FINAL

IMA

3d Inf Div (Mech)

PILOT STUDY
INTERIM PROGRESS REPORT #5
FOR CORRECTIVE ACTIONS AT
BULK FUEL FACILITY (HAA-09)
FORMER UST 117
AST 7009
HUNTER ARMY AIRFIELD, GEORGIA
FACILITY ID #9-025113*2

Prepared for

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT

Contract Number W912HN-13-R-0023
Delivery Order Number 0001

May 2016

SES Construction and Fuel Services LLC

leidos

16-014(E)/051816

DOCUMENT 22

LEIDOS

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

FINAL

PILOT STUDY
INTERIM PROGRESS REPORT #5
FOR CORRECTIVE ACTIONS AT
BULK FUEL FACILITY (HAA-09)
FORMER UST 117
AST 7009
HUNTER ARMY AIRFIELD, GEORGIA
FACILITY ID #9-025113*2

Prepared for

U.S. Army Corps of Engineers,
Savannah District
Under Contract Number W912HN-13-R-0023
Delivery Order Number 0001

Prepared by

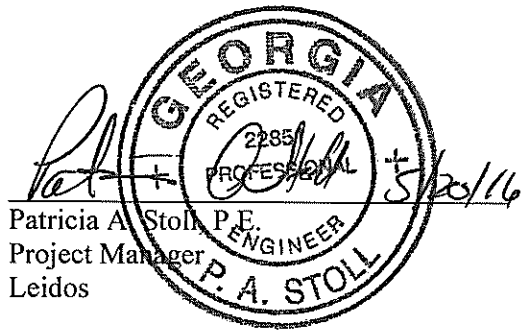
Leidos
301 Laboratory Rd
Oak Ridge, TN 37831

and

SES Construction and Fuel Services, LLC
1006 Floyd Culler Court
Oak Ridge, TN 37830

May 2016

The undersigned certifies that I am a qualified groundwater scientist who has received a baccalaureate or postgraduate degree in the natural sciences or engineering and have sufficient training and experience in groundwater hydrology and related fields, as demonstrated by state registration and completions of accredited university courses, to enable me to make sound professional judgments regarding groundwater monitoring and contaminant fate and transport. I further certify that this report was prepared by myself or by a subordinate working under my direction.



5/20/16

Patricia A. Stoll, P.E.
Project Manager
Leidos

CONTENTS

FIGURES

TABLES

ACRONYMS

AST	aboveground storage tank
BFF	Bulk Fuel Facility
BOD	biological oxygen demand
BTEX	benzene, toluene, ethylbenzene, and xylene
CAP	Corrective Action Plan
COD	chemical oxygen demand
DRO	diesel-range organics
EFR®	Enhanced Fluid Recovery®
GA EPD	Georgia Environmental Protection Division
GRO	gasoline-range organics
GUST	Georgia Underground Storage Tank
HAAF	Hunter Army Airfield
IWQS	In-stream Water Quality Standards
JP	jet propellant
MAE2	Mid-Atlantic Environmental Equipment, Inc.
NFA	no further action
OWS	oil/water separator
PAH	polycyclic aromatic hydrocarbon
RDW	remediation-derived waste
SAIC	Science Applications International Corporation
SP	sample port
STL	soil threshold level
USACE	U. S. Army Corps of Engineers
UST	underground storage tank
USTMP	Underground Storage Tank Management Program
VOC	volatile organic compound
WWTP	waste water treatment plant

1.0 INTRODUCTION

This document represents the fifth Interim Progress Report for pilot study activities at the Bulk Fuel Facility (BFF; HAA-09), Former Underground Storage Tank (UST) 117, Aboveground Storage Tank (AST) 7009 at Hunter Army Airfield (HAAF), Georgia (Figure 1). An initial surfactant flushing pilot study was conducted in 2011 and 2012 at the site by Science Applications International Corporation (SAIC) for the U.S. Army Corps of Engineers (USACE), Savannah District. The 2011 through 2012 pilot study activities were conducted in accordance with the *Corrective Action Plan–Part B Addendum #1, Bulk Fuel Facility (HAA-09), Building 7009, Hunter Army Airfield, Georgia, Facility ID #9-025113*2* (SAIC 2011a), which was approved by the Georgia Environmental Protection Division (GA EPD) through correspondence dated May 2, 2011 (Guentert 2011), and the *Addendum #28 to the Work Plan for Preliminary Groundwater and Corrective Action Plan–Part A/Part B Investigations at Former Underground Storage Tank Sites, Hunter Army Airfield and Fort Stewart, Georgia* (SAIC 2011b). Three Interim Progress Reports associated with the 2011 through 2012 pilot study were previously submitted to GA EPD (SAIC 2012a, 2012b, 2013).

A second round of pilot study activities was initiated in 2014. The 2014 through 2015 pilot study activities are being conducted in accordance with the 2011 Corrective Action Plan (CAP)–Part B Addendum #1 (SAIC 2011a) and the *Addendum #29 to the Work Plan for Preliminary Groundwater and Corrective Action Plan–Part A/Part B Investigations at Former Underground Storage Tank Sites, Hunter Army Airfield and Fort Stewart, Georgia* (Leidos 2014) by SES Construction and Fuel Services, LLC and Leidos for USACE, Savannah District under Contract Number W912HN-13-R-0023, Task Order Number 0001. This Interim Progress Report is the second report associated with the 2014 and 2015 pilot study activities.

This document reviews the site history and contaminants, along with activities associated with the second pilot study for the injection/extraction and treatment operations, quarterly gauging events, and the results of the biannual groundwater monitoring conducted during the period of October 2014 through January 2016.

2.0 SITE HISTORY OF AND CONTAMINANTS AT ABOVEGROUND STORAGE TANK 7009

This section summarizes releases at the BFF and the site history of and contaminants at AST 7009, including the 2011 through 2012 pilot study.

2.1 RELEASES AT THE BULK FUEL FACILITY

The BFF is approximately 600 by 1,200 ft and covers an area of approximately 16.5 acres (Figure 2). Currently, the facility contains two active ASTs (AST 7007 and AST 7009) for the storage of jet propellant (JP)-8 with capacities of approximately 500,000 gal each; above- and underground piping; and off-loader and pump stations for the distribution of fuel to and from the tanks, and a third active AST constructed in 2011 to replace former AST 7005. The capacity of this third AST is 30,000 barrels or 1,260,000 gal. Previously, UST 117, a 550-gal JP-4 fuel tank, and three former 500,000-gal ASTs (AST 7001, AST 7003, and AST 7005) were located at the BFF. Since the closure of UST 117 in 1996, three separate releases have been identified at the BFF under GA EPD Underground Storage Tank Management Program (USTMP) regulations.

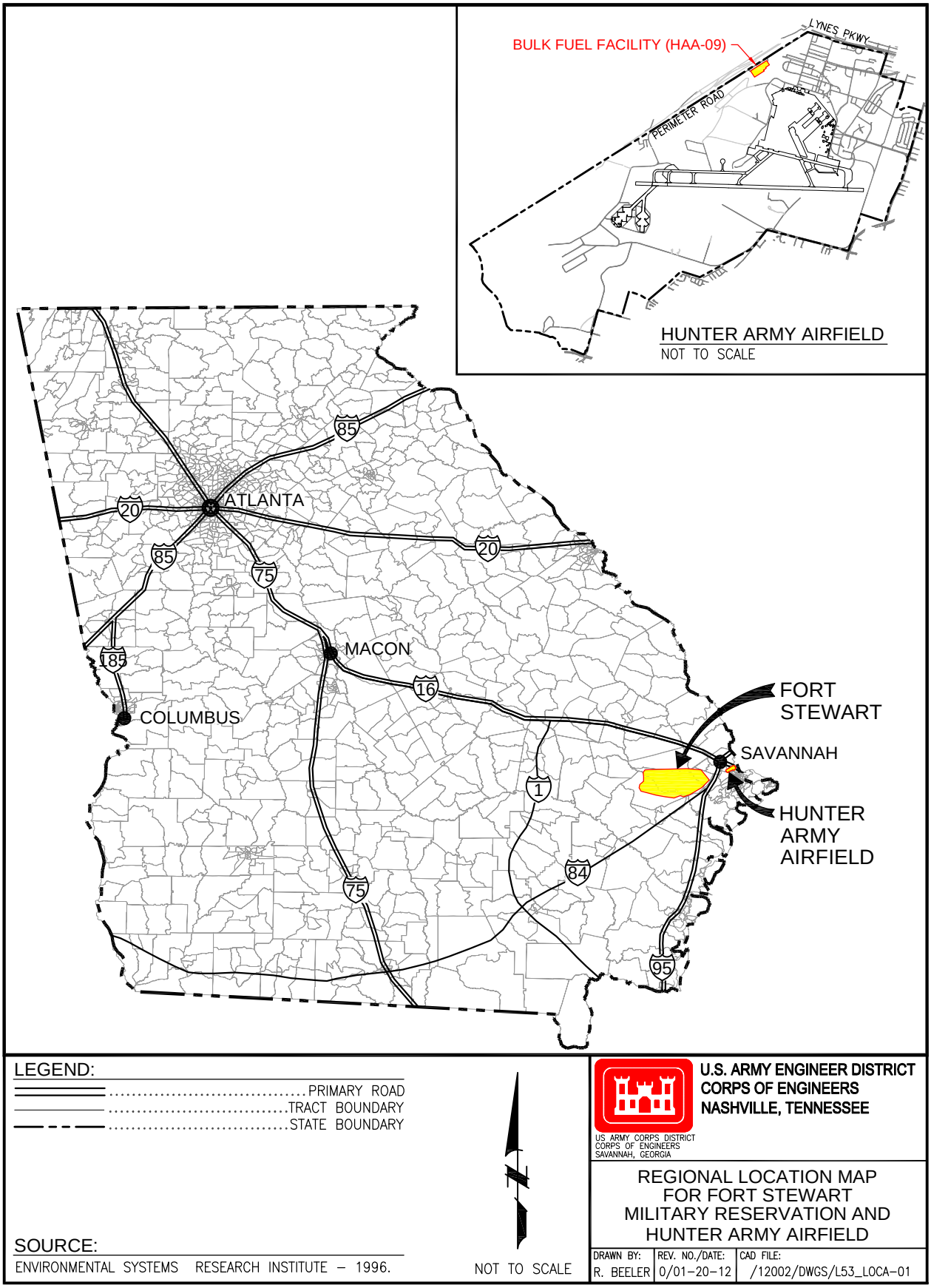


Figure 1. Location of the Bulk Fuel Facility, Hunter Army Airfield, Georgia

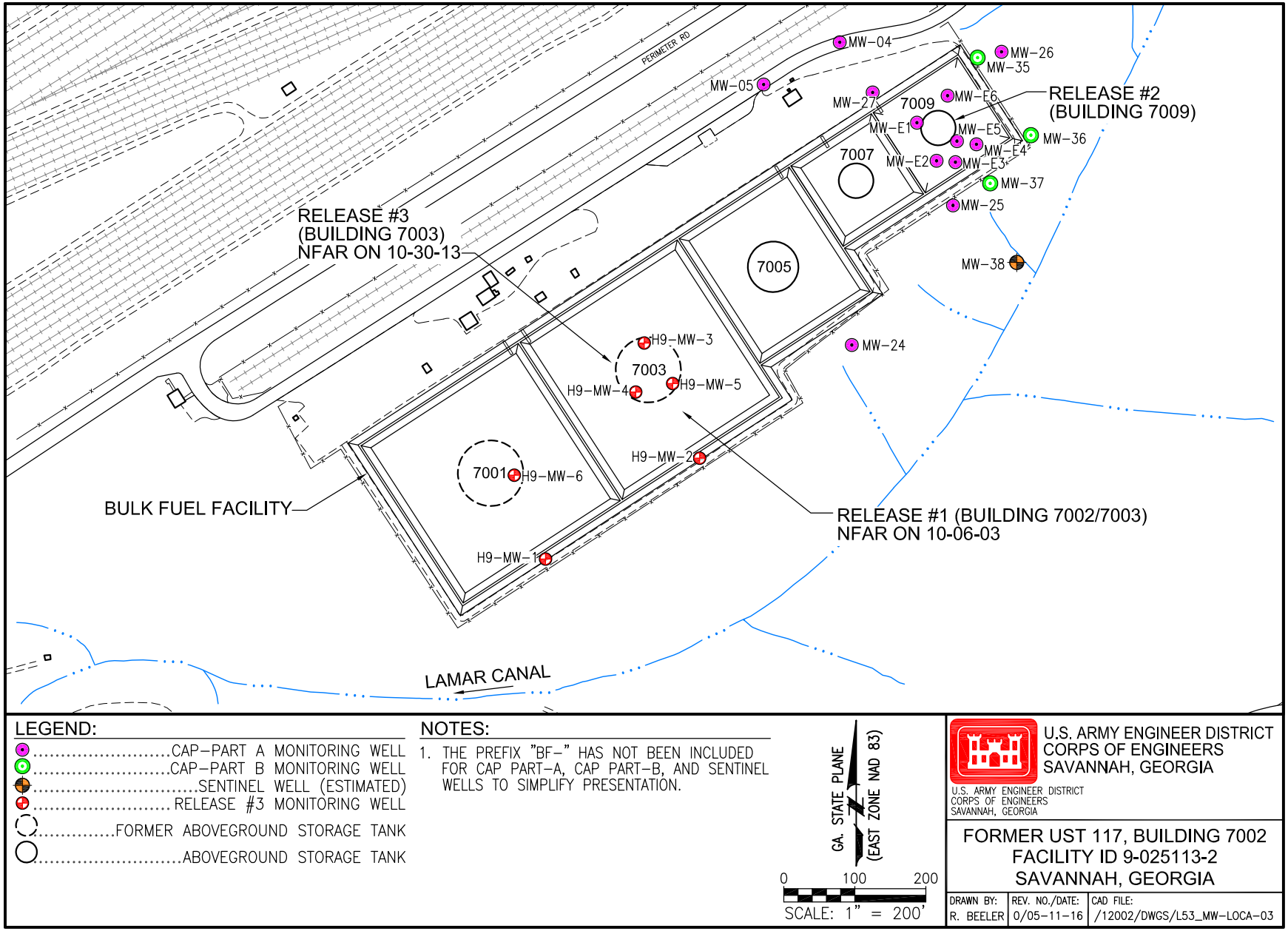


Figure 2. Site Location Map for the Bulk Fuel Facility, Hunter Army Airfield, Georgia

In association with the area designated as Release #1, SAIC performed a soil gas survey of the BFF in January 1999 to identify areas of significant contaminant concentrations (SAIC 1999). SAIC conducted a CAP–Part A investigation in December 1999 and January 2000 and a CAP–Part B investigation from November 2000 to March 2001 to determine the extent of petroleum contamination at the BFF, including the areas around UST 117, AST 7001, AST 7003, AST 7005, AST 7007, and AST 7009. Thirty-four monitoring wells, seven soil borings, and six vertical-profile borings were installed during these investigations, and surface water and sediment samples were collected from Lamar Canal (Figure 2). The *Corrective Action Plan–Part B Report for the Former Underground Storage Tank 117, Building 7002 Site, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*1, Hunter Army Airfield, Georgia* (SAIC 2001) was submitted to GA EPD USTMP in July 2001.

Release #1: UST 117, Building 7002. UST 117 was a 500-gal UST located near Building 7002 at the BFF. This tank was removed and the piping abandoned in place on September 30, 1996. A CAP–Part A investigation was conducted by SAIC between December 1999 and January 2000 to identify areas of significant contamination concentrations (SAIC 2000). A CAP–Part B investigation was conducted by SAIC from November 2000 to March 2001 to determine the extent of petroleum contamination at the site (SAIC 2001). As part of these investigations, a groundwater plume was identified in the vicinity of AST 7003, which is located 100 to 150 ft south of UST 117. Semiannual monitoring of Release #1 was initiated in July 2002 and discontinued in January 2003. GA EPD USTMP granted no further action (NFA) status for Release #1 in correspondence dated October 6, 2003 (Lewis 2003). All wells associated with this release were abandoned between February 2006 and January 2008, with the exception of monitoring wells MW-04 and MW-05.

Release #2: AST 7009. In December 1999 and January 2000, the CAP–Part A investigation associated with Release #1 to identify areas of significant contamination concentrations involved collecting samples from the vicinity of AST 7009. A CAP–Part B investigation, which included the vicinity of AST 7009, was conducted by SAIC from November 2000 to March 2001 to determine the extent of petroleum contamination at the site (SAIC 2001). The nature and extent of contamination was determined during the CAP–Part B investigation. In July 2002, as part of the groundwater monitoring for Release #1, free product was observed in well MW-E5, which is located within the bermed area of AST 7009 (identified as Release #2). The prefix "BF-" is sometimes used to distinguish wells located at the BFF from others at HAAF (i.e., BF-MW-E5); however, as all wells within this plan are located at the BFF, this prefix is not included in well identifiers within this document. This tank is approximately 500 ft northeast of AST 7003 and is hydraulically sidegradient to AST 7003. Semiannual monitoring of Release #2 was initiated in July 2004 and discontinued in January 2005 because detected benzene, toluene, ethylbenzene, and xylene (BTEX) and polycyclic aromatic hydrocarbon (PAH) constituents were below the In-Stream Water Quality Standards (IWQS). GA EPD concurred with the recommendation of suspending the semiannual groundwater sampling until free product removal in BF-MW-E5 is complete (letter from William Logan GA EPD USTMP dated May 16, 2006). Free product removal activities were implemented in July 2004 consisting of absorbent socks in well MW-E5 and bi-monthly or quarterly pumping of the same well. In July 2007, an 8-hr Enhanced Fluid Recovery® (EFR®) event was initiated to vacuum extract the free product from well MW-E5 on a quarterly basis. Free product has not been observed in the other wells located within the berm or those located around the perimeter of the berm for AST 7009. EFR® events were conducted on a quarterly basis through the spring of 2010 with biannual groundwater monitoring of sentinel well MW-38. The final EFR® event was conducted in March 2010. Activities conducted under the USTMP are documented in the reports listed below:

- *Soil Gas Survey Report for the Bulk Fuel Facility (HAA-09) at Hunter Army Airfield, Georgia* (SAIC 1999), documents the results of the 1999 soil gas survey that was performed to identify areas of significant contaminant concentrations.

- *Corrective Action Plan–Part A Report for the Former Underground Storage Tank 117, Building 7002 Site, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*1, Hunter Army Airfield, Georgia* (SAIC 2000), documents the results of the CAP–Part A investigation conducted in 1999 and 2000.

- CAP–Part B Report (SAIC 2001) documents the results of the CAP–Part B investigation conducted in 2000 and 2001.

- *First Annual Monitoring Only Report for Former Underground Storage Tank 117, Building 7002, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*1, Hunter Army Airfield, Georgia* (SAIC 2003), documents the results of the July 2002 and January 2003 monitoring events for Release #1.

- *Second Annual Monitoring and Free Product Removal Report for Former Underground Storage Tank 117, Building 7009, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*2, Hunter Army Airfield, Georgia* (SAIC 2005), documents the results of the July 2004 and January 2005 monitoring events and the free product removal activities conducted between June 2004 and March 2005 for Release #2.

- *Completion Report for Former Underground Storage Tank 117, Building 7002, Release #1, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*1, Hunter Army Airfield, Georgia* (SAIC 2006), documents the well abandonment activities for wells installed as part of the CAP–Parts A and B investigations for UST 117. Wells associated with Release #2 were not abandoned.

- *Third Annual Monitoring and Free Product Removal Report for Former Underground Storage Tank 117, Building 7009, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*2, Hunter Army Airfield, Georgia* (SAIC 2007), documents the results of the free product removal activities between April 2005 and December 2006 for Release #2 and the 2006 free product removal activities for Release #3.

- *Fourth Annual Monitoring and Free Product Removal Report for Former Underground Storage Tank 117, Building 7009, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*2, Hunter Army Airfield, Georgia* (SAIC 2008), documents the results of the 2007 free product removal activities for events for Release #2.

- *2008 Free Product Removal Report for the Bulk Fuel Facility (HAA-09), Building 7009, Hunter Army Airfield, Georgia* (SAIC 2009), documents the results of the 2008 free product removal activities for events for Release #2.

- *2009 Free Product Removal Report for the Bulk Fuel Facility (HAA-09), Building 7009, Hunter Army Airfield, Georgia* (SAIC 2010), documents the results of the 2009 free product removal activities for events for Release #2.

Free product was observed consistently in MW-E5 from 2002 through March 2010. Historical EFR® events at MW-E5 from June 18, 2004, through March 15, 2010, recovered a total of approximately 84 gal of free product. However, free product continued to be measured in the well at thicknesses greater than 1/8 in. (0.01 ft). During the four vacuum events conducted in 2009, free product thickness in MW-E5 ranged from 0.46 to 1.95 ft. In March 2010, free product was present in the well at a thickness of 1.28 ft. Other wells within the bermed area of the BFF remained clean, and BTEX and PAH concentrations from all wells within the vicinity of AST 7009 have remained well below applicable regulatory criteria since the first sampling event in 1999.

By 2010, it was determined that the quarterly vacuum events were not providing the constant treatment needed to remove the measurable free product present at Bulk Fuel Tank 7009 (Release #2). Alternative approaches, such as a soil vapor extraction solution and a surfactant injection solution, were evaluated, and surfactant injection was selected as both a time- and cost-effective option.

Release #3: AST 7003. In May 2006, the concrete foundation and berm for AST 7003 were removed by CAPE Environmental, and free product was discovered at a depth of 3 to 4 ft below ground surface. In August 2006, CAPE Environmental installed four, 2-ft-diameter sumps in the bermed area of former AST 7003. In November 2006, monitoring points were installed on 50-ft centers in the bermed area of the former AST. No water or free product was measured in any of the points; however, soil contamination was identified in the soil headspace readings. Griffin Services was contracted to remove the free product on a routine basis. In November 2009, Arcadis initiated remedial action in the vicinity of former AST 7003. Impacted soil exceeding alternate threshold levels was excavated, and an oxygen-releasing substance was placed in the excavated area to enhance bioremediation of contaminated groundwater. Quarterly groundwater monitoring events through October 2010 demonstrated that dissolved benzene in groundwater near former AST 7003 continued to exceed the alternate concentration limit but that attenuation was occurring. Continued semiannual monitoring demonstrated decreasing concentrations; GA EPD approved NFA for Release #3 in October 2013.

2.2 NATURE AND EXTENT OF CONTAMINATION AT ABOVEGROUND STORAGE TANK 7009 (2001 THROUGH 2011)

2.2.1 Soil

Three soil samples were collected from borings in the vicinity of AST 7009 during the CAP–Part A investigation prior to well installation (SB-25, SB-26, and SB-27). Twelve soil samples were collected from an additional six borings during the CAP–Part B investigation prior to installation of wells MW-E1 through MW-E6. BTEX and PAH concentrations for all constituents except ethylbenzene in those samples were below Georgia UST (GUST) soil threshold levels (STLs) (i.e., Table A, Column 1). Ethylbenzene exceeded the GUST STL (i.e., Table A, Column 1) of 0.370 mg/kg in one sample collected from MW-E3. The detected concentration of 4.5 mg/kg falls below the alternative threshold level of 61.85 mg/kg established for the site within the CAP–Part B Report (SAIC 2001).

The CAP–Part B Report concluded that active remediation/removal of soil was not recommended for the area around Tank 7009.

2.2.2 Groundwater

Groundwater samples were collected from monitoring wells MW-25, MW-26, and MW-27 during the CAP–Part A investigation. Additional groundwater samples were collected from these same three wells and wells MW-E1 through MW-E6 during the CAP–Part B investigation. Maximum detected concentrations of BTEX constituents were all detected in well MW-E5. All detected concentrations of BTEX and PAHs were below applicable GA EPD IWQSs. Free product was not identified in the area of AST 7009 during the CAP–Part B investigation.

Following the CAP–Part B Report, semiannual monitoring of Release #2 was initiated in July 2004. In 2002, during the CAP–B investigation, free product was noted in well MW-E5. Three additional wells (MW-35, MW-36, and MW-37) were installed around the perimeter of the bermed area in the vicinity of AST 7009 to confirm that the free product in MW-E5 was not from an upgradient source or migrating downgradient of the AST containment area. The results of semiannual well gauging from 2002 to 2009

with an oil/water interface probe have indicated that the free product is limited to well MW-E5 and does not extend beyond the bermed area.

BTEX and PAH concentrations from wells within the vicinity of AST 7009 have remained well below applicable regulatory criteria since the first sampling in 1999. The CAP–Part B Addendum #1 (SAIC 2011a) concluded that no groundwater remediation is warranted.

However, as of 2011, free product had been consistently encountered in MW-E5 since 2002. The CAP–Part B Addendum #1 (SAIC 2011a) proposed a pilot study, which was approved by stakeholders, with the following objective:

- Remove free product in excess of 1/8 in. by using surfactant flooding to flush the free product from the pore space of the fine-grained sand beneath the AST.

2.3 REGULATORY REQUIREMENTS

Following submittal of the Third Annual Monitoring and Free Product Removal Report (SAIC 2007), GA EPD USTMP recommended that the site be transferred to the GA EPD Solid Waste Program in correspondence dated February 28, 2008 (Logan 2008). The site is currently being remediated under the GA EPD Solid Waste Program.

2.4 INITIAL PILOT STUDY (2011 THROUGH 2012)

Based upon information gathered during prior facility upgrades and removals, a 4- to 5-ft-thick sand foundation was believed to have been installed underneath the concrete pad of each AST at the BFF. Prior activities at the BFF have resulted in a release of fuel into the subsurface in the vicinity of AST 7009. This fuel was believed to remain trapped within a sand foundation by the surrounding silty clay. Because AST 7009 is an active 500,000-gal AST, a surfactant flood of the fine-grained sand was conducted to flush the free product from the pore space without disruption of facility operations.

Surfactant flushing is a free product removal technology involving the injection and subsequent extraction of chemicals to solubilize and/or mobilize free product. The surfactant is injected into a system of wells positioned to sweep the source zone. The chemical flood and the solubilized or mobilized free product are removed through extraction wells, and the produced liquids are then either disposed (usually via off-site treatment) or treated on-site to remove contaminants.

Addendum #28 to the Work Plan identified locations for nine, 1-in. injection points to be installed around the perimeter of AST 7009 and existing monitoring wells MW-E5 and MW-E1 as primary extraction points (SAIC 2011b). The custom injection/product recovery system was manufactured by Mid-Atlantic Environmental Equipment, Inc. (MAE2) and includes a 10-leg injection manifold and 5-leg vacuum extraction manifold.

During initial injection well installation activities, field personnel encountered a layer of hard-packed soil coated with crystallized oil instead of the anticipated sand. This contaminated layer limited injection flow and product recovery. However, within the first 5 months of operation, approximately 1,000 gal of surfactant (i.e., Biosolve) in an average 2% solution were injected to treat one pore volume in the vicinity of AST 7009.

Primary effluent treatment steps are outlined below:

1. Extracted groundwater and vapors flowed through a liquid/vapor separator; separated vapor was sent to an air stripper vapor discharge, while liquid-phase effluent continued on to a 20,000-gal Baker frac tank.

2. In the frac tank, particulates and free product were allowed to settle and separate, respectively.

3. From the frac tank, liquid-phase effluent continued on through an oil/water separator (OWS); separated oil was stored for off-site disposal as free-phase product in 55-gal drums, and liquid-phase effluent continued on to an air stripper to remove dissolved volatile organic compounds (VOCs).

4. The liquid-phase effluent passed through an ultra-filtration system comprised of sand filters, polymer absorber, and an organo-clay vessel.

5. Finally, the effluent was passed through liquid-phase granular-activated carbon as a final polishing step and discharged to the HAAF waste water treatment plant (WWTP).

Two chemical dose systems (one for anti-fouling and one for anti-foaming) were used as required.

By April 2012, the pilot study product recovery system recovered approximately five pore volumes of groundwater and surfactant solution containing approximately 700 gal of free product, roughly half the volume estimated to be present in the subsurface. Recovery costs using the product recovery system dropped 87% per recovered gallon from historical costs using EFR®.

In mid-April 2012, SAIC and USACE agreed to terminate the pilot study treatment phase; the product recovery system was turned off on April 24, 2012. MAE2 disconnected connections to injection and extraction wells, drained lines within and connected to the treatment trailer, and powered down the system. All remediation-derived waste (RDW) was removed from the site.

Details of the initial pilot study are documented in the reports listed below:

- *Pilot Study Interim Progress Report for Corrective Actions at Bulk Fuel Facility (HA-009), Former UST 117, AST 7009, Hunter Army Airfield, Georgia, Facility ID #9-025113*2* (SAIC 2012a) summarizes installation and startup activities for the pilot study product recovery system and discusses field observations related to subsurface conditions at AST 7009.

- *Pilot Study Interim Progress Report #2 for Corrective Actions at Bulk Fuel Facility (HA-009), Former UST 117, AST 7009, Hunter Army Airfield, Georgia, Facility ID #9-025113*2* (SAIC 2012b) provides additional information on pilot study operation and results through May 2012.

- *Pilot Study Interim Progress Report #3 for Corrective Actions at Bulk Fuel Facility (HAA-09), Former UST 117, AST 7009, Hunter Army Airfield, Georgia, Facility ID #9-025113*2* (SAIC 2013) presents the results of four quarterly gauging events following surfactant injection/extraction activities and analytical results of groundwater sampling at two site monitoring wells, MW-E5 and MW-38, in November 2012.

Four rounds of quarterly gauging at extraction wells MW-E1 through MW-E6 were performed between April 30, 2012, and February 2, 2013. Three of the four quarterly events showed that free product was accumulating in well MW-E5 again, thus indicating that free product was still tied up in the soil column.

Results of groundwater sampling conducted in November 2012 confirmed that BTEX concentrations remain well below applicable regulatory criteria.

3.0 PREPARATORY FIELD ACTIVITIES

This section summarizes preparatory field activities conducted prior to the initiation of injection activities in the 2014 through 2015 pilot study.

3.1 SOIL TREATABLITY TESTING

A composite soil sample was collected from the BFF at AST 7009 in April 2014 and submitted for a co-solvent treatability test. The use of a co-solvent was determined to not be appropriate for field-scale application during this pilot study. Soil sampling details and results of the co-solvent treatability test were presented in Addendum #29 to the Work Plan (Leidos 2014).

3.2 INJECTION WELL ABANDONMENT

On October 16, 2014, field personnel attempted to remove the boot from existing injection well BFF-7J for re-use at a new injection well. Although the boot was removed, it could not be re-used, and injection well BFF-7J was abandoned in place by filling with grout. The polyvinyl chloride riser was cut off below the ground surface, and the BFF liner was patched.

3.3 INJECTION WELL INSTALLATION

During October 17 through 19, 2014, six new injection wells (BFF-AJ through BFF-FJ) were installed via hand auger at the approximate locations shown in Figure 3. Injection well construction details are summarized in Table 1. Boring logs and injection well construction diagrams are presented in Appendix A.

Table 1. Injection Wells Installed at AST 7009 for Second Pilot Study

Injection Well ID	Material	Screened Interval (ft BGS)
BFF-AJ	1-in. Schedule 40 PVC	1.3 – 6.3
BFF-BJ	1-in. Schedule 40 PVC	3.7 – 8.7
BFF-CJ	1-in. Schedule 40 PVC	5.1 – 10.1
BFF-DJ	1-in. Schedule 40 PVC	4.4 – 9.4
BFF-EJ	1-in. Schedule 40 PVC	4.8 – 6.8
BFF-FJ	1-in. Schedule 40 PVC	6.4 – 8.4

AST = Aboveground storage tank.
BGS = Below ground surface.
ID = Identifier.
PVC = Polyvinyl chloride.

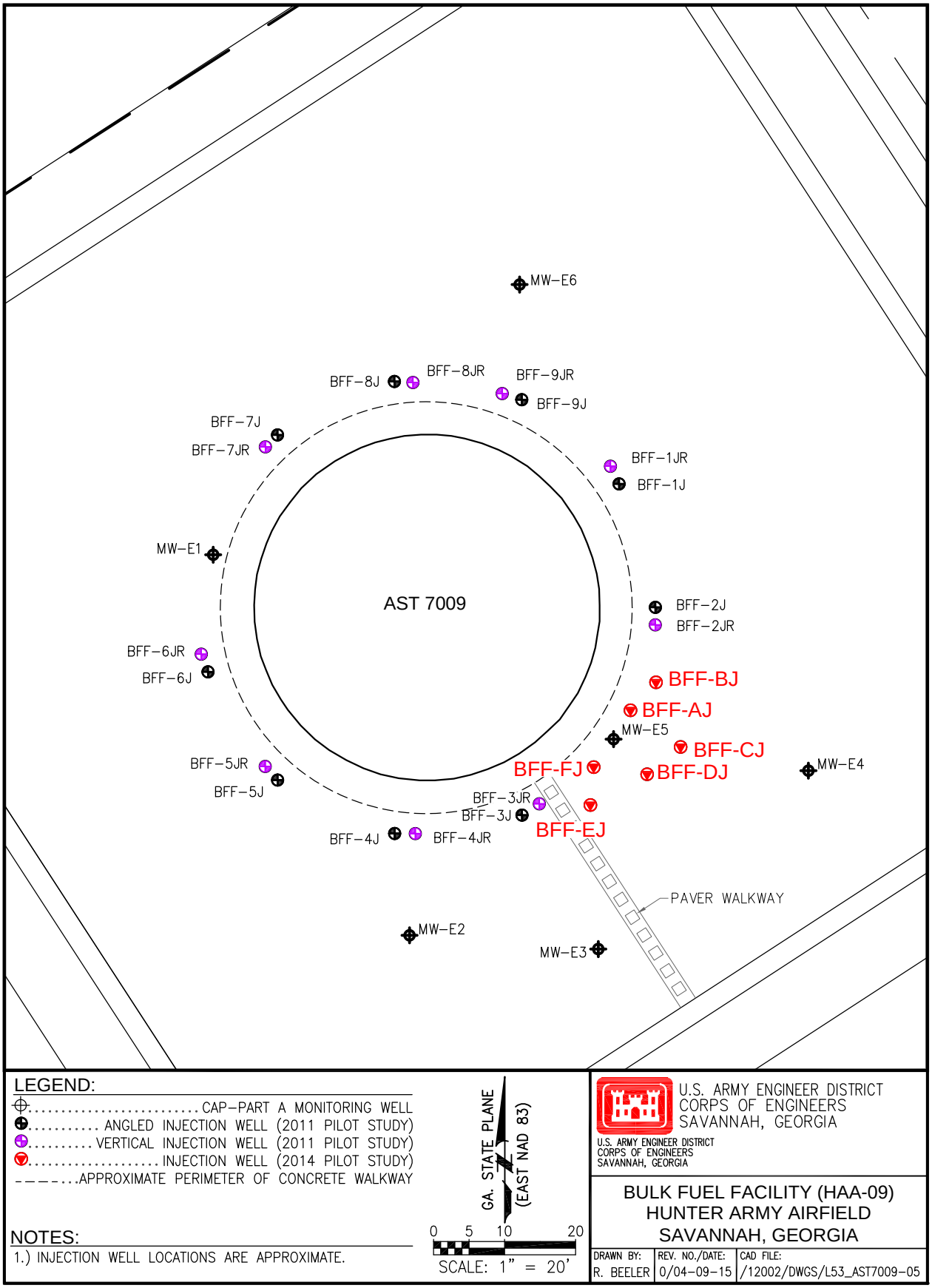


Figure 3. Site Layout

3.4 SYSTEM PREPARATION

During a site visit on September 17, 2014, it was noted that the 3-phase power feed at the telephone pole had been damaged. Pro-Electric repaired the damaged electrical box and associated wiring in October 2014.

Field personnel mobilized to the site for pilot study system preparations on November 3, 2014. The following activities were conducted from November 3 through 8, 2014:

- General site housekeeping activities were conducted, including clearing/killing vegetation in the work area and disposing of all empty surfactant drums.
- Well heads at all but two of the remaining injection wells from the first pilot study (BFF-1J, BFF-4J through BFF-6J, BFF-8J, and BFF-9J) were cut off for re-use. Risers were capped pending the completion of pilot study activities when injection wells will be abandoned.
- A 20,000-gal frac tank was received and sited.
- A water level transducer was installed in the frac tank.
- Power to the treatment system was confirmed.
- The treatment system effluent pipeline connection to the Base sanitary sewer force main was visually inspected and determined to require no repairs or adjustments.
- System pumps were tested for full functionality.
- A gravity-feed system was established for injection activities.

The gravity-feed injection system was selected for use in lieu of pumps due to the tight sand and clay observed in borings surrounding MW-E5 during collection of treatability soil samples in April 2014 and confirmed during injection well installation in October 2014. A gravity-feed test run yielded a combined injection rate of approximately 0.5 gal per minute. Surfactant solution was mixed to the appropriate ratio (6% Biosolve) and placed in a 250-gal poly tank located on the roof of the treatment system. From the poly tank, surfactant solution would be discharged to the six injection wells (BFF-AJ through BFF-FJ). The poly tank would be refilled with surfactant solution as necessary during injection events.

MAE2 arrived on-site the following week (November 10, 2014) to test the multi-phase treatment system prior to the start of injection/extraction activities. Minor system components (e.g., gauges and gaskets) were replaced, and a replacement backwash pump was ordered. The treatment system was ready for operation by startup on December 2, 2014.

4.0 PILOT STUDY OPERATIONS (2014 THROUGH 2015)

As established in Addendum #29 to the Work Plan (Leidos 2014), two rounds of surfactant injection, extraction, and treatment were conducted during the second pilot study. Chains of custody and complete analytical results for effluent samples are presented in Appendix B.

4.1 INJECTION ROUND 1

The first round of surfactant injection was conducted from November 20 to December 19, 2014. Approximately 2,630 gal of surfactant solution (6% Biosolve) was injected into the six injection wells (BFF-AJ, BFF-BJ, BFF-CJ, BFF-DJ, BFF-EJ, and BFF-FJ) surrounding MW-E5; approximately 15,300 gal of injected surfactant and site groundwater were extracted from MW-E5 and temporarily stored on-site in the frac tank.

Prior to discharging any treated effluent to the HAAF WWTP via the sanitary sewer, a startup sample was analyzed to provide representative concentrations of key parameters in the treated effluent. During the week of December 1, 2014, approximately 225 gal was pumped from the frac tank through the treatment system and then sampled for VOCs, diesel-range organics (DRO), gasoline- range organics (GRO), phenols, iron, oil and grease, total suspended solids, total dissolved solids, biological oxygen demand (BOD), chemical oxygen demand (COD), pH, and hardness. Preliminary results of these startup analyses were submitted for HAAF WWTP approval on December 11, 2014. In addition, an effluent air sample was collected from sample port (SP)-402 and analyzed for VOCs by TO-15. Results of these analyses are summarized in Tables 2 and 3.

Following HAAF WWTP approval to discharge (received on January 8, 2015), initial attempts to restart the treatment system were unsuccessful. Water was determined to have infiltrated the buried electrical feed during the week of December 22, 2014. The damaged electrical line was repaired by Pro-Electric, and the treatment system was restarted on January 20, 2015.

A treated effluent sample was collected from SP-803 during treatment operations on January 20, 2015, and analyzed for VOCs, DRO, GRO, phenols, iron, oil and grease, total suspended solids, total dissolved solids, BOD, COD, pH, and hardness. An effluent air sample also was collected from SP-402 and submitted for analysis of VOCs by TO-15. Results of these analyses are summarized in Tables 2 and 3.

4.2 INJECTION ROUND 2

The second round of injections was initiated on January 27, 2015. Approximately 2,435 gal of surfactant solution (6% Biosolve) were injected in the second round, and extraction operations continued for approximately 1 week after injections were complete (through February 17, 2015). Approximately 27,000 gal of groundwater/surfactant mixture were extracted from MW-E5 to maintain hydraulic control of the injected fluids and to pull the surfactant solution through the contaminated soil zone surrounding MW-E5. No free product was observed within the frac tank during the 4-month pilot study operational period, and negligible (<5 gal) free product was captured by the treatment system OWS.

Due to the reduced amount of free-phased product recovered during the second surfactant injection/extraction event, it appears that the maximum amount of mobile and recoverable free-phased liquid beneath AST 7009 has been removed. It was noted, however, that additional free-phased product may still be bound to the soils and, with time, may migrate to MW-E5 within the secondary containment area of AST 7009. As a result of the BFF being an active facility and an insufficient amount of recoverable volume of free-phased product, the continued active free-phased recovery system at the BFF is impractical at this time. A treated effluent sample was collected from SP-803 on February 11, 2015, and analyzed for VOCs, DRO, GRO, phenols, iron, oil and grease, total suspended solids, total dissolved solids, BOD, COD, pH, and hardness. Results of the analyses are summarized in Table 2.

Table 2. Analytical Results of Treated Effluent Samples

Date		**12/03/14**	**01/20/15**	**02/11/15**
Sample Location		**Poly Tank**	**SP-803**	**SP-803**
Sample ID		**BFF80301**	**BFF80302**	**BFF80303**
Sample Description	**Unit**	**Startup**	**Bi-weekly #1**	**Bi-weekly #2**
Volatile Organic Compounds[a]				
Acetone	µg/L	1.95 J	4.08 J	5.0 U
Total Petroleum Hydrocarbons				
DRO	mg/L	4.27 J	2.39	36.5
GRO	mg/L	0.050 U	0.0281 J	0.0646
Miscellaneous				
BOD	mg/L	8.94	4.72 J	27.8
COD	mg/L	92.6	102	281
Hardness (as $CaCO_3$)	mg/L	87.3	68.0	800
Iron	mg/L	9.69	8.82	9.49
Oil and grease	mg/L	2.66 J	1.63 J	29.9
pH	S.U.	5.90	6.89 J	8.04 J
Phenol	mg/L	0.00447 U	0.119	0.237 J
TDS	mg/L	470	234	373
TSS	mg/L	4.10	4.80	13.6 J

[a] Only volatile organic compounds detected in one or more samples are shown.
BOD = Biological oxygen demand.
$CaCO_3$ = Calcium carbonate.
COD = Chemical oxygen demand.
DRO = Diesel-range organics.
GRO = Gasoline-range organics.
ID = Identifier.
S.U. = Standard unit.
TDS = Total dissolved solids.
TSS = Total suspended solids.
Laboratory Qualifiers
J = Detected at an estimated concentration.
U = Not detected at the concentration shown.

Table 3. Volatile Organic Compounds Detected in Effluent Air Samples

Date		**12/03/14**	**01/20/15**
Sample Location		**SP-402**	**SP-402**
Sample ID		**BFF40201**	**BFF40202**
Sample Description	**Unit**	**Startup**	**Bi-weekly #1**
2-Butanone	ppb_v	2.6	0.48 J
2-Hexanone	ppb_v	0.24 J	0.1 U
4-Methyl-2-Pentanone	ppb_v	0.16 J	0.1 U
Acetone	ppb_v	13.7	25.1
Benzene	ppb_v	0.38 J	0.21 J
Carbon Disulfide	ppb_v	0.1 U	0.36 J
Carbon Tetrachloride	ppb_v	0.08	0.08
Chloroform	ppb_v	0.1 U	0.54
Chloromethane	ppb_v	0.58	0.59
Cyclohexane	ppb_v	1.3	2.6
Dichlorodifluoromethane	ppb_v	0.65	0.64
Ethylbenzene	ppb_v	0.1 U	0.26 J
Isopropylbenzene	ppb_v	0.1 J	0.1 U
m/p-Xylene	ppb_v	0.23 J	0.8 J
Methylene Chloride	ppb_v	0.2 U	2
o-Xylene	ppb_v	0.14 J	0.37 J
Styrene	ppb_v	2.7	1.1
Toluene	ppb_v	1.4	3.4
Total Xylenes	ppb_v	0.37	1.17
Trichlorofluoromethane	ppb_v	0.27 J	0.23 J

Note: Only analytes detected in one or more samples are shown.
ID = Identifier.
ppb_v = Parts per billion by volume.
Laboratory Qualifier
J = Detected at an estimated concentration.
U = Not detected at the concentration shown.

5.0 BIANNUAL GROUNDWATER SAMPLING

On November 13, 2014, groundwater samples were collected from well MW-E5, located within the bermed area of AST 7009, and downgradient sentinel well MW-38. Samples were submitted to an off-site laboratory for analysis of BTEX. Results of the November 2014 sampling event are presented in Table 4. The only detected constituent was toluene, which was detected at a concentration of 2.51 µg/L in MW-E5 and below its respective IWQS of 200,000 µg/L.

Table 4. Groundwater Analytical Results for BTEX, 1999 through 2014

Sample Location	Sample ID	Date Sampled	Benzene (µg/L)		Toluene (µg/L)		Ethylbenzene (µg/L)		Xylenes (µg/L)		Total BTEX (µg/L)
CAP-Part A Investigation – December 1999 and January 2000											
MW-25	BF2512	12/02/99	1	U	1	U	1	U	3	U	ND
MW-26	BF2612	12/02/99	1	U	1	U	1	U	3	U	ND
MW-27	BF2712	01/11/00	1	UJ	1	UJ	1	UJ	3	UJ	ND
CAP-Part B Investigation – December 2000											
MW-25	BF2522	12/02/00	1	U	1	U	1	U	3	U	ND
MW-26	BF2622	12/02/00	1	U	1	U	1	U	3	U	ND
MW-27	BF2722	12/03/00	1	U	1	U	1	U	3	U	ND
MW-E1	BFE122	12/01/00	1	U	1	U	0.99	J	0.45	J	1.44
MW-E2	BFE222	12/02/00	1	U	0.3	J	1	U	3	U	0.3
MW-E3	BFE322	12/02/00	1	U	0.48	J	1	U	0.3	J	0.78
MW-E4	BFE422	12/02/00	0.29	J	0.27	J	0.28	J	0.36	J	1.2
MW-E5	BFE522	12/02/00	3.6	=	1	=	17.2	=	19	=	40.8
MW-E6	BFE622	12/01/00	1	U	1	U	1	U	3	U	ND
Third Semiannual Sampling Event – July 2004											
MW-25	BF2552	07/16/04	1	U	1	U	1	U	1	U	ND
MW-26	BF2652	07/16/04	1	U	1	U	1	U	1	U	ND
MW-27	BF2752	07/16/04	1	U	1	U	1	U	1	U	ND
MW-35	BF3552	07/17/04	1	U	1	U	1	U	1	U	ND
MW-36	BF3652	07/17/04	1	U	1	U	1	U	1	U	ND
MW-37	BF3752	07/17/04	1	U	1	U	1	U	1	U	ND
MW-E1	BFE152	07/16/04	1	U	1	U	1	U	1	U	ND
MW-E2	BFE252	07/16/04	1	U	1	U	1	U	1	U	ND
MW-E3	BFE352	07/16/04	1	U	1	U	1	U	1	U	ND
MW-E4	BFE452	07/16/04	1	U	1	U	1	U	1	U	ND
MW-E5	BFE552	07/16/04	2	=	1	U	17.3	=	42.7	=	62.0
MW-E6	BFE652	07/16/04	1	U	1	U	1	U	1	U	ND
In-Stream Water Quality Standards (Georgia Rule 391-3-6.03)			51		200,000		28,718		NRC		NRC
Alternate Concentration Limits			634		—		—		—		—

Table 4. Groundwater Analytical Results for BTEX, 1999 through 2014 (continued)

Sample Location	Sample ID	Date Sampled	Benzene (µg/L)		Toluene (µg/L)		Ethylbenzene (µg/L)		Xylenes (µg/L)		Total BTEX (µg/L)
Fourth Semiannual Sampling Event (Release #2) – January 2005											
MW-25	BF2562	01/12/05	1	U	1	U	1	U	1	U	ND
MW-26	BF2662	01/13/05	1	U	1	U	1	U	1	U	ND
MW-27	BF2762	01/13/05	1	U	1	U	1	U	1	U	ND
MW-35	BF3562	01/14/05	1	U	1	U	1	U	1	U	ND
MW-36	BF3662	01/14/05	1	U	1	U	1	U	1	U	ND
MW-37	BF3762	01/14/05	1	U	1	U	1	U	1	U	ND
MW-E1	BFE162	01/13/05	1	U	1	U	1	U	1	U	ND
MW-E2	BFE262	01/13/05	1	U	1	U	1	U	1	U	ND
MW-E3	BFE362	01/13/05	1	U	1	U	1	U	1	U	ND
MW-E4	BFE462	01/13/05	1	U	1	U	1	U	0.9	J	0.9
MW-E5	BFE562	01/13/05	1	U	0.43	J	10.4	=	34.9	=	45.73
MW-E6	BFE662	01/13/05	1	U	0.47	J	1	U	1	U	ND
Sentinel Well Sampling – December 2007											
MW-38	BF3872	12/10/07	1	U	1	U	1	U	1	U	ND
First Biannual Sampling Event – October 2009											
MW-E5	BFE592	10/08/09	3.82	=	0.360	J	34.7	=	69.4	=	108.28
MW-38	BF3892	10/08/09	1	U	1	U	1	U	1	U	ND
Second Biannual Sampling Event – November 2012											
MW-E5	BFE5A2	11/29/12	1	U	0.51	J	1	U	3	U	0.51
MW-38	BF38A2	11/29/12	1	U	1	U	1	U	1	U	ND
Third Biannual Sampling Event – November 2014											
MW-E5	BFE5A2	11/13/14	1	U	2.51	=	1	U	3	U	2.51
MW-38	BF38A2	11/13/14	1	U	1	U	1	U	3	U	ND
In-Stream Water Quality Standards (Georgia Rule 391-3-6.03)			51		200,000		28,718		NRC		NRC
Alternate Concentration Limits			634		—		—		—		—

BTEX = Benzene, toluene, ethylbenzene, and xylene.
CAP = Corrective Action Plan.
ID = Identifier.
ND = Not detected.
NRC = No regulatory criterion.

Laboratory Qualifier
J = Detected at an estimated concentration.
U = Not detected at the concentration shown.
UJ = Not detected at the estimated concentration shown.
'=' = Detected at the concentration shown.

The chain of custody and complete analytical results for biannual sampling are provided in Appendix B.

In conjunction with the biannual monitoring event, a sample of free product was collected from extraction well MW-E5 and submitted to an off-site laboratory for fingerprint analysis of DRO. Fingerprint sampling was conducted to evaluate the possibility that continued free product observations in MW-E5 might be the result of an ongoing leak or recent spill. Historical fuels stored on-site at the BFF included JP-4 and JP-8; however, the Air Force recently converted to the more common and commercially available Jet A fuel. The same additive package used for JP-8 is added to Jet A fuel, and the combination is identified as F-24. For comparative purposes, a sample of F-24 aviation fuel obtained from the BFF also was submitted for fingerprint analyses. Results of the two analyses indicate that the free product sample from MW-E5 exhibits hydrocarbons higher in the carbon range than those of the F-24 fuel sample, which closely resembles kerosene. An overlay chromatogram created by the laboratory does not show any conformity between the two samples (Figure 4), indicating that the free product in MW-E5 is not likely a release that contains F-24.

6.0 QUARTERLY GAUGING

Four quarterly gauging events were conducted at site wells BFF-MW-E1 through BFF-MW-E6 following system shutdown (Figure 3). Gauging began on March 18, 2015, approximately 1 month after extraction operations ended, and subsequent gauging events were conducted on June 18, 2015; October 7, 2015; and January 5, 2016. The product recovery sock was removed at least 1 week prior to each gauging event. Results of the quarterly gauging events indicate that free product remains present in MW-E5 at thicknesses ranging from 0.13 to 0.74 ft (Table 5). The free product zone was observed at least 1 ft above the top of the screened interval during all four gauging events. The groundwater flow direction was reported to the southeast, consistent with historical water level measurements.

7.0 REMEDIATION-DERIVED WASTE

Soil RDW generated during the installation of injection points was containerized in two 55-gal drums. Based upon analytical results for Toxicity Characteristic Leachate Procedure VOCs and metals and site process knowledge, the soils were determined to be non-hazardous. These non-hazardous soil drums were removed from the site on March 4, 2015, and transported for disposal by EQ-Environmental Quality Co. A copy of the chain of custody and complete analytical results are included in Appendix B; a copy of the waste manifest is provided in Appendix C.

All extracted groundwater/surfactant mixture was pumped to the 20,000-gal frac tank and ultimately passed through the treatment system and discharged to the HAAF WWTP. Purge water from the 2014 biannual sampling event also was treated and discharged to the HAAF WWTP. Thus, no off-site disposal of liquid RDW was required.

8.0 PROBLEMS ENCOUNTERED

The frac tank was scheduled for pickup on March 11, 2015; however, upon arrival, the tractor truck got stuck in the wet grass and had to be pulled out by a wrecker. The frac tank has been removed from the site.

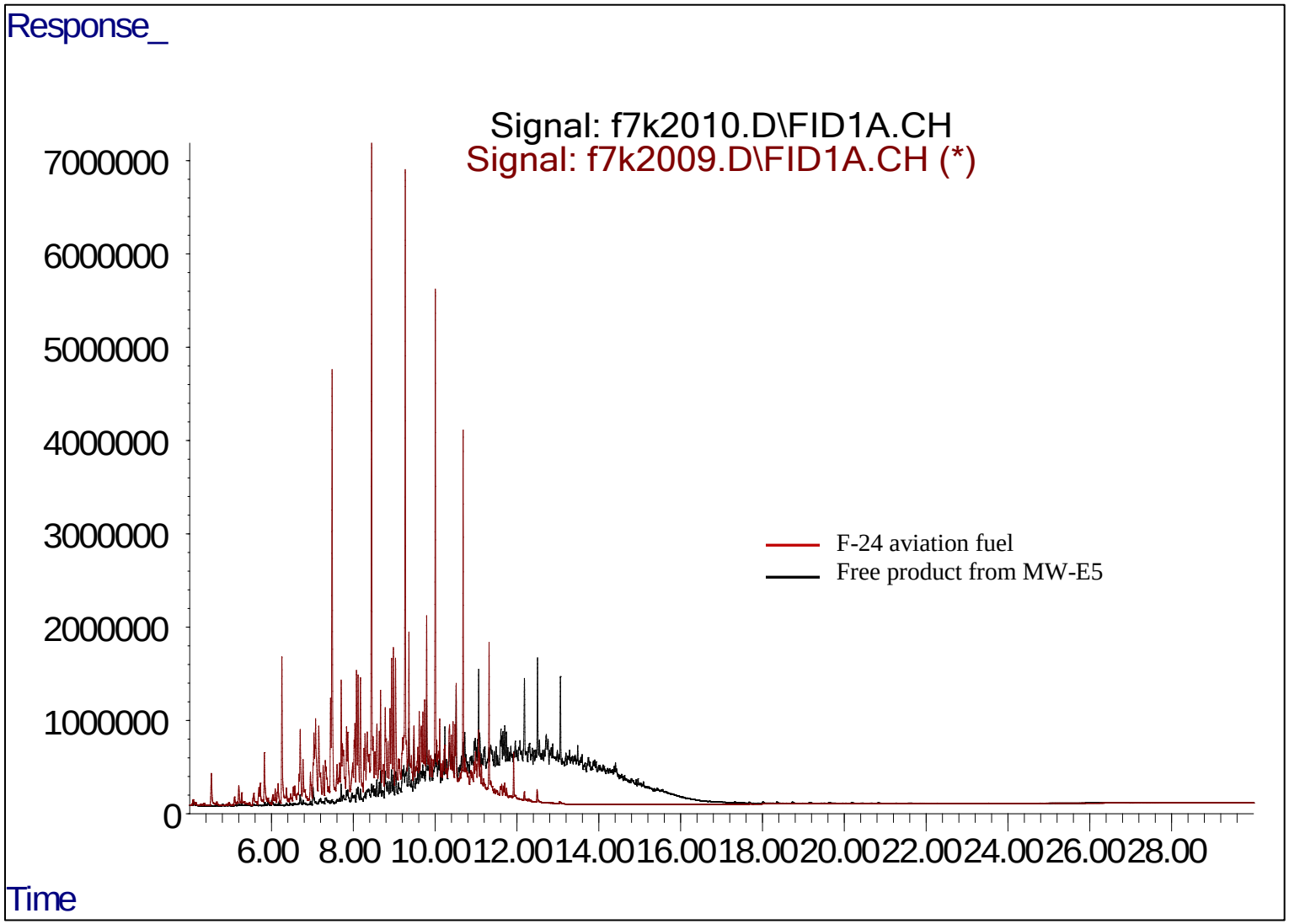


Figure 4. Chromatogram Overlay for Analyses of F-24 Aviation Fuel and Site Free Product

Table 5. Quarterly Well Gauging Results – March 2015 through January 2016

Well Number	Top of Casing Elevation (ft AMSL)	Depth of Screened Interval (ft BGS)	Depth of Screened Interval (ft BTOC)	Depth to Water (ft BTOC)	Depth to Free Product (ft BTOC)	Product Thickness (ft)	Corrected Groundwater Elevation[a] (ft AMSL)
March 18, 2015							
BF-MW-E1	14.00	4.6 – 14.6	NA	2.40	––	0	11.60
BF-MW-E2	13.76	3.94 – 13.94	NA	2.16	––	0	11.60
BF-MW-E3	13.99	4.4 – 14.4	NA	2.71	––	0	11.28
BF-MW-E4	13.88	4.6 – 14.6	NA	2.90	––	0	10.98
BF-MW-E5	14.00	4.8 – 14.8	4.7 – 14.7	2.95	2.82	0.13	11.16
BF-MW-E6	13.76	3.7 – 13.7	NA	1.81	––	0	11.95
June 18, 2015							
BF-MW-E1	14.00	4.6 – 14.6	NA	3.52	––	0	10.48
BF-MW-E2	13.76	3.94 – 13.94	NA	3.40	––	0	10.36
BF-MW-E3	13.99	4.4 – 14.4	NA	4.00	––	0	9.99
BF-MW-E4	13.88	4.6 – 14.6	NA	4.33	––	0	9.55
BF-MW-E5	14.00	4.8 – 14.8	4.7 – 14.7	4.21	3.67	0.54	10.27
BF-MW-E6	13.76	3.7 – 13.7	NA	3.05	––	0	10.71
October 7, 2015							
BF-MW-E1	14.00	4.6 – 14.6	NA	2.84	––	0	11.16
BF-MW-E2	13.76	3.94 – 13.94	NA	2.64	––	0	11.12
BF-MW-E3	13.99	4.4 – 14.4	NA	3.15	––	0	10.84
BF-MW-E4	13.88	4.6 – 14.6	NA	3.35	––	0	10.53
BF-MW-E5	14.00	4.8 – 14.8	4.7 – 14.7	3.78	3.04	0.74	10.87
BF-MW-E6	13.76	3.7 – 13.7	NA	2.43	––	0	11.33
January 5, 2016							
BF-MW-E1	14.00	4.6 – 14.6	NA	2.38	––	0	11.62
BF-MW-E2	13.76	3.94 – 13.94	NA	2.46	––	0	11.30
BF-MW-E3	13.99	4.4 – 14.4	NA	3.01	––	0	10.98
BF-MW-E4	13.88	4.6 – 14.6	NA	3.16	––	0	10.72
BF-MW-E5	14.00	4.8 – 14.8	4.7 – 14.7	3.30	3.04	0.26	10.93
BF-MW-E6	13.76	3.7 – 13.7	NA	2.14	––	0	11.62

[a] Corrected groundwater elevation based on a product density of 880 kg/m^3.
AMSL = Above mean sea level.
BGS = Below ground surface.
BTOC = Below top of casing.
NA = Not available.

9.0 COMMUNICATIONS/CONTACTS

A follow-on pilot testing notification was submitted to Mr. Bijan Rahbar at GA EPD by email on October 9, 2014; Mr. Rahbar approved a 90-day injection timeframe in an email that same date. Copies of the 2011 initial permit request, the 2011 approval email, and 2014 email correspondence can be found in Appendix D.

10.0 CONCLUSIONS AND RECOMMENDATIONS

Two rounds of surfactant injection were conducted as part of a second pilot study between November 2014 and February 2015 at AST 7009 at the HAAF BFF. Approximately 5,065 gal of 6% Biosolve solution was gravity-fed into six injection wells surrounding well MW-E5 during a 90-day window (November 20, 2014, through February 10, 2015) in compliance with GA EPD pilot testing approval. In conjunction with injection activities, approximately 42,000 gal of groundwater/surfactant mixture was extracted from MW-E5 to maintain hydraulic control of the injected fluids and to pull the surfactant solution through the contaminated soil zone surrounding MW-E5.

No free product was observed within the frac tank during the 4-month pilot study operational period, and negligible (<5 gal) free product was captured by the treatment system OWS. Results of the quarterly gauging events indicate that free product remains present in MW-E5 at thicknesses ranging from 0.13 to 0.74 ft. The last gauging event conducted in January 2016 reported a free product thickness of 0.26 ft in MW-E5. The free product zone was observed at least 1 ft above the top of the screened interval during all four gauging events.

Due to the reduced amount of free-phased product recovered during the second surfactant injection/extraction event, it appears that the maximum amount of mobile and recoverable free-phased liquid beneath AST 7009 has been removed. As a result of the BFF being an active facility and an insufficient amount of recoverable volume of free-phased product within the secondary containment area of AST 7009, HAAF recommends that NFA be required at this site, as the continued removal of free-phased product at this operational facility is no longer viable. Per the U.S. Environmental Protection Agency's Spill Prevention Control Countermeasures regulations, remedial activities within the secondary containment of an active AST are prohibited if they impact the integrity of the secondary containment. The appearance of free-phased product has continuously only been exhibited beneath the secondary containment area in one well located currently within the secondary containment area, and all groundwater constituents associated with Release #2 have been below their respective IWQS since 2005.Upon approval of NFA required, all injection/monitoring wells will be properly abandoned, and the liner within the secondary containment area will be repaired via a thermal fusion welding process utilizing an industrial-grade ethylene interpolymer alloy geomembrane material.

11.0 REFERENCES

Guentert, James S. 2011. Letter to Thomas C. Fry (Fort Stewart Directorate of Public Works Environmental Branch) regarding approval of the Corrective Action Plan–Part B Addendum for AST 7009, Bulk Fuel Facility (HAA-09), May 2.

Leidos 2014. *Addendum #29 to the Work Plan for Preliminary Groundwater and Corrective Action Plan–Part A/Part B Investigations at Former Underground Storage Tank Sites, Hunter Army Airfield and Fort Stewart, Georgia*.

Lewis, Lisa L. 2003. Letter to Thomas C. Fry (Fort Stewart Directorate of Public Works Environmental Branch) regarding approval of no further action for Release #1 and proceed with corrective action on Release #2, October 6.

Logan, William 2006. Letter to Algeana Stevenson (Fort Stewart Directorate of Public Works Environmental Branch) regarding semiannual groundwater sampling for Release #2 at AST 7009, May 16.

Logan, William 2008. Letter to Algeana Stevenson (Fort Stewart Directorate of Public Works Environmental Branch) regarding review comments on the Third Annual Monitoring and Free Product Removal Report, February 28.

SAIC (Science Applications International Corporation) 1999. *Soil Gas Survey Report for the Bulk Fuel Facility (HAA-09) at Hunter Army Airfield, Georgia,* November.

SAIC 2000. *Corrective Action Plan–Part A Report for the Former Underground Storage Tank 117, Building 7002 Site, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*1, Hunter Army Airfield, Georgia,* Oak Ridge, TN, June.

SAIC 2001. *Corrective Action Plan–Part B Report for the Former Underground Storage Tank 117, Building 7002 Site, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*1, Hunter Army Airfield, Georgia,* Oak Ridge, TN, July.

SAIC 2003. *First Annual Monitoring Only Report for Former Underground Storage Tank 117, Building 7002, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*1, Hunter Army Airfield, Georgia,* July.

SAIC 2005. *Second Annual Monitoring and Free Product Removal Report for Former Underground Storage Tank 117, Building 7009, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*2, Hunter Army Airfield, Georgia,* December.

SAIC 2006. *Completion Report for Former Underground Storage Tank 117, Building 7002, Release #1, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*1, Hunter Army Airfield, Georgia,* July.

SAIC 2007. *Third Annual Monitoring and Free Product Removal Report for Former Underground Storage Tank 117, Building 7009, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*2, Hunter Army Airfield, Georgia,* September.

SAIC 2008. *Fourth Annual Monitoring and Free Product Removal Report for Former Underground Storage Tank 117, Building 7009, Bulk Fuel Facility (HAA-09), Facility ID #9-025113*2, Hunter Army Airfield, Georgia,* September.

SAIC 2009. *2008 Free Product Removal Report for the Bulk Fuel Facility (HAA-09), Building 7009, Hunter Army Airfield, Georgia,* May.

SAIC 2010. *2009 Free Product Removal Report for the Bulk Fuel Facility (HAA-09), Building 7009, Hunter Army Airfield, Georgia,* May.

SAIC 2011a. *Corrective Action Plan–Part B Addendum #1, Bulk Fuel Facility (HAA-09), Building 7009, Hunter Army Airfield, Georgia, Facility ID #9-025113*2,* April.

SAIC 2011b. *Addendum #28 to the Work Plan for Preliminary Groundwater and Corrective Action Plan–Part A/Part B Investigations at Former Underground Storage Tank Sites, Hunter Army Airfield and Fort Stewart, Georgia*, May.

SAIC 2012a. *Pilot Study Interim Progress Report for Corrective Actions at Bulk Fuel Facility (HA-009), Former UST 117, AST 7009, Hunter Army Airfield, Georgia, Facility ID #9-025113*2*, Final, January.

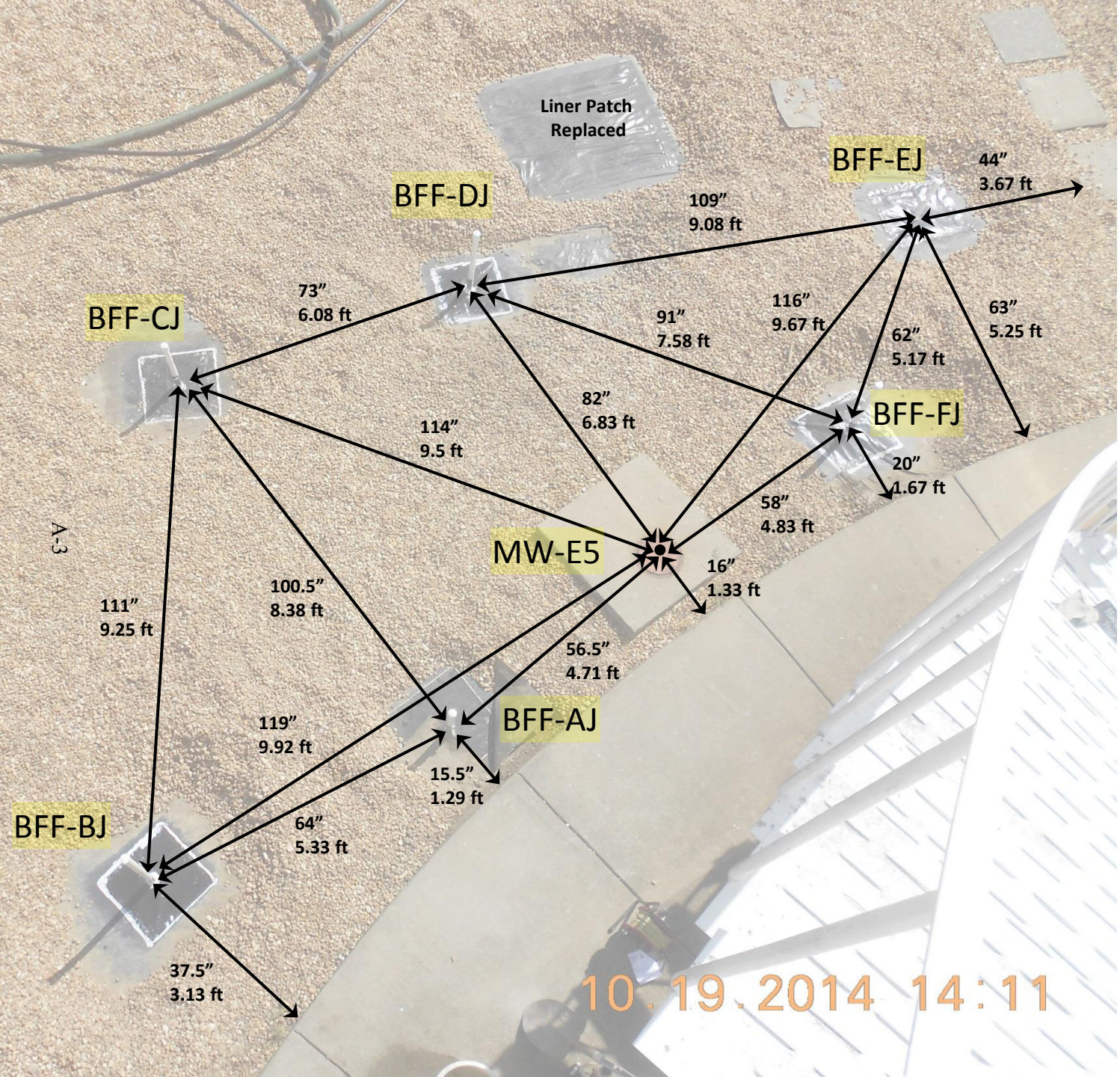
SAIC 2012b. *Pilot Study Interim Progress Report #2 for Corrective Actions at Bulk Fuel Facility (HA-009), Former UST 117, AST 7009, Hunter Army Airfield, Georgia, Facility ID #9-025113*2*, Final, September.

SAIC 2013. *Pilot Study Interim Progress Report #3 for Corrective Actions at Bulk Fuel Facility (HA-009), Former UST 117, AST 7009, Hunter Army Airfield, Georgia, Facility ID #9-025113*2*, Final, April.

APPENDIX A

INJECTION WELL INSTALLATION DETAILS

INJECTION WELL LAYOUT



Hunter Pilot #2
BFF IWs

Screen Info

BFF-AJ (5 ft)
1.3-6.3 ft bgs

BFF-BJ (5 ft)
3.67-8.67 ft bgs

BFF-CJ (5 ft)
5.1-10.1 ft bgs

BFF-DJ (5 ft)
4.37-9.37 ft bgs

BFF-EJ (2 ft)
4.75-6.75 ft bgs

BFF-FJ (2 ft)
6.37-8.37 ft bgs

Draft 10-19-14

BORING LOGS

BORING LOG					HOLE NUMBER: BFF-AJ
PROJECT: **HAAF Pilot Study #2 (2014)**		GEOLOGIST: **Bob Gelinas**			SHEET **1** OF **1** SHEET(S)
DEPTH (FT BGS)	DESCRIPTION OF MATERIALS	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO.	REMARKS
1	Silty sand (SM) with mixed clay, dark brown to black, hydrocarbon odor (0-6") Silty sand (SM), medium brown, moist, fine-grained (6"-12") Silty sand (SM), medium to light grayish brown, moist to nearly wet, fine-grained (0.8'-2.5')				
2					
3	Silty sand (SM), light grayish brown, wet, fine-grained, strong hydrocarbon odor (2.5'-3.5')				
4	Sandy clay (SC), wet (3.5'-4.5')				
5	Clayey sand (SC), medium brownish gray, wet, fine-grained, dense, hydrocarbon odor (4.5'-4.8') Sandy lean clay, medium gray, mottled, wet, very dense, crystallized layer (4.8'-4.9')				
6	Lean clay (CL) with fine sand, medium brownish gray, wet, hydrocarbon odor (4.9'-5.1') Clayey sand (SC), medium brownish gray, wet, fine-grained (5.1'-7')				
7					
8					
9					
10					

BORING LOG					HOLE NUMBER: BFF-BJ
PROJECT: **HAAF Pilot Study #2 (2014)**		GEOLOGIST: **Bob Gelinas**			SHEET **1** OF **1** SHEET(S)
DEPTH (FT BGS)	DESCRIPTION OF MATERIALS	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO.	REMARKS
	Silty sand (SM), dark brown to black, moist, fine-grained (0-6")				
1	Silty sand (SM), light pale brown, moist, fine-grained (8"-20")				
2					
3					
	Hydrocarbon odor (3.4')				
4	Fat clay (CL) with fine trace sand, dark gray, wet (3.91'-4.3')				
	Lean clay (CL) with fine sand, some clayey sand pockets, medium gray with some mottling, wet (4.3'-4.4')				
5	Sandy lean clay, medium gray, wet, fine-grained, hydrocarbon odor (4.4'-5.6')				
	Silty sand (SM) with clay, dark gray, wet, hydrocarbon odor (5.6'-5.8')				
6	Sandy clay to claying sand (SC), gray, wet, hydrocarbon odor (5.8'-7.1')				
7					
	Silty clayey sand, gray, wet, fine-grained, hydrocarbon odor, medium dilatancy (7.1'8.1')				
8					
	Silty sand (SM), light to medium gray, wet, fine-grained (8.67')				
9					
10					

BORING LOG					HOLE NUMBER: BFF-CJ
PROJECT: **HAAF Pilot Study #2 (2014)**		GEOLOGIST: **Bob Gelinas**			SHEET **1** OF **1** SHEET(S)
DEPTH (FT BGS)	DESCRIPTION OF MATERIALS	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO.	REMARKS
	Silty sand (SM), dark brown, moist, fine-grained (0-8")				
1	Silty sand (SM) to poorly graded sand with silt, medium brown to tan, fine-grained (10"-19")				
	Fat clay (CH), olive brown, moist, highly plastic (21"-54")				
2	Water encountered (24")				
3					
4					
5					
6					
	Silty sand (SM), medium brownish gray, wet, fine-grained (6.5'-7.7')				
7					
	Hydrocarbon odor (7.7')				
8	Silty sand (SM), medium gray, wet, fine-grained (8.2')				
9					
10					

BORING LOG					HOLE NUMBER: BFF-DJ
PROJECT: **HAAF Pilot Study #2 (2014)**		GEOLOGIST: **Bob Gelinas**			SHEET **1** OF **1** SHEET(S)
DEPTH (FT BGS)	DESCRIPTION OF MATERIALS	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO.	REMARKS
	Silty sand (SM), very dark brown to black, moist, fine-grained (0-10")				
1	Silty sand (SM), pale tan-gray, moist to wet at about 24", fine-grained (0.8'-2.4')				
2					
	Fat clay (CH) with fine trace sand, dark greenish brown, moist to wet (2.4'-3.6')				
3					
4					
5	Lean clay (CL) with fine trace sand, medium gray, wet (5.2'-6.4')				
6					
	Silty sand (SM) with clay, medium gray, wet, fine-grained (6.4'-6.7')				
7	Silty sand (SM), medium gray, wet, fine-grained, slight hydrocarbon odor (6.7'-7.7')				
	Clayey silty sand (SC-SM), medium gray, wet, fine-grained, slight hydrocarbon odor (7.7'-7.9')				
8					
9					
10					

BORING LOG					HOLE NUMBER: BFF-EJ
PROJECT: **HAAF Pilot Study #2 (2014)**		GEOLOGIST: **Bob Gelinas**			SHEET **1** OF **1** SHEET(S)
DEPTH (FT BGS)	DESCRIPTION OF MATERIALS	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO.	REMARKS
1	Silty sand (SM), dark brown to black, moist, fine-grained (0-1.2')				
2	Silty sand to poorly graded firm sand (SM, SP-SM), medium grayish brown, moist to wet, fine-grained (2'-4')				
3					
4	Lean clay (CL) with trace sand, medium gray to dark olive gray, wet (4'-5.7')				
5					
6	Clayey sand (SC), medium gray, wet, fine-grained (5.75'-6.2')				
	Clayey sand/silty sand mix, medium grayish brown, wet, fine-grained (6.2')				
7					
8					
9					
10					

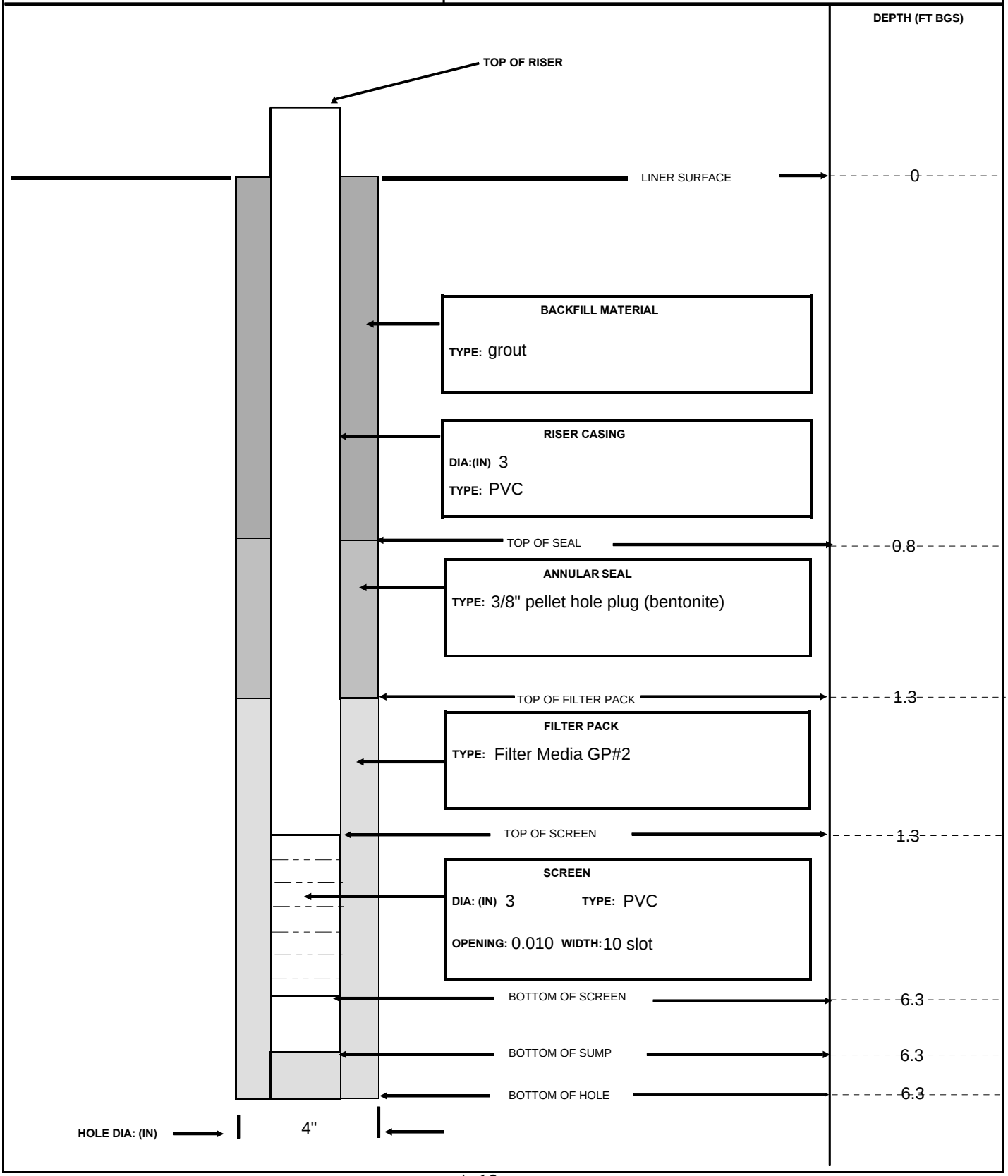
BORING LOG					HOLE NUMBER: BFF-FJ
PROJECT: **HAAF Pilot Study #2 (2014)**		GEOLOGIST: **Bob Gelinas**			SHEET **1** OF **1** SHEET(S)
DEPTH (FT BGS)	DESCRIPTION OF MATERIALS	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO.	REMARKS
	Silty sand (SM), dark brown, moist, fine-grained (0-6")				
	Silty sand (SM) to poorly graded sand, tan to light brownish gray, moist, fine-grained (6"-4')				
1					
2	Becomes wet, free product/ hydrocarbon odor (2')				
3					
4	Lean clay (CL) with sand, medium brownish gray, wet, fine-grained, hydrocarbon odor (4.1'-6.05')				
5					
6	Silty sand (SM), medium gray, wet, fine-grained, hydrocarbon odor (6.05'-6.5')				
7					
8					
9					
10					

WELL CONSTRUCTION DIAGRAMS

INJECTION WELL (STICK-UP)

HAAF BFF AST 7009 Pilot Study #2 (2014) CONTRACT W912HN-13-R-0023 TASK ORDER 0001

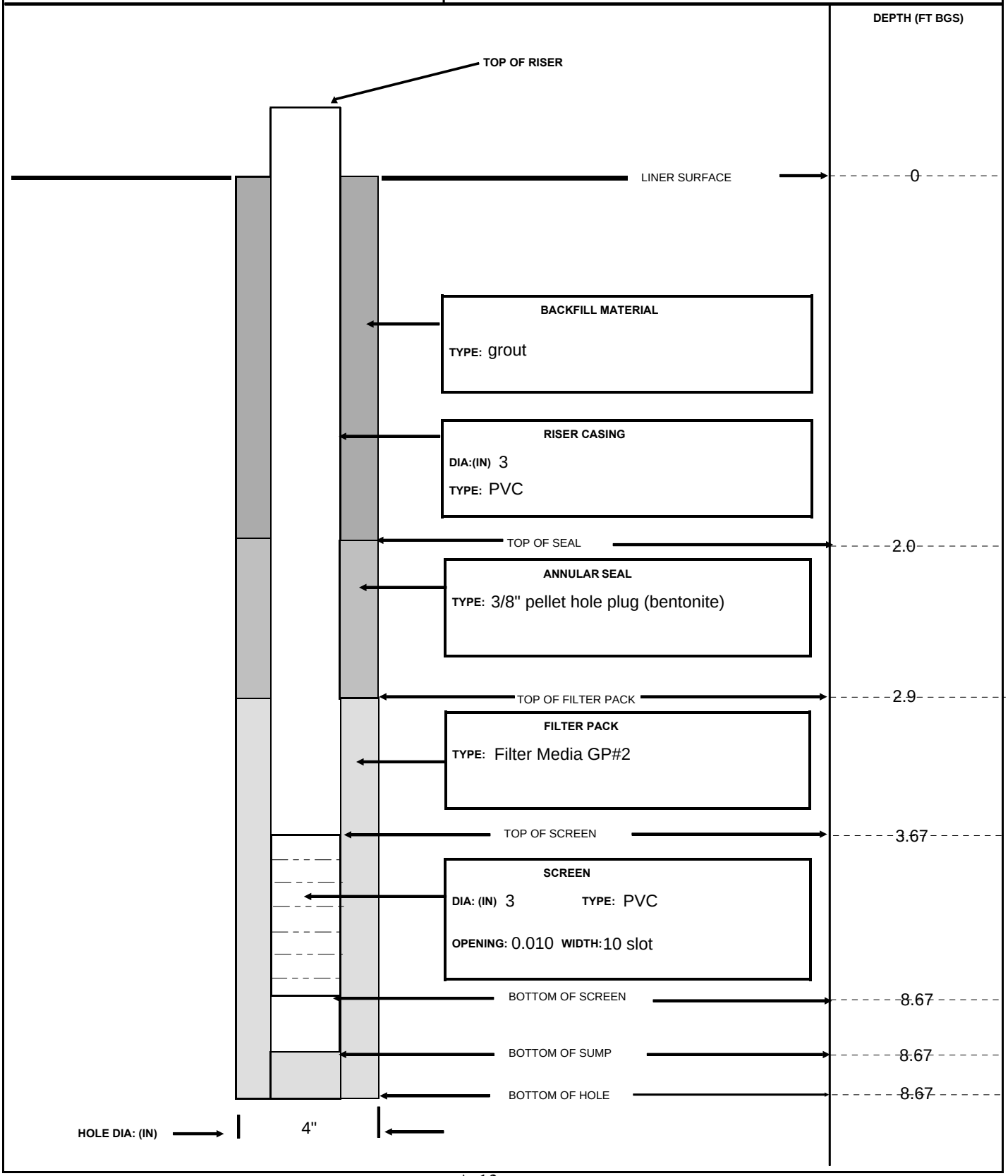
INJECTION WELL ID: BFF-AJ	**DATE BEGUN:** 10/16/14	**COMPLETED:** 10/17/14
LOCATION: ~5 ft NE of MW-E5	**NOTES:**	



INJECTION WELL (STICK-UP)

HAAF BFF AST 7009 Pilot Study #2 (2014) CONTRACT W912HN-13-R-0023 TASK ORDER 0001

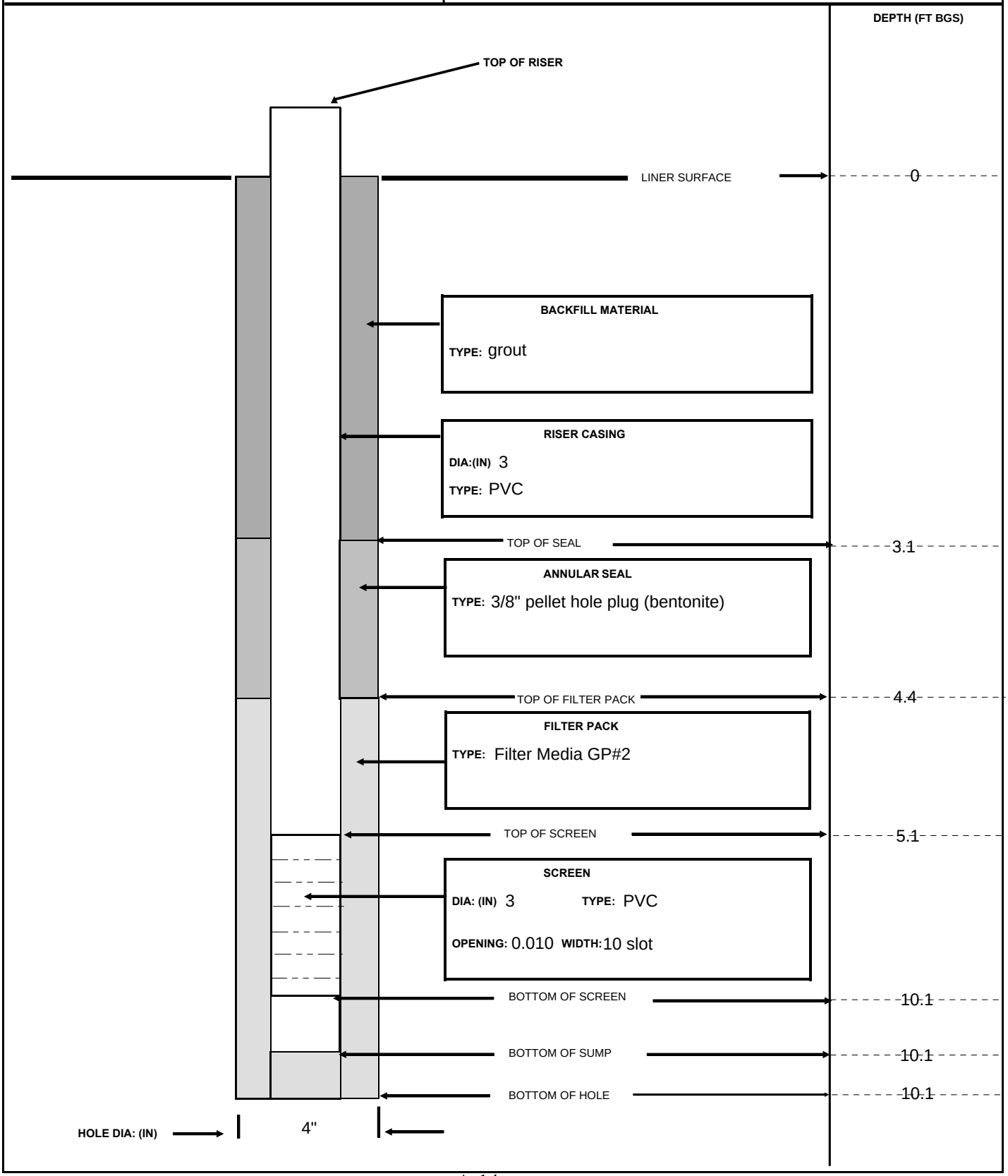
INJECTION WELL ID: BFF-BJ	**DATE BEGUN:** 10/19/14	**COMPLETED:** 10/19/14
LOCATION: ~5.5 ft NE of MW-E5	**NOTES:**	



INJECTION WELL (STICK-UP)

HAAF BFF AST 7009 Pilot Study #2 (2014) CONTRACT W912HN-13-R-0023 TASK ORDER 0001

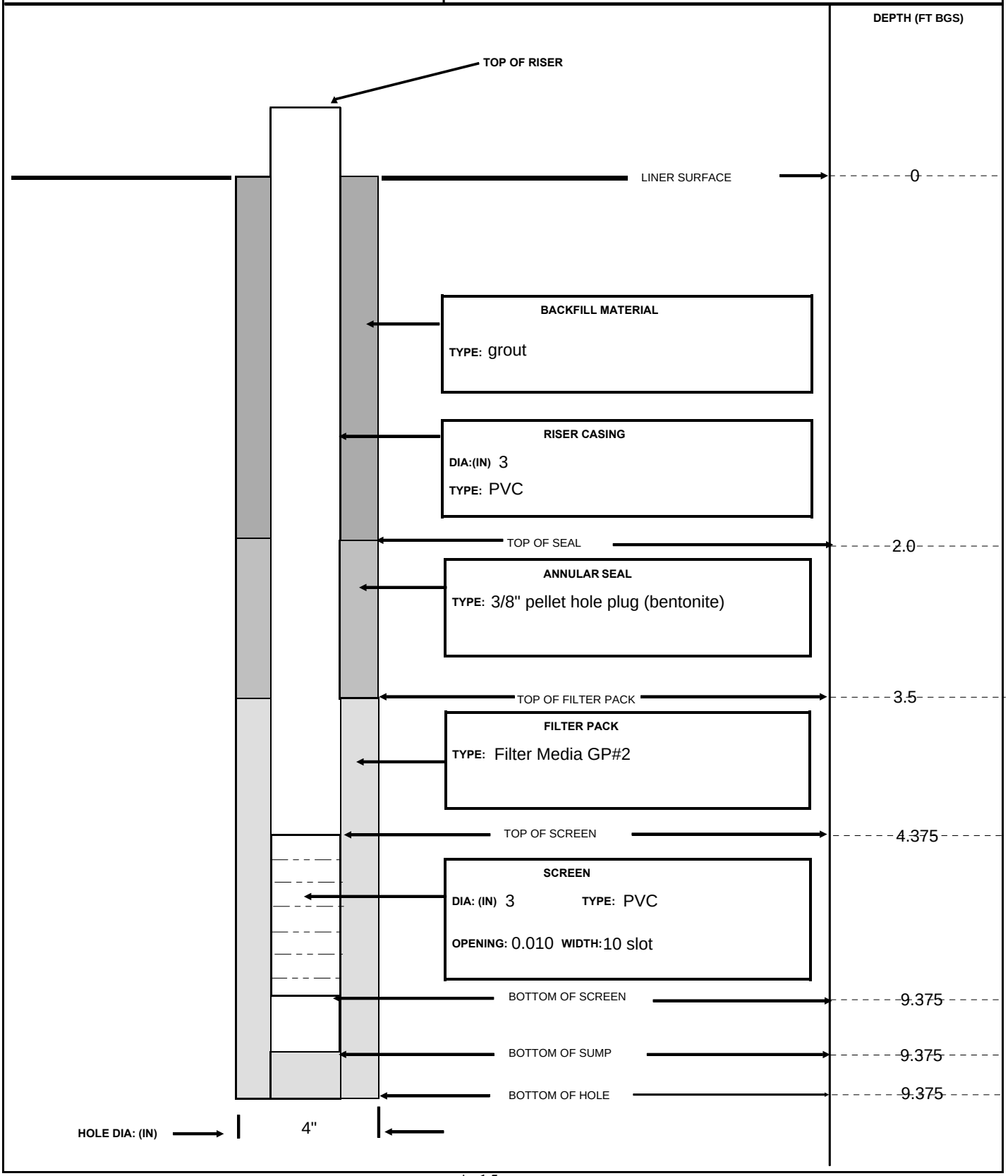
INJECTION WELL ID: BFF-CJ	**DATE BEGUN:** 10/18/14	**COMPLETED:** 10/18/14
LOCATION: ~10 ft SE of MW-E5	**NOTES:**	



INJECTION WELL (STICK-UP)

HAAF BFF AST 7009 Pilot Study #2 (2014) CONTRACT W912HN-13-R-0023 TASK ORDER 0001

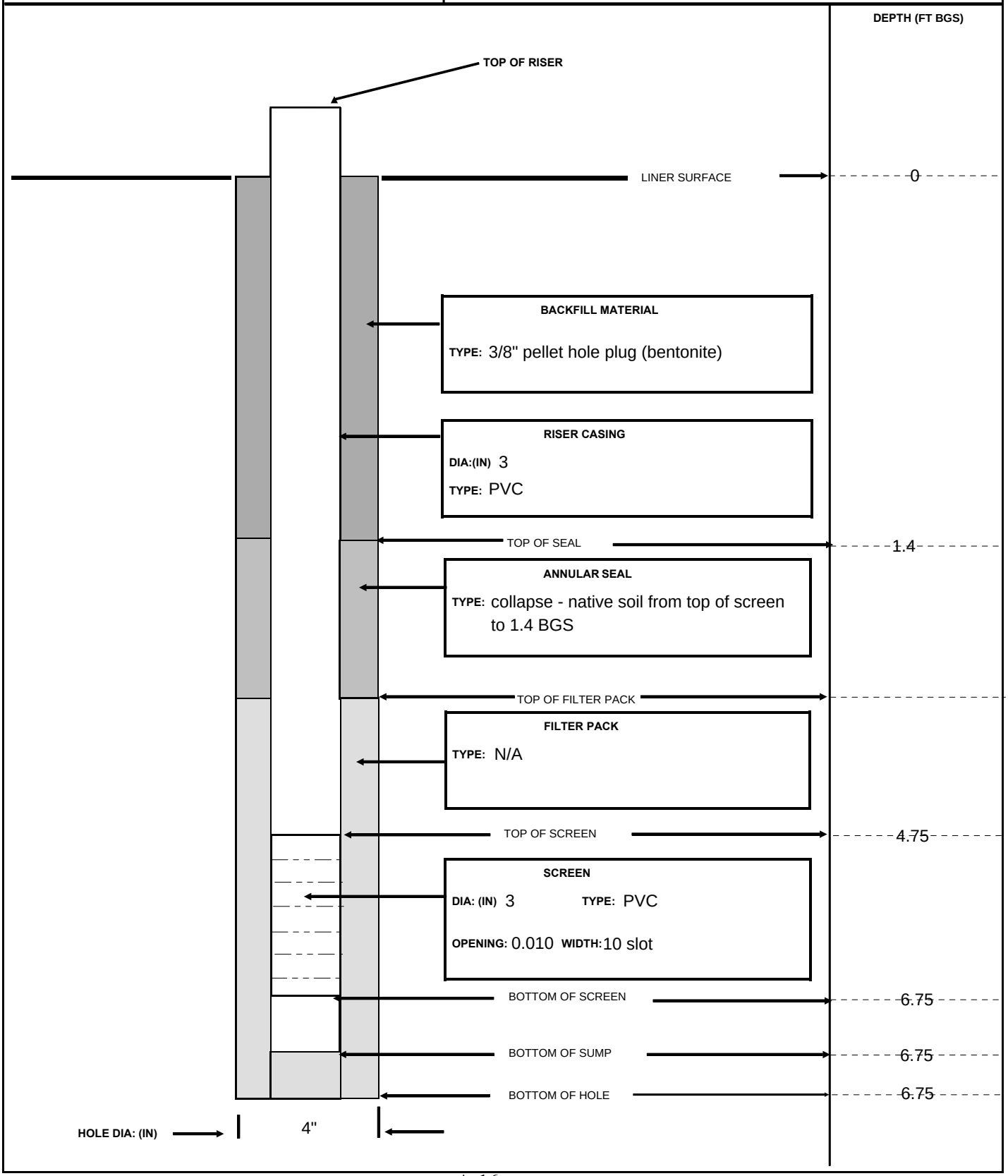
INJECTION WELL ID: BFF-DJ	**DATE BEGUN:** 10/19/14	**COMPLETED:** 10/19/14
LOCATION: ~7 ft SE of MW-E5	**NOTES:**	



INJECTION WELL (STICK-UP)

HAAF BFF AST 7009 Pilot Study #2 (2014) CONTRACT W912HN-13-R-0023 TASK ORDER 0001

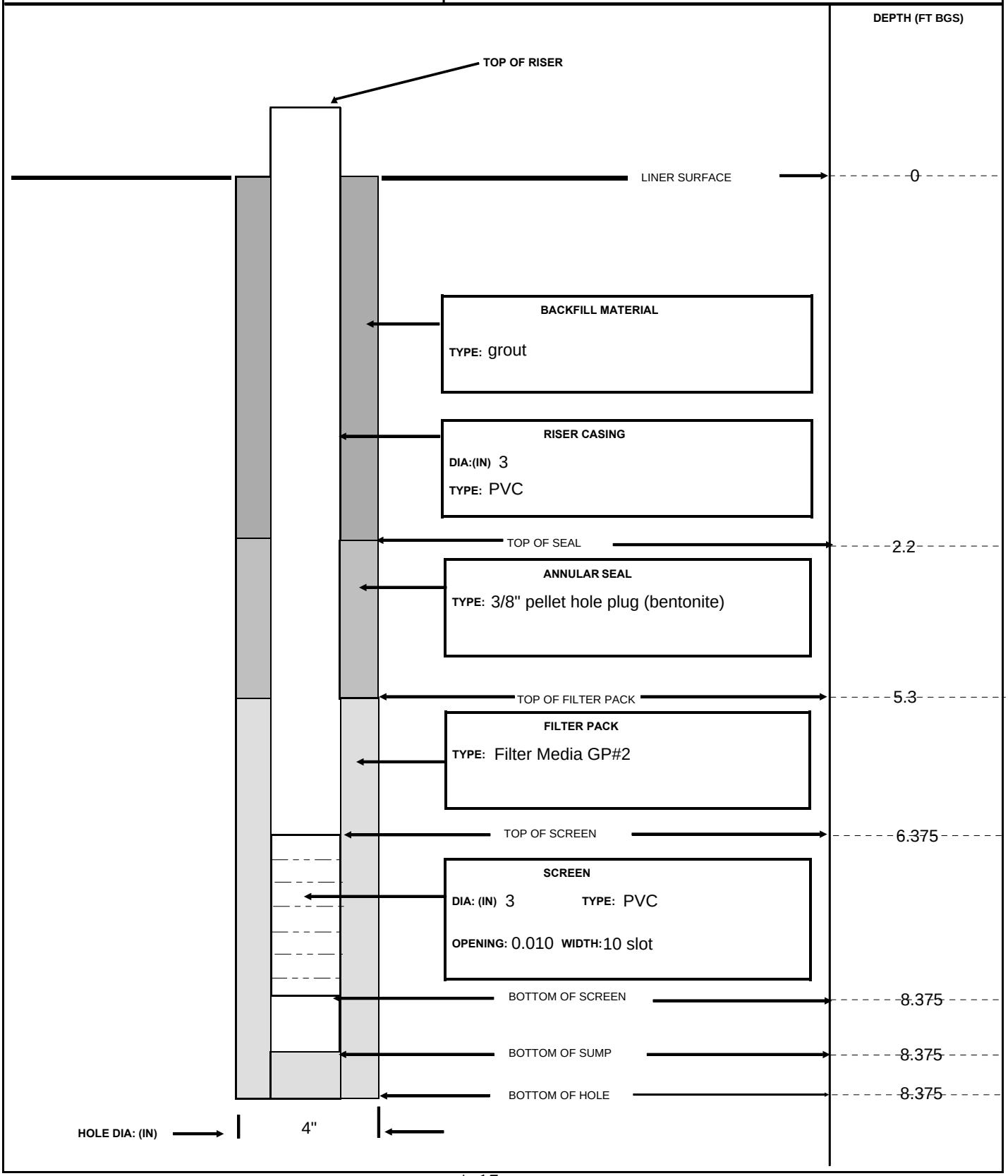
INJECTION WELL ID: BFF-EJ	**DATE BEGUN:** 10/18/14	**COMPLETED:** 10/18/14
LOCATION: ~10 ft SW of MW-E5	**NOTES:**	



INJECTION WELL (STICK-UP)

HAAF BFF AST 7009 Pilot Study #2 (2014) CONTRACT W912HN-13-R-0023 TASK ORDER 0001

INJECTION WELL ID: BFF-FJ	**DATE BEGUN:** 10/18/14	**COMPLETED:** 10/18/14
LOCATION: ~5 ft SW of MW-E5	**NOTES:**	



APPENDIX B

CHAINS OF CUSTODY AND ANALYTICAL RESULTS

leidos

361439

301 Laboratory Road, Oak Ridge, Tennessee 37831(865) 482-9031

CHAIN OF CUSTODY RECORD

COC NO.:

PROJECT NAME: Hunter

PROJECT NUMBER: 301205.00.000.00.200

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Amanda Harness (Printed Name): Amanda Harness

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Road, Charleston, SC 29417

PHONE NO: (843) 556-8171

REQUESTED PARAMETERS

Sample ID	Date Collected	Time Collected	Matrix	BTEX (1)	3580/8015 DRO (2)	No. of Bottles/ Vials:	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
BFE5B2	11/13/14	1145	GW	2		2		
TH0653	——lab prepared		water	2		2		
BFE5B4	11/13/14	1145	GW	2		2		
BF38B2	11/13/14	1130	GW	2		2		
BF38B2MSD	11/13/14	1130	GW	2		2		
BF38B2MS	11/13/14	1130	GW	2		2		

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Amanda Harness	11/13/14 14:30	[signature]	11/13/14 1430
COMPANY NAME: SCF		COMPANY NAME: GE	
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time
COMPANY NAME:		COMPANY NAME:	
RELINQUISHED BY:	Date/Time	RECEIVED BY: [signature]	Date/Time 11/13/14 16:45
COMPANY NAME:		COMPANY NAME: GEL	

TOTAL NUMBER OF CONTAINERS:

Cooler Temperature:

Cooler ID:

FEDEX NUMBER:

1 2 - 40 ml VOA Vial, HCL to pH < 2, 4C
2 1 - 250 ml Amber glass, Cool, 4C

7-day TAT

Samples BFE5B2 + BFE5B4 are from a MW w/ free product.

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**361439**	**Date Collected:**	**11/13/2014 11:45**	**Matrix:**	**WATER**
Lab Sample ID:	**361439001**	**Date Received:**	**11/13/2014 16:45**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFE5B2**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1437367**	**Inst:**	**VOAA.I**	**Dilution:**	**1**
Run Date:	**11/18/2014 20:51**	**Analyst:**	**JEB**	**Purge Vol:**	**5 mL**
Prep Date:	**11/18/2014 20:51**				
Data File:	**111814\AJ220.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
71-43-2	Benzene	U U	1.00	ug/L	0.300	1.00
100-41-4	Ethylbenzene	U U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	=	2.51	ug/L	0.300	1.00
1330-20-7	Xylenes (total)	U U	3.00	ug/L	0.300	3.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	3.493	33.5	ug/L	0	J
	unknown	3.836	34.3	ug/L	0	J
000564-04-5	3-Pentanone, 2,2-dimethyl-	11.815	30.4	ug/L	80	J
000934-80-5	Benzene, 4-ethyl-1,2-dimethyl-	15.341	35.8	ug/L	97	NJ
001074-55-1	Benzene, 1-methyl-4-propyl-	15.581	34.5	ug/L	94	NJ
000527-84-4	Benzene, 1-methyl-2-(1-methylethyl	15.762	23.8	ug/L	95	NJ
000768-00-3	Benzene, (1-methyl-1-propenyl)-, (	15.956	42.7	ug/L	81	J
000934-80-5	Benzene, 4-ethyl-1,2-dimethyl-	16.122	29.3	ug/L	96	NJ
001595-16-0	Benzene, 1-methyl-4-(1-methylpropy	16.66	25.7	ug/L	83	J
	unknown hydrocarbon	16.723	46	ug/L	0	J
	unknown hydrocarbon	16.741	28.8	ug/L	0	J
001758-88-9	Benzene, 2-ethyl-1,4-dimethyl-	16.787	51.2	ug/L	91	NJ
000767-58-8	Indan, 1-methyl-	16.837	74.1	ug/L	90	NJ
	unknown hydrocarbon	16.847	29.2	ug/L	0	J
000119-64-2	Naphthalene, 1,2,3,4-tetrahydro-	17.069	45.2	ug/L	95	NJ
020836-11-7	1H-Indene,2,3-dihydro-2,2-dimethyl	17.401	44.2	ug/L	91	NJ
003877-19-8	Naphthalene, 1,2,3,4-tetrahydro-2-	17.77	33.9	ug/L	76	J
	unknown hydrocarbon	18.464	27.5	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**361439**	**Date Collected:**	**11/13/2014 12:00**	**Matrix:**	**WATER**
Lab Sample ID:	**361439002**	**Date Received:**	**11/13/2014 16:45**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**TH0653**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1437367**	**Inst:**	**VOAA.I**	**Dilution:**	**1**
Run Date:	**11/19/2014 15:46**	**Analyst:**	**JEB**	**Purge Vol:**	**5 mL**
Prep Date:	**11/19/2014 15:46**				
Data File:	**111914\AJ309.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
71-43-2	Benzene	U U	1.00	ug/L	0.300	1.00
100-41-4	Ethylbenzene	U U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	U U	1.00	ug/L	0.300	1.00
1330-20-7	Xylenes (total)	U U	3.00	ug/L	0.300	3.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated Units	Fit	Qual
	No Tentatively Identified Compounds Found		ug/L		

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**361439**	**Date Collected:**	**11/13/2014 11:45**	**Matrix:**	**WATER**
Lab Sample ID:	**361439003**	**Date Received:**	**11/13/2014 16:45**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFE5B4**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1437367**	**Inst:**	**VOAA.I**	**Dilution:**	**1**
Run Date:	**11/18/2014 21:41**	**Analyst:**	**JEB**	**Purge Vol:**	**5 mL**
Prep Date:	**11/18/2014 21:41**				
Data File:	**111814\AJ222.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
71-43-2	Benzene	U U	1.00	ug/L	0.300	1.00
100-41-4	Ethylbenzene	U U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	=	2.65	ug/L	0.300	1.00
1330-20-7	Xylenes (total)	U U	3.00	ug/L	0.300	3.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	3.513	27.5	ug/L	0	J
	unknown	3.846	25.3	ug/L	0	J
	unknown	11.815	31.7	ug/L	0	J
000934-80-5	Benzene, 4-ethyl-1,2-dimethyl-	15.344	46	ug/L	97	NJ
001074-55-1	Benzene, 1-methyl-4-propyl-	15.581	37	ug/L	94	NJ
001758-88-9	Benzene, 2-ethyl-1,4-dimethyl-	15.761	25	ug/L	95	NJ
000527-84-4	Benzene, 1-methyl-2-(1-methylethyl	15.91	34.8	ug/L	92	NJ
	unknown hydrocarbon	15.956	46.4	ug/L	0	J
	unknown hydrocarbon	16.271	50.9	ug/L	0	J
001595-16-0	Benzene, 1-methyl-4-(1-methylpropy	16.66	28.9	ug/L	87	NJ
	unknown hydrocarbon	16.723	42.6	ug/L	0	J
	unknown hydrocarbon	16.741	27.8	ug/L	0	J
000934-74-7	Benzene, 1-ethyl-3,5-dimethyl-	16.787	53.4	ug/L	91	NJ
000767-58-8	Indan, 1-methyl-	16.836	77.6	ug/L	90	NJ
	unknown hydrocarbon	16.847	29.7	ug/L	0	J
000119-64-2	Naphthalene, 1,2,3,4-tetrahydro-	17.069	45.9	ug/L	95	NJ
017059-48-2	1H-Indene, 2,3-dihydro-1,6-dimethy	17.401	45.9	ug/L	91	NJ
	unknown hydrocarbon	17.77	32.8	ug/L	0	J
002809-64-5	Naphthalene, 1,2,3,4-tetrahydro-5-	18.464	25.5	ug/L	91	NJ

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**361439**	**Date Collected:**	**11/13/2014 11:30**	**Matrix:**	**WATER**
Lab Sample ID:	**361439004**	**Date Received:**	**11/13/2014 16:45**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BF38B2**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1437367**	**Inst:**	**VOAA.I**	**Dilution:**	**1**
Run Date:	**11/19/2014 16:11**	**Analyst:**	**JEB**	**Purge Vol:**	**5 mL**
Prep Date:	**11/19/2014 16:11**				
Data File:	**111914\AJ310.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
71-43-2	Benzene	U U	1.00	ug/L	0.300	1.00
100-41-4	Ethylbenzene	U U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	U U	1.00	ug/L	0.300	1.00
1330-20-7	Xylenes (total)	U U	3.00	ug/L	0.300	3.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	3.493	16.4	ug/L	0	J
	unknown	15.684	5.47	ug/L	0	J

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171 F 843.766.1178

www.gel.com

November 19, 2014

Ms. Marie Simpson
Leidos
301 Laboratory Rd.
Oak Ridge, Tennessee 37830

Re: Product Recovery System Pilot Study 2, Hunter AA-09
Work Order: 361440

Dear Ms. Simpson:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the following analytical results for the sample(s) we received on November 13, 2014, and analyzed for Diesel Range Organics. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4485.

Sincerely,

Hope Taylor for
Valerie Davis
Project Manager

Enclosures

Leidos (p010165517)
Product Recovery System Pilot Study 2, Hunter AA-09
Work Order #: 361440
SDG: 361440

Table of Contents

Case Narrative

Case Narrative for
Leidos (p010165517)
Product Recovery System Pilot Study 2, Hunter AA-09
Workorder #: 361440
SDG # : 361440

November 19, 2014

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary

Sample receipt The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on November 13, 2014 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following samples:

Laboratory ID	Client ID
361440001	STANDARD
361440002	FREE PRODUCT

Case Narrative

Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

Data Package

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Diesel Range Organics.

I certify that this data report is in compliance with the terms and conditions of the subcontract and task order, both technically and for completeness, for other than the conditions detailed in the attached case narrative.

Hope Taylor for
Valerie Davis
Project Manager

List of current GEL Certifications as of 19 November 2014

State	Certification
Alaska	UST−110
Arkansas	88−0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH−0169
Delaware	SC000122013−10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−12−00283, P330−12−00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013−10
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA130005
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC000122013−10
Nebraska	NE−OS−26−13
Nevada	SC000122014−1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68−00485
Plant Material Permit	PDEP−12−00260
South Carolina Chemistry	10120001
South Carolina GVL	23611001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235−14−9
Utah NELAP	SC000122014−16
Vermont	VT87156
Virginia NELAP	460202
Washington	C780−12
Wisconsin	999887790

Chain of Custody and Supporting Documentation

leidos

361440

301 Laboratory Road, Oak Ridge, Tennessee 37831(865) 482-9031

CHAIN OF CUSTODY RECORD

COC NO.:

PROJECT NAME: Hunter

PROJECT NUMBER: 301205.00.000.00.200

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Amanda Harness (Printed Name): Amanda Harness

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Road, Charleston, SC 29417

PHONE NO: (843) 556-8171

REQUESTED PARAMETERS

Sample ID	Date Collected	Time Collected	Matrix	1 BTEX	2 3580/8015 DRO	No. of Bottles/ Vials:	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
STANDARD	11/13/14	0815	fuel		1	1		
FREE PRODUCT	11/13/14	0830	fuel		1	1		

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Amanda Harness	11/13/14 14:30	Stockhart	11/13/14 1430
COMPANY NAME: SCF		COMPANY NAME: GEL	
RECEIVED BY:	Date/Time	RELINQUISHED BY: Mock	Date/Time 11/13/14 1645
COMPANY NAME:		COMPANY NAME:	
RELINQUISHED BY:	Date/Time	RECEIVED BY: Mock	Date/Time 11/13/14 1645
COMPANY NAME:		COMPANY NAME: GEL	

TOTAL NUMBER OF CONTAINERS:

Cooler ID:

Cooler Temperature:

FEDEX NUMBER:

1 2 - 40 ml VOA Vial, HCL to pH < 2, 4C
2 1 - 250 ml Amber glass, Cool, 4C

7-day TAT

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: LEID			**SDG/AR/COC/Work Order:** 361439 361440
Received By: SHANTA MACK			**Date Received:** 11/3/14 @ 16:45
Suspected Hazard Information	**Yes**	**No**	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 cpm
Classified Radioactive II or III by RSO?		✓	If yes, Were swipes taken of sample contatiners < action levels?
COC/Samples marked containing PCBs?		✓	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		✓	If yes, samples are to be segregeated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		✓	

	Sample Receipt Criteria	**Yes**	**NA**	**No**	**Comments/Qualifiers (Required for Non-Conforming Items)**
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*			✓	Preservation Method: Ice bags Blue ice Dry ice (None) Other (describe) *all temperatures are recorded in Celsius 20 C
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: 130532792 Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?	✓			Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?	✓			Sample ID's and containers affected:
7	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	✓			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			
14	Carrier and tracking number.				Circle Applicable: FedEx Air FedEx Ground UPS Field Services (Courier) Other

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials VSO Date 11/17/14 Page 1 of 1

GL-CHL-SR-001

Data Review Qualifier Flag Definition Sheet

Data Review Qualifier Definitions

Qualifier	Explanation
*	A quality control analyte recovery is outside of specified acceptance criteria
**	Analyte is a surrogate compound
<	Result is less than value reported
>	Result is greater than value reported
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL
A	The TIC is a suspected aldol-condensation product
B	Target analyte was detected in the associated blank
B	Metals-Either presence of analyte detected in the associated blank, or MDL/IDL < sample value < PQL
BD	Results are either below the MDC or tracer recovery is low
C	Analyte has been confirmed by GC/MS analysis
D	Results are reported from a diluted aliquot of the sample
d	5-day BOD-The 2:1 depletion requirement was not met for this sample
E	Organics-Concentration of the target analyte exceeds the instrument calibration range
E	Metals-%difference of sample and SD is >10%. Sample concentration must meet flagging criteria
H	Analytical holding time was exceeded
h	Preparation or preservation holding time was exceeded
J	Value is estimated
N	Metals-The Matrix spike sample recovery is not within specified control limits
N	Organics-Presumptive evidence based on mass spectral library search to make a tentative identification of the analyte (TIC). Quantitation is based on nearest internal standard response factor
N/A	Spike recovery limits do not apply. Sample concentration exceeds spike concentration by 4X or more
ND	Analyte concentration is not detected above the reporting limit
UI	Gamma Spectroscopy-Uncertain identification
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	QC Samples were not spiked with this compound
Z	Paint Filter Test-Particulates passed through the filter, however no free liquids were observed.

P Organics-The concentrations between the primary and confirmation columns/detectors is >40% difference. For HPLC, the difference is >70%.

U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

FID Diesel Range Organics Analysis

Case Narrative

FID Diesel Range Organics
Leidos (LEID)
SDG 361440

Method/Analysis Information

Procedure:	**Analysis of Diesel Range Organics by Flame Ionization Detector**
Analytical Method:	SW846 3580A/8015C
Prep Method:	SW846 3580A
Analytical Batch Number:	1437858
Prep Batch Number:	1437857

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 3580A/8015C:

Sample ID	Client ID
361440001	STANDARD
361440002	FREE PRODUCT
1203214337	MB for batch 1437857

The samples in this SDG were analyzed on an "as received" basis.

Preparation/Analytical Method Verification

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-003 REV# 24.

Raw data reports are processed and reviewed by the analyst using the Chemstation software package. False positives have been removed from the quantitation reports per standard operating procedures (SOP).

Calibration Information

Initial Calibration
Samples 361440001 (STANDARD) and 361440002 (FREE PRODUCT) were for fingerprint analysis. The instrument initial calibration was not required.

Continuing Calibration Verification (CCV) Requirements
Samples 361440001 (STANDARD) and 361440002 (FREE PRODUCT) were for fingerprint analysis. The instrument calibration verification was not required.

Quality Control (QC) Information

Method Blank (MB) Statement
The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries
Surrogate was not added to any samples in this batch.

QC Sample Designation
The matrix spike and matrix spike duplicate analysis was not performed for this batch of the samples.

Technical Information

Holding Time Specifications
GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification
The analysis was for fingerprint only.

Sample Dilutions
Samples 361440001 (STANDARD) and 361440002 (FREE PRODUCT) were diluted at 1:500.

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Electronic Package Comment

This package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative.

Data Exception (DER) Documentation
Data exception report (DER) is generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A DER was not required for this SDG in this batch.

Manual Integrations
Certain standards and samples may have required manual integration to correctly position the baseline as set in the calibration standard injections. If manual integration was performed, copies of all manual integration peak profiles are included in the raw data section of this fraction.

Additional Comments
An overlay chromatogram of the patterns of samples 361440001 (STANDARD) and 361440002 (FREE PRODUCT) was created at client request. The overlay chromatogram does not show any conformity between the two samples. Sample 361440001 (STANDARD) closely resembles kerosene. Sample 361440002 (FREE PRODUCT) closely resembles diesel range organics.

System Configuration

The Diesel Range Organics analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
FID7.I	Agilent Gas Chromatograph	Agilent 6890N GC/FID	DB-5MS	30m x 0.25mm, 0.25um(J&W)

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 − (843) 556−8171 − www.gel.com

Qualifier Definition Report
for

LEID002 Leidos (p010165517)

Client SDG: 361440 GEL Work Order: 361440

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a surrogate compound

U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

DL Indicates that sample is diluted.
RA Indicates that sample is re−analyzed without re−extraction.
RE Indicates that sample is re−extracted.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP−like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: Jimi Cao **Name: Jimin Cao**

Date: 20 NOV 2014 **Title: Data Validator**

Sample Data

Quantitation Report
GEL Laboratories, LLC

Data Path : C:\msdchem\1\DATA\112014DR\
Data File : f7k2009.D
Signal(s) : FID1A.CH
Acq On : 20 Nov 2014 13:21
Operator : BYT1 InstName : FID7
Sample : |361440001|1437858|500|DROQ|1|LEID
Misc : |MIX[A]
ALS Vial : 8 Sample Multiplier: 500

Integration File: autoint1.e
Quant Time: Nov 20 14:38:56 2014
Quant Method : C:\msdchem\1\DATA\112014DR\110414_DRO.m
Quant Title : DRO TPH SubList :
QLast Update : Wed Nov 05 07:51:49 2014
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. : 1 ul
Signal Phase : DB-5MS
Signal Info : 30m x 250um x 0.25um

Compound	Exp	R.T.	Delta	Response	Conc	Units
System Monitoring Compounds						
2) SA o-Terphenyl		13.593	0.000-13.593	0	N.D.	mg/L

Compound	Amount	Range	Recovery
2) o-Terphenyl	20.000	No Limits	0.00%

Target Compounds						
1) HA Diesel Range Organics	Range	7.500 - 17.401		1429881625	1166.779	mg/L

SemiQuant Compounds - Not Calibrated on this Instrument

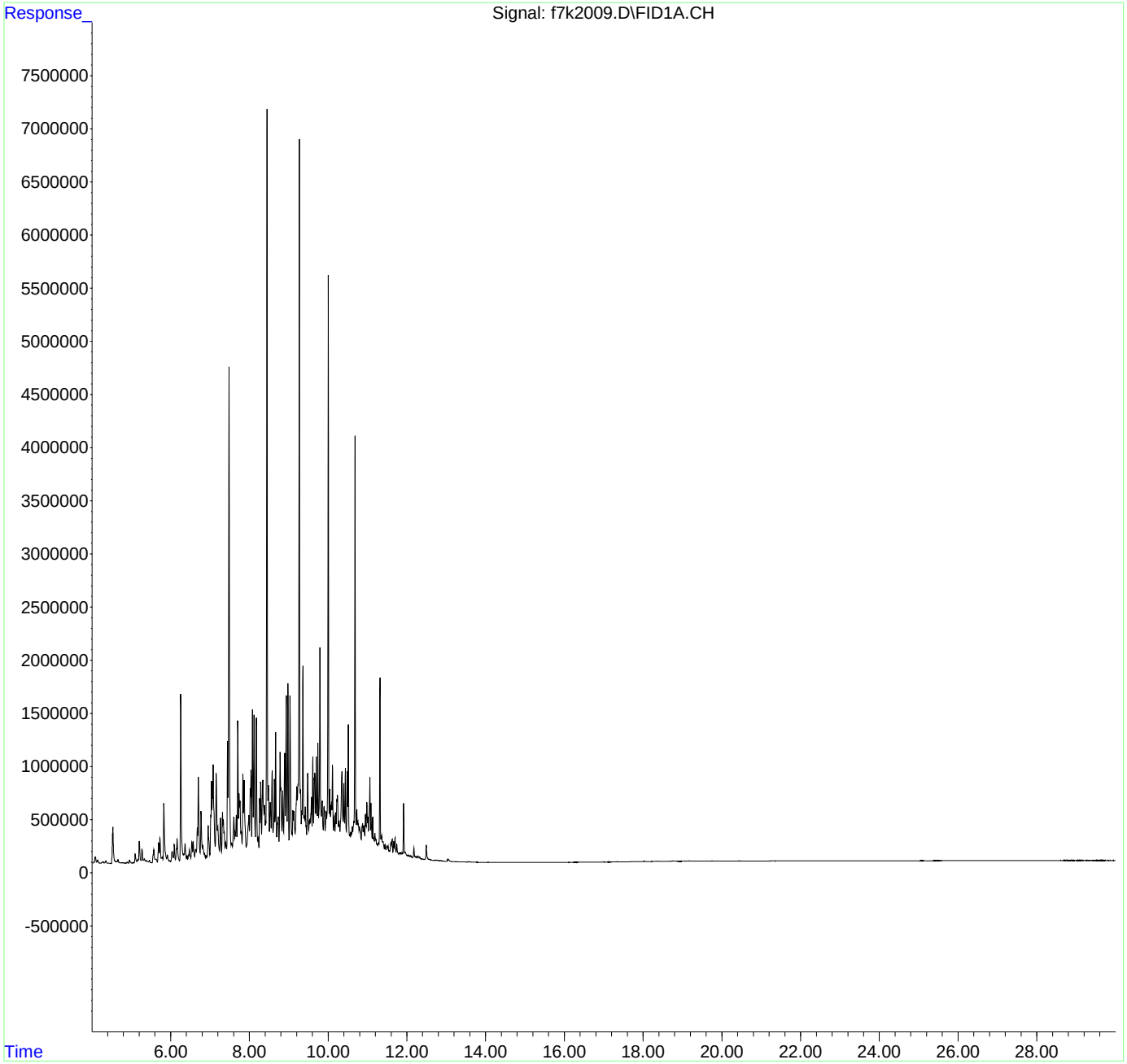
(f)=RT Delta > 1/2 Window (A) = Over the calibration range (d) = deleted (m)=manual int.

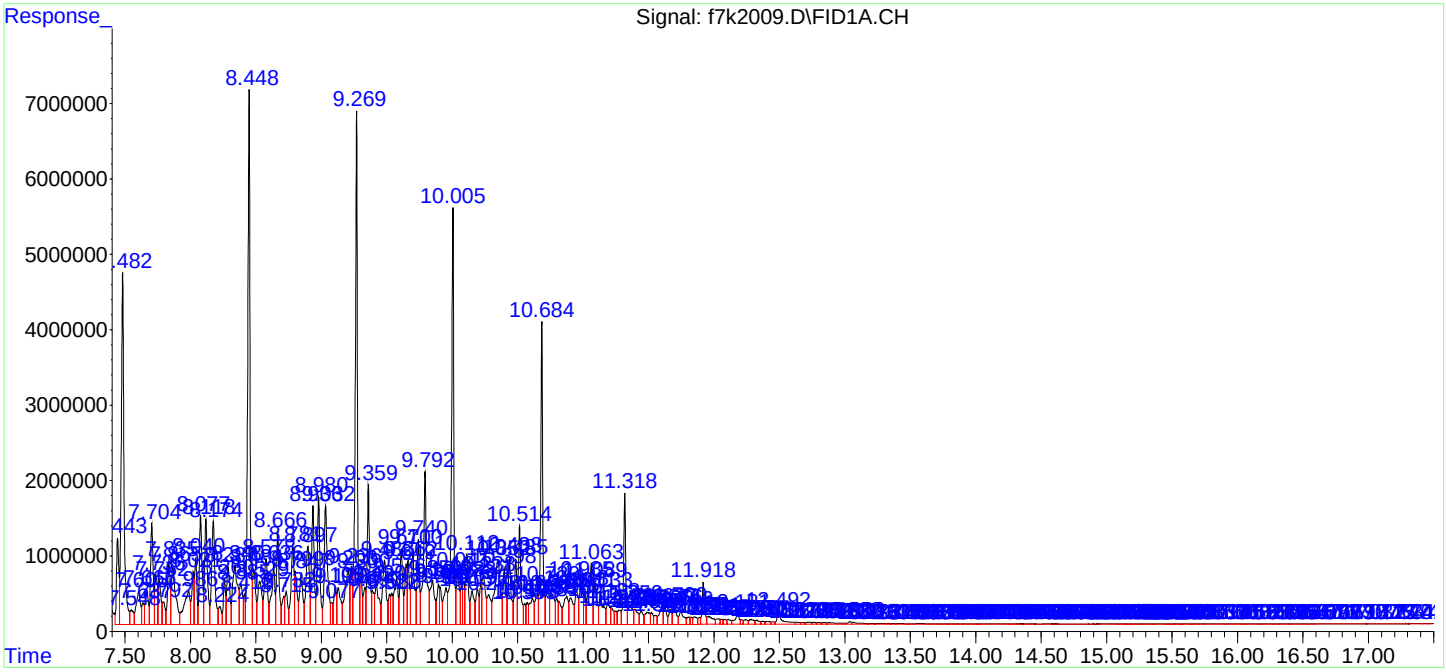
Quantitation Report
GEL Laboratories, LLC

DaData Path : C:\msdchem\1\DATA\112014DR\
DaData File : f7k2009.D
Signal(s) : FID1A.CH
Acq On : 20 Nov 2014 13:21
Operator : BYT1 InstName : FID7
Sample : |361440001|1437858|500|DROQ|1|LEID
Misc : |MIX[A]
ALS Vial : 8 Sample Multiplier: 500

Integration File: autoint1.e
Quant Time: Nov 20 14:38:56 2014
Quant Method : C:\msdchem\1\DATA\112014DR\110414_DRO.m
Quant Title : DRO TPH SubList :
QLast Update : Wed Nov 05 07:51:49 2014
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. : 1 ul
Signal Phase : DB-5MS
Signal Info : 30m x 250um x 0.25um





Compound: Diesel Range Organics

RT Range:	7.500: 17.401
Total TPH Resp:	1429881625
Total SMC/ISTD Resp:	0
Final Resp:	1429881625

Quantitation Report
GEL Laboratories, LLC

Data Path : C:\msdchem\1\DATA\112014DR\
Data File : f7k2010.D
Signal(s) : FID1A.CH
Acq On : 20 Nov 2014 14:00
Operator : BYT1 InstName : FID7
Sample : |361440002|1437858|500|DROQ|1|LEID
Misc : |MIX[A]
ALS Vial : 9 Sample Multiplier: 500

Integration File: autoint1.e
Quant Time: Nov 20 14:38:59 2014
Quant Method : C:\msdchem\1\DATA\112014DR\110414_DRO.m
Quant Title : DRO TPH SubList :
QLast Update : Wed Nov 05 07:51:49 2014
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

Volume Inj. : 1 ul
Signal Phase : DB-5MS
Signal Info : 30m x 250um x 0.25um

Compound	Exp	R.T.	Delta	Response	Conc	Units
System Monitoring Compounds						
2) SA o-Terphenyl	13.593	13.593	0.000	12005288	N.D.	mg/L d

Compound	Amount	Range	Recovery
2) o-Terphenyl	20.000	No Limits	0.00%

Target Compounds					
1) HA Diesel Range Organics	Range	7.500 - 17.401	1878873962	1533.155	mg/L m

SemiQuant Compounds - Not Calibrated on this Instrument

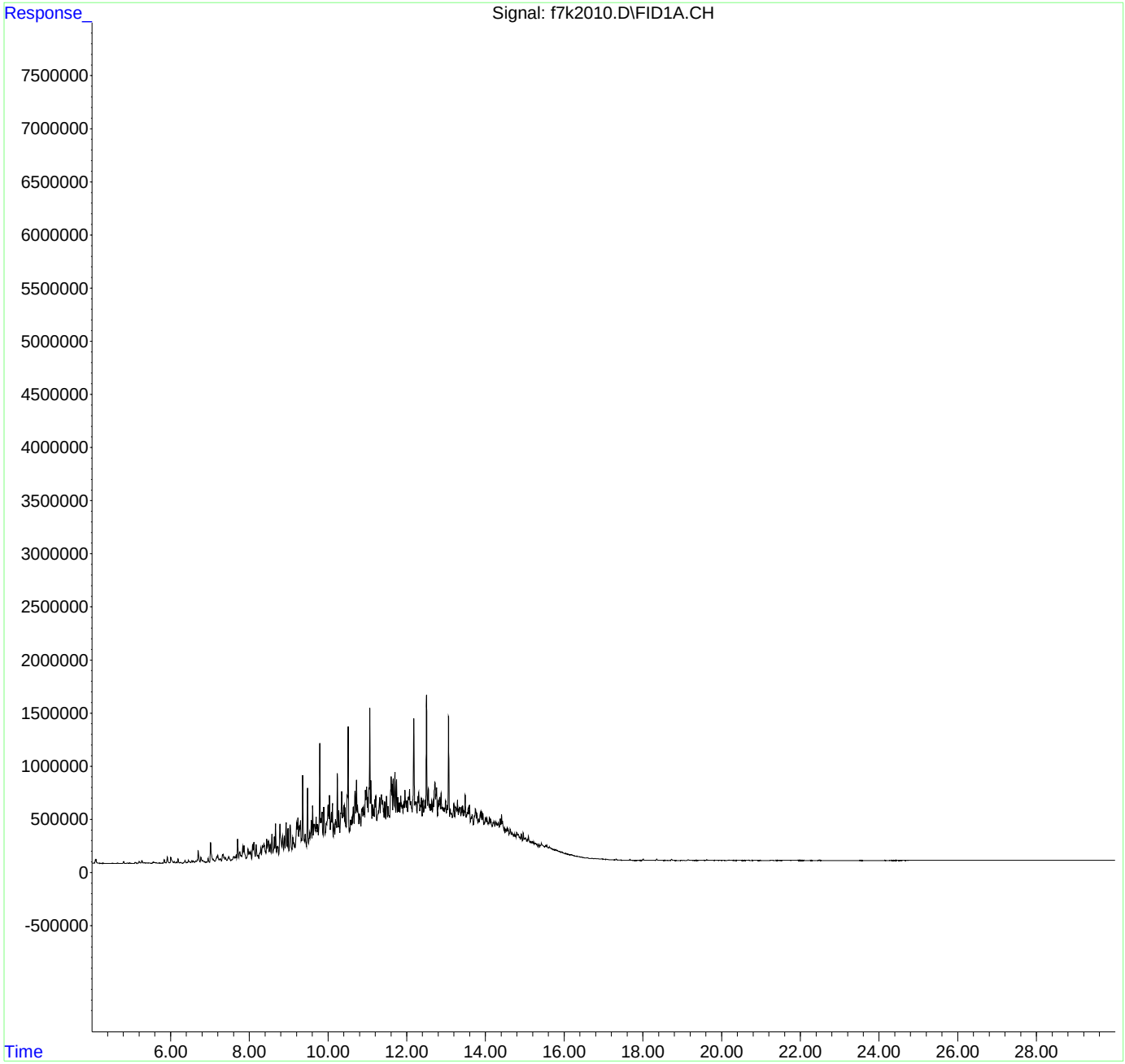
(f)=RT Delta > 1/2 Window (A) = Over the calibration range (d) = deleted (m)=manual int.

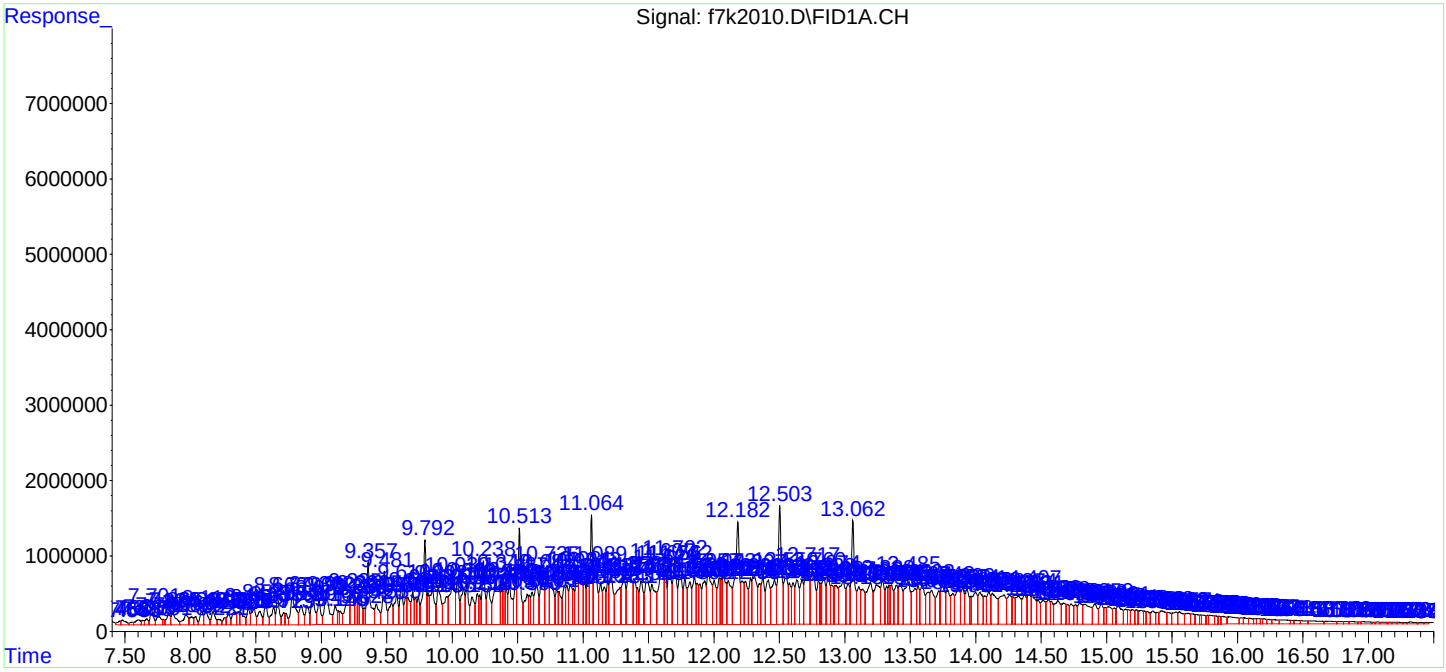
Quantitation Report
GEL Laboratories, LLC

DaData Path : C:\msdchem\1\DATA\112014DR\
DaData File : f7k2010.D
Signal(s) : FID1A.CH
Acq On : 20 Nov 2014 14:00
Operator : BYT1 InstName : FID7
Sample : |361440002|1437858|500|DROQ|1|LEID
Misc : |MIX[A]
ALS Vial : 9 Sample Multiplier: 500

Integration File: autoint1.e
Quant Time: Nov 20 14:38:59 2014
Quant Method : C:\msdchem\1\DATA\112014DR\110414_DRO.m
Quant Title : DRO TPH SubList :
QLast Update : Wed Nov 05 07:51:49 2014
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Large solvent peaks clipped

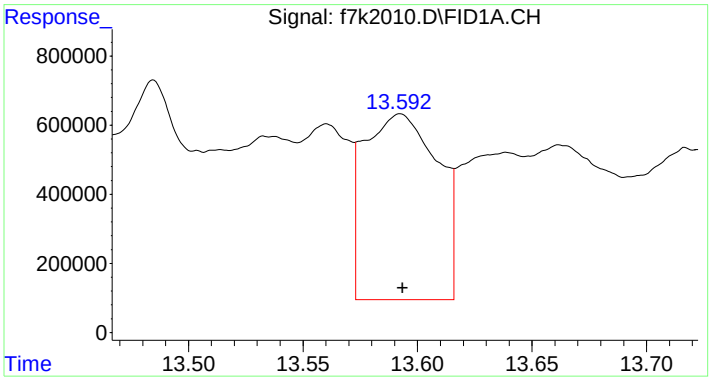
Volume Inj. : 1 ul
Signal Phase : DB-5MS
Signal Info : 30m x 250um x 0.25um



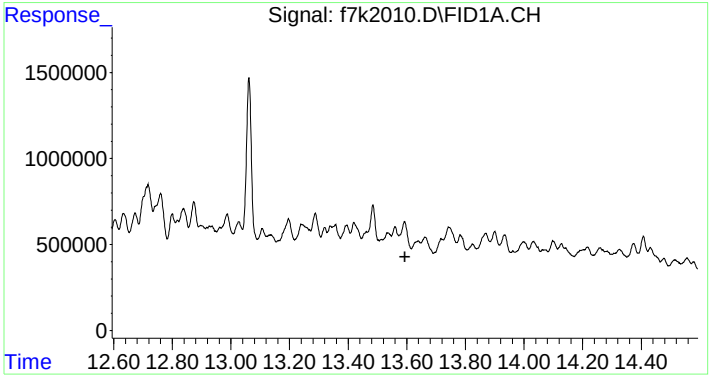


Compound: Diesel Range Organics

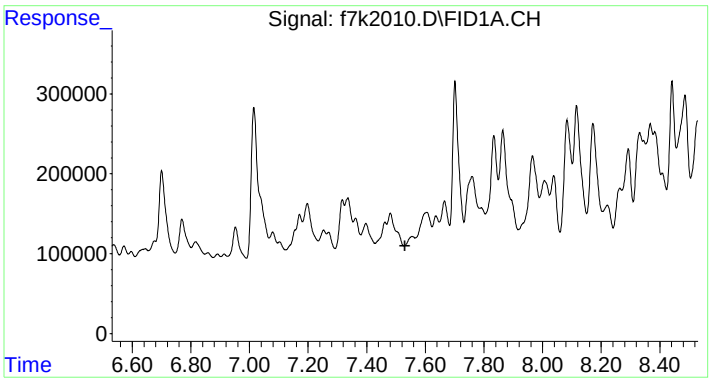
RT Range: 7.500: 17.401
Total TPH Resp: 1878873962
Total SMC/ISTD Resp: 0
Final Resp: 1878873962



#2 BEFORE analyst DELETION
o-Terphenyl
R.T.: 13.593 min
Delta R.T.: 0.000 min
Response: 12005288
Conc: 4217.97 mg/L

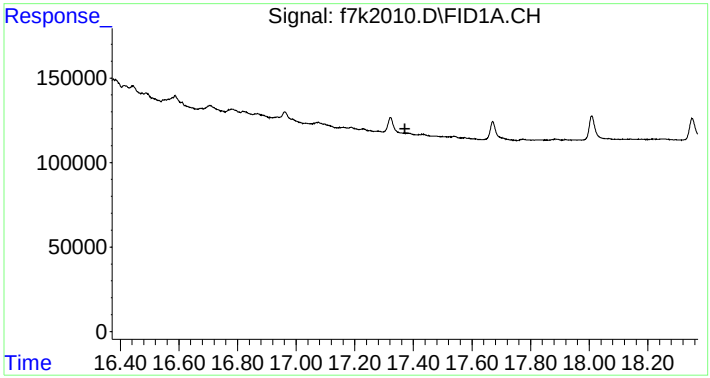


#2 AFTER analyst DELETION
o-Terphenyl
R.T.: 0.000 min
Exp R.T. : 13.593 min
Response: 0
Conc: N.D. DELETED



#3
n-Decane
R.T.: 7.555 min
Delta R.T.: 0.025 min
Response: 0
Conc: N.D. DELETED

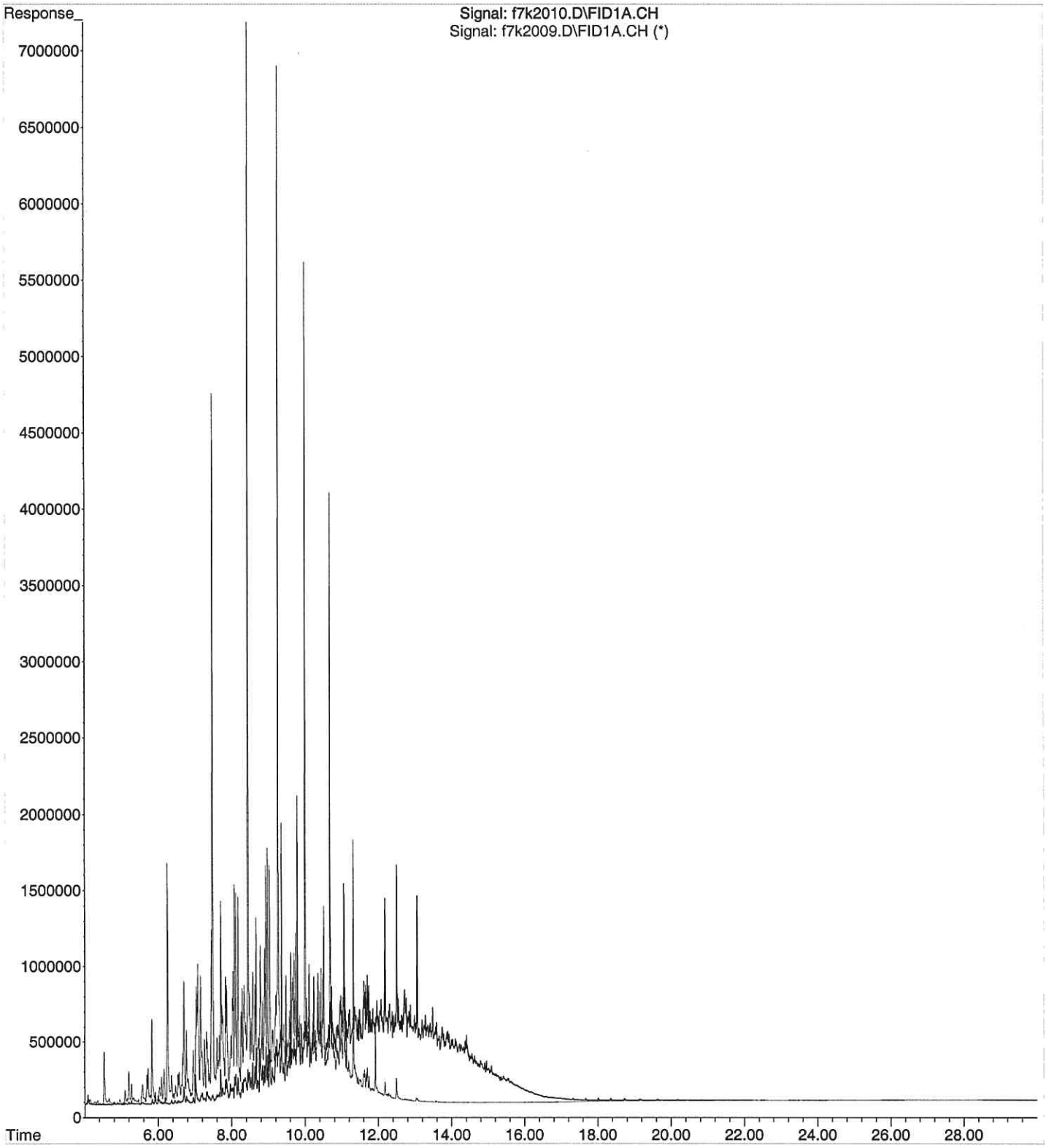
SemiQuant



#4
n-Octacosane
R.T.: 17.376 min
Delta R.T.: 0.005 min
Response: 0
Conc: N.D. DELETED

SemiQuant

File :C:\msdchem\1\DATA\112014DR\f7k2010.D
Operator : BYT1
Acquired : 20 Nov 2014 14:00 using AcqMethod DRO_MOTOR.M
Instrument : FID7
Sample Name: |361440002|1437858|500|DROQ|1|LEID
Misc Info : |MIX[A]
Vial Number: 9



leidos

361439

301 Laboratory Road, Oak Ridge, Tennessee 37831(865) 482-9031

CHAIN OF CUSTODY RECORD

COC NO.:

PROJECT NAME: Hunter

PROJECT NUMBER: 301205.00.000.00.200

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Amanda Harness (Printed Name): Amanda Harness

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Road, Charleston, SC 29417

PHONE NO: (843) 556-8171

REQUESTED PARAMETERS

Sample ID	Date Collected	Time Collected	Matrix	BTEX (1)	3580/8015 DRO (2)	No. of Bottles/ Vials:	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
BFE5B2	11/13/14	1145	GW	2		2		
TH0653	——lab prepared		water	2		2		
BFE5B4	11/13/14	1145	GW	2		2		
BF38B2	11/13/14	1130	GW	2		2		
BF38B2MSD	11/13/14	1130	GW	2		2		
BF38B2MS	11/13/14	1130	GW	2		2		

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Amanda Harness	11/13/14 14:30	[signature]	11/13/14 1430
COMPANY NAME: SCF		COMPANY NAME: GE	
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time
COMPANY NAME:		COMPANY NAME:	
RELINQUISHED BY:	Date/Time	RECEIVED BY: [signature]	Date/Time 11/13/14 16:45
COMPANY NAME:		COMPANY NAME: GEL	

TOTAL NUMBER OF CONTAINERS:

Cooler Temperature:

Cooler ID:

FEDEX NUMBER:

1 2 - 40 ml VOA Vial, HCL to pH < 2, 4C
2 1 - 250 ml Amber glass, Cool, 4C

7-day TAT

Samples BFE5B2 + BFE5B4 are from a MW w/ free product.

Page: 1 of 1
Project #: 301205.00.000.00.200
GEL Quote #:
COC Number (1):
PO Number:

GEL Chain of Custody and Analytical Request

GEL Work Order Number: 362411

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: Leidos Phone #: 8654814798
Project/Site Name: Hunter Fax #: /
Address: 301 Laboratory Rd. Oak Ridge, TN 37831
Collected by: Amanda Harness Send Results To: Patty Stoll & Jill Kovalchik

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Should this sample be considered: Radioactive	Should this sample be considered: TSCA Regulated	Total number of containers	HA VOCs	HA TPH-GRO	TPH-DRO	NI Total Fe + hardness	TDS + TSS	SA Phenols	pH	SA Oil + Grease	SA COD	BOD	<-- Preservative Type (6)
TBH017	lab provided	/	TB	no	water			2	2										
BFF80301	12/3/14	1530	N	no	water			15	2	2	2	1	2	1	1	2	1	1	Everything 48 TAT. except BOD.

Comments
Note: extra sample is required for sample specific QC

TAT Requested: Normal: Rush: ✓ Specify: 48 hr (Subject to Surcharge) Fax Results: Yes / (No)

Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Sample Collection Time Zone
(Eastern) Pacific
Central Other _____
Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	Amanda Harness	12/3/14	1800	P. Ward	12.4.14	0940
2						
3						

Sample Shipping and Delivery Details

GEL PM:
Method of Shipment: FedEx Date Shipped: 12/3/14
Airbill #:
Airbill #:

1.) Chain of Custody Number = Client Determined
2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal
5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. *8260B* - 3, *6010B/7470A* - 1).
6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: C

WHITE = LABORATORY YELLOW = FILE PINK = CLIENT

leidos

301 Laboratory Road, Oak Ridge, Tennessee 37831(865) 482-9031

CHAIN OF CUSTODY RECORD

365466 COC NO.:

PROJECT NAME: Hunter

PROJECT NUMBER: 301205.00.000.00.200

PROJECT MANAGER: Patty Stoll

Sampler (Signature): Amanda Harness (Printed Name): Amanda Harness

LABORATORY NAME: General Engineering Laboratory

LABORATORY ADDRESS: 2040 Savage Road, Charleston, SC 29417

PHONE NO: (843) 556-8171

Sample ID	Date Collected	Time Collected	Matrix	1 TPH-GRO	2 TPH-DRO	3 VOCs	4 Total Fe and Hardness	5 TDS and TSS	6 Phenols	7 pH	8 Oil and Grease	9 COD	10 BOD	No. of Bottles/ Vials:	OVA SCREENING	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
TBH018	lab prepared	—	water			2								2		
BFF80302	1/20/15	13:00	water	2	2	2	1	2	1	1	2	1	1	15		

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
Amanda Harness	1/20/15 16:00		1/21/15 0757
COMPANY NAME:		COMPANY NAME: GEL	
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time
COMPANY NAME:		COMPANY NAME:	
RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
COMPANY NAME:		COMPANY NAME:	

TOTAL NUMBER OF CONTAINERS: 17

Cooler ID:

Cooler Temperature:

FEDEX NUMBER:

Project requires 7-day TAT.

1 2 - 40 ml Vials, Cool, 4C (HCL to pH <2)
2 2 - 1 L Amberglass, Cool, 4C
3 2 - 40 ml Vials, HCL to pH < 2, 4C
4 1 - ~~125~~ ml Polybottle, HNO3 to pH <2, 4C (250 mL)
5 2 - 1 L Polybottle, Cool, 4C
6 1 - ~~1 L Amberglass~~, H2SO4 to pH<2, 4C (250 mL poly)
7 1 - 250 ml Polybottle, Cool, 4C
8 2 - 1 L Amberglass, H2SO4 to pH<2, 4C
9 1 - ~~125~~ ml Polybottle, H2SO4 to pH<2, 4C (250 mL)
10 1 - 500 ml Polybottle, Cool, 4C

Page: 1 of 1
Project #: Hunter - 301205.00.000.00.200
GEL Quote #:
COC Number (1):
PO Number:

GEL Chain of Custody and Analytical Request

GEL Work Order Number: 366036

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: Leidos
Phone #: (865) 297-2543
Project/Site Name: Hunter
Fax #:
Address: 301 Laboratory Rd. Oak Ridge, TN 37831
Collected by: Amanda Harness
Send Results To: Jill Kovalchik + Patty Stoll

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Should this sample be considered: Radioactive	Should this sample be considered: TSCA Regulated	Total number of containers	TCLP VOC + Metals	<-- Preservative Type (6)	Comments
SOIL IDW	11/28/15	1100	C		SO			2	2		Note: extra sample is required for sample specific QC

TAT Requested: Normal: Rush: Specify: 7 day (Subject to Surcharge)
Fax Results: Yes / No
Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Sample Collection Time Zone: Eastern Central Mountain Pacific Other _____

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	Amanda Harness	11/28/15	1600	[signature]	012915	0920
2						
3						

Sample Shipping and Delivery Details

GEL PM:
Method of Shipment:
Date Shipped:
Airbill #:
Airbill #:

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: C

1.) Chain of Custody Number = Client Determined
2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal
5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. *8260B* - 3, *6010B/7470A* - 1).
Preservative Type (6): ... SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

PINK = CLIENT

CHEMTECH

284 Sheffield Street, Mountainside, New Jersey 07092 Phone : 908 789 8900 Fax : 908 789 89

CHEMTECH Project No. : _____

Client Contact Information	Bottle Order ID : **B1412074**	Courier : UPS	_____ of _____ COCs
Client ID : **SCIE03** Project ID : **Hunter Army Airfield Air**		Sampler Name(s) : Amanda Harness	Analysis / Matrix
Customer Name : **Leidos**	Project Manager **Jill kovalchik**	AIR ANALYSIS CHAIN-OF-CUSTODY	
Address : **151 Lafayette Drive**	Phone Number : **858-826-6000**		
PO Box 2502	Fax Number : **8654818714**		
City : **Oak Ridge**	Site Details:	Batch Certified	
State : **TN**	Analysis Turnaround Time		
Zip Code : **37831**	Standard : ~~15 business days~~ **OR**	Data Package Type :	
Country :	Rush (Specify): 7 **Days**	EDD Type :	

Sample Identification	Sample Date(s)	Time Start (24 hr Clock)	Time Stop (24 hr Clock)	Can Vacuum in Field ("Hg) (Start)	Can Vacuum in Field ("Hg) (Stop)**	Interior Temp. (F) (Start)	Interior Temp. (F) (Stop)	Out going Can Pressure ("Hg)(Lab)	In coming Can Pressure ("Hg)(Lab)	Flow Reg. ID	Can ID	Can Size (L)	Flow Controller Readout	Can Cert ID	TO-15	Indoor/Ambinet Air	Soil Gas		
BFF40202	1/20/15	12:30	12:30					-30	-3.1	NR	10298	6 L	NA	VL023539.D	✓				

Temperature (Fahrenheit)	Ambient	Maximum	Minimum	
Start				
Stop				

GC/MS Analyst Signature (TO-15)

Pressure (Inches of Hg)	Ambient	Maximum	Minimum	
Start				
Stop				

** Submittal of this COC indicates approval of the analysis based on existing conditio

Please follow the instructions on the back of this CO

Special Instructions/QC Requirements & Comments :

Suspected Contamination: High Medium Low PID Readings:

Sampling site (State): Georgia

Quick Connector required : NO

Canisters Shiped by:	Date/Time: 12/23/14	Canisters Received by:	Date/Time:	B1412074 - 1
Samples Relinquished by: Amanda Harness	Date/Time: 1/20/15 4:00PM	Received by:	Date/Time:	
Relinquished by:	Date/Time:	Received by:	Date/Time:	

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**361439**	**Date Collected:**	**11/13/2014 11:45**	**Matrix:**	**WATER**
Lab Sample ID:	**361439001**	**Date Received:**	**11/13/2014 16:45**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFE5B2**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1437367**	**Inst:**	**VOAA.I**	**Dilution:**	**1**
Run Date:	**11/18/2014 20:51**	**Analyst:**	**JEB**	**Purge Vol:**	**5 mL**
Prep Date:	**11/18/2014 20:51**				
Data File:	**111814\AJ220.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
71-43-2	Benzene	U U	1.00	ug/L	0.300	1.00
100-41-4	Ethylbenzene	U U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	=	2.51	ug/L	0.300	1.00
1330-20-7	Xylenes (total)	U U	3.00	ug/L	0.300	3.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	3.493	33.5	ug/L	0	J
	unknown	3.836	34.3	ug/L	0	J
000564-04-5	3-Pentanone, 2,2-dimethyl-	11.815	30.4	ug/L	80	J
000934-80-5	Benzene, 4-ethyl-1,2-dimethyl-	15.341	35.8	ug/L	97	NJ
001074-55-1	Benzene, 1-methyl-4-propyl-	15.581	34.5	ug/L	94	NJ
000527-84-4	Benzene, 1-methyl-2-(1-methylethyl	15.762	23.8	ug/L	95	NJ
000768-00-3	Benzene, (1-methyl-1-propenyl)-, (	15.956	42.7	ug/L	81	J
000934-80-5	Benzene, 4-ethyl-1,2-dimethyl-	16.122	29.3	ug/L	96	NJ
001595-16-0	Benzene, 1-methyl-4-(1-methylpropy	16.66	25.7	ug/L	83	J
	unknown hydrocarbon	16.723	46	ug/L	0	J
	unknown hydrocarbon	16.741	28.8	ug/L	0	J
001758-88-9	Benzene, 2-ethyl-1,4-dimethyl-	16.787	51.2	ug/L	91	NJ
000767-58-8	Indan, 1-methyl-	16.837	74.1	ug/L	90	NJ
	unknown hydrocarbon	16.847	29.2	ug/L	0	J
000119-64-2	Naphthalene, 1,2,3,4-tetrahydro-	17.069	45.2	ug/L	95	NJ
020836-11-7	1H-Indene,2,3-dihydro-2,2-dimethyl	17.401	44.2	ug/L	91	NJ
003877-19-8	Naphthalene, 1,2,3,4-tetrahydro-2-	17.77	33.9	ug/L	76	J
	unknown hydrocarbon	18.464	27.5	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**361439**	**Date Collected:**	**11/13/2014 12:00**	**Matrix:**	**WATER**
Lab Sample ID:	**361439002**	**Date Received:**	**11/13/2014 16:45**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**TH0653**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1437367**	**Inst:**	**VOAA.I**	**Dilution:**	**1**
Run Date:	**11/19/2014 15:46**	**Analyst:**	**JEB**	**Purge Vol:**	**5 mL**
Prep Date:	**11/19/2014 15:46**				
Data File:	**111914\AJ309.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
71-43-2	Benzene	U U	1.00	ug/L	0.300	1.00
100-41-4	Ethylbenzene	U U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	U U	1.00	ug/L	0.300	1.00
1330-20-7	Xylenes (total)	U U	3.00	ug/L	0.300	3.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated Units	Fit	Qual
	No Tentatively Identified Compounds Found		ug/L		

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**361439**	**Date Collected:**	**11/13/2014 11:45**	**Matrix:**	**WATER**
Lab Sample ID:	**361439003**	**Date Received:**	**11/13/2014 16:45**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFE5B4**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1437367**	**Inst:**	**VOAA.I**	**Dilution:**	**1**
Run Date:	**11/18/2014 21:41**	**Analyst:**	**JEB**	**Purge Vol:**	**5 mL**
Prep Date:	**11/18/2014 21:41**				
Data File:	**111814\AJ222.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
71-43-2	Benzene	U U	1.00	ug/L	0.300	1.00
100-41-4	Ethylbenzene	U U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	=	2.65	ug/L	0.300	1.00
1330-20-7	Xylenes (total)	U U	3.00	ug/L	0.300	3.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	3.513	27.5	ug/L	0	J
	unknown	3.846	25.3	ug/L	0	J
	unknown	11.815	31.7	ug/L	0	J
000934-80-5	Benzene, 4-ethyl-1,2-dimethyl-	15.344	46	ug/L	97	NJ
001074-55-1	Benzene, 1-methyl-4-propyl-	15.581	37	ug/L	94	NJ
001758-88-9	Benzene, 2-ethyl-1,4-dimethyl-	15.761	25	ug/L	95	NJ
000527-84-4	Benzene, 1-methyl-2-(1-methylethyl	15.91	34.8	ug/L	92	NJ
	unknown hydrocarbon	15.956	46.4	ug/L	0	J
	unknown hydrocarbon	16.271	50.9	ug/L	0	J
001595-16-0	Benzene, 1-methyl-4-(1-methylpropy	16.66	28.9	ug/L	87	NJ
	unknown hydrocarbon	16.723	42.6	ug/L	0	J
	unknown hydrocarbon	16.741	27.8	ug/L	0	J
000934-74-7	Benzene, 1-ethyl-3,5-dimethyl-	16.787	53.4	ug/L	91	NJ
000767-58-8	Indan, 1-methyl-	16.836	77.6	ug/L	90	NJ
	unknown hydrocarbon	16.847	29.7	ug/L	0	J
000119-64-2	Naphthalene, 1,2,3,4-tetrahydro-	17.069	45.9	ug/L	95	NJ
017059-48-2	1H-Indene, 2,3-dihydro-1,6-dimethy	17.401	45.9	ug/L	91	NJ
	unknown hydrocarbon	17.77	32.8	ug/L	0	J
002809-64-5	Naphthalene, 1,2,3,4-tetrahydro-5-	18.464	25.5	ug/L	91	NJ

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**361439**	**Date Collected:**	**11/13/2014 11:30**	**Matrix:**	**WATER**
Lab Sample ID:	**361439004**	**Date Received:**	**11/13/2014 16:45**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BF38B2**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1437367**	**Inst:**	**VOAA.I**	**Dilution:**	**1**
Run Date:	**11/19/2014 16:11**	**Analyst:**	**JEB**	**Purge Vol:**	**5 mL**
Prep Date:	**11/19/2014 16:11**				
Data File:	**111914\AJ310.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
71-43-2	Benzene	U U	1.00	ug/L	0.300	1.00
100-41-4	Ethylbenzene	U U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	U U	1.00	ug/L	0.300	1.00
1330-20-7	Xylenes (total)	U U	3.00	ug/L	0.300	3.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	3.493	16.4	ug/L	0	J
	unknown	15.684	5.47	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**362411**	**Date Collected:**	**12/03/2014 12:00**	**Matrix:**	**WATER**
Lab Sample ID:	**362411001**	**Date Received:**	**12/04/2014 09:40**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**TBH017**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1441166**	**Inst:**	**VOA9.I**	**Dilution:**	**1**
Run Date:	**12/05/2014 15:43**	**Analyst:**	**RXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**12/05/2014 15:43**				
Data File:	**120514V9\9Q517.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	
71-55-6	1,1,1-Trichloroethane	U	1.00	ug/L	0.300	1.00	U
79-34-5	1,1,2,2-Tetrachloroethane	U	1.00	ug/L	0.300	1.00	
79-00-5	1,1,2-Trichloroethane	U	1.00	ug/L	0.300	1.00	
75-34-3	1,1-Dichloroethane	U	1.00	ug/L	0.300	1.00	
75-35-4	1,1-Dichloroethylene	U	1.00	ug/L	0.300	1.00	
87-61-6	1,2,3-Trichlorobenzene	U	1.00	ug/L	0.300	1.00	
120-82-1	1,2,4-Trichlorobenzene	U	1.00	ug/L	0.300	1.00	
96-12-8	1,2-Dibromo-3-chloropropane	U	1.00	ug/L	0.500	1.00	
106-93-4	1,2-Dibromoethane	U	1.00	ug/L	0.300	1.00	
95-50-1	1,2-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
107-06-2	1,2-Dichloroethane	U	1.00	ug/L	0.300	1.00	
78-87-5	1,2-Dichloropropane	U	1.00	ug/L	0.300	1.00	
541-73-1	1,3-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
106-46-7	1,4-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
123-91-1	1,4-Dioxane	U	50.0	ug/L	15.0	50.0	
78-93-3	2-Butanone	U	5.00	ug/L	1.50	5.00	
591-78-6	2-Hexanone	U	5.00	ug/L	1.50	5.00	
108-10-1	4-Methyl-2-pentanone	U	5.00	ug/L	1.50	5.00	
67-64-1	Acetone	U	5.00	ug/L	1.50	5.00	UJ C05
71-43-2	Benzene	U	1.00	ug/L	0.300	1.00	U
74-97-5	Bromochloromethane	U	1.00	ug/L	0.300	1.00	
75-27-4	Bromodichloromethane	U	1.00	ug/L	0.300	1.00	
75-25-2	Bromoform	U	1.00	ug/L	0.300	1.00	
74-83-9	Bromomethane	U	1.00	ug/L	0.300	1.00	
75-15-0	Carbon disulfide	U	5.00	ug/L	1.50	5.00	
56-23-5	Carbon tetrachloride	U	1.00	ug/L	0.300	1.00	
108-90-7	Chlorobenzene	U	1.00	ug/L	0.300	1.00	
75-00-3	Chloroethane	U	1.00	ug/L	0.300	1.00	
67-66-3	Chloroform	U	1.00	ug/L	0.300	1.00	
74-87-3	Chloromethane	U	1.00	ug/L	0.300	1.00	
110-82-7	Cyclohexane	U	1.00	ug/L	0.300	1.00	
124-48-1	Dibromochloromethane	U	1.00	ug/L	0.300	1.00	
75-71-8	Dichlorodifluoromethane	U	1.00	ug/L	0.300	1.00	UJ C05
100-41-4	Ethylbenzene	U	1.00	ug/L	0.300	1.00	U
98-82-8	Isopropylbenzene	U	1.00	ug/L	0.300	1.00	
79-20-9	Methyl acetate	U	5.00	ug/L	1.50	5.00	
108-87-2	Methylcyclohexane	U	1.00	ug/L	0.300	1.00	
75-09-2	Methylene chloride	U	5.00	ug/L	1.00	5.00	

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**362411**	**Date Collected:**	**12/03/2014 12:00**	**Matrix:**	**WATER**
Lab Sample ID:	**362411001**	**Date Received:**	**12/04/2014 09:40**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**TBH017**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1441166**	**Inst:**	**VOA9.I**	**Dilution:**	**1**
Run Date:	**12/05/2014 15:43**	**Analyst:**	**RXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**12/05/2014 15:43**				
Data File:	**120514V9\9Q517.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
100-42-5	Styrene	U	1.00	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene	U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	U	1.00	ug/L	0.300	1.00
79-01-6	Trichloroethylene	U	1.00	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane	U	1.00	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	5.00	ug/L	2.00	5.00
75-01-4	Vinyl chloride	U	1.00	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	2.00	ug/L	0.300	2.00
95-47-6	o-Xylene	U	1.00	ug/L	0.300	1.00
1634-04-4	tert-Butyl methyl ether	U	1.00	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	4.286	9.22	ug/L	0	J
	unknown	5.307	7.72	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**362411**	**Date Collected:**	**12/03/2014 15:30**	**Matrix:**	**WATER**
Lab Sample ID:	**362411002**	**Date Received:**	**12/04/2014 09:40**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80301**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1441166**	**Inst:**	**VOA9.I**	**Dilution:**	**1**
Run Date:	**12/05/2014 16:11**	**Analyst:**	**RXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**12/05/2014 16:11**				
Data File:	**120514V9\9Q518.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	
71-55-6	1,1,1-Trichloroethane	U	1.00	ug/L	0.300	1.00	U
79-34-5	1,1,2,2-Tetrachloroethane	U	1.00	ug/L	0.300	1.00	
79-00-5	1,1,2-Trichloroethane	U	1.00	ug/L	0.300	1.00	
75-34-3	1,1-Dichloroethane	U	1.00	ug/L	0.300	1.00	
75-35-4	1,1-Dichloroethylene	U	1.00	ug/L	0.300	1.00	
87-61-6	1,2,3-Trichlorobenzene	U	1.00	ug/L	0.300	1.00	
120-82-1	1,2,4-Trichlorobenzene	U	1.00	ug/L	0.300	1.00	
96-12-8	1,2-Dibromo-3-chloropropane	U	1.00	ug/L	0.500	1.00	
106-93-4	1,2-Dibromoethane	U	1.00	ug/L	0.300	1.00	
95-50-1	1,2-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
107-06-2	1,2-Dichloroethane	U	1.00	ug/L	0.300	1.00	
78-87-5	1,2-Dichloropropane	U	1.00	ug/L	0.300	1.00	
541-73-1	1,3-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
106-46-7	1,4-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
123-91-1	1,4-Dioxane	U	50.0	ug/L	15.0	50.0	
78-93-3	2-Butanone	U	5.00	ug/L	1.50	5.00	
591-78-6	2-Hexanone	U	5.00	ug/L	1.50	5.00	
108-10-1	4-Methyl-2-pentanone	U	5.00	ug/L	1.50	5.00	
67-64-1	Acetone	J	1.95	ug/L	1.50	5.00	UJ C05
71-43-2	Benzene	U	1.00	ug/L	0.300	1.00	U
74-97-5	Bromochloromethane	U	1.00	ug/L	0.300	1.00	
75-27-4	Bromodichloromethane	U	1.00	ug/L	0.300	1.00	
75-25-2	Bromoform	U	1.00	ug/L	0.300	1.00	
74-83-9	Bromomethane	U	1.00	ug/L	0.300	1.00	
75-15-0	Carbon disulfide	U	5.00	ug/L	1.50	5.00	
56-23-5	Carbon tetrachloride	U	1.00	ug/L	0.300	1.00	
108-90-7	Chlorobenzene	U	1.00	ug/L	0.300	1.00	
75-00-3	Chloroethane	U	1.00	ug/L	0.300	1.00	
67-66-3	Chloroform	U	1.00	ug/L	0.300	1.00	
74-87-3	Chloromethane	U	1.00	ug/L	0.300	1.00	
110-82-7	Cyclohexane	U	1.00	ug/L	0.300	1.00	
124-48-1	Dibromochloromethane	U	1.00	ug/L	0.300	1.00	
75-71-8	Dichlorodifluoromethane	U	1.00	ug/L	0.300	1.00	UJ C05
100-41-4	Ethylbenzene	U	1.00	ug/L	0.300	1.00	U
98-82-8	Isopropylbenzene	U	1.00	ug/L	0.300	1.00	
79-20-9	Methyl acetate	U	5.00	ug/L	1.50	5.00	
108-87-2	Methylcyclohexane	U	1.00	ug/L	0.300	1.00	
75-09-2	Methylene chloride	U	5.00	ug/L	1.00	5.00	

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**362411**	**Date Collected:**	**12/03/2014 15:30**	**Matrix:**	**WATER**
Lab Sample ID:	**362411002**	**Date Received:**	**12/04/2014 09:40**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80301**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1441166**	**Inst:**	**VOA9.I**	**Dilution:**	**1**
Run Date:	**12/05/2014 16:11**	**Analyst:**	**RXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**12/05/2014 16:11**				
Data File:	**120514V9\9Q518.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	
100-42-5	Styrene	U	1.00	ug/L	0.300	1.00	U
127-18-4	Tetrachloroethylene	U	1.00	ug/L	0.300	1.00	
108-88-3	Toluene	U	1.00	ug/L	0.300	1.00	
79-01-6	Trichloroethylene	U	1.00	ug/L	0.300	1.00	
75-69-4	Trichlorofluoromethane	U	1.00	ug/L	0.300	1.00	
76-13-1	Trichlorotrifluoroethane	U	5.00	ug/L	2.00	5.00	
75-01-4	Vinyl chloride	U	1.00	ug/L	0.300	1.00	
156-59-2	cis-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00	
10061-01-5	cis-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00	
179601-23-1	m,p-Xylenes	U	2.00	ug/L	0.300	2.00	
95-47-6	o-Xylene	U	1.00	ug/L	0.300	1.00	
1634-04-4	tert-Butyl methyl ether	U	1.00	ug/L	0.300	1.00	
156-60-5	trans-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00	
10061-02-6	trans-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00	

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	4.286	23.9	ug/L	0	J
	unknown	4.657	20.2	ug/L	0	J

FID Diesel Range Organics
Certificate of Analysis
Sample Summary

SDG Number:	**362411**	**Date Collected:**	**12/03/2014 15:30**	**Matrix:**	**WATER**
Lab Sample ID:	**362411002**	**Date Received:**	**12/04/2014 09:45**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80301**	**Method:**	**SW846 3535A/8015C**	**SOP Ref:**	**GL-OA-E-003**
Batch ID:	**1441025**	**Inst:**	**FID7.I**	**Dilution:**	**1**
Run Date:	**12/05/2014 17:14**	**Analyst:**	**BYT1**	**Inj. Vol:**	**1 uL**
Prep Date:	**12/05/2014 07:25**	**Aliquot:**	**1060 mL**	**Final Volume:**	**1 mL**
Data File:	**120514DR\f7l0508.D**	**Column:**	**DB-5ms**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	
DRO	Diesel Range Organics	B	4.27	mg/L	0.0472	0.189	J G01

GC Volatiles (GRO)
Certificate of Analysis
Sample Summary

SDG Number:	**362411**	**Date Collected:**	**12/03/2014 15:30**	**Matrix:**	**WATER**
Lab Sample ID:	**362411002**	**Date Received:**	**12/04/2014 09:45**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80301**	**Method:**	**SW846 8015C**	**SOP Ref:**	**GL-OA-E-004**
Batch ID:	**1440965**	**Inst:**	**VOC4A.I**	**Dilution:**	**1**
Run Date:	**12/04/2014 14:49**	**Analyst:**	**ACJ**	**Inj. Vol:**	**1 uL**
Prep Date:	**12/04/2014 14:49**				
Data File:	**120414\4M404.D**	**Column:**	**DB-MTBE**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	
	Gasoline Range Organics	U	50.0	ug/L	16.7	50.0	U

METALS
−1−
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 362411 **METHOD TYPE:** SW846

SAMPLE ID: 362411002 **CLIENT ID:** BFF80301

CONTRACT: LEID00200

MATRIX: Water **DATE RECEIVED** 04−DEC−14 **LEVEL:** Low **%SOLIDS:**

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439−89−6	Iron	9690	ug/L		=	P	30	1	OPTIMA6	120514A−1

***Analytical Methods:**

P SW846 3005A/6010C

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: December 10, 2014

Company : Leidos
Address : 301 Laboratory Rd.
Oak Ridge, Tennessee 37830
Contact: Ms. Marie Simpson
Project: Product Recovery System Pilot Study 2, Hunter AA-09

Client Sample ID:	BFF80301	Project:	LEID00200
Sample ID:	362411002	Client ID:	LEID002
Matrix:	Water		
Collect Date:	03-DEC-14 15:30		
Receive Date:	04-DEC-14		
Collector:	Client		

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis												
EPA 420.4 Total Phenols "As Received"												
Total Phenol	J	4.47	U F01 5.00	1.67	5.00	ug/L	1	AXH3	12/08/14	1217	1440690	1
Oil & Grease Analysis												
EPA 1664A n-Hexane Extractable Material (Oil and Grease) "As Received"												
Oil and Grease	J	2.66	J	1.13	4.03	mg/L		KLP1	12/08/14	1015	1441224	2
Solids Analysis												
SM 2540D Total Suspended Liq "As Received"												
Total Suspended Solids		4.10	=	0.570	2.50	mg/L		MXB3	12/04/14	1328	1440920	3
SM2540C Solids, Dissolved "As Received"												
Total Dissolved Solids		470	=	3.40	14.3	mg/L		MXB3	12/04/14	1409	1441921	4
Spectrometric Analysis												
EPA 410.4 Chem. Oxygen Demand "As Received"												
COD		92.6	=	6.67	20.0	mg/L	1	SXC5	12/05/14	1503	1441073	5
Titration and Ion Analysis												
EPA 150.1 pH "As Received"												
pH at Temp 18.2C	H	5.90	J A03	0.010	0.100	SU	1	PXO1	12/06/14	1546	1441508	6
SM 2340 C Total Hardness "As Received"												
Hardness as CaCO3		87.3	=	2.00	4.00	mg/L		PXO1	12/06/14	1408	1441509	7

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 420.4	EPA 420.4 Phenols, Total in liquid PREP	AXH3	12/08/14	1156	1440689

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 420.4	
2	EPA 1664A/1664B	
3	SM 2540D	
4	SM 2540C	
5	EPA 410.4	
6	EPA 150.1	
7	SM 2340 C	

Notes:

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: December 10, 2014

Company :	Leidos
Address :	301 Laboratory Rd.
	Oak Ridge, Tennessee 37830
Contact:	Ms. Marie Simpson
Project:	Product Recovery System Pilot Study 2, Hunter AA-09

Client Sample ID:	BFF80301	Project:	LEID00200
Sample ID:	362411003	Client ID:	LEID002
Matrix:	Water		
Collect Date:	03-DEC-14 15:30		
Receive Date:	04-DEC-14		
Collector:	Client		

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Micro-biology												
SM 5210B BOD, 5DAY "As Received"												
BOD, 5 DAY		8.94	=	3.00	6.00	mg/L		SXC4	12/05/14	0741	1441074	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SM 5210B	

Notes:

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**365466**	**Date Collected:**	**01/20/2015 12:00**	**Matrix:**	**WATER**
Lab Sample ID:	**365466001**	**Date Received:**	**01/21/2015 07:57**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**TBH018**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1452142**	**Inst:**	**VOA1.I**	**Dilution:**	**1**
Run Date:	**01/22/2015 15:34**	**Analyst:**	**VXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**01/22/2015 15:34**				
Data File:	**012215V1\1S413.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
71-55-6	1,1,1-Trichloroethane	U	1.00	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	1.00	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	1.00	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	1.00	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	1.00	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	1.00	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	1.00	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	1.00	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	1.00	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	1.00	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	1.00	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	1.00	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	1.00	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	1.00	ug/L	0.300	1.00
123-91-1	1,4-Dioxane	U	50.0	ug/L	15.0	50.0
78-93-3	2-Butanone	U	5.00	ug/L	1.50	5.00
591-78-6	2-Hexanone	U	5.00	ug/L	1.50	5.00
108-10-1	4-Methyl-2-pentanone	U	5.00	ug/L	1.50	5.00
67-64-1	Acetone	U	5.00	ug/L	1.50	5.00
71-43-2	Benzene	U	1.00	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	1.00	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	1.00	ug/L	0.300	1.00
75-25-2	Bromoform	U	1.00	ug/L	0.300	1.00
74-83-9	Bromomethane	U	1.00	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	5.00	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	1.00	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	1.00	ug/L	0.300	1.00
75-00-3	Chloroethane	U	1.00	ug/L	0.300	1.00
67-66-3	Chloroform	U	1.00	ug/L	0.300	1.00
74-87-3	Chloromethane	U	1.00	ug/L	0.300	1.00
110-82-7	Cyclohexane	U	1.00	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	1.00	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	1.00	ug/L	0.300	1.00
100-41-4	Ethylbenzene	U	1.00	ug/L	0.300	1.00
98-82-8	Isopropylbenzene	U	1.00	ug/L	0.300	1.00
79-20-9	Methyl acetate	U	5.00	ug/L	1.50	5.00
108-87-2	Methylcyclohexane	U	1.00	ug/L	0.300	1.00
75-09-2	Methylene chloride	J	1.01	ug/L	1.00	5.00

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**365466**	**Date Collected:**	**01/20/2015 12:00**	**Matrix:**	**WATER**
Lab Sample ID:	**365466001**	**Date Received:**	**01/21/2015 07:57**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**TBH018**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1452142**	**Inst:**	**VOA1.I**	**Dilution:**	**1**
Run Date:	**01/22/2015 15:34**	**Analyst:**	**VXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**01/22/2015 15:34**				
Data File:	**012215V1\1S413.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
100-42-5	Styrene	U	1.00	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene	U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	U	1.00	ug/L	0.300	1.00
79-01-6	Trichloroethylene	U	1.00	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane	U	1.00	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	5.00	ug/L	2.00	5.00
75-01-4	Vinyl chloride	U	1.00	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	2.00	ug/L	0.300	2.00
95-47-6	o-Xylene	U	1.00	ug/L	0.300	1.00
1634-04-4	tert-Butyl methyl ether	U	1.00	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown siloxane	15.019	5.44	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**365466**	**Date Collected:**	**01/20/2015 13:00**	**Matrix:**	**WATER**
Lab Sample ID:	**365466002**	**Date Received:**	**01/21/2015 07:57**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80302**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1452142**	**Inst:**	**VOA1.I**	**Dilution:**	**1**
Run Date:	**01/22/2015 16:07**	**Analyst:**	**VXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**01/22/2015 16:07**				
Data File:	**012215V1\1S414.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
71-55-6	1,1,1-Trichloroethane	U	1.00	ug/L	0.300	1.00
79-34-5	1,1,2,2-Tetrachloroethane	U	1.00	ug/L	0.300	1.00
79-00-5	1,1,2-Trichloroethane	U	1.00	ug/L	0.300	1.00
75-34-3	1,1-Dichloroethane	U	1.00	ug/L	0.300	1.00
75-35-4	1,1-Dichloroethylene	U	1.00	ug/L	0.300	1.00
87-61-6	1,2,3-Trichlorobenzene	U	1.00	ug/L	0.300	1.00
120-82-1	1,2,4-Trichlorobenzene	U	1.00	ug/L	0.300	1.00
96-12-8	1,2-Dibromo-3-chloropropane	U	1.00	ug/L	0.500	1.00
106-93-4	1,2-Dibromoethane	U	1.00	ug/L	0.300	1.00
95-50-1	1,2-Dichlorobenzene	U	1.00	ug/L	0.300	1.00
107-06-2	1,2-Dichloroethane	U	1.00	ug/L	0.300	1.00
78-87-5	1,2-Dichloropropane	U	1.00	ug/L	0.300	1.00
541-73-1	1,3-Dichlorobenzene	U	1.00	ug/L	0.300	1.00
106-46-7	1,4-Dichlorobenzene	U	1.00	ug/L	0.300	1.00
123-91-1	1,4-Dioxane	U	50.0	ug/L	15.0	50.0
78-93-3	2-Butanone	U	5.00	ug/L	1.50	5.00
591-78-6	2-Hexanone	U	5.00	ug/L	1.50	5.00
108-10-1	4-Methyl-2-pentanone	U	5.00	ug/L	1.50	5.00
67-64-1	Acetone	J	4.08	ug/L	1.50	5.00
71-43-2	Benzene	U	1.00	ug/L	0.300	1.00
74-97-5	Bromochloromethane	U	1.00	ug/L	0.300	1.00
75-27-4	Bromodichloromethane	U	1.00	ug/L	0.300	1.00
75-25-2	Bromoform	U	1.00	ug/L	0.300	1.00
74-83-9	Bromomethane	U	1.00	ug/L	0.300	1.00
75-15-0	Carbon disulfide	U	5.00	ug/L	1.50	5.00
56-23-5	Carbon tetrachloride	U	1.00	ug/L	0.300	1.00
108-90-7	Chlorobenzene	U	1.00	ug/L	0.300	1.00
75-00-3	Chloroethane	U	1.00	ug/L	0.300	1.00
67-66-3	Chloroform	U	1.00	ug/L	0.300	1.00
74-87-3	Chloromethane	U	1.00	ug/L	0.300	1.00
110-82-7	Cyclohexane	U	1.00	ug/L	0.300	1.00
124-48-1	Dibromochloromethane	U	1.00	ug/L	0.300	1.00
75-71-8	Dichlorodifluoromethane	U	1.00	ug/L	0.300	1.00
100-41-4	Ethylbenzene	U	1.00	ug/L	0.300	1.00
98-82-8	Isopropylbenzene	U	1.00	ug/L	0.300	1.00
79-20-9	Methyl acetate	U	5.00	ug/L	1.50	5.00
108-87-2	Methylcyclohexane	U	1.00	ug/L	0.300	1.00
75-09-2	Methylene chloride	U	5.00	ug/L	1.00	5.00

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**365466**	**Date Collected:**	**01/20/2015 13:00**	**Matrix:**	**WATER**
Lab Sample ID:	**365466002**	**Date Received:**	**01/21/2015 07:57**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80302**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1452142**	**Inst:**	**VOA1.I**	**Dilution:**	**1**
Run Date:	**01/22/2015 16:07**	**Analyst:**	**VXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**01/22/2015 16:07**				
Data File:	**012215V1\1S414.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
100-42-5	Styrene	U	1.00	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene	U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	U	1.00	ug/L	0.300	1.00
79-01-6	Trichloroethylene	U	1.00	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane	U	1.00	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	5.00	ug/L	2.00	5.00
75-01-4	Vinyl chloride	U	1.00	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	2.00	ug/L	0.300	2.00
95-47-6	o-Xylene	U	1.00	ug/L	0.300	1.00
1634-04-4	tert-Butyl methyl ether	U	1.00	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown siloxane	15.028	9.03	ug/L	0	J
	unknown	21.141	6.07	ug/L	0	J
	unknown	21.611	7.41	ug/L	0	J
	unknown	21.833	19.3	ug/L	0	J

FID Diesel Range Organics
Certificate of Analysis
Sample Summary

SDG Number:	**365466**	**Date Collected:**	**01/20/2015 13:00**	**Matrix:**	**WATER**
Lab Sample ID:	**365466002**	**Date Received:**	**01/21/2015 07:57**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80302**	**Method:**	**SW846 3535A/8015C**	**SOP Ref:**	**GL-OA-E-003**
Batch ID:	**1452152**	**Inst:**	**FID5.I**	**Dilution:**	**1**
Run Date:	**01/23/2015 20:00**	**Analyst:**	**BYT1**	**Inj. Vol:**	**1 uL**
Prep Date:	**01/23/2015 10:50**	**Aliquot:**	**1050 mL**	**Final Volume:**	**1 mL**
Data File:	**012315DR\f5a2311.D**	**Column:**	**DB-5ms**		

CAS No.	Parmname	Qualifier	Result		Units	MDL/LOD	PQL/LOQ
DRO	Diesel Range Organics		2.39	=	mg/L	0.0476	0.190

METALS
−1−
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 365466 **METHOD TYPE:** SW846

SAMPLE ID: 365466002 **CLIENT ID:** BFF80302

CONTRACT: LEID00200

MATRIX: Water **DATE RECEIVED** 21−JAN−15 **LEVEL:** Low **%SOLIDS:**

CAS No	Analyte	Result		Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439−89−6	Iron	8820	=	ug/L			P	30	1	OPTIMA3	012215−1

***Analytical Methods:**

P SW846 3005A/6010C

GC Volatiles (GRO)
Certificate of Analysis
Sample Summary

SDG Number:	**365466**	**Date Collected:**	**01/20/2015 13:00**	**Matrix:**	**WATER**
Lab Sample ID:	**365466002**	**Date Received:**	**01/21/2015 07:57**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80302**	**Method:**	**SW846 8015C**	**SOP Ref:**	**GL-OA-E-004**
Batch ID:	**1453008**	**Inst:**	**VOC4A.I**	**Dilution:**	**1**
Run Date:	**01/26/2015 15:38**	**Analyst:**	**ACJ**	**Inj. Vol:**	**1 uL**
Prep Date:	**01/26/2015 15:38**				
Data File:	**012615\4T104.D**	**Column:**	**DB-MTBE**		

CAS No.	Parmname	Qualifier	Result		Units	MDL/LOD	PQL/LOQ
	Gasoline Range Organics	J	28.1	J	ug/L	16.7	50.0

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: January 27, 2015

Company : Leidos
Address : 301 Laboratory Rd.
Oak Ridge, Tennessee 37830
Contact: Ms. Marie Simpson
Project: Product Recovery System Pilot Study 2, Hunter AA-09

Client Sample ID: BFF80302
Sample ID: 365466002
Matrix: Water
Collect Date: 20-JAN-15 13:00
Receive Date: 21-JAN-15
Collector: Client

Project: LEID00200
Client ID: LEID002

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis												
EPA 420.4 Total Phenols "As Received"												
Total Phenol		119	=	1.67	5.00	ug/L	1	AXH3	01/23/15	1238	1451956	1
Micro-biology												
SM 5210B BOD, 5DAY "As Received"												
BOD, 5 DAY	J	4.72	J	3.00	6.00	mg/L		SXC4	01/21/15	1316	1451618	2
Oil & Grease Analysis												
EPA 1664A n-Hexane Extractable Material (Oil and Grease) "As Received"												
Oil and Grease	J	1.63	J	1.14	4.07	mg/L		JXT1	01/22/15	1032	1452126	3
Solids Analysis												
SM 2540D Total Suspended Liq "As Received"												
Total Suspended Solids		4.80	=	0.570	2.50	mg/L		MXB3	01/22/15	1019	1451982	4
SM2540C Solids, Dissolved "As Received"												
Total Dissolved Solids		234	=	3.40	14.3	mg/L		MXB3	01/22/15	1501	1451983	5
Spectrometric Analysis												
EPA 410.4 Chem. Oxygen Demand "As Received"												
COD		102	=	6.67	20.0	mg/L	1	SXC5	01/23/15	1549	1452180	6
Titration and Ion Analysis												
EPA 150.1 pH "As Received"												
pH at Temp 21.3C	H	6.89	J A03	0.010	0.100	SU	1	PXO1	01/24/15	1402	1452689	7
SM 2340 C Total Hardness "As Received"												
Hardness as CaCO3		68.0	=	2.00	4.00	mg/L		PXO1	01/27/15	1458	1452687	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 420.4	EPA 420.4 Phenols, Total in liquid PREP	AXH3	01/23/15	1215	1451955

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**367015**	**Date Collected:**	**02/11/2015 14:00**	**Matrix:**	**WATER**
Lab Sample ID:	**367015001**	**Date Received:**	**02/12/2015 08:35**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80303**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1458070**	**Inst:**	**VOA9.I**	**Dilution:**	**1**
Run Date:	**02/16/2015 14:32**	**Analyst:**	**RXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**02/16/2015 14:32**				
Data File:	**021615V9\9B116.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	
71-55-6	1,1,1-Trichloroethane	U	1.00	ug/L	0.300	1.00	U
79-34-5	1,1,2,2-Tetrachloroethane	U	1.00	ug/L	0.300	1.00	
79-00-5	1,1,2-Trichloroethane	U	1.00	ug/L	0.300	1.00	
75-34-3	1,1-Dichloroethane	U	1.00	ug/L	0.300	1.00	
75-35-4	1,1-Dichloroethylene	U	1.00	ug/L	0.300	1.00	
87-61-6	1,2,3-Trichlorobenzene	U	1.00	ug/L	0.300	1.00	
120-82-1	1,2,4-Trichlorobenzene	U	1.00	ug/L	0.300	1.00	
96-12-8	1,2-Dibromo-3-chloropropane	U	1.00	ug/L	0.500	1.00	
106-93-4	1,2-Dibromoethane	U	1.00	ug/L	0.300	1.00	
95-50-1	1,2-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
107-06-2	1,2-Dichloroethane	U	1.00	ug/L	0.300	1.00	
78-87-5	1,2-Dichloropropane	U	1.00	ug/L	0.300	1.00	
541-73-1	1,3-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
106-46-7	1,4-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
123-91-1	1,4-Dioxane	U	50.0	ug/L	15.0	50.0	
78-93-3	2-Butanone	U	5.00	ug/L	1.50	5.00	
591-78-6	2-Hexanone	U	5.00	ug/L	1.50	5.00	UJ C05
108-10-1	4-Methyl-2-pentanone	U	5.00	ug/L	1.50	5.00	U
67-64-1	Acetone	U	5.00	ug/L	1.50	5.00	
71-43-2	Benzene	U	1.00	ug/L	0.300	1.00	
74-97-5	Bromochloromethane	U	1.00	ug/L	0.300	1.00	
75-27-4	Bromodichloromethane	U	1.00	ug/L	0.300	1.00	
75-25-2	Bromoform	U	1.00	ug/L	0.300	1.00	
74-83-9	Bromomethane	U	1.00	ug/L	0.300	1.00	
75-15-0	Carbon disulfide	U	5.00	ug/L	1.50	5.00	
56-23-5	Carbon tetrachloride	U	1.00	ug/L	0.300	1.00	
108-90-7	Chlorobenzene	U	1.00	ug/L	0.300	1.00	
75-00-3	Chloroethane	U	1.00	ug/L	0.300	1.00	
67-66-3	Chloroform	U	1.00	ug/L	0.300	1.00	
74-87-3	Chloromethane	U	1.00	ug/L	0.300	1.00	
110-82-7	Cyclohexane	U	1.00	ug/L	0.300	1.00	
124-48-1	Dibromochloromethane	U	1.00	ug/L	0.300	1.00	
75-71-8	Dichlorodifluoromethane	U	1.00	ug/L	0.300	1.00	UJ C05
100-41-4	Ethylbenzene	U	1.00	ug/L	0.300	1.00	U
98-82-8	Isopropylbenzene	U	1.00	ug/L	0.300	1.00	U
79-20-9	Methyl acetate	U	5.00	ug/L	1.50	5.00	U
108-87-2	Methylcyclohexane	U	1.00	ug/L	0.300	1.00	U
75-09-2	Methylene chloride	U	5.00	ug/L	1.00	5.00	U J P02

02/26/2015

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**367015**	**Date Collected:**	**02/11/2015 14:00**	**Matrix:**	**WATER**
Lab Sample ID:	**367015001**	**Date Received:**	**02/12/2015 08:35**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80303**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1458070**	**Inst:**	**VOA9.I**	**Dilution:**	**1**
Run Date:	**02/16/2015 14:32**	**Analyst:**	**RXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**02/16/2015 14:32**				
Data File:	**021615V9\9B116.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
100-42-5	Styrene	U	1.00	ug/L	0.300	1.00
127-18-4	Tetrachloroethylene	U	1.00	ug/L	0.300	1.00
108-88-3	Toluene	U	1.00	ug/L	0.300	1.00
79-01-6	Trichloroethylene	U	1.00	ug/L	0.300	1.00
75-69-4	Trichlorofluoromethane	U	1.00	ug/L	0.300	1.00
76-13-1	Trichlorotrifluoroethane	U	5.00	ug/L	2.00	5.00
75-01-4	Vinyl chloride	U	1.00	ug/L	0.300	1.00
156-59-2	cis-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00
10061-01-5	cis-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00
179601-23-1	m,p-Xylenes	U	2.00	ug/L	0.300	2.00
95-47-6	o-Xylene	U	1.00	ug/L	0.300	1.00
1634-04-4	tert-Butyl methyl ether	U	1.00	ug/L	0.300	1.00
156-60-5	trans-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00
10061-02-6	trans-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	4.315	72.4	ug/L	0	J
	unknown hydrocarbon	14.687	12.3	ug/L	0	J
017302-28-2	Nonane, 2,6-dimethyl-	15.387	15.7	ug/L	94	NJ
	unknown hydrocarbon	15.553	5.08	ug/L	0	J
017302-32-8	Nonane, 3,7-dimethyl-	15.624	5.16	ug/L	86	NJ
001120-21-4	Undecane	16.311	15.2	ug/L	91	NJ
017301-23-4	Undecane, 2,6-dimethyl-	17.77	87.9	ug/L	93	NJ
	unknown hydrocarbon	18.588	149	ug/L	0	J

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**367015**	**Date Collected:**	**02/11/2015 14:00**	**Matrix:**	**WATER**
Lab Sample ID:	**367015002**	**Date Received:**	**02/12/2015 08:35**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**TBH019**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1458070**	**Inst:**	**VOA9.I**	**Dilution:**	**1**
Run Date:	**02/16/2015 16:23**	**Analyst:**	**RXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**02/16/2015 16:23**				
Data File:	**021615V9\9B120.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	
71-55-6	1,1,1-Trichloroethane	U	1.00	ug/L	0.300	1.00	U
79-34-5	1,1,2,2-Tetrachloroethane	U	1.00	ug/L	0.300	1.00	
79-00-5	1,1,2-Trichloroethane	U	1.00	ug/L	0.300	1.00	
75-34-3	1,1-Dichloroethane	U	1.00	ug/L	0.300	1.00	
75-35-4	1,1-Dichloroethylene	U	1.00	ug/L	0.300	1.00	
87-61-6	1,2,3-Trichlorobenzene	U	1.00	ug/L	0.300	1.00	
120-82-1	1,2,4-Trichlorobenzene	U	1.00	ug/L	0.300	1.00	
96-12-8	1,2-Dibromo-3-chloropropane	U	1.00	ug/L	0.500	1.00	
106-93-4	1,2-Dibromoethane	U	1.00	ug/L	0.300	1.00	
95-50-1	1,2-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
107-06-2	1,2-Dichloroethane	U	1.00	ug/L	0.300	1.00	
78-87-5	1,2-Dichloropropane	U	1.00	ug/L	0.300	1.00	
541-73-1	1,3-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
106-46-7	1,4-Dichlorobenzene	U	1.00	ug/L	0.300	1.00	
123-91-1	1,4-Dioxane	U	50.0	ug/L	15.0	50.0	
78-93-3	2-Butanone	U	5.00	ug/L	1.50	5.00	
591-78-6	2-Hexanone	U	5.00	ug/L	1.50	5.00	UJ C05
108-10-1	4-Methyl-2-pentanone	U	5.00	ug/L	1.50	5.00	U
67-64-1	Acetone	U	5.00	ug/L	1.50	5.00	
71-43-2	Benzene	U	1.00	ug/L	0.300	1.00	
74-97-5	Bromochloromethane	U	1.00	ug/L	0.300	1.00	
75-27-4	Bromodichloromethane	U	1.00	ug/L	0.300	1.00	
75-25-2	Bromoform	U	1.00	ug/L	0.300	1.00	
74-83-9	Bromomethane	U	1.00	ug/L	0.300	1.00	
75-15-0	Carbon disulfide	U	5.00	ug/L	1.50	5.00	
56-23-5	Carbon tetrachloride	U	1.00	ug/L	0.300	1.00	
108-90-7	Chlorobenzene	U	1.00	ug/L	0.300	1.00	
75-00-3	Chloroethane	U	1.00	ug/L	0.300	1.00	
67-66-3	Chloroform	U	1.00	ug/L	0.300	1.00	
74-87-3	Chloromethane	U	1.00	ug/L	0.300	1.00	
110-82-7	Cyclohexane	U	1.00	ug/L	0.300	1.00	
124-48-1	Dibromochloromethane	U	1.00	ug/L	0.300	1.00	
75-71-8	Dichlorodifluoromethane	U	1.00	ug/L	0.300	1.00	UJ C05
100-41-4	Ethylbenzene	U	1.00	ug/L	0.300	1.00	U
98-82-8	Isopropylbenzene	U	1.00	ug/L	0.300	1.00	U
79-20-9	Methyl acetate	U	5.00	ug/L	1.50	5.00	U
108-87-2	Methylcyclohexane	U	1.00	ug/L	0.300	1.00	U
75-09-2	Methylene chloride	U	5.00	ug/L	1.00	5.00	U J P02

02/26/2015

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**367015**	**Date Collected:**	**02/11/2015 14:00**	**Matrix:**	**WATER**
Lab Sample ID:	**367015002**	**Date Received:**	**02/12/2015 08:35**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**TBH019**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1458070**	**Inst:**	**VOA9.I**	**Dilution:**	**1**
Run Date:	**02/16/2015 16:23**	**Analyst:**	**RXY1**	**Purge Vol:**	**5 mL**
Prep Date:	**02/16/2015 16:23**				
Data File:	**021615V9\9B120.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ	
100-42-5	Styrene	U	1.00	ug/L	0.300	1.00	U
127-18-4	Tetrachloroethylene	U	1.00	ug/L	0.300	1.00	
108-88-3	Toluene	U	1.00	ug/L	0.300	1.00	
79-01-6	Trichloroethylene	U	1.00	ug/L	0.300	1.00	
75-69-4	Trichlorofluoromethane	U	1.00	ug/L	0.300	1.00	
76-13-1	Trichlorotrifluoroethane	U	5.00	ug/L	2.00	5.00	
75-01-4	Vinyl chloride	U	1.00	ug/L	0.300	1.00	
156-59-2	cis-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00	
10061-01-5	cis-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00	
179601-23-1	m,p-Xylenes	U	2.00	ug/L	0.300	2.00	
95-47-6	o-Xylene	U	1.00	ug/L	0.300	1.00	
1634-04-4	tert-Butyl methyl ether	U	1.00	ug/L	0.300	1.00	
156-60-5	trans-1,2-Dichloroethylene	U	1.00	ug/L	0.300	1.00	
10061-02-6	trans-1,3-Dichloropropylene	U	1.00	ug/L	0.300	1.00	

Tentatively Identified Compound Summary

CAS No.	Tentatively Identified Compound (TIC)	RT	Estimated	Units	Fit	Qual
	unknown	4.301	29.4	ug/L	0	J
000556-67-2	Cyclotetrasiloxane, octamethyl-	14.663	6.32	ug/L	90	NJ

FID Diesel Range Organics
Certificate of Analysis
Sample Summary

SDG Number:	**367015**	**Date Collected:**	**02/11/2015 14:00**	**Matrix:**	**WATER**
Lab Sample ID:	**367015001**	**Date Received:**	**02/12/2015 08:35**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80303**	**Method:**	**SW846 3535A/8015C**	**SOP Ref:**	**GL-OA-E-003**
Batch ID:	**1457856**	**Inst:**	**FID7.I**	**Dilution:**	**10**
Run Date:	**02/17/2015 04:40**	**Analyst:**	**BYT1**	**Inj. Vol:**	**1 uL**
Prep Date:	**02/16/2015 08:10**	**Aliquot:**	**1050 mL**	**Final Volume:**	**1 mL**
Data File:	**021615NW\f7b1627.D**	**Column:**	**DB-5ms**		

CAS No.	Parmname	Qualifier	Result		Units	MDL/LOD	PQL/LOQ
DRO	Diesel Range Organics		36.5	=	mg/L	0.476	1.90

GC Volatiles (GRO)
Certificate of Analysis
Sample Summary

SDG Number:	**367015**	**Date Collected:**	**02/11/2015 14:00**	**Matrix:**	**WATER**
Lab Sample ID:	**367015001**	**Date Received:**	**02/12/2015 08:35**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**BFF80303**	**Method:**	**SW846 8015C**	**SOP Ref:**	**GL-OA-E-004**
Batch ID:	**1458443**	**Inst:**	**VOC4A.I**	**Dilution:**	**1**
Run Date:	**02/17/2015 13:51**	**Analyst:**	**ACJ**	**Inj. Vol:**	**1 uL**
Prep Date:	**02/17/2015 13:51**				
Data File:	**021715\4W1206.D**	**Column:**	**DB-MTBE**		

CAS No.	Parmname	Qualifier	Result		Units	MDL/LOD	PQL/LOQ
	Gasoline Range Organics		64.6	=	ug/L	16.7	50.0

METALS
−1−
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 367015 **METHOD TYPE:** SW846

SAMPLE ID: 367015001 **CLIENT ID:** BFF80303

CONTRACT: LEID00200

MATRIX: Water **DATE RECEIVED** 12−FEB−15 **LEVEL:** Low **%SOLIDS:**

CAS No	Analyte	Result		Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7439−89−6	Iron	9490	=	ug/L			P	30	1	OPTIMA3	021315A−1

***Analytical Methods:**

P SW846 3005A/6010C

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 19, 2015

Company : Leidos
Address : 301 Laboratory Rd.
Oak Ridge, Tennessee 37830
Contact: Ms. Marie Simpson
Project: Product Recovery System Pilot Study 2, Hunter AA-09

Client Sample ID: BFF80303
Sample ID: 367015001
Matrix: Water
Collect Date: 11-FEB-15 14:00
Receive Date: 12-FEB-15
Collector: Client

Project: LEID00200
Client ID: LEID002

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Flow Injection Analysis												
EPA 420.4 Total Phenols "As Received"												
Total Phenol		237	J H02	16.7	50.0	ug/L	1	AXH3	02/12/15	1434	1456214	1
Micro-biology												
SM 5210B BOD, 5DAY "As Received"												
BOD, 5 DAY		27.8		10.0	20.0	mg/L		SXC4	02/12/15	1356	1457292	2
Oil & Grease Analysis												
EPA 1664A n-Hexane Extractable Material (Oil and Grease) "As Received"												
Oil and Grease		29.9		1.12	4.00	mg/L		JXT1	02/16/15	0810	1457992	3
Solids Analysis												
SM 2540D Total Suspended Liq "As Received"												
Total Suspended Solids		13.6	J E02	2.28	10.0	mg/L		MXB3	02/13/15	1017	1457638	4
SM2540C Solids, Dissolved "As Received"												
Total Dissolved Solids		373		3.40	14.3	mg/L		MXB3	02/16/15	0951	1457959	5
Spectrometric Analysis												
EPA 410.4 Chem. Oxygen Demand "As Received"												
COD		281		6.67	20.0	mg/L	1	SXC5	02/13/15	1420	1457633	6
Titration and Ion Analysis												
EPA 150.1 pH "As Received"												
pH at Temp 22.6C	H	8.04	J A03	0.010	0.100	SU	1	PXO1	02/17/15	1458	1458383	7
SM 2340 C Total Hardness "As Received"												
Hardness as CaCO3		800		2.00	4.00	mg/L		SXC5	02/16/15	1359	1457634	8

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 420.4	EPA 420.4 Phenols, Total in liquid PREP	AXH3	02/12/15	1142	1456212

CHEMTECH 284 Sheffield Street, Mountainside NJ 07092 (908)-789-8900 Fax : 908 789 8922

Report of Analysis

Client:	Leidos	Date Collected:	12/03/14
Project:	Hunter Army Airfield Air	Date Received:	12/04/14
Client Sample ID:	BFF40201	SDG No.:	F4957
Lab Sample ID:	F4957-01	Matrix:	Air
Analytical Method:	TO-15	Test:	VOCMS Group2
Sample Wt/Vol:	400 Units: mL		

File ID/Qc Batch:	Dilution:	Prep Date	Date Analyzed	Prep Batch ID
VL024313.D	1		12/04/14 21:44	VL120414

CAS Number	Parameter	Conc. ppbv	Conc. ug/M3	Qualifier	MDL	LOD	LOQ / CRQL	Units
TARGETS								
75-71-8	Dichlorodifluoromethane	0.65	3.21	=	0.04	0.1	0.5	ppbv
74-87-3	Chloromethane	0.58	1.2	=	0.1	0.1	0.5	ppbv
75-01-4	Vinyl Chloride	0.03	0.08	U U	0.03	0.03	0.03	ppbv
74-83-9	Bromomethane	0.1	0.39	U U	0.03	0.1	0.5	ppbv
75-00-3	Chloroethane	0.1	0.26	U U	0.1	0.1	0.5	ppbv
75-69-4	Trichlorofluoromethane	0.27	1.52	J J	0.04	0.1	0.5	ppbv
76-13-1	1,1,2-Trichlorotrifluoroethane	0.1	0.77	U U	0.04	0.1	0.5	ppbv
75-35-4	1,1-Dichloroethene	0.1	0.4	U U	0.05	0.1	0.5	ppbv
67-64-1	Acetone	13.7	32.5	B =	0.1	0.1	0.5	ppbv
75-15-0	Carbon Disulfide	0.1	0.31	U U	0.05	0.1	0.5	ppbv
1634-04-4	Methyl tert-Butyl Ether	0.1	0.36	U U	0.05	0.1	0.5	ppbv
75-09-2	Methylene Chloride	0.2	0.69	JB U F01	0.05	0.1	0.5	ppbv
156-60-5	trans-1,2-Dichloroethene	0.1	0.4	U U	0.05	0.1	0.5	ppbv
75-34-3	1,1-Dichloroethane	0.1	0.4	U U	0.04	0.1	0.5	ppbv
110-82-7	Cyclohexane	1.3	4.47	=	0.1	0.1	0.5	ppbv
78-93-3	2-Butanone	2.6	7.67	=	0.1	0.1	0.5	ppbv
56-23-5	Carbon Tetrachloride	0.08	0.5	=	0.03	0.03	0.03	ppbv
156-59-2	cis-1,2-Dichloroethene	0.1	0.4	U U	0.05	0.1	0.5	ppbv
67-66-3	Chloroform	0.1	0.49	U U	0.02	0.1	0.5	ppbv
71-55-6	1,1,1-Trichloroethane	0.03	0.16	U U	0.03	0.03	0.03	ppbv
71-43-2	Benzene	0.38	1.21	J J	0.04	0.1	0.5	ppbv
107-06-2	1,2-Dichloroethane	0.1	0.4	U U	0.1	0.1	0.5	ppbv
79-01-6	Trichloroethene	0.03	0.16	U U	0.02	0.03	0.03	ppbv
78-87-5	1,2-Dichloropropane	0.1	0.46	U U	0.1	0.1	0.5	ppbv
75-27-4	Bromodichloromethane	0.1	0.67	U U	0.05	0.1	0.5	ppbv
108-10-1	4-Methyl-2-Pentanone	0.16	0.66	J J	0.05	0.1	0.5	ppbv
108-88-3	Toluene	1.4	5.28	=	0.05	0.1	0.5	ppbv
10061-02-6	t-1,3-Dichloropropene	0.1	0.45	U U	0.1	0.1	0.5	ppbv
10061-01-5	cis-1,3-Dichloropropene	0.1	0.45	U U	0.1	0.1	0.5	ppbv
79-00-5	1,1,2-Trichloroethane	0.1	0.55	U U	0.1	0.1	0.5	ppbv
591-78-6	2-Hexanone	0.24	0.98	J J	0.1	0.1	0.5	ppbv
124-48-1	Dibromochloromethane	0.1	0.85	U U	0.05	0.1	0.5	ppbv
106-93-4	1,2-Dibromoethane	0.1	0.77	U U	0.1	0.1	0.5	ppbv
127-18-4	Tetrachloroethene	0.03	0.2	U U	0.03	0.03	0.03	ppbv
108-90-7	Chlorobenzene	0.1	0.46	U U	0.1	0.1	0.5	ppbv
100-41-4	Ethyl Benzene	0.1	0.43	U U	0.1	0.1	0.5	ppbv
179601-23-1	m/p-Xylene	0.23	1	J J	0.1	0.2	1	ppbv
1330-20-7	Total Xylenes	0.37	1.61	=	0.2	0.3	1.5	ppbv

CHEMTECH 284 Sheffield Street, Mountainside NJ 07092 (908)-789-8900 Fax : 908 789 8922

Report of Analysis

Client:	Leidos	Date Collected:	12/03/14
Project:	Hunter Army Airfield Air	Date Received:	12/04/14
Client Sample ID:	BFF40201	SDG No.:	F4957
Lab Sample ID:	F4957-01	Matrix:	Air
Analytical Method:	TO-15	Test:	VOCMS Group2
Sample Wt/Vol:	400 Units: mL		

File ID/Qc Batch:	Dilution:	Prep Date	Date Analyzed	Prep Batch ID
VL024313.D	1		12/04/14 21:44	VL120414

CAS Number	Parameter	Conc. ppbv	Conc. ug/M3	Qualifier	MDL	LOD	LOQ / CRQL	Units
95-47-6	o-Xylene	0.14	0.61	J J	0.1	0.1	0.5	ppbv
100-42-5	Styrene	2.7	11.5	=	0.1	0.1	0.5	ppbv
75-25-2	Bromoform	0.1	1.03	U U	0.05	0.1	0.5	ppbv
98-82-8	Isopropylbenzene	0.1	0.49	J J	0.1	0.1	0.5	ppbv
79-34-5	1,1,2,2-Tetrachloroethane	0.03	0.21	U U	0.03	0.03	0.03	ppbv
541-73-1	1,3-Dichlorobenzene	0.1	0.6	U U	0.1	0.1	0.5	ppbv
106-46-7	1,4-Dichlorobenzene	0.1	0.6	U U	0.1	0.1	0.5	ppbv
95-50-1	1,2-Dichlorobenzene	0.1	0.6	U U	0.1	0.1	0.5	ppbv
120-82-1	1,2,4-Trichlorobenzene	0.1	0.74	U U	0.04	0.1	0.5	ppbv
123-91-1	1,4-Dioxane	0.1	0.36	U UJ C05	0.1	0.1	0.5	ppbv
SURROGATES								
460-00-4	1-Bromo-4-Fluorobenzene	10.4			65 - 135		104%	SPK: 10
INTERNAL STANDARDS								
540-36-3	1,4-Difluorobenzene	2526110		8.27				
3114-55-4	Chlorobenzene-d5	1965530		13.68				
TENTITIVE IDENTIFIED COMPOUNDS								
563-58-6	1,1-Dichloropropane	0.5		U			0	ppbv
96-12-8	1,2,3-Trichlorobenzene	0.5		U			0	ppbv
87-61-6	1,2Dibromo-3-Chloropropane	0.5		U			0	ppbv
74-97-5	Bromochloromethane	0.5		U			0	ppbv
79-20-9	Methyl acetate	0.5		U			0	ppbv
108-87-2	Methylcyclohexane	0.5		U			0	ppbv

U = Not Detected
RL = Reporting Limit
MDL = Method Detection Limit

E = Value Exceeds Calibration Range

D = Dilution

J = Estimated Value
B = Analyte Found in Associated Method Blank
N = Presumptive Evidence of a Compound

* = Values outside of QC limits

Q = indicates LCS control criteria did not meet requirements

CHEMTECH 284 Sheffield Street, Mountainside NJ 07092 (908)-789-8900 Fax : 908 789 8922

Report of Analysis

Client:	Leidos	Date Collected:	01/20/15
Project:	Hunter Army Airfield Air	Date Received:	01/21/15
Client Sample ID:	BFF40202	SDG No.:	G1129
Lab Sample ID:	G1129-01	Matrix:	Air
Analytical Method:	TO-15	Test:	VOCMS Group2
Sample Wt/Vol:	400 Units: mL		

File ID/Qc Batch:	Dilution:	Prep Date	Date Analyzed	Prep Batch ID
VL024532.D	1		01/23/15 20:23	VL012315

CAS Number	Parameter	Conc. ppbv	Conc. ug/M3	Qualifier	MDL	LOD	LOQ / CRQL	Units	
TARGETS		* DO NOT USE							
75-71-8	Dichlorodifluoromethane	0.64	3.16	=	0.04	0.1	0.5	ppbv	
74-87-3	Chloromethane	0.59	1.22	=	0.1	0.1	0.5	ppbv	
75-01-4	Vinyl Chloride	0.03	0.08	U U	0.03	0.03	0.03	ppbv	
74-83-9	Bromomethane	0.1	0.39	U U	0.03	0.1	0.5	ppbv	
75-00-3	Chloroethane	0.1	0.26	U U	0.1	0.1	0.5	ppbv	
75-69-4	Trichlorofluoromethane	0.23	1.29	J J	0.04	0.1	0.5	ppbv	
76-13-1	1,1,2-Trichlorotrifluoroethane	0.1	0.77	U U	0.04	0.1	0.5	ppbv	
75-35-4	1,1-Dichloroethene	0.1	0.4	U U	0.05	0.1	0.5	ppbv	
67-64-1	Acetone	21.2	50.4	E *	0.1	0.1	0.5	ppbv	
75-15-0	Carbon Disulfide	0.36	1.12	J J	0.05	0.1	0.5	ppbv	
1634-04-4	Methyl tert-Butyl Ether	0.1	0.36	U U	0.05	0.1	0.5	ppbv	
75-09-2	Methylene Chloride	2	6.95	B =	0.05	0.1	0.5	ppbv	
156-60-5	trans-1,2-Dichloroethene	0.1	0.4	U U	0.05	0.1	0.5	ppbv	
75-34-3	1,1-Dichloroethane	0.1	0.4	U U	0.04	0.1	0.5	ppbv	
110-82-7	Cyclohexane	2.6	8.95	=	0.1	0.1	0.5	ppbv	
78-93-3	2-Butanone	0.48	1.42	J J	0.1	0.1	0.5	ppbv	
56-23-5	Carbon Tetrachloride	0.08	0.5	=	0.03	0.03	0.03	ppbv	
156-59-2	cis-1,2-Dichloroethene	0.1	0.4	U U	0.05	0.1	0.5	ppbv	
67-66-3	Chloroform	0.54	2.64	=	0.02	0.1	0.5	ppbv	
71-55-6	1,1,1-Trichloroethane	0.03	0.16	U U	0.03	0.03	0.03	ppbv	
71-43-2	Benzene	0.21	0.67	J J	0.04	0.1	0.5	ppbv	
107-06-2	1,2-Dichloroethane	0.14	0.57	J J	0.1	0.1	0.5	ppbv	
79-01-6	Trichloroethene	0.03	0.16	U U	0.02	0.03	0.03	ppbv	
78-87-5	1,2-Dichloropropane	0.1	0.46	U U	0.1	0.1	0.5	ppbv	
75-27-4	Bromodichloromethane	0.1	0.67	U U	0.05	0.1	0.5	ppbv	
108-10-1	4-Methyl-2-Pentanone	0.1	0.41	U U	0.05	0.1	0.5	ppbv	
108-88-3	Toluene	3.4	12.8	=	0.05	0.1	0.5	ppbv	
10061-02-6	t-1,3-Dichloropropene	0.1	0.45	U U	0.1	0.1	0.5	ppbv	
10061-01-5	cis-1,3-Dichloropropene	0.1	0.45	U U	0.1	0.1	0.5	ppbv	
79-00-5	1,1,2-Trichloroethane	0.1	0.55	U U	0.1	0.1	0.5	ppbv	
591-78-6	2-Hexanone	0.1	0.41	U U	0.1	0.1	0.5	ppbv	
124-48-1	Dibromochloromethane	0.1	0.85	U U	0.05	0.1	0.5	ppbv	
106-93-4	1,2-Dibromoethane	0.1	0.77	U U	0.1	0.1	0.5	ppbv	
127-18-4	Tetrachloroethene	0.03	0.2	U U	0.03	0.03	0.03	ppbv	
108-90-7	Chlorobenzene	0.1	0.46	U U	0.1	0.1	0.5	ppbv	
100-41-4	Ethyl Benzene	0.26	1.13	J J	0.1	0.1	0.5	ppbv	J 01
179601-23-1	m/p-Xylene	0.8	3.47	J J	0.1	0.2	1	ppbv	
1330-20-7	Total Xylenes	1.17	5.08	=	0.2	0.3	1.5	ppbv	

CHEMTECH 284 Sheffield Street, Mountainside NJ 07092 (908)-789-8900 Fax : 908 789 8922

Report of Analysis

Client:	Leidos	Date Collected:	01/20/15
Project:	Hunter Army Airfield Air	Date Received:	01/21/15
Client Sample ID:	BFF40202	SDG No.:	G1129
Lab Sample ID:	G1129-01	Matrix:	Air
Analytical Method:	TO-15	Test:	VOCMS Group2
Sample Wt/Vol:	400 Units: mL		

File ID/Qc Batch:	Dilution:	Prep Date	Date Analyzed	Prep Batch ID
VL024532.D	1		01/23/15 20:23	VL012315

CAS Number	Parameter	Conc. ppbv	Conc. ug/M3	Qualifier	MDL	LOD	LOQ / CRQL	Units
95-47-6	o-Xylene	0.37	1.61	J J	0.1	0.1	0.5	ppbv
100-42-5	Styrene	1.1	4.68	=	0.1	0.1	0.5	ppbv
75-25-2	Bromoform	0.1	1.03	U U	0.05	0.1	0.5	ppbv
98-82-8	Isopropylbenzene	0.1	0.49	U U	0.1	0.1	0.5	ppbv
79-34-5	1,1,2,2-Tetrachloroethane	0.03	0.21	U U	0.03	0.03	0.03	ppbv
541-73-1	1,3-Dichlorobenzene	0.1	0.6	U U	0.1	0.1	0.5	ppbv
106-46-7	1,4-Dichlorobenzene	0.1	0.6	U U	0.1	0.1	0.5	ppbv
95-50-1	1,2-Dichlorobenzene	0.1	0.6	U U	0.1	0.1	0.5	ppbv
120-82-1	1,2,4-Trichlorobenzene	0.1	0.74	U U	0.04	0.1	0.5	ppbv
123-91-1	1,4-Dioxane	0.1	0.36	UQ UJ	0.1	0.1	0.5	ppbv C05, ~~P01~~
SURROGATES								JV 04/13/15
460-00-4	1-Bromo-4-Fluorobenzene	9.7			65 - 135		97%	SPK: 10
INTERNAL STANDARDS								
540-36-3	1,4-Difluorobenzene	2100950		8.32				
3114-55-4	Chlorobenzene-d5	2068590		13.74				
TENTITIVE IDENTIFIED COMPOUNDS								
563-58-6	1,1-Dichloropropane	0.5		U			0	ppbv
96-12-8	1,2,3-Trichlorobenzene	0.5		U			0	ppbv
87-61-6	1,2Dibromo-3-Chloropropane	0.5		U			0	ppbv
74-97-5	Bromochloromethane	0.5		U			0	ppbv
79-20-9	Methyl acetate	0.5		U			0	ppbv
108-87-2	Methylcyclohexane	0.5		U			0	ppbv

U = Not Detected
RL = Reporting Limit
MDL = Method Detection Limit

E = Value Exceeds Calibration Range

D = Dilution

J = Estimated Value
B = Analyte Found in Associated Method Blank
N = Presumptive Evidence of a Compound

* = Values outside of QC limits

Q = indicates LCS control criteria did not meet requirements

CHEMTECH 284 Sheffield Street, Mountainside NJ 07092 (908)-789-8900 Fax : 908 789 8922

Report of Analysis

Client:	Leidos	Date Collected:	01/20/15
Project:	Hunter Army Airfield Air	Date Received:	01/21/15
Client Sample ID:	BFF40202DL	SDG No.:	G1129
Lab Sample ID:	G1129-01DL	Matrix:	Air
Analytical Method:	TO-15	Test:	VOCMS Group2
Sample Wt/Vol:	400 Units: mL		

File ID/Qc Batch:	Dilution:	Prep Date	Date Analyzed	Prep Batch ID
VL024530.D	10		01/23/15 18:10	VL012315

CAS Number	Parameter	Conc. ppbv	Conc. ug/M3	Qualifier	MDL	LOD	LOQ / CRQL	Units
TARGETS			* DO NOT USE					
75-71-8	Dichlorodifluoromethane	1	4.94	UD *	0.4	1	5	ppbv
74-87-3	Chloromethane	1	2.07	UD	1	1	5	ppbv
75-01-4	Vinyl Chloride	0.3	0.77	UD	0.3	0.3	0.3	ppbv
74-83-9	Bromomethane	1	3.88	UD	0.3	1	5	ppbv
75-00-3	Chloroethane	1	2.64	UD	1	1	5	ppbv
75-69-4	Trichlorofluoromethane	1	5.62	UD	0.4	1	5	ppbv
76-13-1	1,1,2-Trichlorotrifluoroethane	1	7.66	UD	0.4	1	5	ppbv
75-35-4	1,1-Dichloroethene	1	3.96	UD	0.5	1	5	ppbv
67-64-1	Acetone	25.1	59.6	D =	1	1	5	ppbv
75-15-0	Carbon Disulfide	1	3.11	UD *	0.5	1	5	ppbv
1634-04-4	Methyl tert-Butyl Ether	1	3.61	UD	0.5	1	5	ppbv
75-09-2	Methylene Chloride	3.1	10.8	JDB	0.5	1	5	ppbv
156-60-5	trans-1,2-Dichloroethene	1	3.96	UD	0.5	1	5	ppbv
75-34-3	1,1-Dichloroethane	1	4.05	UD	0.4	1	5	ppbv
110-82-7	Cyclohexane	2.5	8.61	JD	1	1	5	ppbv
78-93-3	2-Butanone	1	2.95	UD	1	1	5	ppbv
56-23-5	Carbon Tetrachloride	0.3	1.89	UD	0.3	0.3	0.3	ppbv
156-59-2	cis-1,2-Dichloroethene	1	3.96	UD	0.5	1	5	ppbv
67-66-3	Chloroform	1	4.88	UD	0.2	1	5	ppbv
71-55-6	1,1,1-Trichloroethane	0.3	1.64	UD	0.3	0.3	0.3	ppbv
71-43-2	Benzene	1	3.19	UD	0.4	1	5	ppbv
107-06-2	1,2-Dichloroethane	1	4.05	UD	1	1	5	ppbv
79-01-6	Trichloroethene	0.3	1.61	UD	0.15	0.3	0.3	ppbv
78-87-5	1,2-Dichloropropane	1	4.62	UD	1	1	5	ppbv
75-27-4	Bromodichloromethane	1	6.7	UD	0.5	1	5	ppbv
108-10-1	4-Methyl-2-Pentanone	1	4.1	UD	0.5	1	5	ppbv
108-88-3	Toluene	3.1	11.7	JD	0.5	1	5	ppbv
10061-02-6	t-1,3-Dichloropropene	1	4.54	UD	1	1	5	ppbv
10061-01-5	cis-1,3-Dichloropropene	1	4.54	UD	1	1	5	ppbv
79-00-5	1,1,2-Trichloroethane	1	5.46	UD	1	1	5	ppbv
591-78-6	2-Hexanone	1	4.09	UD	1	1	5	ppbv
124-48-1	Dibromochloromethane	1	8.52	UD	0.5	1	5	ppbv
106-93-4	1,2-Dibromoethane	1	7.69	UD	1	1	5	ppbv
127-18-4	Tetrachloroethene	0.3	2.03	UD	0.3	0.3	0.3	ppbv
108-90-7	Chlorobenzene	1	4.61	UD	1	1	5	ppbv
100-41-4	Ethyl Benzene	1	4.34	UD	1	1	5	ppbv
179601-23-1	m/p-Xylene	2	8.69	UD	1	2	10	ppbv
1330-20-7	Total Xylenes	3	13.0	UD	2	3	15	ppbv

CHEMTECH 284 Sheffield Street, Mountainside NJ 07092 (908)-789-8900 Fax : 908 789 8922

Report of Analysis

Client:	Leidos	Date Collected:	01/20/15
Project:	Hunter Army Airfield Air	Date Received:	01/21/15
Client Sample ID:	BFF40202DL	SDG No.:	G1129
Lab Sample ID:	G1129-01DL	Matrix:	Air
Analytical Method:	TO-15	Test:	VOCMS Group2
Sample Wt/Vol:	400 Units: mL		

File ID/Qc Batch:	Dilution:	Prep Date	Date Analyzed	Prep Batch ID
VL024530.D	10		01/23/15 18:10	VL012315

CAS Number	Parameter	Conc. ppbv	Conc. ug/M3	Qualifier	MDL	LOD	LOQ / CRQL	Units
95-47-6	o-Xylene	1	4.34	UD *	1	1	5	ppbv
100-42-5	Styrene	1	4.26	UD	1	1	5	ppbv
75-25-2	Bromoform	1	10.3	UD	0.5	1	5	ppbv
98-82-8	Isopropylbenzene	1	4.92	UD	1	1	5	ppbv
79-34-5	1,1,2,2-Tetrachloroethane	0.3	2.06	UD	0.3	0.3	0.3	ppbv
541-73-1	1,3-Dichlorobenzene	1	6.01	UD	1	1	5	ppbv
106-46-7	1,4-Dichlorobenzene	1	6.01	UD	1	1	5	ppbv
95-50-1	1,2-Dichlorobenzene	1	6.01	UD	1	1	5	ppbv
120-82-1	1,2,4-Trichlorobenzene	1	7.42	UD	0.4	1	5	ppbv
123-91-1	1,4-Dioxane	1	3.6	UDQ	1	1	5	ppbv
SURROGATES								
460-00-4	1-Bromo-4-Fluorobenzene	9.7			65 - 135		97%	SPK: 10
INTERNAL STANDARDS								
74-97-5	Bromochloromethane	1075580		6.64				
540-36-3	1,4-Difluorobenzene	2132030		8.31				
3114-55-4	Chlorobenzene-d5	2083500		13.73				

U = Not Detected
RL = Reporting Limit
MDL = Method Detection Limit

E = Value Exceeds Calibration Range

D = Dilution

J = Estimated Value
B = Analyte Found in Associated Method Blank
N = Presumptive Evidence of a Compound

* = Values outside of QC limits

Q = indicates LCS control criteria did not meet requirements

Page: 1 of 1
Project #: Hunter - 301205.00.000.00.200
GEL Quote #:
COC Number (1):
PO Number:

GEL Chain of Custody and Analytical Request

GEL Work Order Number: 366036

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: Leidos
Phone #: (865) 297-2543
Project/Site Name: Hunter
Fax #:
Address: 301 Laboratory Rd. Oak Ridge, TN 37831
Collected by: Amanda Harness
Send Results To: Jill Kovalchik + Patty Stoll

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Should this sample be considered: Radioactive	Should this sample be considered: TSCA Regulated	Total number of containers	TCLP VOC + Metals	<-- Preservative Type (6)	Comments
SOIL IDW	11/28/15	1100	C		SO			2	2		Note: extra sample is required for sample specific QC

TAT Requested: Normal: Rush: Specify: 7 day (Subject to Surcharge)
Fax Results: Yes / No
Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Sample Collection Time Zone: Eastern Central Mountain Pacific Other _____

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	Amanda Harness	11/28/15	1600	[signature]	012915	0920
2						
3						

Sample Shipping and Delivery Details

GEL PM:
Method of Shipment:
Date Shipped:
Airbill #:
Airbill #:

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: C

1.) Chain of Custody Number = Client Determined
2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal
5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. *8260B* - 3, *6010B/7470A* - 1).
Preservative Type (6): ... SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

PINK = CLIENT

Volatile
Certificate of Analysis
Sample Summary

SDG Number:	**366036**	**Date Collected:**	**01/28/2015 11:00**	**Matrix:**	**TCLP SOIL**
Lab Sample ID:	**366036001**	**Date Received:**	**01/29/2015 09:20**		
		Client:	**LEID002**	**Project:**	**LEID00200**
Client ID:	**Soil IDW**	**Method:**	**SW846 8260B**	**SOP Ref:**	**GL-OA-E-038**
Batch ID:	**1454641**	**Inst:**	**VOA4.I**	**Dilution:**	**10**
Run Date:	**02/02/2015 14:17**	**Analyst:**	**ACJ**	**Purge Vol:**	**5 mL**
Prep Date:	**01/29/2015 16:00**				
Data File:	**020215V4\4U110.D**	**Column:**	**DB-624**		

CAS No.	Parmname	Qualifier	Result	Units	MDL/LOD	PQL/LOQ
75-35-4	1,1-Dichloroethylene	U	0.010	mg/L	0.003	0.010
107-06-2	1,2-Dichloroethane	U	0.010	mg/L	0.003	0.010
106-46-7	1,4-Dichlorobenzene	U	0.010	mg/L	0.003	0.010
78-93-3	2-Butanone	U	0.050	mg/L	0.015	0.050
71-43-2	Benzene	U	0.010	mg/L	0.003	0.010
56-23-5	Carbon tetrachloride	U	0.010	mg/L	0.003	0.010
108-90-7	Chlorobenzene	U	0.010	mg/L	0.003	0.010
67-66-3	Chloroform	U	0.010	mg/L	0.003	0.010
127-18-4	Tetrachloroethylene	U	0.010	mg/L	0.003	0.010
79-01-6	Trichloroethylene	U	0.010	mg/L	0.003	0.010
75-01-4	Vinyl chloride	U	0.010	mg/L	0.003	0.010

METALS
−1−
INORGANICS ANALYSIS DATA PACKAGE

SDG No: 366036 **METHOD TYPE:** SW846

SAMPLE ID: 366036001 **CLIENT ID:** Soil IDW

CONTRACT: LEID00200

MATRIX: TCLP **DATE RECEIVED** 29−JAN−15 **LEVEL:** Low **%SOLIDS:**

CAS No	Analyte	Result	Units	C	Qual	M*	MDL	DF	Inst ID	Analytical Run
7440−38−2	Arsenic	0.05	mg/L	U		P	0.05	1	OPTIMA5	020215−1
7440−39−3	Barium	0.31	mg/L			P	0.01	1	OPTIMA5	020215−1
7440−43−9	Cadmium	0.01	mg/L	U		P	0.01	1	OPTIMA5	020215−1
7440−47−3	Chromium	0.01	mg/L	U		P	0.01	1	OPTIMA5	020215−1
7439−92−1	Lead	0.0587	mg/L	B		P	0.033	1	OPTIMA5	020215−1
7439−97−6	Mercury	0.00067	mg/L	U		AV	0.00067	1	HG4	020215W2−2
7782−49−2	Selenium	0.06	mg/L	U		P	0.06	1	OPTIMA5	020215−1
7440−22−4	Silver	0.01	mg/L	U		P	0.01	1	OPTIMA5	020215−1

***Analytical Methods:**

P **SW846 3010A/6010C**
AV **SW846 7470A**

APPENDIX C

WASTE MANIFEST

#26419 (2)

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: GA9 210 020 872
2. Page 1 of: 1
3. Emergency Response Phone: (800) 275-6629
4. Waste Tracking Number: 076931

5. Generator's Name and Mailing Address: DWP ENVIRONMENTAL OFFICE
1550 FRANK COCHRAN DRIVE
BLDG 1137
FORT STEWART, GA 31314
Generator's Phone: (865) 607-8267

Generator's Site Address (if different than mailing address): DWP ENVIRONMENTAL OFFICE-HUNTER ARMY AIR

6. Transporter 1 Company Name: EQ INDUSTRIAL SERVICES
U.S. EPA ID Number: MIK 435 642 742

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address: EQIS ATLANTA TRANSFER & PROCESSING
5600 FULTON INDUSTRIAL BLVD,SW
ATLANTA, GA 30336
Facility's Phone: (404) 494-3520
U.S. EPA ID Number: GAR 000 039 776

GENERATOR

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
1.	NON-HAZARDOUS, NON DOT REGULATED MATERIAL		DM	1200	P
2.					
3.					
4.					

13. Special Handling Instructions and Additional Information
1. B15159EQATL / IDW SOIL

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Generator's/Offeror's Printed/Typed Name: Migeana D. Stevenson
Signature:
Month: 3 Day: 4 Year: 15

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Tyndell Moreland
Signature: Tyndell Moreland
Month: 3 Day: 4 Year: 15
Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator) U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator) Month: Day: Year:

NONE

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in item 17a
Printed/Typed Name: JASON SMITH
Signature:
Month: 03 Day: 06 Year: 15

169-BLC-I 6 Rev. 8/06

DESIGNATED FACILITY TO GENERATOR

APPENDIX D

UNDERGROUND INJECTION CONTROL PERMIT REQUESTS AND APPROVALS

Kovalchik, Jill M.

From: Stevenson, Algeana L CIV USARMY IMCOM ATLANTIC (US) <algeana.l.stevenson.civ@mail.mil>
Sent: Thursday, October 09, 2014 3:36 PM
To: Stoll, Patricia A.; Kovalchik, Jill M.; Brian Odom (SES)
Cc: Kiefer, Dale F CTR USARMY IMCOM ATLANTIC (US); Vergara, Ana del R SAS; Zsolt Haverland
Subject: Approval UIC Application for HAA-09R2, HAAF, Georgia (UNCLASSIFIED)

Importance: High

Classification: UNCLASSIFIED
Caveats: NONE

Please see Bijan's approval of the permit for only 90-days in his email correspondence below. Also, note that in the event we require additional time we will be required to submit a full permit application to continue injection beyond this (i.e. 90-days)

Patty,
Did SAIC install the power box in which the lines were damaged? As noted in one of my previous emails. Canoochee has removed the meter and they need the repairs done before they'll re-energize the meter. If this is not an Installation power box there may be some additional logistical issues.

Algeana L. Stevenson
Remediation Section Leader/Chem. Eng.
DPW Prevention and Compliance Branch
1550 Veterans Parkway, Bldg. # 1137
Ft. Stewart, GA 31314-4927
☎ Work: (912) 315-5144
☎ Cell: (912) 210-2950
☎ Fax: (912) 315-5148
"ROCK"
Resources Optimize Compliance Keep improving

-----Original Message-----
From: Rahbar, Bijan [mailto:Bijan.Rahbar@dnr.state.ga.us]
Sent: Thursday, October 09, 2014 2:50 PM
To: Stevenson, Algeana L CIV USARMY IMCOM ATLANTIC (US)
Subject: RE: UIC Application for HAA-09R2, HAAF, Georgia (UNCLASSIFIED)

Algeana,
Please note that Pilot test notifications are only good for 90 days. Under rare circumstances we extend the pilot tests for another 90 days. Those circumstances need to be explained and most people request for the extension when they could not obtain enough data. I'll be ok with your notification this time but please submit a full permit application if you needed to continue injection beyond this. Thanks, Bijan

-----Original Message-----
From: Stevenson, Algeana L CIV USARMY IMCOM ATLANTIC (US)
[mailto:algeana.l.stevenson.civ@mail.mil]
Sent: Thursday, October 09, 2014 1:31 PM
To: Rahbar, Bijan; Kiefer, Dale F CTR USARMY IMCOM ATLANTIC (US)
Cc: Stoll, Patricia A.; Brian Odom (SES); Vergara, Ana del R SAS; Zsolt Haverland
Subject: RE: UIC Application for HAA-09R2, HAAF, Georgia (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Bijan,
This is actually a request for the continuation of a Pilot Study in which the first phase of this study was conducted in 2011. I've attached to this email the original pilot study request along with an email denoting your previous approval. If possible we're looking to restart the pilot study. I've also attached the Addendum to the Work Plan for your review as well.

Thanks Again

Algeana L. Stevenson
Remediation Section Leader/Chem. Eng.
DPW Prevention and Compliance Branch
1550 Veterans Parkway, Bldg. # 1137
Ft. Stewart, GA 31314-4927
☎ Work: (912) 315-5144
☎ Cell: (912) 210-2950
☎ Fax: (912) 315-5148
"ROCK"
Resources Optimize Compliance Keep improving

or the employee or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution, forwarding or copying of this communication is strictly prohibited. If you have received this communication in error, please notify the sender immediately by email, and delete the original message immediately. Thank you.

-----Original Message-----
From: Rahbar, Bijan [mailto:Bijan.Rahbar@dnr.state.ga.us]
Sent: Thursday, October 09, 2014 12:21 PM
To: Kiefer, Dale F CTR USARMY IMCOM ATLANTIC (US)
Cc: Stevenson, Algeana L CIV USARMY IMCOM ATLANTIC (US)
Subject: RE: UIC Application for HAA-09R2, HAAF, Georgia (UNCLASSIFIED)

Mr. Keifer,

The attached form was pilot test notification and not a UIC permit application. Is this the first notification for this site?

Our address is:

Watershed Protection Branch

2 MLK Jr. Drive.

East Tower

Suite 1152

Atlanta, GA 30334

Thanks, Bijan

From: Kiefer, Dale F CTR USARMY IMCOM ATLANTIC (US) [mailto:dale.f.kiefer.ctr@mail.mil]
Sent: Thursday, October 09, 2014 10:53 AM
To: Rahbar, Bijan
Cc: Stevenson, Algeana L CIV USARMY IMCOM ATLANTIC (US)
Subject: UIC Application for HAA-09R2, HAAF, Georgia (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Mr. Rahbar,

I left a telephone message for you, but you do not have to return my call if you receive this email. I attached a signed transmittal letter from Fort Stewart and a UIC Application Permit for HAA-09R2 that has a prior UIC approved from your office. The site has an approved prior Work Plan from Mr. Guentert. However, we are sending Mr. Guentert an Addendum #29 to the Work Plan (Part A/Part B) and will provide you with his approval. I understand that your office possibly moved within the past year. Would please verify your current mailing address so I can send you the hard copy of the attachment ? if it is not correct in the attached letter? I will correct the office mailing address (if necessary) in future correspondence. Thanks and have a good day.

Dale F. Kiefer, P.E.

CONTRACTOR, ERG, L.L.C.

Environmental Services

Phone: 912-767-4629 / Fax: 912-767-1724

email: dale.f.kiefer.ctr@mail.mil

"ROCK" - Resources, Optimize, Compliance, Keep Improving

Classification: UNCLASSIFIED
Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

1.0 Address	Facility	Operator
1.1 Name	**Hunter Army Air Field Bulk Fuel Facility**	**United States Army**
1.2 Street Address	**Building 7009, Perimeter Road**	**Mr. Thomas Fry**
1.3 City, State	**Hunter Army Air Field, Savannah, Georgia**	**Chief Environmental Division**
1.4 ZIP Code	**31405**	
1.5 Telephone	**(912) 767-2010**	
2.0 Location:	**Latitude: 32° 01' 45"**	**Longitude: 81° 08' 40"**

3.0 What is the contaminant in the Ground Water? **Free product (LNAPL)**
4.0 Georgia Licensed Water Well Contractor or Bonded Driller: **N/A – wells will be hand-augered under the supervision of a P.G. (see 5.0)**
5.0 Professional Engineer or Geologist: **Patricia Stoll, P.E. and Robert Gelinas, P.G.**
6.0 Well Data Table

	Injection Wells	Monitoring Wells
6.1 Number Wells	**Six (6) – proposed**	**One (1) extraction well – existing well MW-E5**
6.2 Well Depth(s)	**approx. 6-10 ft bgs**	**14 ft bgs**
6.3 Well Diameter	**1"**	**2"**
6.4 Volume in/out	**In – approx. 150 gal surfactant and approx. 4,250 gal potable water (solution & chase water)**	**Out - approx. 2.5 times the injected volume - 11,000 gal**
6.5 Sampling freq.	**Not applicable**	**Bi-weekly**

7.0 Responsible EPD Associate for site: **Jim Guentert of the Solid Waste Program**
8.0 Date injection started: **November 1, 2014 (earliest anticipated start date)**
8.1 Date* injection stopped: **3 months maximum after start; extraction continues for up to 6 months total**
8.2 Reason Injection Stopped? **Completion of pilot study**
8.3 Date these injection wells were logged in to the UIC Class V Well inventory and file: **Not applicable**
9.0 UIC Class V Well Inventory Number: **Not applicable**
10.0 UST/HWMB CAP tracking number: **Facility ID #9-025113*2**
11.0 Pending UIC Class V Permit Number: **Not applicable**

*Note: This pilot test well form is valid only for 90 days from the start of injection.

**Submit this form to:
Georgia Environmental Protection Division,
Regulatory Support Program
UIC Unit
Suite 1062 East Tower
2 M.L. King, Jr. Dr.
Atlanta, Georgia, 30334

Jill M. Kovalchik

From: Stoll, Patty
Sent: Wednesday, September 21, 2011 3:53 PM
To: Kovalchik, Jill M.
Subject: FW: Hunter Army Airfield Temporary UIC Permit for Bulk FuelFacility

Patty Stoll | SAIC
Project Manager | Energy, Engineering & Infrastructure Business Unit (E2I)
phone: 865.481.8792 | fax 865.482.7257
mobile: 865.556.9421 | email: patricia.a.stoll@saic.com

-----Original Message-----
From: Bijan Rahbar [mailto:Bijan.Rahbar@dnr.state.ga.us]
Sent: Tuesday, July 26, 2011 11:49 AM
To: Algeana L CIV US USA Stevenson
Cc: Stoll, Patty
Subject: Re: Hunter Army Airfield Temporary UIC Permit for Bulk FuelFacility

I reviewed the attached pilot test notification form and the approval letter from the solid waste program. We have no objections to the notification and you may begin the field activities. Please note that 90-day approval window starts from the date that injection begins.
Thanks, Bijan

>>> "Stevenson, Algeana L CIV US USA" <algeana.stevenson@us.army.mil> 7/26/2011 11:22 am >>>
Mr. Rahbar,
Attached is an electronic copy of a request for a temporary UIC permit at the Bulk Fuel Facility Release 2 area located on Hunter Army Airfield.

A hard copy is being forwarded via certified mail. I've also, attached the approval letter from the GA EPD Solid Waste Management Program of the proposed Work Plan. Patty Stoll from SAIC the contractor for this site asked me to forward this to you per your conversation authorizing the receipt of an electronic copy.

Algeana L. Stevenson
Remediation Section Leader
DPW Prevention and Compliance Branch
1550 Frank Cochran Drive, Bldg. # 1137
Ft. Stewart, GA 31314-4927
* Work: (912) 315-5144
* Cell: (912) 210-2950
* Fax: (912) 315-5148
"ROCK"
Resources Optimize Compliance Keep improving

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, US ARMY GARRISON, FORT STEWART/HUNTER army AIRFIELD
DIRECTORATE OF PUBLIC WORKS
1587 FRANK COCHRAN DRIVE
FORT STEWART. GEORGIA 31314-5048

REPLY TO
ATTENTION OF

Office of the Directorate

July 26, 2011

CERTIFIED MAIL
7010 2780 0001 4428 1913

Georgia Department of Natural Resources
Environmental Protection Division
Regulatory Support Program
Watershed Protection Branch, Room 400
Attn: Mr. Bijan Rahbar, PhD
19 Martin Luther King Jr. Dr., S.W.
Atlanta, Georgia 30334

Dear Mr. Rahbar:

Fort Stewart is pleased to submit to the Georgia Environmental Protection Division (GA EPD) the temporary permit request for the Injection Well Operating Permit Application, Facility ID#9-025113*2, Hunter Army Airfield, Savannah, Georgia, for your review and approval.

In accordance with the Federal Code of Regulations, Section 270.11(d), the following certification is provided by the Installation:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions or comments please contact Ms. Algeana Stevenson at (912) 315-5144 or Ms. Tressa Rutland, Directorate of Public Works, Environmental Division, Prevention and Compliance Branch at (912) 767-2010.

Sincerely,

Tressa M Rutland

Robert R. Baumgardt
Director, Public Works

Enclosure

1.0 Address FACILITY: OPERATOR:
1.1 Name **Hunter Army Air Field Bulk Fuel Facility** **United States Army**
1.2 Street Address **Building 7009, Perimeter Road** **Mr. Thomas Fry**
1.3 City, State **Hunter Army Air Field, Savannah, GA** **Chief Environmental Division**
1.4 ZIP CODE **31405**
1.5 Telephone Num. **(912) 767-2010**

2.0 LOCATION: Latitude: **32° 01' 45" (approximate center of site)**
Longitude: **81° 08' 40" (approximate center of site)**

3.0 What is the contaminant in the Ground Water? **Free product (LNAPL)**

4.0 Georgia Licensed Water Well Contractor or Bonded Driller: **N/A, wells will be hand-augered under supervision of a Georgia P.G.**

5.0 Professional Engineer or Geologist: **Patricia Stoll, P.E. and Wayne Parker, P.G.**

6.0 Well Data Table

	Injection Wells	Monitoring Wells
6.1 Number Wells	**Nine (9) – proposed**	**Two (2) extraction wells – existing wells MW-E1 and MW-E5**
6.2 Well Depth(s)	**approx. 6 ft bgs**	**14 ft bgs**
6.3 Well Diameter	**1-inch**	**2-inch**
6.4 Air volume in/out	**IN: 2,000 gal of surfactant (for all 9 wells) and a maximum of 2,800 gal of water per day (for all 9 wells)**	**OUT: Maximum 7,800 gal per day (both wells)**
6.5 Sampling freq	**Not Applicable**	**Bi-weekly**

7.0 Responsible EPD Associate for site: **Jim Guentert of the Solid Waste Program**

8.0 Date injection started: **August 3, 2011 (anticipated)**
8.1 Date* injection stopped: **Surfactant on or before September 3, 2011 (anticipated); Potable water: at completion of Pilot Study (estimated at 6 months)**
8.2 Reason Injection Stopped? **Completion of pilot study**
8.3 Date these injection wells were logged in to the UIC Class V.Well Inventory and file: **Not Applicable**

9.0 UIC Class V Well Inventory Number: **Not Applicable**
10.0 UST/HWMB CAP tracking number: **Facility ID #9-025113*2**
11.0 Pending UIC Class V Permit Number: **Not Applicable**

*Note: This pilot test well form is only valid for 90 days from the start of injection.
**Submit this form to:
Georgia Environmental Protection Division
Regulatory Support Program
UIC Unit
Suite 1062 East Tower
2 M.L.King Jr. Dr.
Atlanta, Georgia, 30334

Bijan Rahbar

From: McGowan, Jimmie M CIV US USA IMCOM [Jimmie.McGowanjr@us.army.mil]
Sent: Tuesday, November 08, 2011 8:32 AM
To: Bijan Rahbar
Cc: Stoll, Patty; Stevenson, Algeana L CIV US USA; Kiefer, Dale F CTR US USA FORSCOM
Subject: RE: Hunter Army Airfield Temporary UIC Permit for Bulk FuelFacility (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

Mr. Rahbar,

Fort Stewart is respectfully requesting an additional 90-day extension to the Bulk Fuel Facility (HAA-09 Release #2) Underground Injection Control, Pilot Test Injection Well Notification Permit, located on Hunter Army Airfield. At your earliest convenience, could you please respond with your concurrence to the request of extending the permit for this location. Also, if you need an additional transmittal letter, from the Installation requesting this action, please let me know, and I will assure that one will be routed for approval.

If you have any questions, comments, or concerns, please contact myself or Ms. Algeana Stevenson for further clarification.

Highest Regards,

Jimmie McGowan

Remediation/Restoration and Compliance Division
Versar Inc.
Environmental Division
Directorate of Public Works
(912)-767-2202 (o)
(912)-228-7227 (c)
150*2470*136 (d.c)
(912)-614-5400 (c)

ROCK
"Resources Optimize Compliance Keep Improving"