥ MDL.

(NOTE:Replace "N" with "J", "R" as appropriate.)

A.1.17.5 Soil/Sediment

Are any spike recoveries:

(a) less than 10%?	___	[___]	___
(b) between 10-74%?	___	[___]	___
(c) between 126-200%?	___	[___]	___
(d) greater than 200%?	___	[___]	___

ACTION:
If yes for any of the above, proceed as follows:

If the matrix spike recovery is less than 10%, reject (R) and red-line all associated data (detects & non-detects); if between 10-74%, qualify all associated data ≥ MDL as "J" and non-detects as "UJ"; if between 126-200%, flag (J) all associated data ≥ MDL as "J" If greater than 200%, reject (R) and red-line all associated data ≥ MDL.
(NOTE:Replace "N" with "J" or "R" as appropriate.)

A.1.18 Lab Duplicates) - Form VI

A.1.18.1 Was the lab duplicate analysis performed:

For each SDG?	[___]	___	___
On one of the SDG samples?	[___]	___	___
For each matrix type?	[___]	___	___
For each concentration range (low or med.)?	[___]	___	___
For each analytical Method (ICP-AES/ICP-MS, Hg, CN) Used?	[___]	___	___
Was a lab duplicate prepared and analyzed with the SDG samples?	[___]	___	___

client didn't request

		YES	NO	N/A
	ACTION: If no for any of the above, flag (J) as estimated all the SDG sample results (detects & non-detects) for which the lab duplicate analysis was not performed.			
	NOTE: If more than one lab duplicate sample were analyzed for an SDG, then qualify the associated samples based on the worst lab duplicate analysis.			
A.1.18.2	Was a Field Blank or PE sample used for the Lab Duplicate analysis?	___	[___]	___
	ACTION: If yes, flag as estimated (J) all SDG sample results (hits & non-detects) for which Field Blank or PE sample was used for duplicate analysis.			
A.1.18.3	Circle on each Form VI all values that are: RPD > 20%, or Absolute Difference > CRQL			
	Are all values within control limits (RPD ≤ 20% or absolute difference ≤ ±CRQL)?	[___]	___	___
	If no, are all results outside the control limits flagged with an "*" (Lab Qualifier) on Form VI and on all Form I's?	[___]	___	___
	ACTION: If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.			
	NOTE: The laboratory is not required to report on Form VI the RPD when both values are non-detects.			
A.1.18.4	Aqueous			
A.1.18.4.1	When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			

	YES	NO	N/A
is any RPD > 20% but < 100%?	___	[___]	✓
is any RPD ≥ 100%?	___	[___]	✓

ACTION:
If the RPD is > 20% but < 100%, flag (J) as estimated the associated sample data ≥ CRQL. If the RPD is ≥ 100%, reject (R) and red-line the associated sample data ≥ CRQL.

(**NOTE:** Replace "*" with "J" or "R" as appropriate.)

A.1.18.4.2 When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate values:

> ± CRQL?	___	[___]	✓
> ± 2xCRQL?	___	[___]	✓

ACTION:
If the absolute difference is > CRQL, flag as estimated all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 2xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but < 5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.18.5 Soil/Sediment

A.1.18.5.1 When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 35% but < 120%?	___	[___]	✓
is any RPD ≥ 120%?	___	[___]	✓

ACTION:
If the RPD is ≥ 35% and < 120%, flag (J) as estimated the associated sample

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		YES	NO	N/A
	data ≥ CRQL. If the RPD is ≥ 120%, reject (R) and red-line the associated sample data ≥ CRQL.			
A.1.18.5.2	When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and duplicate:			
	> ± 2 x CRQL?	___	[___]	✓
	> ± 4 x CRQL	___	[___]	✓

ACTION:
If the absolute difference is > 2 x CRQL, flag all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 4xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but <5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.19 Field Duplicates

Aqueous Field Duplicates

A.1.19.1	Was an aqueous Field Duplicate pair collected and analyzed? (Check Sampling Trip Report)	[___]	✓	___

No field dup was submitted for the metals fraction

ACTION:
If yes, prepare a Form (Appendix A.4) for each aqueous Field Duplicate pair. Report the sample and Field Duplicate results on Appendix A.4 from their respective Form I's. Calculate and report RPD on Appendix A.4 when sample and its Field Duplicate values are both > 5xCRQL. Calculate and report the absolute difference on Appendix A.4 when at least one value (sample or duplicate) is <5xCRQL. Evaluate the aqueous Field Duplicate analysis in accordance with the

	YES	NO	N/A

QC criteria stated in Sections A.1.19.2 and A.1.19.3.

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this the criteria to qualify the results.

A.1.19.2 Circle all values on the Form (Appendix A.4) for Field Duplicates that have:

RPD ≥ 20% or

Difference > ± CRQL

When sample and duplicate values are both ≥5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 20%?	___	[___]	___
is any RPD ≥ 100%?	___	[___]	___

ACTION:
If the RPD is >20% but < 100%, flag (J) only the associated sample and its Field Duplicate results ≥ CRQL. If the RPD is ≥ 100%, reject(R) and red-line only the associated sample and its Field Duplicate result ≥ CRQL.

A.1.19.3 When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate:

> ± CRQL?	___	[___]	___
> ± 2 x CRQL?	___	[___]	___

ACTION:
If the absolute difference is > CRQL, flag detects ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the difference is > 2xCRQL, reject (R) and red-line non-detects

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		YES	NO	N/A
	and results ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
	Soil/Sediment Field Duplicates			
A.1.19.4	Was a soil field duplicate pair collected and analyzed? (Check Sampling Trip Report)	[___]	___	✓

ACTION:
If yes, for each soil Field Duplicate pair proceed as follows:

Prepare Appendix A.4 for each Field Duplicate pair. Report on Appendix A.4 all sample and its Field Duplicate results in MG/KG from their respective Form I's. Calculate and report RPD when sample and its duplicate values are both greater than 5xCRQL. Calculate and report the absolute difference when at least one value (sample or duplicate) is < 5xCRQL. Evaluate the Field Duplicate analysis in accordance with the QC Criteria stated in Sections A.1.19.5 and A.1.19.6.

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and apply the criteria to qualify the results.

A.1.19.5	Circle on each Appendix A.4 all values that have: RPD ≥ 35%, or Difference > ± 2xCRQL When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			
	is any RPD ≥ 35% but < 120%?	___	[___]	✓
	is any RPD ≥ 120%?	___	[___]	✓

ACTION:
If the RPD is ≥ 35% but < 120%,

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		YES	NO	N/A
	flag only the associated sample and its Field Duplicate results ≥ CRQL as "J". If the RPD is ≥ 120%, reject (R) and red-line only the sample and its Field Duplicate results ≥ CRQL.			
A.1.19.6	When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and Field Duplicate:			
	> ± 2 x CRQL?	___	[___]	___
	> ± 4 x CRQL?	___	[___]	___
	ACTION: If the absolute difference is > 2xCRQL, flag Sample and its Field Duplicate resuts ≥ MDL but <5xCRQL as "J" and non-detects as "UJ". If the difference is >4xCRQL, reject(R) and red-line non-detects and detects ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
A.1.20	**Laboratory Control Sample (LCS)- Form VII**			
A.1.20.1	Was one LCS prepared and analyzed for:			
	Each SDG?	[___]	___	___
	Each matrix type?	[___]	___	___
	Each batch samples digested/distilled?	[___]	___	___
	For each Method(ICP-AES,ICP-MS,Hg,CN) used?	[___]	___	___
	Was an LCS prepared and analyzed with the samples?	[___]	___	___
	ACTION: If no for any of the above, prepare Telephone Record Log and contact CLP PO or TOPO for submittal of the LCS results. Flag (J) as estimated all the data for which an LCS was not analyzed.			
	NOTE: If only one LCS was analyzed for			

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	YES	NO	N/A

more than 20 samples, then the first 20 samples analyzed are not flagged(J), but all additional samples must be qualified (J).

A.1.20.2 Aqueous LCS

Circle on each Form VII the LCS percent recoveries outside control limits 80-120%.

NOTE: 1.Use digested ICV as LCS for aqueous mercury
2.Use distilled ICV as LCS for aqueous cyanide

Is any LCS recovery:

Less than 50%?	___	[___]	___
Between 50% and 79%?	___	[___]	___
Between 121% and 150%?	___	[___]	___
Greater than 150%?	___	[___]	___

ACTION:
If the LCS recovery is less than 50%, reject (R) and red-line all associated sample data (detects & non-detects); for a recovery between 50-79%, flag detects as "J" all non-detects as "UJ". if the LCS recovery is between 121-150%, flag only detects as "J". if the recovery is greater than 150%, reject (R) and red-line all detects.

A.1.20.3 Solid LCS

If an analyte's MDL is equal to or greater than the true value of LCS, disregard the "Action" below for that analyte even though the LCS is out of control limits.

Is the LCS "Found" value greater than the Upper Control Limit reported on Form VII? ___ [___] ___

ACTION:

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		YES	NO	N/A
	If yes, flag (J) all the associated detects ≥ MDL as estimated (J).			
	Is the LCS "Found" value lower than the Lower Control Limit reported on Form VII?	___	[___]	___ ✓

ACTION:
If yes, flag detects as "J" and non-dectes as "UJ".

A.1.21 **ICP-AES/ICP-MS Serial Dilution - Form VIII**

NOTE: Serial dilution analysis is required only when the initial concentration is equal to or greater than 50 x MDL.

DoD requirement is > 50 X LOQ - no + results were this high.

A.1.21.1	Was a Serial Dilution analysis performed:			
	For each SDG?	[___]	___ ✓	___
	On one of the SDG samples?	[___]	___	___
	For each matrix type?	[___]	___	___
	For each concentration range (low or med.)?	[___]	___	___
	Was a Serial Dilution sample analyzed with the SDG samples?	[___]	___	___

ACTION:
If no for any of the above, flag as estimated (J) detects ≥ MDL of all the SDG samples for which the ICP Serial Dilution Analysis was not performed.

No matrix QC was recorded. J all + results as SD was not performed.

A.1.21.2	Was a Field Blank or PE sample used for the Serial Dilution Analysis?	___	[✓]	___

ACTION:
If yes, flag as estimated (J) detects ≥ MDL of all the SDG samples

A.1.21.3 Circle on Form VIII the Percent Differences (%D) between sample results and its dilution results that are outside the control limits ± 10%

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		YES	NO	N/A
	when initial concentrations ≥ 50 x MDLs.			
	Are results outside the control limits flagged with an "E"(Lab Qualifier) on Form VIII and all Form I's?	[___]	___	✓
	ACTION: If no, write in the Contract-Problem/ Non-Compliance Section of the Data Review Narrative.			
A.1.21.4	Are any %D values:			✓
	> 10%?	___	[___]	___
	≥ 100%?	___	[___]	✓
	ACTION: If the Percent Difference (%D) is greater than 10%, flag (J) as estimated all associated samples whose raw data ≥ MDL; if the %D is ≥ 100%, reject (R) and red-line all associated samples with raw data ≥ MDL.			
	(NOTE:Replace "E" with "J" or "R" as appropriate.)			
A.1.22	Total/Dissolved or Inorganic/Total Analytes			
A.1.22.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s)?	___	[✓]	___
	Were any analyses performed for inorganic as well as total analytes on the same sample(s)?	___	[✓]	___
	ACTION: If yes, prepare a Form (Appendix A.5) to compare the differences between dissolved (or inorganic)and total analyte concentrations. Compute each difference on Appendix A.5 as a percent of the total analyte only when both of the following conditions are fulfilled: (1) The dissolved(or inorganic)concentration is greater than total concentration, and (2) greater than or equal to 5xMDL.			
A.1.22.2	Is any dissolved (or inorganic) concentration greater than its total concentration by more than 20%?	___	[___]	✓

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		YES	NO	N/A
A.1.22.3	Is any dissolved (or inorganic) concentration greater than its total concentration by more than 50%?	___	[___]	___ ✓
	ACTION: If the percent difference is greater than 20%, flag (J) both dissolved/inorganic and total concentrations as estimated. If the difference is more than 50%, reject (R) and red-line both the values.			
A.1.23	Field Blank - Form I NOTE: Designate "Field Blank" as such on Form I			
A.1.23.1	Was a Field/Rinsate Bank collected and analyzed with the SDG samples?	[___]	___ ✓	___
	If yes, is any Field/Rinsate Blank absolute value of an analyte on Form I greater than its CRQL (or 2xMDL when MDL>CRQL)?	___	[___]	___ ✓
	If yes, circle the Field Blank value on Form I that is greater than the CRQL, (or 2 x MDL when MDL > CRQL).			
	Is any Field Blank value greater than CRQL also greater than the Preparation Blank value?	___	[___]	___ ✓
	If yes, is the Field Blank value (> CRQL and > the prep. blank value) already rejected due to other QC criteria?	[___]	___	___ ✓

no field blks were submitted for metals analysis

ACTION:
If the Field Blank value was not rejected, reject all associated sample data (except the Field Blank results) greater than the CRQL but less than the Field Blank value. Reject on Form I's the soil sample results whose raw values in ug/L in the instrument printout are greater than the CRQL but less than the Field Blank value in ug/L. Flag as "J" detects between the Field Blank value and 10xField Blank value. If the sample result ≥ MDL but ≤ CRQL, replace it with CRQL-U.

If the Field Blank value is less than the

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		YES	NO	N/A
	Prep.Blank value, do not qualify the sample results due to the Field Blank criteria.			

NOTE:
1. Field Blank result previously rejected due to other criteria cannot be used to qualify field samples.
2. Do not use Rinsate Blank associated with soils to qualify water samples and vice versa.

A.1.24 Verification of Instrumental Parameters - Form IX, XA, XB, XI

A.1.24.1 Is verification report present for:

Method Detection Limits (Form IX-Annually)?	[✓]	___	___
ICP-AES Interelement Correction Factors (Form XA & XB -Quarterly)?	[✓]	___	___
ICP-AES & ICP-MS Linear Ranges (Form XI-Quarterly)?	[✓]	___	___

ACTION:
If no, contact CLP PO/TOPO for submittal from the laboratory.

A.1.24.2 Method Detection Limits - Form IX

A.1.24.2.1 Are MDLs present on Form IX for:

All the analytes?	[✓]	___	___
All the instruments used?	[✓]	___	___
Digested and undigested samples and Calib.Blanks?	[___]	___	✓
ICP-AES and ICP-MS when both instruments are used for the same analyte?	[✓]	___	___

ACTION:
If no for any of the above, prepare Telephone Record Log and contact CLP PO/TOPO for submittal of the MDLs from the laboratory. Report to CLP PO and write in the Contract Problems/ Non-Compliance Section of the Data Review Narrative if the MDL concentration is not less than ½ CRQL.

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		YES	NO	N/A
A.1.24.2.2	Is MDL greater than the CRQL for any analyte?	___	[✓]	___
	If yes, is the analyte concentration on Form I greater than 5 x MDL for the sample analyzed on the instrument whose MDL exceeds CRQL?	[___]	___	✓
	ACTION: If no, flag as estimated (J) all values less than five times MDL for the analyte whose MDL exceeds the CRQL.			
A.1.24.3	**Linear Ranges - Form XI**			
A.1.24.3.1	Was any sample result higher than the high linear range for ICP-AES or ICP-MS?	___	[✓]	___
	Was any sample result higher than the highest calibration standard for mercury or cyanide?	___	[___]	✓
	If yes for any of the above, was the sample diluted to obtain the result reported on Form I?	[___]	___	✓
	ACTION: If no, flag (J) as estimated the affected detects (≥ MDL) reported on Form I.			
A.1.25	**ICP-MS Tune Analysis - Form XIV**			
A.1.25.1	Was the ICP-MS instrument tuned prior to calibration?	[___]	___	___
	ACTION: If no, reject (R) and red-line all sample data for which tuning was not performed.			
A.1.25.2	Was the tuning solution analyzed or scanned at least five times consecutively?	[___]	___	___
	Were all the required isotopes spanning the analytical range present in the tuning solution?	[___]	___	___
	Was the mass resolution within			

		YES	NO	N/A
	0.1 amu for each isotope in the tuning solution?	[___]	___	___ ✓
	Was %RSD less than 5% for each isotope of each analyte in the tuning solution?	[___]	___	___ ✓
	ACTION: If no for any of the above, qualify all results ≥ MDL associated with that Tune as estimated "J", and all non-detects associated with that Tune as "UJ".			
A.1.26	ICP-MS Internal Standards - Form XV			
A.1.26.1	Were the Internal Standards added to all the samples and all QC samples and calibration standards (except the Tuning Solution)?	[___]	___	___ ✓
	Were all the target analyte masses bracketed by the masses of the five internal standards?	[___]	___	___ ✓
	ACTION: If none of the Internal Standards was added to the samples, reject (R) and red-line all the associated sample data (detects & non-detects). If internal standards were used but did not cover all the analyte masses, reject (R) and red-line only the analyte results not bracketed by the internal standard masses.			
A.1.26.2	Was the intensity of an Internal Standard in each sample within 60-125% of the intensity of the same Internal Standard in the calibration blank?	[___]	___	___ ✓
	If no, was the original sample diluted two fold, Internal Standard added and the sample re-analyzed?	[___]	___	___ ✓
	Was the %RI for the two fold diluted sample within the acceptance limits (60-125%)?	[___]	___	___ ✓
	ACTION: If no for any of the above, flag detects as "J" and non-detects "UJ" of all the analytes with atomic masses between the atomic mass of the internal standard lighter			

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than the affected internal standard, and the atomic mass of the internal standard heavier than the affected internal standard.

A.1.27 Percent Solids of Sediments

A.1.27.1 Are percent solids in sediment(s):

< 50%? ___ [___] ___

ACTION:
If yes, qualify as estimated (J) all detects and non-detects of a sample that has percent solids less than 50%(i.e.,moisture content greater than 50%).

NOTE:
Flag(J) only the sample results that were not previously flagged due to other QC criteria.

Inorganic Data Review Narrative

Case# _____ Site: _____ Matrix: Soil ____

SDG# _____ Lab: _____ Water ____

Sampling Team: _____ Reviewer: _____ Other _____

A.2.1 Data Validation Flags:
The following flags may have been applied in red by the data validator and must be considered by the data user.

J - This flag indicates the result qualified as estimated

R and Red-Line - A red-line drawn through a sample result indicates unusable value. The red-lined data are known to contain significant errors based on documented information and must not be used by the data user.

U - This data validation qualifier is applied to sample results ≥ MDL when associated blank is contaminated

Fully Usable Data - The results that do not carry "J" or "red-line" are fully usable.

A.2.2 Laboratory Qualifiers:
The CLP laboratory applies a contractual qualifier on all

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DataQual

Environmental Services, LLC

CH2M HILL
15010 Conference Center Drive
Suite 200
Chantilly, Virginia 20151

July 27, 2012
SDG# L1093, Spectrum Analytical, Inc.
Vieques Island, Puerto Rico-CTO-083

Dear Ms. Ott,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # L1093. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the metals in this SDG (SW-846 method 6010C). The Region II Standard Operating Procedure for the Evaluation of Metals Data for the CLP was used as applicable for the metals data. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA	Fe, Mn
VWAI-MW05-0512	L1093-01	water	X	X	X
VWAI-TB01-052212	L1093-02	water	X		
VWAI-EB01-052312	L1093-03	water	X	X	
VWAI-TB01-052312	L1093-04	water	X		
VWAI-MW04-0512	L1093-05	water	X	X	X
VWAI-MW07-0512	L1093-06	water	X	X	X
VWAI-MW07P-0512	L1093-07	water	X	X	
VWAI-MW05-0512 MS	L1093-01MS	water	X	X	
VWAI-MW05-0512 MSD	L1093-01MSD	water	X	X	

The following quality control samples were provided with this SDG: samples VWAI-TB01-052212 and VWAI-TB01-052312-trip blanks; sample VWAI-EB01-052312-equipment blank; and sample VWAI-MW07P-0512-field duplicate of sample VWAI-MW07-0512.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- GC Performance *

- Initial/Continuing Calibrations *
- ICSA/ICSAB Standards *
- RL Standards *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries
- Matrix Duplicate RPDs
- Serial Dilutions
- Field Duplicates *
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications to the data were required.

SVOA

The associated matrix spike and matrix spike duplicate exhibited non-compliant recoveries that required qualifications to the data.

Select Filtered Metals

The laboratory did not perform a matrix spike, matrix duplicate or a serial dilution in this SDG. These QC samples are required by Region II. Qualifications were required.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 5/22-23/12 and samples were received at the laboratory 5/23-24/12. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Matrix Spike/Matrix Duplicates

SVOA

The matrix spike and matrix spike duplicate associated with sample VWAI-MW05-0512 exhibited low recoveries for bis(2-ethylehexyl) phthalate at 37% and 30% (QC limit 40-125%). Therefore the non-detected result in the associated sample was qualified as estimated UJ, qualifier code: MSL.

Select Filtered Metals

The laboratory did not perform a matrix spike/matrix duplicate on a sample from this SDG. Region II required that all positive and non-detect results be qualified as estimated J because of this. Therefore, the reported positive and non-detect results for iron and manganese were qualified as estimated J/UJ with a qualifier code of OT.

Serial Dilution

Select Filtered Metals

The laboratory did not perform a serial dilution sample on a sample from this SDG. Region II required that all positive results be qualified as estimated J because of this. Therefore, the reported positive results for iron and manganese were qualified as estimated J with a qualifier code of OT.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Jacqueline Cleveland

Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
No qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
VWAI-MW05-0512	bis(2-ethylehexyl) phthalate	-	UJ	MSL

Select Filtered Metals

Sample ID	Analyte	Results	Q flag	Q Code
all samples	iron, manganese	+/-	J/UJ	OT

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the LOQ (2X sample LOQ for common laboratory contaminants) when the blank value is less than the LOQ. The sample result for the blank contaminant is not qualified with any blank qualifiers.
LOQ	The sample result for the blank contaminant is less than the LOQ (2X sample LOQ for common laboratory contaminants) but greater than the MDL when the blank value is less than the LOQ. The sample result for the blank contaminant is changed to the LOQ and qualified as non-detect U.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the LOQ and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the LOQ, result is reported as non-detect at the LOQ, when the ICB/CCB/PB result is less or greater than the LOQ.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the LOQ and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the LOQ.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the LOQ.

J/UJ - Sample result is less than 10X LOQ when blank result is below the negative LOQ.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the LOQ and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the LOQ, result is reported as non-detect at the LOQ, when the FB result is less or greater than the LOQ.

R - Sample result is greater than the LOQ and less than the FB value when the FB value is greater than the LOQ.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the LOQ.

General Abbreviations

RL	reporting limit
MDL	method detection limit
IDL	instrument detection limit
LOD	Level of Detection
LOQ	Level of Quantitation
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
MBL, EBL, FBL or TBL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-0512

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-01A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I7263.D

Level: (TRACE/LOW/MED) LOW Date Received: 05/23/2012

% Moisture: not dec. Date Analyzed: 05/24/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WM 6/23/12

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-TB01-052212

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-02A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I7264.D

Level: (TRACE/LOW/MED) LOW Date Received: 05/23/2012

% Moisture: not dec. Date Analyzed: 05/24/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VM 072312

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-052312

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-03A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I7300.D

Level: (TRACE/LOW/MED) LOW Date Received: 05/24/2012

% Moisture: not dec. Date Analyzed: 05/25/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VW 052312

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-TB01-052312

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-04A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I7297.D

Level: (TRACE/LOW/MED) LOW Date Received: 05/24/2012

% Moisture: not dec. Date Analyzed: 05/25/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VM 052312

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW04-0512

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-05A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I7301.D

Level: (TRACE/LOW/MED) LOW Date Received: 05/24/2012

% Moisture: not dec. Date Analyzed: 05/25/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	2.6	J	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WM 072312

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07-0512

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-06A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I7302.D

Level: (TRACE/LOW/MED) LOW Date Received: 05/24/2012

% Moisture: not dec. Date Analyzed: 05/25/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	2.9	J	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WW 072312

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07P-0512

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-07A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I7303.D

Level: (TRACE/LOW/MED) LOW Date Received: 05/24/2012

% Moisture: not dec. Date Analyzed: 05/25/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	2.8	J	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

VM 072312

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-0512MS

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-01AMS

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I7272.D

Level: (TRACE/LOW/MED) LOW Date Received: 05/23/2012

% Moisture: not dec. Date Analyzed: 05/24/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	54		0.41	0.50	5.0
71-43-2	Benzene	52		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	51		0.61	1.0	5.0

VM 072312

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-0512MSD

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-01AMSD

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V6I7273.D

Level: (TRACE/LOW/MED) LOW Date Received: 05/23/2012

% Moisture: not dec. Date Analyzed: 05/24/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	55		0.41	0.50	5.0
71-43-2	Benzene	54		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	54		0.61	1.0	5.0

VM 072312

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-0512

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-01B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6A9050.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 05/23/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 05/23/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 06/04/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	1.3	J	0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	11		0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

UJ, MSL

MM 072312

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-052312

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-03B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6A9046.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 05/24/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 05/25/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 06/04/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

WM 072312

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW04-0512

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-05B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6A9047.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 05/24/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 05/25/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 06/04/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.2		0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

WW 072312

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07-0512

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-06B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6A9048.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 05/24/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 05/25/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 06/04/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	3.3		0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	3.4		0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

MM 072312

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07P-0512

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-07B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6A9049.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 05/24/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 05/25/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 06/04/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	3.2		0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	3.3		0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

WW 072312

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-0512MS

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-01BMS

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6A9051.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 05/23/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 05/23/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 06/04/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	36		0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	46		0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	18		1.3	2.0	5.0

VM 072312

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-0512MSD

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L1093-01BMSD

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6A9052.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 05/23/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 05/23/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 06/04/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	38		0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	49		0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	15		1.3	2.0	5.0

VW 072312

U.S. EPA - CLP

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EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

VWAI-MW04-0512

Lab Name: Spectrum Analytical, Inc. Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SL1093

Matrix (soil/water): WATER Lab Sample ID: L1093-05

Level (low/med): MED Date Received: 05/24/2012

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): ug/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	50	U	UJ OT	P	31.0	50.0	200
7439-96-5	Manganese	712	J	OT	P	10.0	15.0	50.0

JC 12712

Comments:

ilm11.12.12.A FORM I - IN SW846

U.S. EPA - CLP

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EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

VWAI-MW05-0512

Lab Name: Spectrum Analytical, Inc. Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SL1093

Matrix (soil/water): WATER Lab Sample ID: L1093-01

Level (low/med): MED Date Received: 05/23/2012

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): ug/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	107	B	J OT	P	31.0	50.0	200
7439-96-5	Manganese	1230		J OT	P	10.0	15.0	50.0

JMC 72712

Comments:

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

VWAI-MW07-0512

Lab Name: Spectrum Analytical, Inc. Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SL1093

Matrix (soil/water): WATER Lab Sample ID: L1093-06

Level (low/med): MED Date Received: 05/24/2012

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): ug/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	50	U	UJ OT	P	31.0	50.0	200
7439-96-5	Manganese	15	U	UJ OT	P	10.0	15.0	50.0

JAC 72712

Comments:

REPORT NARRATIVE

Spectrum Analytical, Inc. Featuring Hanibal Technology, RI Division.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC I

Laboratory Workorder / SDG #: L1093

SW846 8260C, VOC by GC-MS

I. SAMPLE RECEIPT

No exceptions or unusual conditions were encountered unless a Sample Condition Notification Form, or other record of communication is included with the Sample Receipt Documentation.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed following procedures in laboratory test code: SW846 8260C

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW5030

V. INSTRUMENTATION

The following instrumentation was used

Instrument Code: V6
Instrument Type: GCMS-VOA
Description: HP6890 / HP5973
Manufacturer: Hewlett-Packard
Model: 6890 / 5973
GC Column used: 30 m X 0.25 mm ID [1.40 um thickness] DB-624 capillary column.

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Surrogates:

Surrogate standard percent recoveries were within the QC limits.

D. Spikes:

1. Laboratory Control Spikes (LCS):

Percent recoveries for lab control samples were within the QC limits.

2. Matrix Spike / Matrix Spike Duplicate (MS/MSD):

Matrix spikes were performed on samples: VWAI-MW05-0512 (L1093-01AMS) and VWAI-MW05-0512 (L1093-01AMSD).

Percent recoveries were within the QC limits.

Replicate RPDs were within the advisory QC limits.

E. Internal Standards:

Internal standard peak areas were within the QC limits.

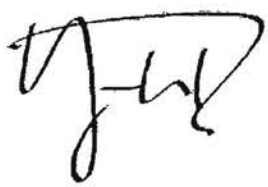
F. Dilutions:

No sample in this SDG required analysis at dilution.

G. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Spectrum, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.



Signed:_____ _____

Date:_____6/14/2012_____

REPORT NARRATIVE

Spectrum Analytical, Inc. Featuring Hanibal Technology, RI Division.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC I

Laboratory Workorder / SDG #: L1093

SW846 8270D, SVOA by GC-MS

I. SAMPLE RECEIPT

No exceptions or unusual conditions were encountered unless a Sample Condition Notification Form, or other record of communication is included with the Sample Receipt Documentation.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed following procedures in laboratory test code: SW846 8270D

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW3510

V. INSTRUMENTATION

The following instrumentation was used

Instrument Code: S6
Instrument Type: GCMS-Semi
Description: HP7890A
Manufacturer: Agilent
Model: 7890A/5973

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Surrogates:

Surrogate standard percent recoveries were within the QC limits with the following exceptions. Please note that the acceptance criteria allow one surrogate recovery outside of the QC limits per fraction.

VWAI-MW05-0512 (L1093-01B), recovery is below criteria for Terphenyl-d14 at 22% with criteria of (50-135).

VWAI-MW05-0512 (L1093-01BMS), recovery is below criteria for Terphenyl-d14 at 18% with criteria of (50-135).

VWAI-MW05-0512 (L1093-01BMSD), recovery is below criteria for Terphenyl-d14 at 17% with criteria of (50-135).

VWAI-EB01-052312 (L1093-03B), recovery is below criteria for Terphenyl-d14 at 46% with criteria of (50-135).

VWAI-MW04-0512 (L1093-05B), recovery is below criteria for Terphenyl-d14 at 30% with criteria of (50-135).

VWAI-MW07-0512 (L1093-06B), recovery is below criteria for Terphenyl-d14 at 34% with criteria of (50-135).

VWAI-MW07P-0512 (L1093-07B), recovery is below criteria for Terphenyl-d14 at 43% with criteria of (50-135).

D. Spikes:

1. Laboratory Control Spikes (LCS):

   Percent recoveries for lab control samples were within the QC limits.

2. Matrix Spike / Matrix Spike Duplicate (MS/MSD):

   Matrix spikes were performed on samples: VWAI-MW05-0512 (L1093-01BMS) and VWAI-MW05-0512 (L1093-01BMSD).

   Percent recoveries were within the QC limits with the following exceptions:

   VWAI-MW05-0512 (L1093-01BMS)Percent Recovery is outside QC Limits, recovery is below criteria for Bis(2-ethylhexyl)phthalate at 37% with criteria of (40-125).

   VWAI-MW05-0512 (L1093-01BMSD)Percent Recovery is outside QC Limits, recovery is below criteria for Bis(2-ethylhexyl)phthalate at 30% with criteria of (40-125).

   Replicate RPDs were within the advisory QC limits.

E. Internal Standards:

Internal standard peak areas were within the QC limits.

F. Dilutions:

No sample in this SDG required analysis at dilution.

G. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Spectrum, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed:_____ _____

Date:_____6/14/2012_____

REPORT NARRATIVE

Spectrum Analytical, Inc. Featuring Hanibal Technology, RI Division.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC I

Laboratory Workorder / SDG #: L1093

SW846 6010C

I. SAMPLE RECEIPT

No exceptions or unusual conditions were encountered unless a Sample Condition Notification Form, or other record of communication is included with the Sample Receipt Documentation.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed following procedures in laboratory test code: SW846 6010C

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW3005A

V. INSTRUMENTATION

The following instrumentation was used to perform analysis:

Instrument Code: OPTIMA3
Instrument Type: ICP
Description: Optima ICP-OES
Manufacturer: Perkin-Elmer
Model: 4300 DV

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Spikes:

1. Laboratory Control Spikes (LCS):

   Percent recoveries for laboratory control samples were within the QC limits.

2. Matrix spike (MS):

   A matrix spike was not performed on any sample in this SDG.

D. Post Digestion Spike (PDS):

A post-digestion spike was not performed on any sample in this SDG.

E. Duplicate sample:

A duplicate analysis was not performed on any sample in this SDG.

F. Serial Dilution (SD):

A serial dilution was not performed on any sample in this SDG.

G. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Spectrum, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed: _____

Date: 06/14/12

SPECTRUM ANALYTICAL, INC
Featuring
HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: Stephen Brand
Project Mgr.: S. BRAND

Invoice To: Stephen Brand
P.O. No.: _____ RQN: _____

Project No.: 392485. FI. FK
Site Name: VIEQUES, AOC I
Location: VIEQUES, PR State: PR
Sampler(s): D. WHITAKER, M. DAVOIS, P. MURPHY

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8=$NaHSO_4$ 9=H_3PO_4 10=_____ 11=_____

List preservative code below:

6	N/A	4	N/A	9			

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW=Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

	Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: VOCs	SVOCs	TAL METALS	WCHEM (SO4, NO3)	WCHEM (TOC)				QA/QC Reporting Level
L10993	01	VWAI-MW05-0512	5/22/12	1055	G	GW	4	2		2	2	2	1	1	2				
	01	VWAI-MW05-MS-0512	5/22/12	1055	G	GW	2	2			2	2							MS/MSD
	01	VWAI-MW05-SD-0512	5/22/12	1055	G	GW	2	2			2	2							MS/MSD
L10993	02	VWAI-TB01-052212	5/22/12	1000	G	TB	1				1								TRIP BLANK

Relinquished by: 05/22/12

Received by:

Relinquished by:	Received by:	Date:	Time:
	FedEx	05/22/12	1300
Fed Ex		5/23/12	8:55

☐ E-mail to Stephen.brand@cham.com
EDD Format _____

Condition upon receipt: ☐ Iced ☐ Ambient ☒ °C 4°

SPECTRUM ANALYTICAL, INC
Featuring
HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: Stephen Brand / VBC
Project Mgr.: Stephen Brand / CH2M Hill

Invoice To: Stephen Brand / VBC
P.O. No.: _____ RQN: _____

Project No.: 392485 FI. FK
Site Name: VIEQUES AOC I
Location: VIEQUES, PR State: PR
Sampler(s): P. Murphy, D. Whitaker, M. Davis

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8=$NaHSO_4$ 9=H_3PO_4 10=_____ 11=_____

List preservative code below: 6 | N/A | 4 | N/A | 9

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW=Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses: VOCs	SVOCs	T-METALS	WCHEM(Sc, Ni)	WCHEM(TOC)	QA/QC Reporting Level
03	VWAI-EB01-052312	5/23/12	0705	G	GW	2	2			2	2				EQUIPMENT blank
04	VWAI-TB01-052312	5/23/12	0745	G	TB	1				1					TRIP blank
05	VWAI-MW04-0512	5/23/12	0825	G	GW	4	2		2	2	2	1	1	2	
06	VWAI-MW07-0512	5/23/12	1050	G	GW	4	2		2	2	2	1	1	2	
07	VWAI-MW07R-0512	5/23/12	1055	G	GW	2	2			2	2				

L1093 ↓ L1093

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____
State specific reporting standards: _____

QAW 05/23/12

☐ E-mail to _____
EDD Format _____

Condition upon receipt: ☒ Iced ☐ Ambient °C 5°C, 5°C

Relinquished by:	Received by:	Date:	Time:
[signature]	FedEx	05/23/12	1300
FedEx	[signature]	5/24/12	12:30

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Spectrum Analytical, Inc. Featuring Hanibal Technology -- Rhode Island Division

Received By:	Page 01 of 00
Reviewed By:	Log-in Date 05/23/2012
Work Order: L1093	Client Name: CH2M Hill, Inc.
Project Name/Event: CTO-0083 Vieques AOC E and I	

Remarks: (1/2) Please see associated sample/extract transfer logbook pages submitted with this data package.

1. Custody Seal(s)	Present / Absent
	Intact / Broken
2. Custody Seal Nos.	N/A
3. Traffic Reports/ Chain of Custody Records (TR/COCs) or Packing Lists	Present / Absent
4. Airbill	AirBill / Sticker Present / Absent
5. Airbill No.	FedEx 8708 2609 2940
6. Sample Tags	Present / Absent
Sample Tag Numbers	Listed / Not Listed on Chain-of-Custody
7. Sample Condition	Intact / Broken / Leaking
8. Cooler Temperature Indicator Bottle	Present / Absent
9. Cooler Temperature	4.0 °C
10. Does information on TR/COCs and sample tags agree?	Yes / No
11. Date Received At Laboratory	05/23/2012
12. Time Received	08:55

Sample Transfer	
Fraction (1) TVOA/VOA	Fraction (2) SVOA/PEST/ARO
Area #	Area #
By	By
On	On

Lab Sample ID	Preservation (pH) HNO3	H2SO4	HCl	NaOH	H3PO4	VOA Matrix	Soil HeadSpace or Air Bubble > or equal to 1/4"
L1093-01	<2				<2	Ascorbic Acid	
L1093-02	<2				<2	~~Ascorbic Acid~~ HCL JV 5/23/12	

IR Temp Gun ID:MT-1

CoolantCondition: ICE

Preservative Name/Lot No:

VOA Matrix Key:

US = Unpreserved Soil	A= Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form Yes / No

Rad OK Yes / No

WO: L1093 / CTO:0083 SO4 / CWO:1003.002

Sample Condition Form 6

Spectrum Analytical, Inc. Featuring Hanibal Technology -- Rhode Island Division

Received By:

Reviewed By:

Page 01 of 00

Log-in Date 05/24/2012

Work Order: L1093 Client Name: CH2M Hill, Inc.

Project Name/Event: CTO-0083 Vieques AOC J

Remarks: (1/2) Please see associated sample/extract transfer logbook pages submitted with this data package.

1. Custody Seal(s) Present / Absent
   Intact / Broken
2. Custody Seal Nos. N/A
3. Traffic Reports/ Chain of Custody Records (TR/COCs) or Packing Lists Present / Absent
4. Airbill AirBill / Sticker Present / Absent
5. Airbill No. FedEx 8729 0909 2519,
6. Sample Tags Present / Absent
   Sample Tag Numbers Listed / Not Listed on Chain-of-Custody
7. Sample Condition Intact / Broken/ Leaking
8. Cooler Temperature Indicator Bottle Present / Absent
9. Cooler Temperature 5,5 °C
10. Does information on TR/COCs and sample tags agree? Yes / No
11. Date Received at Laboratory 05/24/2012
12. Time Received 12:30

Lab Sample ID	Preservation (pH) HNO3	H2SO4	HCl	NaOH	H3PO4	VOA Matrix	Soil HeadSpace or Air Bubble > or equal to 1/4"
L1093-03						Ascorbic	
L1093-04						H	
L1093-05	<2					Ascorbic	
L1093-06	<2					Ascorbic	
L1093-07						Ascorbic	

Sample Transfer

Fraction (1) TVOA/VOA	Fraction (2) SVOA/PEST/ARO
Area #	Area #
By	By
On	On

IR Temp Gun ID:MT-1

CoolantCondition: ICE

Preservative Name/Lot No:

VOA Matrix Key:

US = Unpreserved Soil A= Air
UA = Unpreserved Aqueous H = HCl
M = MeOH E = Encore
N = NaHSO4 F = Freeze

See Sample Condition Notification/Corrective Action Form Yes / No

Rad OK Yes / No

WO: L1093 / GIC:002593 / CWO:003575

Sample Condition Form 7

040

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: L1093 LAB: Spectrum

SITE NAME: Vieques AOC I CTO-083

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? [✓] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? [✓] ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? [✓] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? [✓] ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? [✓] ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

Sampled 5/22-23/12 analy 5/24-25/12
rec'd 5/23-24/12 temp 4-5°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ N ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not fcllowed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ✓ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits.
[ ] [✓] ___

0

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) VWAI-MW05-0512

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [1] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [4] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [✓] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7) for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ [✓] ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VWAI-TB01-052212
EB01-052312
TB01-052312
> NO ⊕

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) [✓] ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? [✓] ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ [✓] ___

9.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. [✓] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

	YES	NO	N/A
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

NO TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ___ ✓

b. Blanks [ ] ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ___

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [ ] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] [✓] ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [ ] ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? [ ] ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? Y ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓1 ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VWAI-MW07-0512
VWAI-MW07P-0512
> No qual, see attached sheet

Initial Calibration Date: 5/23/2012

RRF and %RSD Calculations:

Compound Name: 1,2-dichloroethane
Lab Value: 0.2960

Area of Compound	743143
Area of Internal STD	626681
Conc. of Internal STD	50
Conc. of Compound	200
Calculated RRF	0.296

Compound Name: benzene
Lab Value: 7.7

RRF of STD 1	0.9470
RRF of STD 2	0.9830
RRF of STD 3	0.8970
RRF of STD 4	0.8660
RRF of STD 5	0.7840
RRF of STD 6	0.9050
Calculated % RSD	7.7

Continuing Calibration File ID: 5/25/2012

RRF and %D Calculations:

Compound Name: 1,2-dichloropropane
Lab Value: 0.262

Area of Compound	165930
Area of Internal STD	632646
Conc. of Internal STD	50
Conc. of Compound	50
Calculated RRF	0.262

Compound Name: 1,2-dichloroethane
Lab Value: 6.0

Average RRF	0.301
Calibration Check RRF	0.319
Calculated % D	-6.0

DataQual VOA

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VWAI-MW07-0512
Duplicate Sample ID: VWAI-MW07P-0512

Water: RPD>20%
Soil: RPD>30%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
benzene	2.9	2.8	4
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
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			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: No qualifications required

* one of the results below the LOD

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: L1093 LAB: Spectrum

SITE NAME: Vieques AOCI CTO-083

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

	YES	NO	N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? | Y | | |

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? | | Y | |

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ".

Temp 4-5°C

Sampled 5/22-23/12 Rec'd 5/23-24/12
Extr 5/23-25/12 Analy 6/14/12

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? | | Y | |

Continuous extraction of water samples for semivolatile analysis must be started within **7** days of the date of collection. Soil/sediment samples must be extracted within **14** days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received (See Traffic Report)	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

	YES	NO	N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a.	Low Water	[✓]	___	___
b.	Low/Med Soil	[ ]	___	___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a.	Low Water	[✓]	___	___
b.	Low/Med Soil	[ ]	___	___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3	Were outliers marked correctly with an asterisk?	[✓]	___	___

ACTION: Circle all outliers in red.

3.4	Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 80000C-24).	[ ]	✓	___

Note: Examine lab in house limits for reasonableness.

	If yes, were samples re-analyzed?	[ ]	___	✓

2H - FORM II SV-2

WATER SEMIVOLATILE DEUTERATED MONITORING COMPOUND RECOVERY

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

	EPA SAMPLE NO.	SDMC1 (NBZ) #	SDMC2 (FBP) #	SDMC3 (TPH) #						TOT OUT
01	MB-66318	75	72	77						0
02	LCS-66318	72	73	73						0
03	MB-66345	80	76	78						0
04	LCS-66345	77	78	80						0
05	LCSD-66345	79	75	85						0
06	VWAI-EB01-052312	58	59	46 *						1
07	VWAI-MW04-0512	58	59	30 *						1
08	VWAI-MW07-0512	60	63	34 *						1
09	VWAI-MW07P-0512	56	62	43 *						1
10	VWAI-MW05-0512	73	65	22 *						1
11	VWAI-MW05-0512MS	78	69	18 *						1
12	VWAI-MW05-0512MSD	79	72	17 *						1

		QC LIMITS
SDMC1	(NBZ) = Nitrobenzene-d5	(40-110)
SDMC2	(FBP) = 2-Fluorobiphenyl	(50-110)
SDMC3	(TPH) = Terphenyl-d14	(50-135)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D DMC diluted out

som111.10.27.A

	YES	NO	N/A
Were method blanks re-analyzed?	[ ]	___	✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II?	___	✓	___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent) VWAI-MW05-0512

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [✓] ___ ___

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low Solid [ ] ___ ___

c. Med Solid [ ] ___ ___

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. Y ___ ___

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
2 out of 6	____ out of ____

3C - FORM III SV-1

WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L1093 Mod. Ref No.: SDG No.: SL1093

Matrix Spike - EPA Sample No.: VWAI-MW05-0512

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS %REC	#	QC. LIMITS REC.
Naphthalene	50.0000	1.2732	35.7838	69		40-100
2-Methylnaphthalene	50.0000	11.0377	46.3900	71		45-105
Bis(2-ethylhexyl)phthalate	50.0000	0.0000	18.4985	37	*	40-125

J/UJ

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD %REC	#	%RPD	#	QC LIMITS RPD	QC LIMITS REC.
Naphthalene	50.0000	38.1297	74		7		0-40	40-100
2-Methylnaphthalene	50.0000	48.7442	75		6		0-40	45-105
Bis(2-ethylhexyl)phthalate	50.0000	14.7979	30	*	22		0-40	40-125

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 3 outside limits

Spike Recovery: 2 out of 6 outside limits

COMMENTS:

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
0 out of 3	____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a method blank been analyzed either after

	YES	NO	N/A
the calibration standard or at any other time during the analytical shift for each GC/MS system used ?	✓		

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

	YES	NO	N/A
Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles?	✓		

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

	YES	NO	N/A
6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary.		✓	
6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)?		✓	

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

VWAI-EB01-052312 - MO⊕

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

	YES	NO	N/A
that exceeded the initial calibration range.	[ ]	___	✓
6.5 Does the instrument blank have positive results for target analytes and/or TICs?	___	[✓]	___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

	YES	NO	N/A
7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column.	[✓]	___	___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

	YES	NO	N/A
8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)?	[✓]	___	___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

	YES	NO	N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

	YES	NO	N/A
ACTION: If ion abundance criteria are not met, take action specified in section 3.2			
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)	___	[✓]	___
8.7 Have the appropriate number of significant figures (two) been reported?	[✓]	___	___
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.			
8.8 Are the spectra of the mass calibration compound acceptable?	[ ]	___	___
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
9.0 Target Analytes			
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	[✓]	___	___
b. Matrix spikes and matrix spike duplicates	[✓]	___	___
c. Blanks	[✓]	___	___
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?	[ ]	___	✓

	YES	NO	N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate	[✓]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[✓]	___	___
c. Blanks	[✓]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report?	[✓]	___	___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability?	[✓]	___	___
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___
Other:_____	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

	YES	NO	N/A
each sample?	☑		

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	☑		
9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum?	☑		
9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum?	☑		

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

	YES	NO	N/A

10.0 Tentatively Identified Compounds (TIC)

NO TICs

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

	YES	NO	N/A
sample mass spectrum?	[ ]	___	✓
10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%?	[ ]	___	✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	___	[✓]	___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture?	[ ]	___	✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ✓ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ✓ ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ [✓] ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ [✓] ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? [ ] ✓ ___

	YES	NO	N/A
13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%?	___	[ ]	✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

	YES	NO	N/A
14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest?	✓	[ ]	___	___
14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument?	✓	[ ]	___	___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

	YES	NO	N/A
call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").			
14.3 Do any of the SPCCs have an RRF <0.05?	___	✓	___
If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18.	[ ]	___	___
14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?			
ACTION: If yes, make a note in data assessment.			
14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%?	___	✓	___
ACTION: Circle all outliers in red.			
ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.			
14.6 Do any semivolatile compounds have a RRF < 0.05?	___	[ ]	___
ACTION: Circle all outliers in red.			
ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.			
14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more).	___	✓	___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

	YES	NO	N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? [ ] [✓] ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? [✓] ___ ___

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? [✓] ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? [ ] ___ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

VWAI-MW07-0512
VWAI-MW07P-0512
> No qualifications per attached sheet

Initial Calibration Date: 6/1/2012

RRF and %RSD Calculations:

Compound Name: naphthalene
Lab Value: 1.006

Area of Compound	385375
Area of Internal STD	191614
Conc. of Internal STD	40
Conc. of Compound	80
Calculated RRF	1.006

Compound Name: 2-methylnaphthalene
Lab Value: 5.0

RRF of STD 1	0.711
RRF of STD 2	0.824
RRF of STD 3	0.771
RRF of STD 4	0.734
RRF of STD 5	0.734
RRF of STD 6	0.725
RRF of STD 7	0.759
Calculated % RSD	5.1

Continuing Calibration File ID: 6/4/2012

RRF and %D Calculations:

Compound Name: bis(2-ethylhexyl)phthalate
Lab Value: 0.599

Area of Compound	181980
Area of Internal STD	486010
Conc. of Internal STD	40
Conc. of Compound	25
Calculated RRF	0.599

Compound Name: naphthalene
Lab Value: 0.7

Average RRF	1.056
Calibration Check RRF	1.063
Calculated % D	-0.7

DataQual **SVOA**

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VWAI-MW07-0512
Duplicate Sample ID: VWAI-MW07P-0512

Water: RPD>75%
Soil: RPD>100%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
naphthalene	3.3	3.2	3
2-methylnaphthalene	3.4	3.3	3
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

* one values below LOD
only values above LOD listed

COMMENTS: No qualifications required

	YES	NO	N/A
A.I.1 **Contract Compliance Screening Report** Present?	[ ]	___	✓
ACTION: If no, contact RSCC/PO.			
A.I.2 **Record of Communication (from RSCC)** Present?	[ ]	___	✓
ACTION: If no, request from the RSCC.			
A.1.3 **Sampling Trip Report** Present and complete?	[ ]	___	✓
ACTION: If no, contact RSCC/PO.			
A.I.4 **Chain of Custody/Sample Traffic Report** Present?	[✓]	___	___
Legible?	[✓]	___	___
Signature of sample custodian present?	[✓]	___	___
ACTION: If no, contact RSCC/WAM/PO.			
A.I.5 **Cover Page** Present?	[✓]	___	___
Is the Cover Page properly filled in and the verbatim signed by the lab manager or the manager's designee?	[✓]	___	___
Do the sample identification numbers on the Cover Page agree with sample Identification numbers on:			
(a) Traffic Report Sheet?	[COC ✓]	___	✓

	YES	NO	N/A
(b) Form I's?	[✓]	___	___
Is the number of samples on the Cover Page the same as the number of samples on the Traffic Report sheet and the Regional Record of Communication (ROC) for the data Case?	[___]	___	___

ACTION:
If no for any of the above, prepare Telephone Record Log and contact RSCC/PO for re-submittal of the corrected Cover Page from the laboratory.

A.1.6 **SDG Narrative, DC-1 & DC-2 Form**

Is the SDG Narrative present?	[✓]	___	___
Is Sample Log-In Sheet(Form DC-1) present and complete?	[___]	___	✓
Is Complete SDG Inventory Sheet(Form DC-2) present and complete?	[___]	___	✓

ACTION:
If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.

A.1.7 **Form I to XV**

A.1.7.1 Are all the Form I through Form XV labeled with:

Forms as required by DOD QSC 4.2.

Laboratory Name?	[✓]	___	___
Laboratory Code?	[✓]	___	___
RAS/Non-RAS Case No.?	[___]	___	✓
SDG No.?	[✓]	___	___

		YES	NO	N/A
	Contract No.?	[✓]	___	___

ACTION:
If no for any of the above, note under Contract Problem/Non-Compliance Section of the "Data Review Narrative" and contact PO for corrected Form(s) from the laboratory.

A.1.7.2 After comparing values on Forms I-IX against the raw data, do any computation/ transcription errors exceed 10% of the reported values on the Forms for:

(a) all analytes analyzed by ICP-AES?	___	[✓]	___
(b) all analytes analyzed by ICP-MS?	_	[___]	_ ✓
(c) Mercury?	__	[_]	____ ✓
(d) Cyanide?	_	[_]	_ ✓

ACTION:
If yes, prepare Telephone Record Log and contact CLP PO/TOPO for the corrected data from the laboratory.

A.1.8 Raw Data

Data shall not be validated without the hard/electronic copies of the associated raw data for samples and QC samples.

A.1.8.1 Digestion/Distillation Log

Digestion Log for ICP-AES (Form XII)present?	[✓]	___	___
Digestion Log for ICP-MS (Form XII) present?	[___]	___	___ ✓
Digestion Log for mercury (Form XII) present?	[___]	___	___ ✓
Distillation Log for cyanide (Form XII) present?	[___]	___	___ ✓

Are pH values for metals and

	YES	NO	N/A
cyanide reported for each aqueous sample?	[✓]	_	_
Are percent solids calculations present for soils/sediments?	[_]	_	✓
Are preparation dates present on the sample preparation logs/bench sheets?	[✓]	_	_

NOTE:
Digestion/Distillation log must include weights, volumes, and dilutions used to obtain the reported results.

A.1.8.2 Is the analytical instrument real-time printouts present for:

ICP-AES?	[✓]	_	_
ICP-MS?	[_]	_	✓
Mercury?	[_]	_	✓
Cyanide?	[_]	_	✓

Are all laboratory bench sheets and instrument raw data printouts necessary to support all sample analyses and QC operations:

Legible?	[✓]	_	_
Properly labeled?	[✓]	_	_

Are all field samples, QC samples and field QC samples present on:

Digestion/Distillation log?	[✓]	_	_
Instrument Printouts?	[✓]	_	_

ACTION:
If no for any of the above questions in Section A.1.8.1 and Section A.1.8.2, write Telephone Record Log and contact TOPO/PO for re-submittal from the laboratory.

		YES	NO	N/A
A.1.9 **Technical Holding Times**: (Aqueous and soil samples) (Examine sample Traffic Reports and digestion/distillation logs to determine the holding time from the sample collection date to the sample preparation date.)				
A.1.9.1	Cyanide distillation(14 days)exceeded?	_	[_]	✓
	Mercury analysis(28 days) exceeded?	_	[_]	✓
	Other Metals analysis(180 days)exceeded?	___	[✓]	_

ACTION:
If yes, reject (R) and red-line non-detects and flag as estimated (J)results ≥ MDL even if sample(s) was preserved properly.

NOTE:
In addition to qualifying the data, a list of all samples and analytes which exceeded the holding times must be prepared. Report for each sample the number of days that were exceeded. (Subtract the sample collection date from the sample preparation date). Attach this list to the data review narrative.

A.1.9.2	Is pH of aqueous samples for:			
	Metals Analysis ≤ 2?	[✓]	___	___
	Cyanide Analysis ≥ 12?	[_]	_	✓

ACTION:
If no for any of the above, flag non-detects as "R" and detects as "J".

A.1.9.3	Is the cooler temperature ≤ 10 C°?	✓	_	_

ACTION:
If cooler temperature is >10 °C , flag non-detects as "UJ" and detects as "J".

A.1.10 **Final Data Correctness - Form I**

A.1.10.1 Are Form I's for all samples

	YES	NO	N/A
present and complete?	[✓]	___	___

ACTION:
If no, prepare Telephone Record Log and contact CLP PO/TOPO for submittal from the laboratory.

A.1.10.2 Verify there are no calculation and transcription errors in the results reported on Form I's. Circle on each Form I all results that are incorrect.

Is the calculation error less than 10% of the correct result?	[✓]	_	_
Are results on Form I's reported in correct units (ug/L for aqueous and MG/KG for soils)?	[✓]	___	___
Are results on Form I'S reported by correct significant figures?	[✓]	___	___
Are soil sample results on Form I's corrected for percent solids?	[___]	___	✓
Are all "less than MDL" values reported by the ~~CRQLs~~ LOQs and coded with "U"? by the LOQs but down to MDL's with J flag.	[___]	✓	___
Are values less than the ~~CRQLs~~ LOQs but greater than or equal to the MDLs flagged with "J"?	[✓]	___	___
Are appropriate contractual quality control and Method qualifiers used?	[✓]	___	___

ACTION:
If no for any of the above questions, prepare Telephone Record Log, and contact CLP PO/TOPO for corrected data.

A.1.10.3 Do EPA sample identification numbers and the corresponding laboratory sample identification numbers match on the Cover Page, Form I's and in the raw data? [✓] ___ ___

Was a brief physical description

	YES	NO	N/A
of the samples before and after digestion given on the Form I's?	[___]	✓	
Was any sample result outside the mercury/cyanide calibration range or the ICP-AES/ICP-MS linear range diluted and noted on the Form I?	[___]		✓

ACTION:
If no for any of the above, note under the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.11 **Initial Calibration**

		YES	NO	N/A
A.1.11.1	Is a record of at least 2 point (A blank and a standard)calibration present for ICP-AES analysis?	[✓]		
	Is a record of at least 2 point (a blank and a standard)calibration present for ICP-MS analysis?	[___]		✓
	Is a record of at least 5 point calibration (a blank & 4 standards)present for Hg analysis?	[___]		✓
	Is a record of at least 4 point calibration (a blank & 4 standards)present for cyanide?	[___]		✓

ACTION:
If incomplete or no initial calibration was performed, reject (R) and red-line the associated data (detects & non-detects).

	Is one initial calibration standard at the CRQL level for cyanide and mercury?	[___]		✓

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the Data Review Narrative.

A.1.11.2 Is the curve correlation coefficient $\geq$ 0.995 for:

		YES	NO	N/A
	Mercury Analysis?	[___]	___	___
	Cyanide Analysis?	[___]	___	___
	ICP-AES(more than 2 point Calib.)?	[✓]	___	___
	ICP-MS (more than 2 point calib.)?	[___]	___	___

ACTION:
If no, qualify the associated sample results ≥ MDL as estimated "J" and non-detects as "UJ".

NOTE:
The correlation coefficient shall be calculated by the data validator using standard concentrations and the corresponding instrument response (e.g. absorbance, peak area, peak height, etc.).

A.1.12 **Initial and Continuing Calibration Verification- Form IIA**

A.1.12.1	Present and complete for every metal and cyanide?	[✓]	___	___
	Present and complete for ICP-AES and ICP-MS when both these methods were used for the same analyte?	[___]	___	___

ACTION:
If no for any of the above, prepare a Telephone Record Log and contact PO/TOPO for re-submittal from the laboratory.

A.1.12.2	Was a Continuing Calibration Verification performed every 10 samples or every 2 hours whichever is more frequent?	[✓]	___	___

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.12.3	Was an ICV or a mid-range standard distilled and analyzed with each batch of cyanide samples?	[___]	___	___

	YES	NO	N/A

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative and qualify results ≥ MDL as estimated (J).

A.1.12.2 Circle on each Form IIA all percent recoveries that are outside the contract windows.

Are ICV/CCVs within control limits for:

Metals - 90-110%R?	[✓]	___	___
Hg - 80-120%R?	[___]	___	✓
Cyanide - 85-115%R?	[___]	___	✓

ACTION:
If no, qualify all samples between a previous technically acceptable CCV standard and a subsequent technically acceptable CCV standard as follows as follows:

Qualify as estimated (J) all detects and non-detects, if the ICV/CCV %R is between 75-89%(65-79% for Hg; 70-84% for CN). Qualify only positive results(≥ MDL) as "J" if the ICV/CCV %R is between 111-125%(121-135% for Hg;116-130% for CN). Reject (R) and red-line only
detects if the recovery is greater than 125% (135% for Hg; 130% for CN). Reject (R) and red-line all associated results (hits and non-detects)if the recovery is less than 75%(65% for Hg;70% for CN).

NOTE:
For ICV that does not fall within the acceptance limits, qualify all samples reported from the analytical run.

A.1.12.3 Was the distilled ICV or mid-range standard for cyanide within acceptance limits (85-115%)? [___] ___ ✓

ACTION:
If no, Qualify all cyanide results ≥ MDL as "J".

A.1.13 **CRQL Standard Analysis - Form IIB**

A.1.13.1 For each ICP-AES run, was a CRI

	YES	NO	N/A
(CRQL or MDL when MDL > CRQL) standard analyzed? (Note:CRI is not required for Al, Ba, Ca, Fe, Mg, Na and K.)	[___]	___ ✓	___
For each ICP-MS run, was a CRI (CRQL or MDL when MDL > CRQL) standard analyzed for each mass/isotope used for the analysis?	[___]	___	___ ✓ ___
For each mercury run, was a CRQL standard analyzed?	[___]	___	___ ✓
For each cyanide run, was a CRQL standard analyzed?	[___]	___	___ ✓

ACTION:
If no for any of the above, write this deficiency in the Contract Problems/ Non-Compliance Section of the Data Review Narrative, inform CLP PO and flag results in the affected ranges (detects <2xCRQL)as J and non-detects UJ.

CRI Std was not run but a Std at LOQ was analyzed for Mn.

The affected ranges are:
ICP-AES Analysis - *True Value ± CRQL
ICP-MS Analysis - *True Value ± CRQL
Mercury Analysis - *True Value ± CRQL
Cyanide Analysis - *True Value ± CRQL
* True value of the CRQL Standard

A.1.13.2 Was a CRQL standard analyzed after the ICV/ICB, before the final CCV/CCB and once every 20 analytical samples in the analytical run for each analysis? [___] ___ ✓ ___

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the "Data Review Narrative".

A.1.13.3 Circle on each Form IIB all percent recoveries that are outside the acceptance windows.

	YES	NO	N/A
Is the CRQL standard within control limits for:			
Metals(ICP-AES/ICP-MS)- 70 - 130%?	[___]	___	___
Mercury- 70 - 130%?	[___]	___	___
Cyanide - 70 - 130%?	[___]	___	___

ACTION:
If no, flag detects <2xCRQL as "J" and non-detects as "UJ" if the CRQL standard recovery is between 50-69%. Flag(J) only detects <2xCRQL if the recovery is between 131% and ≤180%. If the recovery is less than 50%, reject(R) and red-line non-detects and detects < 2xCRQL, and flag (J) detects between 2xCRQL and ICV/CCV. Reject and red-line only detects <2xCRQL and flag (J)detects ≥ 2xCRQL but < ICV/CCV if the recovery is > 180%.

NOTE:
1. Qualify all field samples analyzed between a previous technically acceptable analysis of the CRQL standard and a subsequent acceptable analysis of the CRQL standard
2. Flag (J) or reject (R) only the final sample results on Form I's when **Sample raw data** are within the affected ranges and the CRQL standard is outside the acceptance windows.
3. The samples and the CRQL standard must be analyzed in the same analytical run.

A.1.14 Initial and Continuing Calibration Blanks - Form III

		YES	NO	N/A
A.1.14.1	Present and complete for all the instruments used for the metals and cyanide analyses?	[✓]	___	___
	Was an initial Calibration Blank analyzed after ICV?	[✓]	___	___
	Was a continuing Calibration Blank analyzed after every CCV and every 10 samples or every 2 hours, whichever is more frequent?	[✓]	___	___
	Were the ICB & CCB values ≥ MDL but < CRQL reported on Form III and flagged "J" by			

		YES	NO	N/A
	using MDLs from direct analysis(Preparation Method "NP1")? (Check Form III against the raw data)	[___]	___	✓

ACTION:
If no, inform CLP PO/TOPO and make a note in the Contract-Problems/Non-Compliance Section of the "Data Review Narrative".

A.1.14.2 Circle with red pencil on each Form III all Calib. Blank values that are:

≥ MDL but ≤ CRQL

> CRQL

A.1.14.2.1	When MDL < CRQL, is any Calib. Blank value ≥ MDL but ≤ CRQL?	___	[✓]	___

ACTION:
If yes, change sample results ≥ MDL but ≤ CRQL to the CRQL with a "U". Do not qualify non-detects.

A.1.14.2.2	When MDL < CRQL, is any Calib. Blank value > CRQL?	___	[✓]	___

ACTION:
If yes, reject (R) and red line the associated sample results > CRQL but <ICB/CCB Blank Result. Flag as "J" detects > ICB/CCB blank value but < 10xICB/CCB value. Change the sample results ≥ MDL but ≤ the CRQL to CRQL with a "U".

A.1.14.2.3	Is any Calibration Blank value below the negative CRQL?	___	[✓]	___

ACTION:
If yes, flag (J) as estimated all associated sample results ≥ CRQL but <10xCRQL.

NOTE:

1. For ICB that does not meet the technical QC Criteria, apply the action to all samples

	YES	NO	N/A

reported from the analytical run.
2. For CCBs that do not meet the technical QC criteria, apply the action to all samples analyzed between a previous technically acceptable analysis of CCB and a subsequent technically acceptable analysis of the CCB in the analytical run.,

A.1.15 **Preparation Blank - FORM III**

NOTE: The Preparation Blank for mercury is the same as the calibration blank.

A.1.15.1 Was one Preparation Blank prepared with and analyzed for:			
Each Sample Delivery Group (SDG)?	[✓]	___	___
Each batch of the SDG samples digested/distilled?	[✓]	___	___
Each matrix type?	[✓]	___	___
All instruments used for metals and cyanide analyses?	[✓]	___	___

ACTION:
If no for any of the above, flag as estimated (J) all the associated positive data <10xMDL for which the Preparation Blank was not analyzed.

NOTE:
If only one blank was analyzed for more than 20 samples, then the first 20 samples analyzed are not estimated(J),but all additional samples must be qualified (J).

A.1.15.2 Circle with red pencil on each Form III all Prep. Blank values that are:

≥ MDL but ≤ CRQL, and

> CRQL

A.1.15.2.1 When MDL < CRQL, is any preparation blank value ≥ MDL but ≤ CRQL?	___	[✓]	___

ACTION:
If yes, change sample result ≥ MDL

	YES	NO	N/A
but ≤ CRQL to CRQL with a "U".			
A.1.15.2.2 When the MDL ≤ CRQL, is any Preparation Blank value greater than its CRQL?	___	[✓]	___
If yes, is the Prep. Blank value greater than the value of the associated Field Blank collected and analyzed with the SDG samples?	___	[___]	✓
If yes, is the lowest concentration of that analyte in the associated samples less than 10 times the Preparation Blank value?	___	[___]	✓

ACTION:
If yes, reject (R) and red-line all associated sample results greater than the CRQL but less than the Prep.Blank value. Flag as "J" detects > Prep. Blank value but <10xPrep.Blank. If the sample result ≥ MDL but ≤ CRQL, replace it with CRQL-U.

If the Prep. Blank value is less than the same analyte value in the Field Blank, do not qualify the sample results due to the Prep. Blank criteria.

NOTE:
Convert soil sample result to mg/Kg on wet weight basis to compare with the soil Prep. Blank result on Form III.

A.1.15.2.3 Is the Prep. Blank concentration below the negative CRQL?	___	[✓]	___

ACTION:
If yes, flag (J) all associated sample results less than 10xCRQL. Qualify non-detects as estimated (UJ).

A.1.15.2.4 When the MDL is greater than the CRQL, is the preparation blank concentration on Form III greater than two times the MDL?	___	[✓]	___

ACTION:

		YES	NO	N/A
	If yes, reject (R) and red-line all positive sample results with sample raw data less than 10 times the Preparation Blank value.			
A.1.16	**ICP-AES/ICP-MS Interference Check Sample (ICS) - Form IV** **NOTE:** Not required for CN, Hg, Al, Ca, Fe and Mg.			
A.1.16.1	Present and complete?	[✓]	___	___
	Was ICS analyzed at the beginning and end of each analytical run, and once for every 20 analytical samples?	[✓]	___	___
	Was ICS analyzed at the beginning of the ICP-MS analytical run?	[___]	___	✓
	ACTION: If no, flag as estimated (J) all sample results.			
A.1.16.2	**ICP-AES Method**			
A.1.16.2.1	**ICSA Solution:** For ICP-AES, are the ICSA "Found" analyte values within the control limits ± of CRQL of the true/established mean value?	[✓]	___	___
	If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSA Solution on Form IV?	[___]	___	✓
	ACTION: If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run: Flag (J) as estimated only sample results ≥MDL			

	YES	NO	N/A

for which the ICSA "Found' value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag non-detects as "UJ" and detects as "J".

A.1.16.2.3 **ICSAB Solution**

For ICP-AES, are all analyte results in ICSAB within the control limits of 80-120 of the true/established mean value? [✓] ___ ___

If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSAB Solution on Form IV? [___] ___ ✓

ACTION:

If yes, apply the followirg action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79%, qualify sample results ≥ MDL as "J" and non-detects as "UJ". Reject (R) and red-line all sample results (detects & non-detects) for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only positive results.

A.1.16.3 **ICP-MS Method**

A.1.16.3.1 **ICSA Solution:**

For ICP-MS, are the ICSA "Found" analyte values within the control limits of ±CRQL of the true/established mean value? [___] ___ ___ ✓

ACTION:

If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated only sample results ≥ MDL if the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag the associated sample detects as "J" and non-detects as "UJ".

		YES	NO	N/A
A.1.16.3.3	**ICSAB Solution** For ICP-MS, are all analyte results in ICSAB within the control limits of 80-120% of the true/established mean value, whichever is greater?	[___]	___	✓

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79% flag (J) as estimated the associated sample results ≥ MDL. Reject (R) and red-line those all sample detects and non-detects for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only detects (≥ MDL).

A.1.17 **Spiked Sample Recovery: Pre-Digestion/Pre-Distillation)-Form V A**
Note: Not required for Ca, Mg, K, and Na (both matrices); Al and Fe (soil only)

		YES	NO	N/A
A.1.17.1	Was Matrix Spike analysis performed:			
	For each matrix type?	[___]	✓	___
	For each SDG?	[___]	___	___
	On one of the SDG samples?	[___]	___	___
	For each concentration range (i.e., low, med., high)?	[___]	___	___
	For each analytical Method (ICP-AES, ICP-MS, Hg, CN) used?	[___]	___	___
	Was a spiked sample prepared and analyzed with the SDG samples?	[___]	___	___

ACTION:
If no for any of the above, flag as estimated (J) all the positive data for which a spiked sample was not analyzed.

Flag + results in all samples

NOTE:
If more than one spiked sample were analyzed for one SDG, then qualify the associated data based on the worst spiked sample analysis.

		YES	NO	N/A
A.1.17.2	Was a field blank or PE sample used for the spiked sample analysis?	___	[✓]	___

ACTION:
If yes, flag (J) as estimated positive data of the associated SDG samples for which field blank or PE sample was used for the spiked sample analysis.

A.1.17.3 Circle on each Form VA all spike recoveries that are outside the control limits (75-125%) that have sample concentrations less than four times the added spike concentrations.

Are all recoveries within the control limits when sample concentrations are less than or equal to four times the spike concentrations?	[___]	___	✓

NOTE:
Disregard the out of control spike recoveries for analytes whose concentrations are greater than or equal to four times the spike added.

Are results outside the control limits (75-125%) flagged with Lab Qualifier "N" on Form I's and Form VA?	[___]	___	✓

ACTION:
If no for any of the above, write in the Contract - Problems/Non-Compliance Section of the Data Review Narrative.

A.1.17.4 **Aqueous**

Are any spike recoveries:

(a) less than 30%?	___	[___]	✓
(b) between 30-74%?	___	[___]	___
(c) between 126-150%?	___	[___]	___
(d) greater than 150%?	___	[___]	___

ACTION:
If the matrix spike recovery is less than 30%, reject (R) and red-line all associated aqueous data (detects & non-detects). If between 30-74%, qualify all associated aqueous data ≥ MDL as "J" and non-detects

	YES	NO	N/A

as "UJ". If between 126-150%, flag (J) all data ≥ MDL as "J". If greater than 150%, reject (R) and red-line all associated data ≥ MDL.

(**NOTE**:Replace "N" with "J", "R" as appropriate.)

A.1.17.5 **Soil/Sediment**

Are any spike recoveries:

(a) less than 10%?	___	[___]	___ ✓
(b) between 10-74%?	___	[___]	___
(c) between 126-200%?	___	[___]	___
(d) greater than 200%? ✓	___	[___]	___

ACTION:
If yes for any of the above, proceed as follows:

If the matrix spike recovery is less than 10%,reject (R) and red-line all associated data (detects & non-detects); if between 10-74%,qualify all associated data ≥ MDL as "J" and non-detects as "UJ"; if between 126-200%, flag (J) all associated data ≥ MDL as "J" If greater than 200%, reject (R) and red-line all associated data ≥ MDL.
(**NOTE**:Replace "N" with "J" or "R" as appropriate.)

A.1.18 **Lab Duplicates) - Form VI**

A.1.18.1 Was the lab duplicate analysis performed:

		✓	
For each SDG?	[___]	___	___
On one of the SDG samples?	[___]	___	___
For each matrix type?	[___]	___	___
For each concentration range (low or med.)?	[___]	___	___
For each analytical Method (ICP-AES/ICP-MS,Hg,CN)Used?	[___]	___	___
Was a lab duplicate prepared and analyzed with the SDG samples?	[___]	___	___

		YES	NO	N/A
	ACTION: If no for any of the above, flag (J) as estimated all the SDG sample results (detects & non-detects) for which the lab duplicate analysis was not performed. all +/- results flagged - no QC performed.			
	NOTE: If more than one lab duplicate sample were analyzed for an SDG, then qualify the associated samples based on the worst lab duplicate analysis.			
A.1.18.2	Was a Field Blank or PE sample used for the Lab Duplicate analysis?	___	[✓]	___
	ACTION: If yes, flag as estimated (J) all SDG sample results (hits & non-detects) for which Field Blank or PE sample was used for duplicate analysis.			
A.1.18.3	Circle on each Form VI all values that are: RPD > 20%, or Absolute Difference > CRQL			
	Are all values within control limits (RPD ≤ 20% or absolute difference ≤ ±CRQL)?	[___]	___	✓
	If no, are all results outside the control limits flagged with an "*" (Lab Qualifier) on Form VI and on all Form I's?	[___]	___	✓
	ACTION: If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.			
	NOTE: The laboratory is not required to report on Form VI the RPD when both values are non-detects.			
A.1.18.4	**Aqueous**			
A.1.18.4.1	When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			

	YES	NO	N/A
is any RPD > 20% but < 100%?	___	[___]	___
is any RPD ≥ 100%?	___	[___]	___

ACTION:
If the RPD is > 20% but < 100%, flag (J) as estimated the associated sample data ≥ CRQL. If the RPD is ≥ 100%, reject (R) and red-line the associated sample data ≥ CRQL.

(**NOTE:** Replace "*" with "J" or "R" as appropriate.)

A.1.18.4.2 When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate values:

> ± CRQL?	___	[___]	___
> ± 2xCRQL?	___	[___]	___

ACTION:
If the absolute difference is > CRQL, flag as estimated all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 2xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but < 5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.18.5 **Soil/Sediment**

A.1.18.5.1 When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 35% but < 120%?	___	[___]	___
is any RPD ≥ 120%?	___	[___]	___

ACTION:
If the RPD is ≥ 35% and < 120%, flag (J) as estimated the associated sample

		YES	NO	N/A
	data ≥ CRQL. If the RPD is ≥ 120%, reject (R) and red-line the associated sample data ≥ CRQL.			
A.1.18.5.2	When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and duplicate:			
	> ± 2 x CRQL?	___	[___]	✓ ___
	> ± 4 x CRQL	___	[___]	✓ ___

ACTION:
If the absolute difference is > 2 x CRQL, flag all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 4xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but <5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.19 Field Duplicates

Aqueous Field Duplicates

A.1.19.1	Was an aqueous Field Duplicate pair collected and analyzed? (Check Sampling Trip Report)	[___]	✓ ___	___

ACTION:
If yes, prepare a Form (Appendix A.4) for each aqueous Field Duplicate pair. Report the sample and Field Duplicate results on Appendix A.4 from their respective Form I's. Calculate and report RPD on Appendix A.4 when sample and its Field Duplicate values are both > 5xCRQL. Calculate and report the absolute difference on Appendix A.4 when at least one value (sample or duplicate) is <5xCRQL. Evaluate the aqueous Field Duplicate analysis in accordance with the

	YES	NO	N/A

QC criteria stated in Sections A.1.19.2 and A.1.19.3.

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this the criteria to qualify the results.

A.1.19.2 Circle all values on the Form (Appendix A.4) for Field Duplicates that have:

RPD ≥ 20% or

Difference > ± CRQL

When sample and duplicate values are both ≥5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 20%?	___	[___]	___ ✓
is any RPD ≥ 100%?	___	[___]	___ ✓

ACTION:
If the RPD is >20% but < 100%, flag (J) only the associated sample and its Field Duplicate results ≥ CRQL. If the RPD is ≥ 100%, reject (R) and red-line only the associated sample and its Field Duplicate result ≥ CRQL.

A.1.19.3 When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate:

> ± CRQL?	___	[___]	___ ✓
> ± 2 x CRQL?	___	[___]	___ ✓

ACTION:
If the absolute difference is > CRQL, flag detects ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the difference is > 2xCRQL, reject (R) and red-line non-detects

		YES	NO	N/A
	and results ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			

Soil/Sediment Field Duplicates

A.1.19.4	Was a soil field duplicate pair collected and analyzed? (Check Sampling Trip Report)	[___]	___	✓

ACTION:
If yes, for each soil Field Duplicate pair proceed as follows:

Prepare Appendix A.4 for each Field Duplicate pair. Report on Appendix A.4 all sample and its Field Duplicate results in MG/KG from their respective Form I's. Calculate and report RPD when sample and its duplicate values are both greater than 5xCRQL. Calculate and report the absolute difference when at least one value (sample or duplicate) is < 5xCRQL. Evaluate the Field Duplicate analysis in accordance with the QC Criteria stated in Sections A.1.19.5 and A.1.19.6.

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and apply the criteria to qualify the results.

A.1.19.5	Circle on each Appendix A.4 all values that have: RPD ≥ 35%, or Difference > ± 2xCRQL When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			
	is any RPD ≥ 35% but < 120%?	___	[___]	✓
	is any RPD ≥ 120%?	___	[___]	✓

ACTION:
If the RPD is ≥ 35% but < 120%,

		YES	NO	N/A
	flag only the associated sample and its Field Duplicate results ≥ CRQL as "J". If the RPD is ≥ 120%, reject (R) and red-line only the sample and its Field Duplicate results ≥ CRQL.			
A.1.19.6	When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and Field Duplicate:			
	> ± 2 x CRQL?	___	[___]	✓
	> ± 4 x CRQL?	___	[___]	✓
	ACTION: If the absolute difference is > 2xCRQL, flag Sample and its Field Duplicate resuts ≥ MDL but <5xCRQL as "J" and non-detects as "UJ". If the difference is >4xCRQL, reject(R) and red-line non-detects and detects ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
A.1.20	**Laboratory Control Sample (LCS)- Form VII**			
A.1.20.1	Was one LCS prepared and analyzed for:			
	Each SDG?	[✓]	___	___
	Each matrix type?	[✓]	___	___
	Each batch samples digested/distilled?	[✓]	___	___
	For each Method(ICP-AES,ICP-MS,Hg,CN) used?	[✓]	___	___
	Was an LCS prepared and analyzed with the samples?	[✓]	___	___
	ACTION: If no for any of the above, prepare Telephone Record Log and contact CLP PO or TOPO for submittal of the LCS results. Flag (J) as estimated all the data for which an LCS was not analyzed.			
	NOTE: If only one LCS was analyzed for			

	YES	NO	N/A

more than 20 samples, then the first 20 samples analyzed are not flagged(J), but all additional samples must be qualified (J).

A.1.20.2 **Aqueous LCS**

Circle on each Form VII the LCS percent recoveries outside control limits 80-120%.

NOTE: 1.Use digested ICV as LCS for aqueous mercury
2.Use distilled ICV as LCS for aqueous cyanide

Is any LCS recovery:

Less than 50%?	___	[___]	___
Between 50% and 79%?	___	[___]	___
Between 121% and 150%?	___	[___]	___
Greater than 150%?	___	[___]	___

ACTION:
If the LCS recovery is less than 50%, reject (R) and red-line all associated sample data (detects & non-detects); for a recovery between 50-79%, flag detects as "J" all non-detects as "UJ". if the LCS recovery is between 121-150%, flag only detects as "J". if the recovery is greater than 150%, reject (R) and red-line all detects.

all recoveries were good.

A.1.20.3 **Solid LCS**

If an analyte's MDL is equal to or greater than the true value of LCS, disregard the "Action" below for that analyte even though the LCS is out of control limits.

Is the LCS "Found" value greater than the Upper Control Limit reported on Form VII? ___ [___] ___

ACTION:

		YES	NO	N/A
	If yes, flag (J) all the associated detects ≥ MDL as estimated (J).			
	Is the LCS "Found" value lower than the Lower Control Limit reported on Form VII?	___	[___]	✓
	ACTION: If yes, flag detects as "J" and non-dectes as "UJ".			
A.1.21	**ICP-AES/ICP-MS Serial Dilution - Form VIII** NOTE: Serial dilution analysis is required only when the initial concentration is equal to or greater than 50 x MDL.			
A.1.21.1	Was a Serial Dilution analysis performed:			
	For each SDG?	[___]	✓	___
	On one of the SDG samples?	[___]	___	___
	For each matrix type?	[___]	___	___
	For each concentration range (low or med.)?	[___]	___	___
	Was a Serial Dilution sample analyzed with the SDG samples?	[___]	___	___
	ACTION: If no for any of the above, flag as estimated (J) detects ≥ MDL of all the SDG samples for which the ICP Serial Dilution Analysis was not performed.	J all +- no SD		
A.1.21.2	Was a Field Blank or PE sample used for the Serial Dilution Analysis?	___	[___]	✓
	ACTION: If yes, flag as estimated (J) detects ≥ MDL of all the SDG samples			
A.1.21.3	Circle on Form VIII the Percent Differences (%D) between sample results and its dilution results that are outside the control limits ± 10%			

		YES	NO	N/A
	when initial concentrations ≥ 50 x MDLs.			
	Are results outside the control limits flagged with an "E"(Lab Qualifier) on Form VIII and all Form I's?	[___]	___	✓ ___
	ACTION: If no, write in the Contract-Problem/ Non-Compliance Section of the Data Review Narrative.			
A.1.21.4	Are any %D values:			
	> 10%?	___	[___]	✓ ___
	≥ 100%?	___	[___]	✓ ___
	ACTION: If the Percent Difference (%D) is greater than 10%, flag (J) as estimated all associated samples whose **raw data** ≥ MDL; if the %D is ≥ 100%, reject (R) and red-line all associated samples with **raw data** ≥ MDL.			
	(**NOTE**:Replace "E" with "J" or "R" as appropriate.)			
A.1.22	**Total/Dissolved or Inorganic/Total Analytes**			
A.1.22.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s)?	___	✓ [___]	___
	Were any analyses performed for inorganic as well as total analytes on the same sample(s)?	___	✓ [___]	___
	ACTION: If yes, prepare a Form (Appendix A.5) to compare the differences between dissolved (or inorganic) and total analyte concentrations. Compute each difference on Appendix A.5 as a percent of the total analyte only when both of the following conditions are fulfilled:			
	(1) The dissolved(or inorganic)concentration is greater than total concentration, and (2) greater than or equal to 5xMDL.			
A.1.22.2	Is any dissolved (or inorganic) concentration greater than its total concentration by more than 20%?	___	[___]	✓ ___

		YES	NO	N/A
A.1.22.3	Is any dissolved(or inorganic) concentration greater than its total concentration by more than 50%?	___	[___]	___ ✓

ACTION:
If the percent difference is greater than 20%, flag (J) both dissolved/inorganic and total concentrations as estimated. If the difference is more than 50%, reject (R) and red-line both the values.

A.1.23 **Field Blank - Form I**
NOTE: Designate "Field Blank" as such on Form I

A.1.23.1	Was a Field/Rinsate Bank collected and analyzed with the SDG samples?	[___]	___	✓ ___
	If yes, is any Field/Rinsate Blank absolute value of an analyte on Form I greater than its CRQL(or 2xMDL when MDL>CRQL)?	___	[___]	✓ ___
	If yes, circle the Field Blank value on Form I that is greater than the CRQL, (or 2 x MDL when MDL > CRQL).			
	Is any Field Blank value greater than CRQL also greater than the Preparation Blank value?	___	[___]	✓ ___
	If yes, is the Field Blank value (> CRQL and > the prep. blank value) already rejected due to other QC criteria?	[___]	___	✓ ___

ACTION:
If the Field Blank value was not rejected, reject all associated sample data (except the Field Blank results)greater than the CRQL but less than the Field Blank value. Reject on Form I's the soil sample results whose raw values in ug/L in the instrument printout are greater than the CRQL but less than the Field Blank value in ug/L. Flag as "J" detects between the Field Blank value and 10xField Blank value. If the sample result > MDL but ≤ CRQL, replace it with CRQL-U.

If the Field Blank value is less than the

		YES	NO	N/A
	Prep.Blank value, do not qualify the sample results due to the Field Blank criteria.			

NOTE:
1. Field Blank result previously rejected due to other criteria cannot be used to qualify field samples.
2. Do not use Rinsate Blank associated with soils to qualify water samples and vice versa.

A.1.24 **Verification of Instrumental Parameters - Form IX, XA, XB, XI**

A.1.24.1	Is verification report present for:			
	Method Detection Limits (Form IX-Annually)?	[✓]	___	___
	ICP-AES Interelement Correction Factors (Form XA & XB -Quarterly)?	[✓]	___	___
	ICP-AES & ICP-MS Linear Ranges (Form XI-Quarterly)?	[✓]	___	___

ACTION:
If no, contact CLP PO/TOPO for submittal from the laboratory.

A.1.24.2 **Method Detection Limits - Form IX**

A.1.24.2.1	Are MDLs present on Form IX for:			
	All the analytes?	[✓]	___	___
	All the instruments used?	[✓]	___	___
	Digested and undigested samples and Calib.Blanks?	[✓]	___	___
	ICP-AES and ICP-MS when both instruments are used for the same analyte?	[___]	___	✓

ACTION:
If no for any of the above, prepare Telephone Record Log and contact CLP PO/TOPO for submittal of the MDLs from the laboratory. Report to CLP PO and write in the Contract Problems/ Non-Compliance Section of the Data Review Narrative if the MDL concentration is not less than ½ CRQL.

		YES	NO	N/A
A.1.24.2.2	Is MDL greater than the CRQL for any analyte?	___	[✓]	___
	If yes, is the analyte concentration on Form I greater than 5 x MDL for the sample analyzed on the instrument whose MDL exceeds CRQL?	[___]	___	___

ACTION:
If no, flag as estimated (J) all values less than five times MDL for the analyte whose MDL exceeds the CRQL.

A.1.24.3 **Linear Ranges - Form XI**

A.1.24.3.1	Was any sample result higher than the high linear range for ICP-AES or ICP-MS?	___	[✓]	___
	Was any sample result higher than the highest calibration standard for mercury or cyanide?	___	[___]	✓
	If yes for any of the above, was the sample diluted to obtain the result reported on Form I?	[___]	___	✓

ACTION:
If no, flag (J) as estimated the affected detects (≥ MDL) reported on Form I.

A.1.25 **ICP-MS Tune Analysis - Form XIV**

A.1.25.1	Was the ICP-MS instrument tuned prior to calibration?	[___]	___	✓

ACTION:
If no, reject (R) and red-line all sample data for which tuning was not performed.

A.1.25.2	Was the tuning solution analyzed or scanned at least five times consecutively?	[___]	___	✓
	Were all the required isotopes spanning the analytical range present in the tuning solution?	[___]	___	✓
	Was the mass resolution within			

		YES	NO	N/A
0.1 amu for each isotope in the tuning solution?		[___]	___	✓
Was %RSD less than 5% for each isotope of each analyte in the tuning solution?		[___]	___	✓

ACTION:
If no for any of the above, qualify all results ≥ MDL associated with that Tune as estimated "J", and all non-detects associated with that Tune as "UJ".

A.1.26 **ICP-MS Internal Standards - Form XV**

A.1.26.1	Were the Internal Standards added to all the samples and all QC samples and calibration standards (except the Tuning Solution)?	[___]	___	✓
	Were all the target analyte masses bracketed by the masses of the five internal standards?	[___]	___	✓

ACTION:
If none of the Internal Standards was added to the samples, reject (R) and red-line all the associated sample data (detects & non-detects). If internal standards were used but did not cover all the analyte masses, reject (R) and red-line only the analyte results not bracketed by the internal standard masses.

A.1.26.2	Was the intensity of an Internal Standard in each sample within 60-125% of the intensity of the same Internal Standard in the calibration blank?	[___]	___	✓
	If no, was the original sample diluted two fold, Internal Standard added and the sample re-analyzed?	[___]	___	✓
	Was the %RI for the two fold diluted sample within the acceptance limits (60-125%)?	[___]	___	✓

ACTION:
If no for any of the above, flag detects as "J" and non-detects "UJ" of all the analytes with atomic masses between the

atomic mass of the internal standard lighter

than the affected internal standard, and the atomic mass of the internal standard heavier than the affected internal standard.

A.1.27 **Percent Solids of Sediments**

A.1.27.1 Are percent solids in sediment(s):

< 50%? ___ [___] ___

ACTION:
If yes, qualify as estimated (J) all detects and non-detects of a sample that has percent solids less than 50%(i.e.,moisture content greater than 50%).

NOTE:
Flag(J) only the sample results that were not previously flagged due to other QC criteria.

Inorganic Data Review Narrative

Case# _____ **Site:** _____ **Matrix: Soil** ____

SDG# _____ **Lab:** _____ **Water** ____

Sampling Team: _____ **Reviewer:** _____ **Other** _____

A.2.1 **Data Validation Flags:**
The following flags may have been applied in red by the data validator and must be considered by the data user.

J - This flag indicates the result qualified as **estimated**

R and Red-Line - A red-line drawn through a sample result indicates **unusable** value. The red-lined data are known to contain significant errors based on documented information and must not be used by the data user.

U - This data validation qualifier is applied to sample results ≥ MDL when associated blank is contaminated

Fully Usable Data - The results that do not carry "J" or "red-line" are fully **usable**.

A.2.2 **Laboratory Qualifiers:**
The CLP laboratory applies a contractual qualifier on all

SAMPLE CALCULATION

EPA SAMPLE ID: VWAI-MW05-0512
COMPOUND: Manganese
CONCENTRATION: 1230 ug/L
%Solids – NA
Raw Data result: 1.2334 mg/L

1.2334 mg/L (1000ug/1mg) = 1233.4 ug/L

FIELD DUPLICATE SAMPLE SUMMARY

Note: All reported results are noted in the table below because the client requested that the MDL be used as reporting limit instead of the RL for this project. RPDs or absolute differences were calculated based on Region II guidelines: if results are >5X RL RPD is calculated, if results are <5X RL the absolute difference is calculated. Flags are applied to field duplicate pair only as follows: For RPD values - RPD ≥ 35% but <120% results are J, RPD >120%, results are R. For absolute difference values - >+/- 2X RL results are J, >+/- 4X RL results are R.

Sample ID: none Duplicate Sample ID:

Analyte	Sample Conc.	Duplicate Conc.	RPD or absolute difference
			0.000
			#DIV/0!

Comments: No qualifications required.

Sample ID: none Duplicate Sample ID:

Analyte	Sample Conc.	Duplicate Conc.	RPD or absolute difference
			0.000
			0.000

Comments: No qualifications required.

Reviewer JACleveland **Date:** 7/27/12

DataQual

Environmental Services, LLC

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

January 25, 2013
SDG# SL2472, Spectrum Analytical, Inc.
Vieques Island, Puerto Rico, CTO-083

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # SL2472. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22), and professional judgment. Region II has not developed a validation checklist SOP for the methods used to assess the metals in this SDG (SW-846 method 6010B). The Region II Standard Operating Procedure for the Evaluation of Metals Data for the CLP was used as applicable for the metals data. Region II flagging conventions were used. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA	Fe, Mn
VWAI-MW04-1112	L2472-01	water	X	X	X
VWAI-EB01-112812	L2472-02	water	X	X	
VWAI-MW05-1112	L2472-03	water	X	X	X
VWAI-TB01-112812	L2472-04	water	X		
VWAI-MW07-1112	L2472-05	water	X	X	X
VWAI-MW07P-1112	L2472-06	water	X	X	
VWAI-EB01-112912	L2472-07	water	X	X	
VWAI-TB01-112912	L2472-08	water	X		
VWAI-MW04-1112	L2472-01MS	water	X	X	
VWAI-MW04-1112	L2472-01MSD	water	X	X	

The following quality control samples were provided with this SDG: samples VWAI-TB01-112812 and VWAI-TB01-112912-trip blanks; sample VWAI-EB01-112812 and VWAI-EB01-112912-equipment blanks; and sample VWAI-MW07P-1112-field duplicate of sample VWAI-MW07-1112.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *

• GC Performance	*
• ICP MS Tuning	*
• Initial/Continuing Calibrations	*
• ICSA/ICSAB Standards	*
• RL Standards	*
• Blanks	*
• Internal Standards	*
• Surrogate Recoveries	*
• Laboratory Control Samples	*
• Matrix Spike Recoveries	
• Matrix Duplicate RPDs	
• Serial Dilutions	*
• Field Duplicates	
• Identification/Quantitation	*
• Reporting Limits	*
• Tentatively Identified Compounds	NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

The field duplicate pair exhibited non-compliant field duplicate reproducibility which resulted in qualifications to the data.

SVOA

The field duplicate pair exhibited non-compliant field duplicate reproducibility which resulted in qualifications to the data.

Select Filtered Metals

The laboratory did not perform a matrix spike or a matrix duplicate in this SDG. These QC samples are required by Region II. Qualifications were required.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 11/28-29/12 and samples were received at the laboratory 11/29-30/12. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Matrix Spike/Matrix Duplicate

Select Filtered Metals

The laboratory did not perform a matrix spike/matrix duplicate on a field sample from this SDG. Region II required that all positive and non-detect results be qualified as estimated J/UJ because of this. Therefore, the reported results for iron and manganese were qualified as estimated J/UJ with a qualifier code of OT.

Field Duplicates

VOA

Sample VWAI-MW07-1112 and duplicate sample VWAI-MW07P-1112 exhibited non-compliant field duplicate reproducibility for benzene with 200% RPD; therefore the results for this compound were qualified as estimated (J/UJ), qualifier code: FD.

SVOA

Sample VWAI-MW07-1112 and duplicate sample VWAI-MW07P-1112 exhibited non-compliant field duplicate reproducibility for 2-methylnaphthalene with 200% RPD; therefore the results for this compound were qualified as estimated (J/UJ), qualifier code: FD.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Jacqueline Cleveland
Vice President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VWAI-MW07-1112, VWAI-MW07P-1112	benzene	+/-	J/UJ	FD

SVOA

Sample ID	Compound	Results	Q flag	Q Code
VWAI-MW07-1112, VWAI-MW07P-1112	2-methylnaphthalene	+/-	J/UJ	FD

Select Filtered Metals

Sample ID	Analyte	Results	Q flag	Q Code
all samples	iron, manganese	+/-	J/UJ	OT

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the LOD (2X sample LOD for common laboratory contaminants) when the blank value is less than the LOD. The sample result for the blank contaminant is not qualified with any blank qualifiers.
LOD	The sample result for the blank contaminant is less than the LOD (2X sample LOD for common laboratory contaminants) but greater than the MDL when the blank value is less than the LOD. The sample result for the blank contaminant is changed to the LOD and qualified as non-detect U.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the LOD and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the LOD, result is reported as non-detect at the LOD, when the ICB/CCB/PB result is less or greater than the LOD.
R -	Sample result is greater than the LOD and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the LOD.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the LOD.
J/UJ -	Sample result is less than 10X LOD when blank result is below the negative LOD.

Glossary of Qualification Flags and Abbreviations, continued

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the LOD and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the LOD, result is reported as non-detect at the LOD, when the FB result is less or greater than the LOD.

R - Sample result is greater than the LOD and less than the FB value when the FB value is greater than the LOD.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the LOD.

General Abbreviations

RL	reporting limit
MDL	method detection limit
IDL	instrument detection limit
LOD	Level of Detection
LOD	Level of Quantitation
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
MBL, EBL, FBL or TBL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW04-1112

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-01A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V500540.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/29/2012

% Moisture: not dec. Date Analyzed: 11/30/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	2.2	J	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WM 011513

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-112812

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-02A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V500541.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/29/2012

% Moisture: not dec. Date Analyzed: 11/30/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WW 011513

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-1112

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-03A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V500544.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/29/2012

% Moisture: not dec. Date Analyzed: 11/30/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

011513

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-TB01-112812

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-04A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V500542.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/29/2012

% Moisture: not dec. Date Analyzed: 11/30/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WW 011513

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07-1112

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-05A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V500545.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/30/2012

% Moisture: not dec. Date Analyzed: 11/30/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.82	J	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07P-1112

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-06A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V500546.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/30/2012

% Moisture: not dec. Date Analyzed: 11/30/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-112912

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-07A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V500547.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/30/2012

% Moisture: not dec. Date Analyzed: 11/30/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-TB01-112912

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-08A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V500543.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/30/2012

% Moisture: not dec. Date Analyzed: 11/30/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	0.50	U	0.41	0.50	5.0
71-43-2	Benzene	0.50	U	0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	1.0	U	0.61	1.0	5.0

WW 011513

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW04-1112MS

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-01AMS

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V500528.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/29/2012

% Moisture: not dec. Date Analyzed: 11/30/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	46		0.41	0.50	5.0
71-43-2	Benzene	49		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	47		0.61	1.0	5.0

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1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW04-1112MSD

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-01AMSD

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V500529.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/29/2012

% Moisture: not dec. Date Analyzed: 11/30/2012

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
107-06-2	1,2-Dichloroethane	46		0.41	0.50	5.0
71-43-2	Benzene	49		0.33	0.50	5.0
78-87-5	1,2-Dichloropropane	47		0.61	1.0	5.0

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1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW04-1112

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-01C

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6B1996.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/29/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/29/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/18/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	1.6	J	0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

WR 011513

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-112812

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-02B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6B1999.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/29/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/29/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/18/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	1.5	J	1.3	2.0	5.0

VM 011613

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-1112

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-03C

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6B2000.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/29/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/29/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/18/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	11		0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

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1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07-1112

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-05C

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6B2033.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/30/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/30/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/19/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

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1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW07P-1112

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-06B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6B2002.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/30/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/30/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/18/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	1.1	J	0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

J, FD

VW 011513

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-EB01-112912

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-07B

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6B2003.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/30/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/30/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/18/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	2.0	U	0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	2.0	U	0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	2.0	U	1.3	2.0	5.0

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1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW04-1112MS

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-01CMS

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6B2031.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/29/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/29/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/19/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	41		0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	42		0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	41		1.3	2.0	5.0

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1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW04-1112MSD

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: L2472-01CMSD

Sample wt/vol: 1000 (g/mL) ML Lab File ID: S6B2032.D

Level: (LOW/MED) LOW Extraction: (Type) SEPF

% Moisture: Decanted: (Y/N) Date Received: 11/29/2012

Concentrated Extract Volume: 1000 (uL) Date Extracted: 11/29/2012

Injection Volume: 1.0 (uL) GPC Factor: 1.00 Date Analyzed: 12/19/2012

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION: UG/L	Q	DL	LOD	LOQ
91-20-3	Naphthalene	43		0.96	2.0	2.0
91-57-6	2-Methylnaphthalene	43		0.94	2.0	2.0
117-81-7	Bis(2-ethylhexyl)phthalate	42		1.3	2.0	5.0

WW 011513

U.S. EPA - CLP

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EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

VWAI-MW04-1112

Lab Name: Spectrum Analytical, Inc. Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SL2472

Matrix (soil/water): WATER Lab Sample ID: L2472-01

Level (low/med): MED Date Received: 11/29/2012

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): ug/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	34.3	B	J OT	P	31.0	50.0	200
7439-96-5	Manganese	1140		J OT	P	10.0	15.0	50.0

JMC 12513

Comments:

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FORM I - IN SW846

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U.S. EPA - CLP

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

VWAI-MW05-1112

Lab Name: Spectrum Analytical, Inc. Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SL2472

Matrix (soil/water): WATER Lab Sample ID: L2472-03

Level (low/med): MED Date Received: 11/29/2012

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): ug/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	248		J QT	P	31.0	50.0	200
7439-96-5	Manganese	1450		J QT	P	10.0	15.0	50.0

JMC 12513

Comments:

ilm11.12.12.A

FORM I - IN SW846

U.S. EPA - CLP

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EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

VWAI-MW07-1112

Lab Name: Spectrum Analytical, Inc. Contract: 933562, N62

Lab Code: MITKEM Case No.: SAS No.: SDG No.: SL2472

Matrix (soil/water): WATER Lab Sample ID: L2472-05

Level (low/med): MED Date Received: 11/30/2012

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): ug/L

CAS No.	Analyte	Concentration	C	Q	M	MDL	LOD	PQL
7439-89-6	Iron	50	U	UJ OT	P	31.0	50.0	200
7439-96-5	Manganese	15	U	UJ OT	P	10.0	15.0	50.0

JLC 12/13

Comments:

ilm1.1.12.12.A

FORM I - IN SW846

029

REPORT NARRATIVE

Spectrum Analytical, Inc. Featuring Hanibal Technology, RI Division.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC I

Laboratory Workorder / SDG #: L2472

SW846 8260C, VOC by GC-MS

I. SAMPLE RECEIPT

No exceptions or unusual conditions were encountered unless a Sample Condition Notification Form, or other record of communication is included with the Sample Receipt Documentation.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed following procedures in laboratory test code: SW846 8260C

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW5035

V. INSTRUMENTATION

The following instrumentation was used

Instrument Code: V5
Instrument Type: GCMS-VOA
Description: HP6890 / HP6890
Manufacturer: Hewlett-Packard
Model: 6890 / 6890

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Surrogates:

Surrogate standard percent recoveries were within the QC limits.

D. Spikes:

1. Laboratory Control Spikes (LCS):

Percent recoveries for lab control samples were within the QC limits.

2. Matrix Spike / Matrix Spike Duplicate (MS/MSD):

Matrix spikes were performed on samples: VWAI-MW04-1112 (L2472-01AMS) and VWAI-MW04-1112 (L2472-01AMSD).

Percent recoveries were within the QC limits.

Replicate RPDs were within the advisory QC limits.

E. Internal Standards:

Internal standard peak areas were within the QC limits.

F. Dilutions:

No sample in this SDG required analysis at dilution.

G. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Spectrum, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed:_____ _____

Date:_____12/23/2012_____

REPORT NARRATIVE

Spectrum Analytical, Inc. Featuring Hanibal Technology, RI Division.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC I

Laboratory Workorder / SDG #: L2472

SW846 8270D, SVOA by GC-MS

I. SAMPLE RECEIPT

No exceptions or unusual conditions were encountered unless a Sample Condition Notification Form, or other record of communication is included with the Sample Receipt Documentation.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed following procedures in laboratory test code: SW846 8270D

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW3510

V. INSTRUMENTATION

The following instrumentation was used

Instrument Code: S6
Instrument Type: GCMS-Semi
Description: HP7890A
Manufacturer: Agilent
Model: 7890A/5973
GC Column used: 30 m X 0.25 mm ID [0.25 um thickness] Rxi-5sil MS capillary column.

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Surrogates:

Surrogate standard percent recoveries were within the QC limits with the following exceptions. Please note that the acceptance criteria allow one surrogate recovery outside of the QC limits per fraction.

VWAI-MW04-1112 (L2472-01CMS), recovery is below criteria for Terphenyl-d14 at 50% with criteria of (50-135).

VWAI-MW05-1112 (L2472-03C), recovery is below criteria for Terphenyl-d14 at 37% with criteria of (50-135).

VWAI-MW07P-1112 (L2472-06B), recovery is below criteria for Terphenyl-d14 at 33% with criteria of (50-135).

D. Spikes:

1. Laboratory Control Spikes (LCS):

Percent recoveries for lab control samples were within the QC limits.

2. Matrix Spike / Matrix Spike Duplicate (MS/MSD):

Matrix spikes were performed on samples: VWAI-MW04-1112 (L2472-01CMS) and VWAI-MW04-1112 (L2472-01CMSD).

Percent recoveries were within the QC limits.

Replicate RPDs were within the advisory QC limits.

E. Internal Standards:

Internal standard peak areas were within the QC limits.

F. Dilutions:

No sample in this SDG required analysis at dilution.

G. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Spectrum, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed:_____ _____

Date:_____12/27/2012_____

REPORT NARRATIVE

Spectrum Analytical, Inc. Featuring Hanibal Technology, RI Division.

Client : CH2M-Hill, Inc.

Project: CTO-0083 Vieques AOC I

Laboratory Workorder / SDG #: L2472

SW846 6010C

I. SAMPLE RECEIPT

No exceptions or unusual conditions were encountered unless a Sample Condition Notification Form, or other record of communication is included with the Sample Receipt Documentation.

II. HOLDING TIMES

A. Sample Preparation:

All samples were prepared within the method-specified holding times.

B. Sample Analysis:

All samples were analyzed within the method-specified holding times.

III. METHODS

Samples were analyzed following procedures in laboratory test code: SW846 6010C.

IV. PREPARATION

Aqueous Samples were prepared following procedures in laboratory test code: SW3005A.

V. INSTRUMENTATION

The following instrumentation was used:

Instrument Code: OPTIMA2
Instrument Type: ICP
Description: Optima 3100 XL
Manufacturer: Perkin-Elmer
Model: 3100 XL

VI. ANALYSIS

A. Calibration:

Calibrations met the method/SOP acceptance criteria.

B. Blanks:

All method blanks were within the acceptance criteria.

C. Spikes:

1. Laboratory Control Spikes (LCS):

Percent recoveries for laboratory control samples were within the QC limits.

2. Matrix spike (MS):

A matrix spike was not performed on any sample in this SDG.

D. Post Digestion Spike (PDS):

A post-digestion spike was not performed on any sample in this SDG.

E. Duplicate sample:

A duplicate analysis was not performed on any sample in this SDG.

F. Serial Dilution (SD):

Serial Dilution analyses were performed on sample: VWAI-MW07-1112 (L2472-05DSD).

Percent differences were within the QC limits.

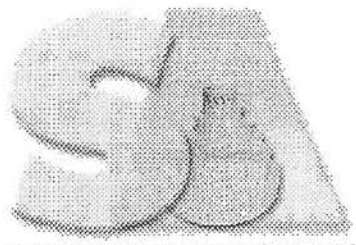
G. Samples:

No other unusual occurrences were noted during sample analysis.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Spectrum, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Signed: Shawn B Lawler

Date: 12/27/12



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Data Flag/Qualifiers:

U — Not Detected. This compound was analyzed-for but not detected. For most analyses the reporting limit (lowest standard concentration) is the value listed. For Department of Defense programs, this is the Limit of Detection (LOD).

J — This flag indicates an estimated value due to either
- the compound was detected below the reporting limit, or
- estimated concentration for Tentatively Identified Compound

B — This flag indicates the compound was also detected in the associated Method Blank. The B flag has an alternative meaning for Inorganics analyses reported using CLP ILM-type metals forms, indicating a "trace" concentration below the reporting limit and equal to or above the detection limit.

D — For Organics analysis, this flag indicates the compound concentration was obtained from a secondary dilution analysis

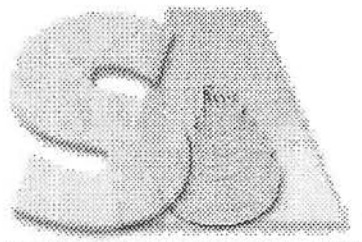
E — This flag indicates the compound concentration exceeded the Calibration Range. The E flag has an alternative meaning for Inorganics analyses reported using CLP metals forms, indicating an estimated concentration due to the presence of interferences, as determined by the serial dilution analysis.

P — This flag is used for pesticides/PCB/herbicide compound when there is a greater than 40% difference for detected concentration between the two GC columns used for primary and confirmation analyses. This difference typically indicates an interference, causing one value to be unusually high. The **lower** of the two values is generally reported on the Form 1, and both values reported on the Form 10.

A — Used to flag semivolatile organic Tentatively Identified Compound library search results for compounds identified as aldol condensation byproducts.

N — Used to flag results for volatile and semivolatile Organics analysis Tentatively Identified Compounds where an analyte has passed the identification criteria, and is considered to be positively identified. For Inorganics analysis the N flag indicates the matrix spike recovery falls outside of the control limit.

* — For Inorganics analysis the * flag indicates Relative Percent Difference for duplicate analyses is outside of the control limit.



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Sample ID Suffixes

DL Diluted analysis. The sample was diluted and reanalyzed. The DL may be followed by a digit if more than one diluted reanalysis is provided. The DL suffix is not attached to an analysis initially performed at dilution, only to reanalyses performed at dilution

RE Reanalysis. Appended to the client sample ID to indicate a reextraction and reanalysis or a reanalysis of the original sample extract.

RA Reanalysis. Appended to the laboratory sample ID indicates a reanalysis of the original sample extract.

RX Reextraction. Appended to the laboratory sample ID indicates a reextraction of the sample.

MS Matrix Spike.

MSD Matrix Spike Duplicate

DUP Duplicate analysis

SD Serial Dilution

PS Post-digestion or Post-distillation spike. For metals or inorganic analyses

175 Metro Center Boulevard · Warwick, RI 02886-1755 · 401-732-3400 · FAX 401-732-3499
www.spectrum-analytical.com

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CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: PER CONTRACT
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: Michael Zamboni
15010 CONFERENCE CENTER DR
CHANTILLY, VA 20151
571-212-9324

Project Mgr.: Stephen Brand

Invoice To: PER CONTRACT

P.O. No.: RQN:

Project No.: 392485.FI.FK
Site Name: Vieques, PR AOC I
Location: Vieques State: PR
Sampler(s): P Murphy, T Horn

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8=$NaHSO_4$ 9=HNO_3 10=H_3PO_4 11=

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= X2= X3=

G=Grab C=Composite

List preservative code below: N/A, 6, 9, N/A, 10

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic		8270C SVOC SW-846	8260B VOC SW-846	6010B Metals SW846	WCHEM EPA 300	WCHEM SM5310B				Notes:
L2472-01	VWAI-MW04-1112	11/28/12	0905	GW		4	2	0	2		2	2	1	1	2				
-01	VWAI-MW04-1112-MS	↓	0905	GW		2	2	0	0		2	2	0	0	0				
-01	VWAI-MW04-1112-SD	↓	0905	GW		2	2	0	0		2	2	0	0	0				
-02	VWAI-EB01-112812	↓	0950	AQ		2	2	0	0		2	2	0	0	0				
-03	VWAI-MW05-1112	↓	1125	GW		4	2	0	2		2	2	1	1	2				
L2472-04	VWAI-TB01-112812	↓	1145	TB		2	0	0	0		0	2	0	0	0				* TB has HCl pres.

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other

State specific reporting standards:

☐ E-mail to
EDD Format

Condition upon receipt: ☒ Iced ☐ Ambient ☒ °C 4° 3°

Relinquished by:	Received by:	Date:	Time:
[signature]	FedEx	11/28/12	1300
FedEx	Veronica Brigand [signature]	11/29/12	10:54

SPECTRUM ANALYTICAL, INC
Featuring
HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling:
TAT- Indicate Date Needed: PER CONTRACT
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 30 days unless otherwise instructed.

Report To: Michael Zambani
1910 CONFERENCE CENTER DR
CHANTILLY, VA 20151
571-212-9324

Project Mgr.:

Invoice To: PER CONTRACT

P.O. No.: RQN:

Project No.: 392485.FI.FK
Site Name: Vieques, PR AOC I
Location: Vieques State: PR
Sampler(s): P. Murphy T. Horn

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8=$NaHSO_4$ 9=H_3PO_4 10= 11=

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= X2= X3=

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	List preservative code below: 6	N/A	4	N/A	9				Analyses: 8260B SW846 VOC	8270C SW846 SVOC	6010B SW846 Metals	WCHEM EPA300	WCHEM SM5310B				QA/QC Reporting Level	Notes:
12472-05	VWAI-MW07-1112	11/29/12	0915		GW	4	2	0	2									2	2	1	1	2					
-06	VWAI-MW07P-1112	↓	0920		GW	2	2	0	0									2	2	0	0	0					
-07	VWAI-EB01-112912		1045		AQ	2	2	0	0									2	2	0	0	0					
-08	VWAI-TB01-112912		1100		TB	2	0	0	0									2	0	0	0	0					* TB has HCl pres.

☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other

State specific reporting standards:

☐ E-mail to
EDD Format

Condition upon receipt: ☒ Iced ☐ Ambient ☒ °C 1.5°

Relinquished by:	Received by:	Date:	Time:
	FedEx	11/29/12	1230
FedEx	Vieneu Byrd	11/30/12	10:25

5042

Spectrum Analytical, Inc. Featuring Hanibal Technology -- Rhode Island Division

Received By: KB	Page 01 of 00
Reviewed By: AT KP	Log-in Date 11/29/2012
Work Order: L2472	Client Name: CH2M Hill, Inc.
Project Name/Event: CTO-0083 Vieques AOC E and I	

Remarks: (1/2) Please see associated sample/extract transfer logbook pages submitted with this data package.

1. Custody Seal(s)	Present / Absent
	Intact / Broken
2. Custody Seal Nos.	N/A
3. Traffic Reports/ Chain of Custody Records (TR/COCs) or Packing Lists	Present / Absent
4. Airbill	AirBill / Sticker
	Present / Absent
5. Airbill No.	FedEx 8763 4395 6027,
6. Sample Tags	Present / Absent
Sample Tag Numbers	Listed / Not Listed on Chain-of-Custody
7. Sample Condition	Intact / Broken / Leaking
8. Cooler Temperature Indicator Bottle	Present / Absent
9. Cooler Temperature	4,3 °C
10. Does information on TR/COCs and sample tags agree?	Yes / No
11. Date Received at Laboratory	11/29/2012
12. Time Received	10:54

Sample Transfer	
Fraction (1) TVOA/VOA	Fraction (2) SVOA/PEST/ARO
Area #	Area #
By	By
On	On

Lab Sample ID	Preservation (pH) HNO3	H2SO4	HCl	NaOH	H3PO4	VOA Matrix	Soil HeadSpace or Air Bubble > or equal to 1/4"
L2472-01	<2				<2	ASCORBIC	
L2472-02						ASCORBIC	
L2472-03	<2				<2	ASCORBIC	
L2472-04						H	

IR Temp Gun ID:MT-1

CoolantCondition: ICE

Preservative Name/Lot No:

VOA Matrix Key:

US = Unpreserved Soil	A= Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form Yes / No

Rad OK Yes / No

Spectrum Analytical, Inc. Featuring Hanibal Technology -- Rhode Island Division

Received By: VEB	Page 01 of 00
Reviewed By:	Log-in Date 11/30/2012
Work Order: L2472	Client Name: CH2M Hill, Inc.
Project Name/Event: CTO-0083 Vieques AOC E and I	

Remarks: (1/2) Please see associated sample/extract transfer logbook pages submitted with this data package.

1. Custody Seal(s)	Present / Absent
	Intact / Broken
2. Custody Seal Nos.	N/A
3. Traffic Reports/ Chain of Custody Records (TR/COCs) or Packing Lists	Present / Absent
4. Airbill	AirBill / Sticker
	Present / Absent
5. Airbill No.	FedEx 8763 4395 6049
6. Sample Tags	Present / Absent
Sample Tag Numbers	Listed / Not Listed on Chain-of-Custody
7. Sample Condition	Intact / Broken / Leaking
8. Cooler Temperature Indicator Bottle	Present / Absent
9. Cooler Temperature	1.5 °C
10. Does information on TR/COCs and sample tags agree?	Yes / No
11. Date Received at Laboratory	11/30/2012
12. Time Received	10:25

Lab Sample ID	Preservation (pH) HNO3	H2SO4	HCl	NaOH	H3PO4	VOA Matrix	Soil HeadSpace or Air Bubble > or equal to 1/4"
L2472-05	<2					ASCORBIC	
L2472-06						ASCORBIC	
L2472-07						ASCORBIC	
L2472-08						H	

Sample Transfer	
Fraction (1) TVOA/VOA	Fraction (2) SVOA/PEST/ARO
Area #	Area #
By	By
On	On

IR Temp Gun ID:MT-87

CoolantCondition: ICE

Preservative Name/Lot No:

VOA Matrix Key:

US = Unpreserved Soil	A= Air
UA = Unpreserved Aqueous	H = HCl
M = MeOH	E = Encore
N = NaHSO4	F = Freeze

See Sample Condition Notification/Corrective Action Form Yes / No

Rad OK Yes / No

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: L2472 LAB: Spectrum Analytical

SITE NAME: Vieques ADCI

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? [✓] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? [✓] ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? [✓] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? [✓] ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? [✓] ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

A 11/28-29/12 a 11/30/12
R 11/29-30/12 t 1.5-4°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ___ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits.

[ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) VWAI-MW04-1112

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? ✓ ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? ✓ ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [✓] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] [✓] ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VWAI-TB01-112812 no⊕
VWAI-EB01-112812 no⊕
VWAI-TB01-112912 no⊕
VWAI-EB01-112912 no⊕

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? [✓] ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. [✓] ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? [✓] ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [✓] ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

	YES	NO	N/A
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

no TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [ ] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] [✓] ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

005

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [ ] [✓] ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? [✓] ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? Y ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ☑ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VWAI-MW07-1112
VWAI-MW07P-1112 > qual, see attached form

DataQual **VOA**

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VWAI-MW07-1112
Duplicate Sample ID: VWAI-MW07P-1112

Water: RPD>30%
Soil: RPD>30%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
benzene	0.82		200
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: Qualify benzene as estimated.

* one of the results below the LOD
only results with both above the LOD are reported

Initial Calibration Date: 11/26/2012

RRF and %RSD Calculations:

Compound Name: 1,2-dichloroethane
Lab Value: 0.546

Area of Compound	1025756
Area of Internal STD	939357
Conc. of Internal STD	50
Conc. of Compound	100
Calculated RRF	0.546

Compound Name: benzene
Lab Value: 7.7

RRF of STD 1	0.9470
RRF of STD 2	0.9830
RRF of STD 3	0.8970
RRF of STD 4	0.8660
RRF of STD 5	0.7840
RRF of STD 6	0.9050
Calculated % RSD	7.7

Continuing Calibration File ID: 11/30/2012

RRF and %D Calculations:

Compound Name: 1,2-dichloropropane
Lab Value: 0.460

Area of Compound	386446
Area of Internal STD	840654
Conc. of Internal STD	50
Conc. of Compound	50
Calculated RRF	0.460

Compound Name: 1,2-dichloroethane
Lab Value: 4.0

Average RRF	0.596
Calibration Check RRF	0.572
Calculated % D	4.0

SAMPLE CALCULATION

Sample ID: VWAI-MW04-1112
Standard ID: 11/30/2012
Compound: benzene
Concnetration: 2.2 ug/L

	Water (ug/L)	Soil (ug/Kg)	Soil ug/Kg)
Area of Compound	52376		
Area of Internal STD	795127		
Conc. of Internal (ng)	250	250	
RRF of Compound	1.481		
Dilution Factor	1	1	
Weight of Sample	NA		
Volume of Sample	5	NA	
% Moisture	NA		
Aliquot of sample	NA	NA	
Concentration	2.22	#DIV/0!	#DIV/0!

	RT of Internal STD	RT of Compound	RRT
Sample	4.476	4.232	0.945
Standard	4.477	4.233	0.945

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: L2472 LAB: Spectrum Analytical

SITE NAME: Vieques AOC I

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". ± 1.5-4°C

A 11/28-29/12 e 11/29-30/12

2.0 Holding Times R 11/29-30/12 a 12/18-19/12

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within **7** days of the date of collection. Soil/sediment samples must be extracted within **14** days of collection. Extracts must be analyzed within

07

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received (See Traffic Report)	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

	YES	NO	N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [✓] ___ ___

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 80000C-24). [ ] [✓] ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ [✓]

07

2H - FORM II SV-2

WATER SEMIVOLATILE DEUTERATED MONITORING COMPOUND RECOVERY

Lab Name: SPECTRUM ANALYTICAL, INC. Contract:

Lab Code: MITKEM Case No.: L2472 Mod. Ref No.: SDG No.: SL2472

	EPA SAMPLE NO.	SDMC1 (NBZ) #	SDMC2 (FBP) #	SDMC3 (TPH) #						TOT OUT
01	MB-69471	96	94	105						0
02	LCS-69471	99	100	106						0
03	MB-69496	97	95	104						0
04	LCS-69496	86	87	91						0
05	LCSD-69496	85	86	90						0
06	VWAI-MW04-1112	84	81	57						0
07	VWAI-EB01-112812	84	83	78						0
08	VWAI-MW05-1112	82	81	37 *						1
09	VWAI-MW07P-1112	87	84	33 *						1
10	VWAI-EB01-112912	84	83	83						0
11	VWAI-MW04-1112MS	80	80	50 *						1
12	VWAI-MW04-1112MSD	81	82	50						0
13	VWAI-MW07-1112	90	88	65						0

		QC LIMITS
SDMC1	(NBZ) = Nitrobenzene-d5	(40-110)
SDMC2	(FBP) = 2-Fluorobiphenyl	(50-110)
SDMC3	(TPH) = Terpheny1-d14	(50-135)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D DMC diluted out

som12.12.17.A

SW846

	YES	NO	N/A
Were method blanks re-analyzed?	[ ]	___	✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II?	___	✓	___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent) VWAI-MW04-1112

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [✓] ___ ___

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low Solid [ ] ___ ___

c. Med Solid [ ] ___ ___

079

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. Y ___ ___

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
0 out of 3	____ out of ____

030

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
0 out of 3	____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a method blank been analyzed either after

	YES	NO	N/A
the calibration standard or at any other time during the analytical shift for each GC/MS system used ?	✓		

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles?	✓		

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary.		✓	
6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)?	✓		

082

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

VWAI-EB01-112812
bis(2-ethylhexyl)phth) 1.5J (2.0)

VWAI-EB01-112912 no ⊕

no qual

083

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? [4] ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

	YES	NO	N/A
that exceeded the initial calibration range.	[ ]	___	✓
6.5 Does the instrument blank have positive results for target analytes and/or TICs?	___	✓	___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column.	✓	___	___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)?	✓	___	___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

	YES	NO	N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

	YES	NO	N/A
ACTION: If ion abundance criteria are not met, take action specified in section 3.2			
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.			
8.8 Are the spectra of the mass calibration compound acceptable?	✓		
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates	✓		
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?			✓

	YES	NO	N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate	[✓]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[✓]	___	___
c. Blanks	[✓]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report?	[✓]	___	___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability?	[✓]	___	___
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___
Other:_____	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

	YES	NO	N/A
each sample?	✓		

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	✓		
9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum?	✓		
9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum?	✓		

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

	YES	NO	N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? NO TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ___ ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

	YES	NO	N/A
sample mass spectrum?	[ ]	___	___
10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%?	[ ]	___	___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	___	[ ]	___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture?	[ ]	___	___

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ✓ ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is $\geq$ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ☑ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ☑ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ☐ ___ ___

	YES	NO	N/A
13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%?	___	[ ]	✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

	YES	NO	N/A
14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest?	✓ [ ]	___	___
14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument?	✓ [ ]	___	___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

	YES	NO	N/A
call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").			
14.3 Do any of the SPCCs have an RRF <0.05?	___	✓	___
If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18.	[ ]	✓	___
14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?			
ACTION: If yes, make a note in data assessment.			
14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%?	___	✓	___
ACTION: Circle all outliers in red.			
ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.			
14.6 Do any semivolatile compounds have a RRF < 0.05?	___	✓	___
ACTION: Circle all outliers in red.			
ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.			
14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more).	___	✓	___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

	YES	NO	N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? [ ] [✓] ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? [✓] ___ ___

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? [✓] ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? [✓] ___ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

VWAI-MW07-1112
VWAI-MW07P-1112 > qual, see attached form

DataQual **SVOA**

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VWAI-MW07-1112
Duplicate Sample ID: VWAI-MW07P-1112

Water: RPD>30%
Soil: RPD>30%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
2-methylnaphthalene		1.1	200
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

* one or both values below LOD

COMMENTS: Qualify as estimated.

Initial Calibration Date: 12/18/2012

RRF and %RSD Calculations:

Compound Name: naphthalene

Lab Value: 0.756

Area of Compound	348674
Area of Internal STD	230477
Conc. of Internal STD	40
Conc. of Compound	80
Calculated RRF	0.756

Compound Name: 2-methylnaphthalene

Lab Value: 12.5

RRF of STD 1	0.818
RRF of STD 2	0.788
RRF of STD 3	0.82
RRF of STD 4	0.668
RRF of STD 5	0.692
RRF of STD 6	0.579
RRF of STD 7	0.788
Calculated % RSD	12.45

Continuing Calibration File ID: 12/19/2012

RRF and %D Calculations:

Compound Name: bis(2-ethylhexyl)phthalate

Lab Value: 0.725

Area of Compound	205333
Area of Internal STD	452887
Conc. of Internal STD	40
Conc. of Compound	25
Calculated RRF	0.725

Compound Name: naphthalene

Lab Value: 7.5

Average RRF	0.962
Calibration Check RRF	1.034
Calculated % D	-7.5

SAMPLE CALCULATION

Sample ID: VWAI-MW04-112
Standard ID: 12/18/2012
Compound: naphthalene
Concnetration: 1.6J ug/L

	Water (ug/L)	Soil (ug/Kg)
Area of Compound	7031	
Area of Internal STD	185698	
Conc. of Internal (ng)	40	2
RRF of Compound	0.962	
Final Volume	1000	1000
Dilution Factor	1	1
GPC Factor	NA	1
Injection Volume	1	1
Weight of Sample	NA	
Initial Volume of Sample	1000	
% Moisture	NA	
Concentration	1.57	#DIV/0!

	RT of Internal STD	RT of Compound	RRT
Sample	5.71	5.727	1.003
Standard	5.716	5.733	1.003

	YES	NO	N/A
A.I.1 Contract Compliance Screening Report			
Present?	[ ]	___	✓
ACTION: If no, contact RSCC/PO.			
A.I.2 Record of Communication (from RSCC)			
Present?	[ ]	___	✓
ACTION: If no, request from the RSCC.			
A.1.3 Sampling Trip Report			
Present and complete?	[ ]	___	✓
ACTION: If no, contact RSCC/PO.			
A.I.4 Chain of Custody/Sample Traffic Report			
Present?	[✓]	___	___
Legible?	[✓]	___	___
Signature of sample custodian present?	[✓]	___	___
ACTION: If no, contact RSCC/WAM/PO.			
A.I.5 Cover Page			
Present?	[✓]	___	___
Is the Cover Page properly filled in and the verbatim signed by the lab manager or the manager's designee? Lab Statement	[✓]	___	___
Do the sample identification numbers on the Cover Page agree with sample Identification numbers on:			
(a) Traffic Report Sheet?	[ ]	___	✓

	YES	NO	N/A
(b) Form I's?	[✓]	___	___
Is the number of samples on the Cover Page the same as the number of samples on the Traffic Report sheet and the Regional Record of Communication (ROC) for the data Case?	[___]	___	✓

Select target analytes

ACTION:
If no for any of the above, prepare Telephone Record Log and contact RSCC/PO for re-submittal of the corrected Cover Page from the laboratory.

A.1.6 **SDG Narrative, DC-1 & DC-2 Form**

Is the SDG Narrative present?	[✓]	___	___
Is Sample Log-In Sheet(Form DC-1) present and complete?	[___]	___	✓
Is Complete SDG Inventory Sheet(Form DC-2) present and complete?	[___]	___	✓

ACTION:
If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.

A.1.7 **Form I to XV**

A.1.7.1 Are all the Form I through Form XV labeled with:

Laboratory Name?	[✓]	___	___
Laboratory Code?	[✓]	___	___
RAS/Non-RAS Case No.?	[___]	___	✓
SDG No.?	[✓]	___	___

		YES	NO	N/A
	Contract No.?	[✓]	___	___

ACTION:
If no for any of the above, note under Contract Problem/Non-Compliance Section of the "Data Review Narrative" and contact PO for corrected Form(s) from the laboratory.

A.1.7.2 After comparing values on Forms I-IX against the raw data, do any computation/ transcription errors exceed 10% of the reported values on the Forms for:

(a) all analytes analyzed by ICP-AES?	___	[✓]	___
(b) all analytes analyzed by ICP-MS?	_	[___]	_
(c) Mercury?	_	[_]	✓
(d) Cyanide?	_	[_]	✓

ACTION:
If yes, prepare Telephone Record Log and contact CLP PO/TOPO for the corrected data from the laboratory.

A.1.8 Raw Data

Data shall not be validated without the hard/electronic copies of the associated raw data for samples and QC samples.

A.1.8.1 Digestion/Distillation Log

Digestion Log for ICP-AES (Form XII)present?	[✓]	___	___
Digestion Log for ICP-MS (Form XII) present?	[___]	___	✓
Digestion Log for mercury (Form XII) present?	[___]	___	___
Distillation Log for cyanide (Form XII) present?	[___]	___	✓

Are pH values for metals and

	YES	NO	N/A
cyanide reported for each aqueous sample?	[ ]	✓	
Are percent solids calculations present for soils/sediments? water samples	[ ]	✓	
Are preparation dates present on the sample preparation logs/bench sheets?	[✓]		

NOTE:
Digestion/Distillation log must include weights, volumes, and dilutions used to obtain the reported results.

A.1.8.2 Is the analytical instrument real-time printouts present for:

ICP-AES?	[✓]		
ICP-MS?	[ ]		✓
Mercury?	[ ]		✓
Cyanide?	[ ]		✓

Are all laboratory bench sheets and instrument raw data printouts necessary to support all sample analyses and QC operations:

Legible?	[✓]		
Properly labeled?	[✓]		

Are all field samples, QC samples and field QC samples present on:

Digestion/Distillation log?	[✓]		
Instrument Printouts?	[✓]		

ACTION:
If no for any of the above questions in Section A.1.8.1 and Section A.1.8.2, write Telephone Record Log and contact TOPO/PO for re-submittal from the laboratory.

	YES	NO	N/A

A.1.9 **Technical Holding Times**: (Aqueous and soil samples)

(Examine sample Traffic Reports and digestion/distillation logs to determine the holding time from the sample collection date to the sample preparation date.)

A.1.9.1	Cyanide distillation(14 days)exceeded?	_	[_]	✓
	Mercury analysis(28 days) exceeded?	_	[_]	✓
	Other Metals analysis(180 days)exceeded?	___	✓	[_] _

ACTION:
If yes, reject (R) and red-line non-detects and flag as estimated (J)results ≥ MDL even if sample(s) was preserved properly.

NOTE:
In addition to qualifying the data, a list of all samples and analytes which exceeded the holding times must be prepared. Report for each sample the number of days that were exceeded. (Subtract the sample collection date from the sample preparation date). Attach this list to the data review narrative.

A.1.9.2	Is pH of aqueous samples for:			
	Metals Analysis ≤ 2?	[✓]	___	___
	Cyanide Analysis ≥ 12?	[_]	_	_ ✓

ACTION:
If no for any of the above, flag non-detects as "R" and detects as "J".

A.1.9.3	Is the cooler temperature ≤ 10 C°?	✓	_	_

ACTION:
If cooler temperature is >10 °C , flag non-detects as "UJ" and detects as "J".

A.1.10 **Final Data Correctness - Form I**

A.1.10.1 Are Form I's for all samples

	YES	NO	N/A
present and complete?	[✓]	___	___

ACTION:
If no, prepare Telephone Record Log and contact CLP PO/TOPO for submittal from the laboratory.

Fe & Mn only

A.1.10.2 Verify there are no calculation and transcription errors in the results reported on Form I's. Circle on each Form I all results that are incorrect.

Is the calculation error less than 10% of the correct result?	[✓]	___	___
Are results on Form I's reported in correct units (ug/L for aqueous and MG/KG for soils)?	[✓]	___	___
Are results on Form I'S reported by correct significant figures?	[✓]	___	___
Are soil sample results on Form I's corrected for percent solids?	[___]	___	✓
Are all "less than MDL" values reported by the ~~CRQLs~~ LODs and coded with "U"?	[✓]	___	___
Are values less than the CRQLs but greater than or equal to the MDLs flagged with "J"?	[___]	___	✓
Are appropriate contractual quality control and Method qualifiers used?	[✓]	___	___

ACTION:
If no for any of the above questions, prepare Telephone Record Log, and contact CLP PO/TOPO for corrected data.

A.1.10.3 Do EPA sample identification numbers and the corresponding laboratory sample identification numbers match on the Cover Page, Form I's and in the raw data? [✓] ___ ___

Was a brief physical description

		YES	NO	N/A
	of the samples before and after digestion given on the Form I's?	[___]	___	___
	Was any sample result outside the mercury/cyanide calibration range or the ICP-AES/ICP-MS linear range diluted and noted on the Form I?	[___]	___	___

ACTION:
If no for any of the above, note under the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.11 **Initial Calibration**

A.1.11.1	Is a record of at least 2 point (A blank and a standard)calibration present for ICP-AES analysis?	[___]	___	___
	Is a record of at least 2 point (a blank and a standard)calibration present for ICP-MS analysis?	[___]	___	___
	Is a record of at least 5 point calibration (a blank & 4 standards)present for Hg analysis?	[___]	___	___
	Is a record of at least 4 point calibration (a blank & 4 standards)present for cyanide?	[___]	___	___

ACTION:
If incomplete or no initial calibration was performed, reject (R) and red-line the associated data (detects & non-detects).

	Is one initial calibration standard at the CRQL level for cyanide and mercury?	[___]	___	___

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the Data Review Narrative.

A.1.11.2	Is the curve correlation coefficient $\geq$ 0.995 for:			

	YES	NO	N/A
Mercury Analysis?	[___]	___	___
Cyanide Analysis?	[___]	___	___
ICP-AES (more than 2 point Calib.)?	[___]	___	___
ICP-MS (more than 2 point calib.)?	[___]	___	___

ACTION:
If no, qualify the associated sample results ≥ MDL as estimated "J" and non-detects as "UJ".

NOTE:
The correlation coefficient shall be calculated by the data validator using standard concentrations and the corresponding instrument response (e.g. absorbance, peak area, peak height, etc.).

A.1.12 **Initial and Continuing Calibration Verification- Form IIA**

A.1.12.1	Present and complete for every metal and cyanide?	[___]	___	___
	Present and complete for ICP-AES and ICP-MS when both these methods were used for the same analyte?	[___]	___	___

ACTION:
If no for any of the above, prepare a Telephone Record Log and contact PO/TOPO for re-submittal from the laboratory.

A.1.12.2	Was a Continuing Calibration Verification performed every 10 samples or every 2 hours whichever is more frequent?	[___]	___	___

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative.

A.1.12.3	Was an ICV or a mid-range standard distilled and analyzed with each batch of cyanide samples?	[___]	___	___

	YES	NO	N/A

ACTION:
If no for any of the above, write in the Contract-Problem/Non-Compliance Section of the Data Review Narrative and qualify results ≥ MDL as estimated (J).

A.1.12.2 Circle on each Form IIA all percent recoveries that are outside the contract windows.

Are ICV/CCVs within control limits for:

Metals - 90-110%R?	[✓]	___	___
Hg - 80-120%R?	[___]	___	✓
Cyanide - 85-115%R?	[___]	___	✓

ACTION:
If no, qualify all samples between a previous technically acceptable CCV standard and a subsequent technically acceptable CCV standard as follows as follows:

Qualify as estimated (J) all detects and non-detects, if the ICV/CCV %R is between 75-89%(65-79% for Hg; 70-84% for CN). Qualify only positive results(≥ MDL) as "J" if the ICV/CCV %R is between 111-125%(121-135% for Hg;116-130% for CN). Reject (R) and red-line only
detects if the recovery is greater than 125% (135% for Hg; 130% for CN). Reject (R) and red-line all associated results (hits and non-detects)if the recovery is less than 75%(65% for Hg;70% for CN).

NOTE:
For ICV that does not fall within the acceptance limits, qualify all samples reported from the analytical run.

A.1.12.3 Was the distilled ICV or mid-range standard for cyanide within acceptance limits (85-115%)? [___] ___ ✓

ACTION:
If no, Qualify all cyanide results ≥ MDL as "J".

A.1.13 CRQL Standard Analysis - Form IIB

A.1.13.1 For each ICP-AES run, was a CRI

	YES	NO	N/A
(CRQL or MDL when MDL > CRQL) standard analyzed? (Note:CRI is not required for Al, Ba, Ca, Fe, Mg, Na and K.)	[___]	___	___
For each ICP-MS run, was a CRI (CRQL or MDL when MDL > CRQL) standard analyzed for each mass/isotope used for the analysis?	[___]	___	___
For each mercury run, was a CRQL standard analyzed?	[___]	___	___
For each cyanide run, was a CRQL standard analyzed?	[___]	___	___

ACTION:
If no for any of the above, write this deficiency in the Contract Problems/ Non-Compliance Section of the Data Review Narrative, inform CLP PO and flag results in the affected ranges (detects <2xCRQL)as J and non-detects UJ.

The affected ranges are:
ICP-AES Analysis - *True Value ± CRQL
ICP-MS Analysis - *True Value ± CRQL
Mercury Analysis - *True Value ± CRQL
Cyanide Analysis - *True Value ± CRQL
* True value of the CRQL Standard

A.1.13.2 Was a CRQL standard analyzed after the ICV/ICB, before the final CCV/CCB and once every 20 analytical samples in the analytical run for each analysis? [___] ✓ ___

ACTION:
If no, write in the Contract Problem/ Non-Compliance Section of the "Data Review Narrative".

A.1.13.3 Circle on each Form IIB all percent recoveries that are outside the acceptance windows.

	YES	NO	N/A
Is the CRQL standard within control limits for:			
Metals(ICP-AES/ICP-MS)- 70 - 130%?	[___]	___	✓
Mercury- 70 - 130%?	[___]	___	✓
Cyanide - 70 - 130%?	[___]	___	✓

ACTION:
If no, flag detects <2xCRQL as "J" and non-detects as "UJ" if the CRQL standard recovery is between 50-69%. Flag(J) only detects <2xCRQL if the recovery is between 131% and ≤180%. If the recovery is less than 50%, reject(R) and red-line non-detects and detects < 2xCRQL, and flag (J) detects between 2xCRQL and ICV/CCV. Reject and red-line only detects <2xCRQL and flag (J)detects ≥ 2xCRQL but < ICV/CCV if the recovery is > 180%.

Not a CLP sequence but all criteria of QC samples was met. No Quals required.

NOTE:
1. Qualify all field samples analyzed between a previous technically acceptable analysis of the CRQL standard and a subsequent acceptable analysis of the CRQL standard
2. Flag (J) or reject (R) only the final sample results on Form I's when **Sample raw data** are within the affected ranges and the CRQL standard is outside the acceptance windows.
3. The samples and the CRQL standard must be analyzed in the same analytical run.

A.1.14 Initial and Continuing Calibration Blanks - Form III

		YES	NO	N/A
A.1.14.1	Present and complete for all the instruments used for the metals and cyanide analyses?	[✓]	___	___
	Was an initial Calibration Blank analyzed after ICV?	[✓]	___	___
	Was a continuing Calibration Blank analyzed after every CCV and every 10 samples or every 2 hours, whichever is more frequent?	[✓]	___	___
	Were the ICB & CCB values ≥ MDL but < CRQL reported on Form III and flagged "J" by			

		YES	NO	N/A
	using MDLs from direct analysis(Preparation Method "NP1")? (Check Form III against the raw data)	[___]	___	___ ✓

ACTION:
If no, inform CLP PO/TOPO and make a note in the Contract-Problems/Non-Compliance Section of the "Data Review Narrative".

A.1.14.2 Circle with red pencil on each Form III all Calib. Blank values that are:

≥ MDL but ≤ CRQL

> CRQL

A.1.14.2.1	When MDL < CRQL, is any Calib. Blank value ≥ MDL but ≤ CRQL?	___	[___] ✓	___

ACTION:
If yes, change sample results ≥ MDL but ≤ CRQL to the CRQL with a "U". Do not qualify non-detects.

A.1.14.2.2	When MDL < CRQL, is any Calib. Blank value > CRQL?	___	[___] ✓	___

ACTION:
If yes, reject (R) and red line the associated sample results > CRQL but <ICB/CCB Blank Result. Flag as "J" detects > ICB/CCB blank value but < 10xICB/CCB value. Change the sample results ≥ MDL but ≤ the CRQL to CRQL with a "U".

A.1.14.2.3	Is any Calibration Blank value below the negative CRQL?	___	[___] ✓	___

ACTION:
If yes, flag (J) as estimated all associated sample results ≥ CRQL but <10xCRQL.

NOTE:

1. For ICB that does not meet the technical QC Criteria, apply the action to all samples

	YES	NO	N/A

reported from the analytical run.
2. For CCBs that do not meet the technical QC criteria, apply the action to all samples analyzed between a previous technically acceptable analysis of CCB and a subsequent technically acceptable analysis of the CCB in the analytical run.,

A.1.15 **Preparation Blank - FORM III**

NOTE: The Preparation Blank for mercury is the same as the calibration blank.

A.1.15.1 Was one Preparation Blank prepared with and analyzed for:

Each Sample Delivery Group (SDG)?	[___]	___	___
Each batch of the SDG samples digested/distilled?	[___]	___	___
Each matrix type?	[___]	___	___
All instruments used for metals and cyanide analyses?	[___]	___	___

ACTION:
If no for any of the above, flag as estimated (J) all the associated positive data <10xMDL for which the Preparation Blank was not analyzed.

NOTE:
If only one blank was analyzed for more than 20 samples, then the first 20 samples analyzed are not estimated(J),but all additional samples must be qualified (J).

A.1.15.2 Circle with red pencil on each Form III all Prep. Blank values that are:

≥ MDL but ≤ CRQL, and

> CRQL

A.1.15.2.1 When MDL < CRQL, is any preparation blank value ≥ MDL but ≤ CRQL? ___ [___] ___

ACTION:
If yes, change sample result ≥ MDL

	YES	NO	N/A

but ≤ CRQL to CRQL with a "U".

A.1.15.2.2 When the MDL ≤ CRQL, is any Preparation Blank value greater than its CRQL? ___ [✓] ___

If yes, is the Prep. Blank value greater than the value of the associated Field Blank collected and analyzed with the SDG samples? ___ [___] ✓

If yes, is the lowest concentration of that analyte in the associated samples less than 10 times the Preparation Blank value? ___ [___] ✓

ACTION:
If yes, reject (R) and red-line all associated sample results greater than the CRQL but less than the Prep.Blank value. Flag as "J" detects > Prep. Blank value but <10xPrep.Blank. If the sample result ≥ MDL but ≤ CRQL, replace it with CRQL-U.

If the Prep. Blank value is less than the same analyte value in the Field Blank, do not qualify the sample results due to the Prep. Blank criteria.

NOTE:
Convert soil sample result to mg/Kg on wet weight basis to compare with the soil Prep. Blank result on Form III.

A.1.15.2.3 Is the Prep. Blank concentration below the negative CRQL? ✓ ___ [___] ___

ACTION:
If yes, flag (J) all associated sample results less than 10xCRQL. Qualify non-detects as estimated (UJ).

A.1.15.2.4 When the MDL is greater than the CRQL, is the preparation blank concentration on Form III greater than two times the MDL? ✓ ___ [___] ___

ACTION:

		YES	NO	N/A
	If yes, reject (R) and red-line all positive sample results with sample raw data less than 10 times the Preparation Blank value.			
A.1.16	**ICP-AES/ICP-MS Interference Check Sample (ICS)- Form IV** **NOTE:** Not required for CN, Hg, Al, Ca, Fe and Mg.			
A.1.16.1	Present and complete?	[✓]	___	___
	Was ICS analyzed at the beginning and end of each analytical run, and once for every 20 analytical samples?	[✓]	___	___
	Was ICS analyzed at the beginning of the ICP-MS analytical run?	[___]	___	✓
	ACTION: If no, flag as estimated (J) all sample results.			
A.1.16.2	**ICP-AES Method**			
A.1.16.2.1	**ICSA Solution:** For ICP-AES, are the ICSA "Found" analyte values within the control limits ± of CRQL of the true/established mean value?	[✓]	___	___
	If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSA Solution on Form IV?	[___]	___	✓
	ACTION: If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run: Flag (J) as estimated only sample results ≥MDL			

	YES	NO	N/A

for which the ICSA "Found' value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag non-detects as "UJ" and detects as "J".

A.1.16.2.3 **ICSAB Solution**

For ICP-AES, are all analyte results in ICSAB within the control limits of 80-120 of the true/established mean value? [✓] ___ ___

If no for any of the above, is the sample concentration of Al, Ca, Fe, or Mg in the same units (ug/L or MG/KG) greater than or equal to its respective concentration in the ICSAB Solution on Form IV? [___] ___ ✓

ACTION:

If yes, apply the following action to all samples analyzed between a previous technically acceptable analysis of the ICS and a subsequent technically acceptable analysis of the ICS in the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79%, qualify sample results ≥ MDL as "J" and non-detects as "UJ". Reject (R) and red-line all sample results (detects & non-detects) for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only positive results.

A.1.16.3 **ICP-MS Method**

A.1.16.3.1 **ICSA Solution:**

For ICP-MS, are the ICSA "Found" analyte values within the control limits of ±CRQL of the true/established mean value? [___] ___ ✓

ACTION:

If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated only sample results ≥ MDL if the ICSA "Found" value is greater than (True value+CRQL). Do not qualify non-detects. If the ICSA "Found" value is less than (True value-CRQL), flag the associated sample detects as "J" and non-detects as "UJ".

		YES	NO	N/A
A.1.16.3.3	**ICSAB Solution** For ICP-MS, are all analyte results in ICSAB within the control limits of 80-120% of the true/established mean value, whichever is greater?	[___]	___	___ ✓

ACTION:
If no, apply the following action to all samples reported from the analytical run:

Flag (J) as estimated those associated sample results ≥ MDL for which the ICSAB analyte recovery is greater than 120% but ≤ 150%. If the ICSAB recovery falls within 50-79% flag (J) as estimated the associated sample results ≥ MDL. Reject (R) and red-line those all sample detects and non-detects for which the ICSAB analyte recovery is less than 50%. If the recovery is above 150%, reject (R) and red-line only detects (≥ MDL).

A.1.17 **Spiked Sample Recovery: Pre-Digestion/Pre-Distillation)-Form V A**
Note: Not required for Ca, Mg, K, and Na (both matrices); Al and Fe (soil only)

		YES	NO	N/A
A.1.17.1	Was Matrix Spike analysis performed:			
	For each matrix type?	[___]	___ ✓	___
	For each SDG?	[___]	___	___
	On one of the SDG samples?	[___]	___	___
	For each concentration range (i.e., low, med., high)?	[___]	___	___
	For each analytical Method (ICP-AES, ICP-MS, Hg, CN) used?	[___]	___	___
	Was a spiked sample prepared and analyzed with the SDG samples?	[___]	___	___

ACTION:
If no for any of the above, flag as estimated (J) all the positive data for which a spiked sample was not analyzed.

all results were J flagged as no MS was analyzed

NOTE:
If more than one spiked sample were analyzed for one SDG, then qualify the associated data based on the worst spiked sample analysis.

		YES	NO	N/A
A.1.17.2	Was a field blank or PE sample used for the spiked sample analysis?	___	[✓]	___

ACTION:
If yes, flag (J) as estimated positive data of the associated SDG samples for which field blank or PE sample was used for the spiked sample analysis.

A.1.17.3	Circle on each Form VA all spike recoveries that are outside the control limits (75-125%) that have sample concentrations less than four times the added spike concentrations.			
	Are all recoveries within the control limits when sample concentrations are less than or equal to four times the spike concentrations?	[___]	___	✓
	NOTE: Disregard the out of control spike recoveries for analytes whose concentrations are greater than or equal to four times the spike added.			
	Are results outside the control limits (75-125%) flagged with Lab Qualifier "N" on Form I's and Form VA?	[___]	___	✓

ACTION:
If no for any of the above, write in the Contract - Problems/Non-Compliance Section of the Data Review Narrative.

no spike performed

A.1.17.4	**Aqueous**			
	Are any spike recoveries:			
	(a) less than 30%?	___	[___]	✓
	(b) between 30-74%?	___	[___]	___
	(c) between 126-150%?	___	[___]	___
	(d) greater than 150%?	___	[___]	___

ACTION:
If the matrix spike recovery is less than 30%, reject (R) and red-line all associated aqueous data (detects & non-detects). If between 30-74%, qualify all associated aqueous data ≥ MDL as "J" and non-detects

	YES	NO	N/A

as "UJ". If between 126-150%, flag (J) all data ≥ MDL as "J". If greater than 150%, reject (R) and red-line all associated data ≥ MDL.

(**NOTE**:Replace "N" with "J", "R" as appropriate.)

A.1.17.5 **Soil/Sediment**

Are any spike recoveries:

(a) less than 10%?	___	[___]	___
(b) between 10-74%?	___	[___]	___
(c) between 126-200%?	___	[___]	___
(d) greater than 200%?	___	[___]	___

ACTION:
If yes for any of the above, proceed as follows:

If the matrix spike recovery is less than 10%,reject (R) and red-line all associated data (detects & non-detects); if between 10-74%,qualify all associated data ≥ MDL as "J" and non-detects as "UJ"; if between 126-200%, flag (J) all associated data ≥ MDL as "J" If greater than 200%, reject (R) and red-line all associated data ≥ MDL.
(**NOTE**:Replace "N" with "J" or "R" as appropriate.)

A.1.18 **Lab Duplicates) - Form VI**

A.1.18.1 Was the lab duplicate analysis performed:

For each SDG?	[___]	___	___
On one of the SDG samples?	[___]	___	___
For each matrix type?	[___]	___	___
For each concentration range (low or med.)?	[___]	___	___
For each analytical Method (ICP-AES/ICP-MS,Hg,CN)Used?	[___]	___	___
Was a lab duplicate prepared and analyzed with the SDG samples?	[___]	___	___

		YES	NO	N/A
	ACTION: If no for any of the above, flag (J) as estimated all the SDG sample results (detects & non-detects) for which the lab duplicate analysis was not performed.			
	NOTE: If more than one lab duplicate sample were analyzed for an SDG, then qualify the associated samples based on the worst lab duplicate analysis.			
A.1.18.2	Was a Field Blank or PE sample used for the Lab Duplicate analysis?	___	[✓]	___
	ACTION: If yes, flag as estimated (J) all SDG sample results (hits & non-detects) for which Field Blank or PE sample was used for duplicate analysis.			
A.1.18.3	Circle on each Form VI all values that are:			
	RPD > 20%, or			
	Absolute Difference > CRQL ✓			
	Are all values within control limits (RPD ≤ 20% or absolute difference ≤ ±CRQL)?	[___]	___	✓ ___
	If no, are all results outside the control limits flagged with an "*" (Lab Qualifier) on Form VI and on all Form I's?	[___]	___	✓ ___
	ACTION: If no, write in the Contract-Problems/ Non-Compliance Section of the Data Review Narrative.			
	NOTE: The laboratory is not required to report on Form VI the RPD when both values are non-detects.			
A.1.18.4	**Aqueous**			
A.1.18.4.1	When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			

no spike dup or matrix dup performed J/UJ

	YES	NO	N/A
is any RPD > 20% but < 100%?	___	[___]	✓
is any RPD ≥ 100%?	___	[___]	✓

ACTION:
If the RPD is > 20% but < 100%, flag (J) as estimated the associated sample data ≥ CRQL. If the RPD is ≥ 100%, reject (R) and red-line the associated sample data ≥ CRQL.

(**NOTE**: Replace "*" with "J" or "R" as appropriate.)

A.1.18.4.2 When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate values:

> ± CRQL?	___	[___]	✓
> ± 2xCRQL?	___	[___]	✓

ACTION:
If the absolute difference is > CRQL, flag as estimated all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 2xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but < 5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.18.5 **Soil/Sediment**

A.1.18.5.1 When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 35% but < 120%?	___	[___]	✓
is any RPD ≥ 120%?	___	[___]	✓

ACTION:
If the RPD is ≥ 35% and < 120%, flag (J) as estimated the associated sample

		YES	NO	N/A
	data ≥ CRQL. If the RPD is ≥ 120%, reject (R) and red-line the associated sample data ≥ CRQL.			
A.1.18.5.2	When the sample and/or duplicate value <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and duplicate:			
	> ± 2 x CRQL?	___	[___]	___
	> ± 4 x CRQL	___	[___]	___

ACTION:
If the absolute difference is > 2 x CRQL, flag all the associated sample results ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the absolute difference is > 4xCRQL, reject (R) and red-line all the associated non-detects and detects ≥ MDL but <5xCRQL.

NOTE:
1. Replace "*" with "J", "UJ" or "R" as appropriate.)
2. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this difference to qualify sample results.

A.1.19 Field Duplicates

Aqueous Field Duplicates

A.1.19.1	Was an aqueous Field Duplicate pair collected and analyzed? (Check Sampling Trip Report)	[___]	___	___

ACTION:
If yes, prepare a Form (Appendix A.4) for each aqueous Field Duplicate pair. Report the sample and Field Duplicate results on Appendix A.4 from their respective Form I's. Calculate and report RPD on Appendix A.4 when sample and its Field Duplicate values are both > 5xCRQL. Calculate and report the absolute difference on Appendix A.4 when at least one value (sample or duplicate) is <5xCRQL. Evaluate the aqueous Field Duplicate analysis in accordance with the

	YES	NO	N/A

QC criteria stated in Sections A.1.19.2 and A.1.19.3.

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and use this the criteria to qualify the results.

A.1.19.2 Circle all values on the Form (Appendix A.4) for Field Duplicates that have:

RPD ≥ 20% or

Difference > ± CRQL

When sample and duplicate values are both ≥5xCRQL (substitute MDL for CRQL when MDL > CRQL),

is any RPD ≥ 20%?	___	[___]	___
is any RPD ≥ 100%?	___	[___]	___

ACTION:
If the RPD is >20% but < 100%, flag (J) only the associated sample and its Field Duplicate results ≥ CRQL. If the RPD is ≥ 100%, reject (R) and red-line only the associated sample and its Field Duplicate result ≥ CRQL.

A.1.19.3 When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL >CRQL), is the absolute difference between sample and duplicate:

> ± CRQL?	___	[___]	___
> ± 2 x CRQL?	___	[___]	___

ACTION:
If the absolute difference is > CRQL, flag detects ≥ MDL but < 5xCRQL as "J" and non-detects as "UJ". If the difference is > 2xCRQL, reject (R) and red-line non-detects

		YES	NO	N/A
	and results ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			

Soil/Sediment Field Duplicates

A.1.19.4	Was a soil field duplicate pair collected and analyzed? (Check Sampling Trip Report)	[___]	___	✓

ACTION:
If yes, for each soil Field Duplicate pair proceed as follows:

Prepare Appendix A.4 for each Field Duplicate pair. Report on Appendix A.4 all sample and its Field Duplicate results in MG/KG from their respective Form I's. Calculate and report RPD when sample and its duplicate values are both greater than 5xCRQL. Calculate and report the absolute difference when at least one value (sample or duplicate) is < 5xCRQL. Evaluate the Field Duplicate analysis in accordance with the QC Criteria stated in Sections A.1.19.5 and A.1.19.6.

NOTE:
1. Do not transfer "*" from Form I's to Appendix A.4.
2. Do not calculate RPD when both values are non-detects.
3. Substitute MDL for CRQL when MDL > CRQL.
4. If one value is >CRQL and the other value is non-detect, calculate the absolute difference between the value > CRQL and the MDL, and apply the criteria to qualify the results.

A.1.19.5	Circle on each Appendix A.4 all values that have: RPD ≥ 35%, or Difference > ± 2xCRQL When sample and duplicate values are both ≥ 5xCRQL (substitute MDL for CRQL when MDL > CRQL),			
	is any RPD ≥ 35% but < 120%?	___	[___]	___
	is any RPD ≥ 120%?	___	[___]	✓

ACTION:
If the RPD is ≥ 35% but < 120%,

		YES	NO	N/A
	flag only the associated sample and its Field Duplicate results ≥ CRQL as "J". If the RPD is ≥ 120%, reject (R) and red-line only the sample and its Field Duplicate results ≥ CRQL.			
A.1.19.6	When the sample and/or duplicate value(s) <5xCRQL (substitute MDL for CRQL when MDL > CRQL), is the absolute difference between sample and Field Duplicate:			
	> ± 2 x CRQL?	___	[___]	✓
	> ± 4 x CRQL?	___	[___]	✓
	ACTION: If the absolute difference is > 2xCRQL, flag Sample and its Field Duplicate resuts ≥ MDL but <5xCRQL as "J" and non-detects as "UJ". If the difference is >4xCRQL, reject(R) and red-line non-detects and detects ≥ MDL but <5xCRQL of the sample and its Field Duplicate.			
A.1.20	**Laboratory Control Sample (LCS)- Form VII**			
A.1.20.1	Was one LCS prepared and analyzed for:			
	Each SDG?	[✓]	___	___
	Each matrix type?	[✓]	___	___
	Each batch samples digested/distilled?	[✓]	___	___
	For each Method(ICP-AES,ICP-MS,Hg,CN) used?	[✓]	___	___
	Was an LCS prepared and analyzed with the samples?	[✓]	___	___
	ACTION: If no for any of the above, prepare Telephone Record Log and contact CLP PO or TOPO for submittal of the LCS results. Flag (J) as estimated all the data for which an LCS was not analyzed.			
	NOTE: If only one LCS was analyzed for			

	YES	NO	N/A

more than 20 samples, then the first 20 samples analyzed are not flagged(J), but all additional samples must be qualified (J).

A.1.20.2 **Aqueous LCS**

Circle on each Form VII the LCS percent recoveries outside control limits 80-120%.

NOTE: 1.Use digested ICV as LCS for aqueous mercury
2.Use distilled ICV as LCS for aqueous cyanide

Is any LCS recovery:

Less than 50%?	___	[✓]	___
Between 50% and 79%?	___	[✓]	___
Between 121% and 150%?	___	[✓]	___
Greater than 150%?	___	[✓]	___

ACTION:
If the LCS recovery is less than 50%, reject (R) and red-line all associated sample data (detects & non-detects); for a recovery between 50-79%, flag detects as "J" all non-detects as "UJ". if the LCS recovery is between 121-150%, flag only detects as "J". if the recovery is greater than 150%, reject (R) and red-line all detects.

A.1.20.3 **Solid LCS**

If an analyte's MDL is equal to or greater than the true value of LCS, disregard the "Action" below for that analyte even though the LCS is out of control limits.

Is the LCS "Found" value greater than the Upper Control Limit reported on Form VII?	___	[___]	✓

ACTION:

		YES	NO	N/A
	If yes, flag (J) all the associated detects ≥ MDL as estimated (J).			
	Is the LCS "Found" value lower than the Lower Control Limit reported on Form VII?	___	[___]	✓
	ACTION: If yes, flag detects as "J" and non-dectes as "UJ".			
A.1.21	**ICP-AES/ICP-MS Serial Dilution - Form VIII** NOTE: Serial dilution analysis is required only when the initial concentration is equal to or greater than 50 x MDL.			
A.1.21.1	Was a Serial Dilution analysis performed:			
	For each SDG?	[✓]	___	___
	On one of the SDG samples?	[✓]	___	___
	For each matrix type?	[✓]	___	___
	For each concentration range (low or med.)?	[✓]	___	___
	Was a Serial Dilution sample analyzed with the SDG samples?	[✓]	___	___
	ACTION: If no for any of the above, flag as estimated (J) detects ≥ MDL of all the SDG samples for which the ICP Serial Dilution Analysis was not performed.			
A.1.21.2	Was a Field Blank or PE sample used for the Serial Dilution Analysis?	___	[✓]	___
	ACTION: If yes, flag as estimated (J) detects ≥ MDL of all the SDG samples			
A.1.21.3	Circle on Form VIII the Percent Differences (%D) between sample results and its dilution results that are outside the control limits ± 10%			

DOD - only applicable for samples with conc. > 50 X LOQ p170 (4.2)

		YES	NO	N/A
	when initial concentrations ≥ 50 x MDLs.			
	Are results outside the control limits flagged with an "E"(Lab Qualifier) on Form VIII and all Form I's?	[___]	___	___
	ACTION: If no, write in the Contract-Problem/ Non-Compliance Section of the Data Review Narrative.			
A.1.21.4	Are any %D values:			
	> 10%?	___	[___]	___
	≥ 100%?	___	[___]	___
	ACTION: If the Percent Difference (%D) is greater than 10%, flag (J) as estimated all associated samples whose **raw data** ≥ MDL; if the %D is ≥ 100%, reject (R) and red-line all associated samples with **raw data** ≥ MDL.			
	(**NOTE**:Replace "E" with "J" or "R" as appropriate.)			
A.1.22	**Total/Dissolved or Inorganic/Total Analytes**			
A.1.22.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s)?	___	[___]	___
	Were any analyses performed for inorganic as well as total analytes on the same sample(s)?	___	[___]	___
	ACTION: If yes, prepare a Form (Appendix A.5) to compare the differences between dissolved (or inorganic) and total analyte concentrations. Compute each difference on Appendix A.5 as a percent of the total analyte only when both of the following conditions are fulfilled: (1) The dissolved(or inorganic)concentration is greater than total concentration, and (2) greater than or equal to 5xMDL.			
A.1.22.2	Is any dissolved (or inorganic) concentration greater than its total concentration by more than 20%?	___	[___]	___

		YES	NO	N/A
A.1.22.3	Is any dissolved(or inorganic) concentration greater than its total concentration by more than 50%?	___	[___]	___

ACTION:
If the percent difference is greater than 20%, flag (J) both dissolved/inorganic and total concentrations as estimated. If the difference is more than 50%, reject (R) and red-line both the values.

A.1.23 **Field Blank - Form I**
NOTE: Designate "Field Blank" as such on Form I

A.1.23.1	Was a Field/Rinsate Bank collected and analyzed with the SDG samples?	[___]	___	___
	If yes, is any Field/Rinsate Blank absolute value of an analyte on Form I greater than its CRQL(or 2xMDL when MDL>CRQL)?	___	[___]	___
	If yes, circle the Field Blank value on Form I that is greater than the CRQL, (or 2 x MDL when MDL > CRQL).			
	Is any Field Blank value greater than CRQL also greater than the Preparation Blank value?	___	[___]	___
	If yes, is the Field Blank value (> CRQL and > the prep. blank value) already rejected due to other QC criteria?	[___]	___	___

ACTION:
If the Field Blank value was not rejected, reject all associated sample data (except the Field Blank results) greater than the CRQL but less than the Field Blank value. Reject on Form I's the soil sample results whose raw values in ug/L in the instrument printout are greater than the CRQL but less than the Field Blank value in ug/L. Flag as "J" detects between the Field Blank value and 10xField Blank value. If the sample result > MDL but ≤ CRQL, replace it with CRQL-U.

If the Field Blank value is less than the

		YES	NO	N/A
	Prep.Blank value, do not qualify the sample results due to the Field Blank criteria.			

NOTE:
1. Field Blank result previously rejected due to other criteria cannot be used to qualify field samples.
2. Do not use Rinsate Blank associated with soils to qualify water samples and vice versa.

A.1.24 **Verification of Instrumental Parameters - Form IX, XA, XB, XI**

A.1.24.1	Is verification report present for:			
	Method Detection Limits (Form IX-Annually)?	[✓]	___	___
	ICP-AES Interelement Correction Factors (Form XA & XB -Quarterly)?	[✓]	___	___
	ICP-AES & ICP-MS Linear Ranges (Form XI-Quarterly)?	[✓]	___	___

ACTION:
If no, contact CLP PO/TOPO for submittal from the laboratory.

A.1.24.2 **Method Detection Limits - Form IX**

A.1.24.2.1	Are MDLs present on Form IX for:			
	All the analytes?	[✓]	___	___
	All the instruments used?	[✓]	___	___
	Digested and undigested samples and Calib.Blanks?	[___]	___	✓
	ICP-AES and ICP-MS when both instruments are used for the same analyte?	[___]	___	✓

ACTION:
If no for any of the above, prepare Telephone Record Log and contact CLP PO/TOPO for submittal of the MDLs from the laboratory. Report to CLP PO and write in the Contract Problems/ Non-Compliance Section of the Data Review Narrative if the MDL concentration is not less than ½ CRQL.

		YES	NO	N/A
A.1.24.2.2	Is MDL greater than the CRQL for any analyte?	___	[✓]	___
	If yes, is the analyte concentration on Form I greater than 5 x MDL for the sample analyzed on the instrument whose MDL exceeds CRQL?	[___]	___	✓

ACTION:
If no, flag as estimated (J) all values less than five times MDL for the analyte whose MDL exceeds the CRQL.

A.1.24.3 **Linear Ranges - Form XI**

A.1.24.3.1	Was any sample result higher than the high linear range for ICP-AES or ICP-MS?	___	[✓]	___
	Was any sample result higher than the highest calibration standard for mercury or cyanide?	___	[___]	✓
	If yes for any of the above, was the sample diluted to obtain the result reported on Form I?	[___]	___	✓

ACTION:
If no, flag (J) as estimated the affected detects (≥ MDL) reported on Form I.

A.1.25 **ICP-MS Tune Analysis - Form XIV**

A.1.25.1	Was the ICP-MS instrument tuned prior to calibration?	[___]	___	✓

ACTION:
If no, reject (R) and red-line all sample data for which tuning was not performed.

A.1.25.2	Was the tuning solution analyzed or scanned at least five times consecutively?	[___]	___	✓
	Were all the required isotopes spanning the analytical range present in the tuning solution?	[___]	___	✓
	Was the mass resolution within			

		YES	NO	N/A
	0.1 amu for each isotope in the tuning solution?	[___]	___	___
	Was %RSD less than 5% for each isotope of each analyte in the tuning solution?	[___]	___	___

ACTION:
If no for any of the above, qualify all results ≥ MDL associated with that Tune as estimated "J", and all non-detects associated with that Tune as "UJ".

A.1.26 **ICP-MS Internal Standards - Form XV**

A.1.26.1	Were the Internal Standards added to all the samples and all QC samples and calibration standards (except the Tuning Solution)?	[___]	___	___
	Were all the target analyte masses bracketed by the masses of the five internal standards?	[___]	___	___

ACTION:
If none of the Internal Standards was added to the samples, reject (R) and red-line all the associated sample data (detects & non-detects). If internal standards were used but did not cover all the analyte masses, reject (R) and red-line only the analyte results not bracketed by the internal standard masses.

A.1.26.2	Was the intensity of an Internal Standard in each sample within 60-125% of the intensity of the same Internal Standard in the calibration blank?	[___]	___	___
	If no, was the original sample diluted two fold, Internal Standard added and the sample re-analyzed?	[___]	___	___
	Was the %RI for the two fold diluted sample within the acceptance limits (60-125%)?	[___]	___	___

ACTION:
If no for any of the above, flag detects as "J" and non-detects "UJ" of all the analytes with atomic masses between the

atomic mass of the internal standard lighter

than the affected internal standard, and the atomic mass of the internal standard heavier than the affected internal standard.

A.1.27 **Percent Solids of Sediments**

A.1.27.1 Are percent solids in sediment(s):

< 50%? ___ [___] ___

ACTION:
If yes, qualify as estimated (J) all detects and non-detects of a sample that has percent solids less than 50%(i.e.,moisture content greater than 50%).

NOTE:
Flag(J) only the sample results that were not previously flagged due to other QC criteria.

Inorganic Data Review Narrative

Case# _____ **Site:** _____ **Matrix: Soil** ____

SDG# _____ **Lab:** _____ **Water** ____

Sampling Team: _____ **Reviewer:** _____ **Other** _____

A.2.1 **Data Validation Flags:**
The following flags may have been applied in red by the data validator and must be considered by the data user.

J - This flag indicates the result qualified as **estimated**

R and Red-Line - A red-line drawn through a sample result indicates **unusable** value. The red-lined data are known to contain significant errors based on documented information and must not be used by the data user.

U - This data validation qualifier is applied to sample results ≥ MDL when associated blank is contaminated

Fully Usable Data - The results that do not carry "J" or "red-line" are fully **usable**.

A.2.2 **Laboratory Qualifiers:**
The CLP laboratory applies a contractual qualifier on all

SAMPLE CALCULATION

EPA SAMPLE ID: VWAI-MW04-1112
COMPOUND: Manganese
CONCENTRATION: 1140 ug/L
%Solids – NA
Raw Data result: 1.1432 mg/L

1.1432 mg/L (1000ug/1mg) = 1143.2 ug/L

FIELD DUPLICATE SAMPLE SUMMARY

Note: All reported results are noted in the table below because the client requested that the MDL be used as reporting limit instead of the RL for this project. RPDs or absolute differences were calculated based on Region II guidelines: if results are >5X RL RPD is calculated, if results are <5X RL the absolute difference is calculated. Flags are applied to field duplicate pair only as follows: For RPD values - RPD ≥ 35% but <120% results are J, RPD >120%, results are R. For absolute difference values - >+/- 2X RL results are J, >+/- 4X RL results are R.

Sample ID: none Duplicate Sample ID:

Analyte	Sample Conc.	Duplicate Conc.	RPD or absolute difference
			0.000
			#DIV/0!

Comments: No qualifications required.

Sample ID: none Duplicate Sample ID:

Analyte	Sample Conc.	Duplicate Conc.	RPD or absolute difference
			0.000
			0.000

Comments: No qualifications required.

Reviewer _____ **Date:** 1/25/13

Appendix E
Final Responses to USEPA and PREQB Comments

Final Responses to EPA Comments on the
Draft In-Situ Remediation Pilot Study Report, Area of Concern I (AOC I)
Former Atlantic Fleet Weapons Training Area- Vieques
Naval Ammunition Support Detachment
Vieques, Puerto Rico
March 2013

EPA General Comments

1. While Section 4 (Conclusions and Path Forward) provides information to substantiate that concentrations decreased at AOC I, the Pilot Study does not provide a sufficient discussion to substantiate that the concentration decreases were specifically related to the application of in-situ chemical oxidation (ISCO) and enhanced in-situ bioremediation (EISB) and not natural processes. In addition, the Pilot Study does not discuss how the application of ISCO and EISB met performance based criteria and data quality objectives (DQOs). Revise Section 4 to provide a discussion to substantiate that the application of ISCO and EISB met performance based criteria and DQOs.

   ***Navy Response**:*

   The following paragraphs have been added to the end of Section 3.2:

   "As stated in Section 1.1, the objectives of the Pilot Study implemented at AOC I were to: (1) determine if the groundwater Pilot Study technologies could reduce COC concentrations to acceptable levels and (2) determine if the Pilot Study technologies could reduce the groundwater cleanup timeframe (relative to that predicted by natural attenuation alone). The associated project quality objective (PQO), as documented in Worksheet 11 of the Pilot Study SAP (CH2M HILL, 2010a), was to collect data sufficient for determining whether unacceptable risk associated with potential potable groundwater use at the site was mitigated (i.e., all COC concentrations below Pilot Study PRGs) and, therefore, no further action was warranted.

   As noted previously, the concentrations of all groundwater COCs in all wells (except benzene and naphthalene in well MW07) had declined to below Pilot Study PRGs before the Pilot Study baseline sampling (i.e., between 2004 and 2010). For MW07, Table 6 summarizes the percent reduction of benzene and naphthalene in monitoring well MW-07 prior to and during the Pilot Study implementation. The table also includes 2-methylnaphthalene because it helps demonstrate the potential affect on COC concentration decline by natural processes and the Pilot Study technologies. As shown in the table, the concentrations of these three COCs declined between 74 percent and 79 percent over the 5 ½ years prior to the Pilot Study (i.e., under the influence of natural attenuation processes alone). During the 2 ½-year Pilot Study, the same COCs declined by about 95 percent.

   In addition to the above, natural attenuation modeling (see Attachment C of the Pilot Study SAP [CH2M HILL, 2010a]) indicated it would take approximately 7 years for benzene and 14 years for naphthalene to decline from levels measured at AOC I in 2008 to the Pilot Study PRGs under the influence of natural attenuation processes alone. As shown in Figures 12 and 14, the Pilot Study PRGs for both of these two COCs were achieved in about 4 years (i.e., 2008 to 2012).

   The information above indicates the decreases in COC concentrations were attributable to both natural processes and Pilot Study technologies, with the Pilot Study technologies likely accelerating the decline to below the PRGs. Regardless of the relative contribution of natural processes and Pilot Study technologies, the monitoring conducted before and during the Pilot Study indicated all COCs at the site declined to below the PRGs without rebound."

The sub-bullets of the third bullet in Section 4 were revised as follows:

- "…(from 14 μg/L to 0.82 μg/L during the Pilot Study). Benzene concentrations declined naturally by 76 percent prior to the Pilot Study and by 94 percent following the ISCO injection and EISB application; overall concentrations declined by 99 percent. Benzene fell below its PRG of 5 μg/L between November 2011 and May 2012 and no rebound was observed."
- "…(from 21 μg/L to non-detect during the Pilot Study). Naphthalene concentrations declined naturally by 74 percent prior to the Pilot Study and by 95 percent following the ISCO injection and EISB application; overall concentrations declined by 99 percent. Naphthalene fell below its PRG of 6.1 μg/L between November 2011 and May 2012 and no rebound was observed."

2. Section 2.5 (Enhanced In-Situ Bioremediation) indicates that oxygen releasing compound (ORC) socks were placed in monitoring wells MW-02, MW-03, MW-04, MW-05, and MW-07 and were removed in August 2011 according to the schedule in the Final In-Situ Remediation Pilot Studies (AOC E and AOC I Sites) Sampling and Analysis Plan, Vieques, Puerto Rico, dated June 2008 (SAP); however, Section 2.5 does not discuss whether the ORC socks met the performance criteria expectations established in the SAP before being removed. Clarify whether the ORC socks met the performance criteria established in the SAP prior to being removed.

   ***Navy Response**:*

   Please see the response to Comment #1.

3. A discussion of how the geology and potential preferential pathways at the site may have impacted the pilot study is not included in the Pilot Study. Based on Figure 5 (Geologic Cross Section A-A') and Figure 6 (AOC I Conceptual Site Model), the monitoring wells which were used for the pilot study injections (e.g., MW-02, MW-03, MW-04, and MW-07) were screened in highly fractured bedrock which may have created preferential pathways within the bedrock.

   ***Navy Response**:*

   The following was added at the end of the third paragraph of Section 2.2:

   "Although fractures in the bedrock at AOC I may have provided preferential pathways for contaminant migration, the ISCO injections would have followed those same pathways since the injections were intentionally performed at very low pressures to avoid creating additional preferential flow pathways. Monitoring during injection was performed and showed no mounding in surrounding wells."

4. Include a discussion of how the geology and potential preferential pathways at the site were evaluated and may have impacted the implementation of the pilot study injections.

   ***Navy Response**:*

   Please see the response to Comment #3.

5. The Pilot Study does not describe any measurements of the oxidant demand. For example, the Pilot Study does not discuss whether the oxidant demand at AOC I was solely due to the hydrocarbon release or if there is a background oxidant demand that affected anaerobic conditions in the saturated zone. Depending on the amount of nonaqueous phase liquid (NAPL) present and the extent of hydrocarbon weathering (loss of soluble and volatile constituents), the oxidative treatment may have been affected if constituents subsequently dissolved into anaerobic groundwater. Include a discussion of oxidant demand during the pilot study injections.

***Navy Response**:*

With respect to the parameters measured during the Pilot Study, they were those concurred upon by the Navy, USEPA, and PREQB via the SAP process. Regarding oxidant demand, the following paragraph has been added as the first paragraph of Section 2.2:

"During the Pilot Study design, the oxidant (persulfate) demand was estimated based on: a) the historical groundwater geochemical data and water quality parameters (showing the anaerobic nature of the subsurface and likelihood of reduced iron and manganese exerting a demand on persulfate), b) the stoichiometric demand based on the historical COC concentrations, and c) professional judgment from numerous persulfate applications. Due to the very low COC concentrations and lack of NAPL at AOC I, the stoichiometric demand, as is common, was negligible."

6. Monitoring wells in the vicinity of the injection wells (i.e., MW-01, MW-06, MW-08, and MW- 09) were not sampled during and after the pilot study injections in 2010, 2011 or 2012. Specifically, downgradient well MW-06 was evaluated in 2004, 2006, and 2008; downgradient wells MW-08 and MW-09 were evaluated in 2006 and 2008; and, upgradient well MW-01 was evaluated in 2004, 2006, and 2008. Clarify how contaminant migration, water geochemistry, and rebound were assessed when the other onsite wells were not evaluated during and after the pilot study injections.

***Navy Response**:*

The following sentence has been added at the end of the first paragraph under Section 2:

"The Vieques Technical Subcommittee, comprising representatives of the Navy, USEPA, and EQB, concurred on the wells to include in the Pilot Study based on historical data and Pilot Study objectives. Wells MW-01, MW-06, MW-08, and MW-09 were excluded from contaminant analysis during the Pilot Study because they were either upgradient of (MW-01) or far downgradient from (MW-06, MW-08, and MW-09) the area of contamination. These wells had been installed during the RI for the purposes of nature and extent determination but were not relevant to the Pilot Study. Due to the small size of the groundwater plume and slow groundwater velocity rates (3 to 16 ft/yr), MW-02, MW-03, MW-04, MW-05, and MW-07 were determined by the Technical Subcommittee as the appropriate wells to be used for monitoring contaminant concentrations during the Pilot Study."

Note that Section 2.7 states that to ensure contaminant rebound did not occur, the Technical Subcommittee agreed to perform two additional sampling events for a subset of the AOC I monitoring wells (i.e., MW-04, MW-05, and MW-07) and that the agreement was reached in the February 22, 2012 Technical Subcommittee meeting. Please also note the correspondence from USEPA in Appendix C stating which wells should be monitored for the two additional rounds used for potential rebound monitoring.

7. Section 2.4 (First Post-injection Performance Monitoring Event) indicates that, "At the concentrations observed at this site and given the water geochemistry, it does not appear to make a difference for VOC [volatile organic compounds] groundwater results how or if the samples are preserved;" however, the Pilot Study does not include information or a discussion to substantiate that the samples were not impacted by the persulfate or the ascorbic acid. Provide information and a discussion to substantiate that the samples were not impacted by the persulfate or the ascorbic acid.

***Navy Response**:*

It is unclear what the commenter means by providing information to substantiate the samples were not impacted by ascorbic acid. The purpose of adding ascorbic acid is to sequester any residual persulfate that could oxidize contaminants in the sample between the time it is collected and

analysis in the laboratory. Therefore, ascorbic acid does not impact the sample; it potentially protects the sample from additional oxidation.

To provide additional clarity, Table 5 has been updated to include the preservative method associated with each sample and the second paragraph of Section 2.4 has been revised as follows:

> ". . . (i.e., in accordance with the SAP). Table 4 shows the persulfate concentrations measured in wells at the time of sample collection. Table 5 shows the results of the three analyses (with identification of the preservative method for each) for each well. Of note is that the volatile organic compounds (VOCs) concentrations for each well were essentially the same among the samples preserved with hydrochloric acid, ascorbic acid, and unpreserved. For example, benzene concentrations in samples from well MW-07, which had a measured persulfate concentration between 14 and 21 mg/L, were 9.5 μg/L (unpreserved), 9.5 μg/L (ascorbic acid), and 9.4 μg/L (HCl). Therefore, at the concentrations observed . . . "

8. A preliminary remediation goal (PRG) of 1.4 micrograms per liter (μg/L) was originally selected to represent a conservative screening value for naphthalene; however, a value of 6.1 μg/L was utilized. While Section 1.1 (Pilot Study Objectives and Goals) indicates that this value was determined to be more appropriate to use as a PRG, information is not provided and/or referenced in the Pilot Study to document that this value was approved for use. While this change does not significantly affect the outcome of the pilot study, some reporting limits, as shown in Table 5 (Analytical Results for COCs, Dissolved Iron and Manganese), would be above the lower PRG value. Revise the Pilot Study to include and/or reference information to document that the use of the higher value for naphthalene was approved.

***Navy Response**:*

The following text has been added after the table of PRGs in Section 1.1:

> "The 2011 Edition of the Drinking Water Standards and Health Advisories (issued by the USEPA Office of Water) indicates that the cancer classification of naphthalene is "I – inadequate information to assess carcinogenic potential." The Lifetime Health Advisory (HA) Level of 100 μg/L for naphthalene is defined as the concentration of naphthalene in drinking water that is not expected to cause any adverse noncarcinogenic effects for a lifetime of exposure. In the updated 2012 Edition of the Drinking Water Standards and Health Advisories, the HA Level of 100 μg/L for naphthalene is unchanged.
>
> The Record of Decision (ROD) entries contained in the USEPA CERCLIS Public Access Database were searched for naphthalene cleanup goals in EPA Region 2. For the nine Superfund Sites where quantitative cleanup goals were available for naphthalene, goals ranged from 10 to 300 μg/L. A PRG of 10 μg/L was selected for three sites in New York, as stipulated in the NYSDEC Groundwater Standards, based on a non-carcinogenic endpoint HI of 1 with an uncertainty factor (UF) of 10 for "Group C" carcinogens to provide sufficient protection from possible carcinogenic effects. Additionally, naphthalene does not have a groundwater standard (SG) in the Puerto Rico Water Quality Standards (PRWQS).
>
> The May 2013 USEPA Regional Screening Level (RSL) Table provides carcinogenic inhalation toxicity values for naphthalene, with a tap water RSL of 0.14 μg/L corresponding to a 1x10-6 excess lifetime cancer risk (ELCR) (or 14 μg/L corresponding to 1x10-4 ELCR). USEPA's target range for ELCR is 1x10-4 to 1x10-6. The 2013 RSL table also identifies a tap water RSL of 6.1 μg/L for non-carcinogenic endpoints, based on an HI of 1 (for cumulative exposures via ingestion/dermal/inhalation).
>
> Based on the above information, the HI-based PRG of 6.1 μg/L, especially considering it is within the USEPA's acceptable ELCR range, is used as the PRG for naphthalene."

Specific Comments

1. **Section 3, Groundwater Monitoring Results:** Based on Table 5 (Analytical Results for COCs, Dissolved Iron and Manganese), iron and manganese levels fluctuated throughout the pilot study; however, these fluctuations are not discussed in Section 3. Revise Section 3 to include a discussion of the varying levels in iron and manganese throughout the pilot study and the long-term effect it may have on AOC I.

   ***Navy Response**:*

   The following was added as the last paragraph of Section 3.1:

   "Dissolved iron and manganese were analyzed to confirm the presence of an oxidative environment post-injection, which would tend to decrease dissolved iron and manganese. As shown in Table 5, this is what was observed; iron and manganese concentrations declined at the injection wells (MW-02, MW-03, MW-04, and MW-07) following the ISCO injection, indicative of the desired oxidative conditions. Several wells also showed increases of these metals toward the end of the study, indicating a return to normal geochemical conditions."

2. **Table 4, Persulfate Concentration:** The table indicates that persulfate in some wells was not measured; however, the Pilot Study does not discuss why persulfate was not measured. In addition, the Pilot Study does not discuss the decision criteria used for measuring or not measuring persulfate concentrations in the onsite wells. Revise Section 2.3 (Persulfate Monitoring) to document deviations from the proposed persulfate measurements. In addition, ensure all deviations are noted in the Pilot Study.

   ***Navy Response**:*

   The following was added as the last sentence of Section 2.3 and as a footnote in Table 4:

   "Persulfate monitoring was conducted in accordance with the SAP (CH2M HILL, 2010a)."

Final Responses to PREQBs Comments on the
Draft In-Situ Remediation Pilot Study Report, Area of Concern I (AOC I)
Former Atlantic Fleet Weapons Training Area-Vieques
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico
March 28, 2013

PREQB has reviewed the report and provides the following minor editorial comments. Note that the substantive comments were discussed during the May 2013 ERP meeting and the Navy indicated that modifications as needed would be made in the draft final version of the report.

I. General Comments

1. Please note that it is reported that in November 2011 samples were submitted for GRO, DRO and ORO analyses, but the results were not tabulated. Since GRO, DRO and ORO are not chemicals of concern, please clarify why these analyses was performed or consider removing this information from the report.

   ***Navy Response**:*

   GRO, DRO, and ORO have been removed from all locations in the report.

II. Page-Specific Comments

1. **Page 6, Section 2.5:** Please correct the date the ORC socks were removed to July 2011, as per Table 1.

   Navy Response:

   Date has been changed from August 2011 to July 2011.

2. **Page 7, Section 3.2:** This section references Figure 16; however, there are only 15 figures. Please clarify.

   Navy Response:

   The first sentence of Section 3.2 has been edited to refer to Figure 7. The first sentence of the second paragraph has been revised to refer to Figures 7, 12, and 13. The first sentence of the third paragraph has been revised to refer to Figures 7, 14, and 15.

3. **Page 7, Section 3.1:**

   a. Please correct the text to state that the DO reading of 6.59 mg/L at MW-02 was from November 2010 (not November 2011).

   Navy Response:

   The date has been changed in Section 3.1 to November 2010.

   b. Please clarify that the DO readings of 11.15 and 5.44 mg/L in MW-07 are from 2011 and 2012, respectively.

Navy Response:

The sentence has been edited to "… 11.15 mg/L and 5.44 mg/L in 2011 and 2012, respectively, in MW-07 may be the result of localized oxidizing conditions …."

4. **Appendix D:** For the March 2010 data validation report, please clarify why bis(2-ethylhexyl)phthalate was not qualified as a nondetect in sample MW-05 due to equipment blank contamination, as per the Region II guidelines.

Navy Response:

Field samples are associated with their equipment rinseate blanks by the date collected. VWAI-MW05-0310 (collected 3/18/10 12:20) contained bis(2-Ethylhexyl)phthalate at 1.4 J µg/L. The associated equipment blank, VWAI-EB01-031810 (collected 3/18/10 13:00), was nondetect for this compound.